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The Effect of Hypnobirthing on Anxiety Levels in Maternal Women at Keputih Health Center Surabaya

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A B S T R A C T

Labor is commonly accompanied by anxiety, which may weaken uterine contractions and slow cervical dilation. Non-pharmacological approaches such as hypnobirthing have been proposed to manage this anxiety, but evidence from Indonesian primary care settings remains limited. To determine the effect of hypnobirthing on anxiety levels among women in labor at Keputih Health Center, Surabaya. This quantitative study used a quasi-experimental one-group pretest-posttest design. Using purposive sampling, 32 of 35 laboring mothers meeting the inclusion criteria were enrolled in July 2024. Anxiety was measured with the Hamilton Anxiety Rating Scale (HARS) before and after a 15-minute hypnobirthing session delivered according to a standard operating procedure. Data were analyzed with the Wilcoxon signed-rank test ($\alpha = 0.05$). Before the intervention, almost all respondents (87.50%) experienced severe anxiety; afterward, most (68.75%) reported no anxiety and the remainder (31.25%) reported mild anxiety ($p < 0.001$). Hypnobirthing was associated with a significant reduction in anxiety levels among laboring mothers at Keputih Health Center, Surabaya, supporting its consideration as a complementary, non-pharmacological option in intrapartum care, pending confirmation in controlled trials.

INTRODUCTION

Childbirth is a physiological process experienced by nearly every woman, yet it is frequently accompanied by anxiety arising from stress responses and labor pain. Labor pain itself results from a decline in progesterone and estrogen alongside a rise in oxytocin, which together intensify contractions and can trigger discomfort and anxiety (Sulis, 2019). Anxiety is one of the principal factors influencing the course of labor; when unmanaged, it often contributes to prolonged labor through poor cervical dilation, which in turn may compromise fetal well-being.

According to Riskesdas 2020, maternal anxiety during labor is linked to both the Maternal Mortality Rate (MMR) and the Infant Mortality Rate (IMR). The World Health Organization (2020) estimated that 8–10% of women experience anxiety during pregnancy, rising to around 12% as childbirth approaches. National data from the Indonesian Ministry of Health in the same year put the prevalence of anxiety among laboring mothers at approximately 48.7%, while Zainiyah and Susanti (2020) reported that pregnant women in East Java experienced very severe anxiety (31.4%) and severe anxiety (12.9%) at similarly high rates. A preliminary study at Keputih Health Center, Surabaya, in December 2023 found that 10 of 21 laboring mothers (about 48%) experienced anxiety during delivery, suggesting the problem is as prevalent locally as it is nationally.

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Anxiety in laboring mothers is an emotional state marked by negative feelings and tension, shaped by internal factors (age, stressors, maturity, education, coping style, physical condition, personality, social support) and external factors (perceived threats to self-integrity and to the self-system). Sustained anxiety activates the hypothalamus to release excess cortisol, which raises heart rate, pulse, and respiration; the resulting fatigue, muscle tension, and loss of strength can weaken uterine contractions, slow cervical dilation, and hinder the smooth progression of labor.

Both pharmacological and non-pharmacological approaches are used to manage anxiety in labor. Pharmacological management typically relies on anti-anxiety medication, while non-pharmacological options include distraction, spiritual, humor, and relaxation therapies, of which hypnobirthing is one example. Hypnobirthing combines muscle relaxation, facial relaxation, breathing relaxation, and mental relaxation through positive affirmation (Sholihah, 2018), helping the mother direct her thoughts, relax her body, and regulate her breathing during labor. In this relaxed state, the pituitary gland increases the release of oxytocin and endorphins while suppressing cortisol, the hormone most closely tied to stress and anxiety.

Elevated oxytocin and endorphins relax the mother's body and ease feelings of stress, and a calmer mother generally experiences a smoother labor. Conversely, unmanaged anxiety can weaken contractions and reduce pushing effort, delaying labor or contributing to prolonged labor (Zamriati, Hutagaol, & Wowiling, 2019), with possible consequences for the fetus including infection, injury, asphyxia, or death (Kusumahati, 2010).

Contemporary evidence continues to support hypnosis-based methods for reducing anxiety and fear surrounding childbirth. In a meta-integration of qualitative and quantitative studies, Gueguen, Huas, Orri, and Falissard (2021) found that hypnosis-based preparation was associated with a more positive birth experience and no additional risk to mother or baby. A randomized controlled trial by Buran and Aksu (2022) reported that hypnobirthing training lowered fear of childbirth and labor pain scores, shortened labor, and increased rates of vaginal birth compared with routine care. A systematic review and meta-analysis by Arab et al. (2021) similarly found that hypnosis-based interventions reduced the use of pain-relief medication (OR = 0.21) and increased the likelihood of unmedicated vaginal birth (OR = 3.06) without adversely affecting neonatal Apgar scores. More recently, an overview of systematic reviews and meta-analyses by Alizadeh-Dibazari, Maghalian, and Mirghafourvand (2024) concluded that psychological and educational interventions, including hypnosis-based preparation, can meaningfully reduce fear of childbirth, although the certainty of evidence for individual interventions varies.

Much of this evidence, however, comes from randomized trials conducted in hospitals or specialized clinics outside Indonesia, where facilitators, session length, and follow-up periods differ considerably from routine primary care. Comparatively few studies have examined hypnobirthing delivered directly by

midwives within an Indonesian Puskesmas, the first point of contact for most low-risk deliveries in the country and a setting with more limited time and staffing than hospital-based trials. This gap is the central justification for the present study: rather than testing a lengthy antenatal hypnobirthing course, it evaluates a brief, midwife-delivered, in-labor hypnobirthing session that could realistically be implemented within existing Puskesmas services. Based on this background, the researchers evaluated the effect of a single 15-minute hypnobirthing session on anxiety levels among women in the physiological first stage of labor at Keputih Health Center, Surabaya, with anxiety assessed using the Hamilton Anxiety Rating Scale (HARS) immediately before and after the intervention.

METHOD

This quantitative study used a quasi-experimental design with a one-group pretest (before the intervention) and one-group posttest (after the intervention), conducted in July 2024 at Keputih Health Center, Surabaya. Because the design did not include a control group, causal inference is limited; this constraint, along with related threats to internal validity, is addressed further under Limitations.

The population comprised all 35 laboring mothers at Keputih Health Center, Surabaya. The sample size was calculated using Slovin's formula with a 5% margin of error (Riyanto & Hatmawan, 2020): $n = N / (1 + N\ e^2) = 35 / (1 + 35 \times 0.05^2) = 35 / 1.0875 \approx 32.18$, rounded to 32 respondents. Respondents were recruited using non-probability purposive sampling. Inclusion criteria were: (1) willingness to participate as a respondent, and (2) being in the physiological first stage of labor and experiencing anxiety. Mothers were excluded if they were taking anti-anxiety or antidepressant medication, or if their first stage of labor was pathological. The independent variable was the administration of hypnobirthing; the dependent variable was the laboring mother's anxiety level.

Data were collected following a fixed sequence: (a) the researcher identified eligible respondents against the inclusion criteria; (b) the purpose, procedure, and expected effects of hypnobirthing were explained to each respondent; (c) written informed consent was obtained; (d) each respondent completed the HARS questionnaire as a pretest; (e) the researcher delivered hypnobirthing according to the standard operating procedure (SOP)—combining muscle relaxation, facial relaxation, breathing relaxation, and mental relaxation through positive affirmation—individually, for 15 minutes, to mothers in the physiological first stage of labor who were experiencing anxiety; (f) each respondent completed the HARS questionnaire again as a posttest immediately afterward; and (g) data were processed and analyzed. In practice, the session lasted closer to 20 minutes for several respondents whose contractions had already become well established by the time the intervention began; this deviation from the intended 15-minute protocol is discussed further under Limitations.

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Anxiety was measured using the Hamilton Anxiety Rating Scale (HARS), a 14-item instrument assessing both psychic and somatic symptoms of anxiety, with scores classified as no anxiety (<14), mild anxiety (14–20), moderate anxiety (21–27), severe anxiety (28–41), and very severe anxiety (42–56). Item-level construct validity of the HARS, based on corrected item-total correlation, has been reported as positive and acceptable, with a Cronbach's alpha of 0.793 (Kautsar, Gustopo, & Achmadi, 2015). The Indonesian-language version used in this study has separately been validated by Ramdan (2019), who reported item correlations of 0.529–0.727 and a Cronbach's alpha of 0.756, supporting its reliability for assessing anxiety in Indonesian clinical populations. Fidelity to the hypnobirthing SOP was recorded dichotomously (performed according to SOP or not) using the SOP checklist as the second instrument.

Data were analyzed using the Wilcoxon Signed-Rank Test in SPSS, with statistical significance set at $p < 0.05$. Because the pre- and post-intervention anxiety categories did not overlap—all pre-intervention scores fell in the moderate-to-severe range, while all post-intervention scores fell in the none-to-mild range—every respondent's HARS category necessarily decreased following the intervention. This all-positive pattern of paired differences allows an approximate, lower-bound estimate of the Wilcoxon Z statistic for $n = 32$ ($Z \approx 4.94$), corresponding to an effect size of $r \approx 0.87$, which would indicate a very large effect. Because the exact continuous HARS scores were not retained in the dataset analyzed here, this estimate should be read as approximate rather than exact; future studies using this protocol are encouraged to report raw paired scores together with the exact Z statistic and 95% confidence interval so that effect size can be calculated directly.

This study received ethical clearance from the Health Research Ethics Committee of Universitas Nahdlatul Ulama Surabaya (certificate number 0297/EC/KEPK/UNUSA/2024). Before data collection, the researcher explained the purpose, procedure, and potential effects of hypnobirthing and provided each prospective respondent with an information and consent sheet; only mothers who read, understood, and voluntarily signed the consent form were enrolled, and no respondent who declined was coerced to participate. Anonymity was maintained by identifying respondents with initials and code numbers rather than names on questionnaires, and no information that could identify an individual respondent is reported in this article. Confidentiality was maintained by storing all data securely and restricting access to the research team; source data will be destroyed after the study period in line with institutional procedure.

RESULT

General Data

General characteristics of respondents covered age, education, occupation, parity, and family presence during labor.

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Table 1. Frequency Distribution of Respondents by Age at Keputih Health Center, Surabaya, July 2024

Age (years)	Frequency (n)	Percentage (%)
17–25	5	15.63
26–35	26	81.25
36–45	1	3.12
Total	32	100

Source: Primary Data, 2024

Table 1 shows that of 32 respondents, almost all (81.25%) were aged 26–35 years.

Table 2. Frequency Distribution of Respondents by Education Level at Keputih Health Center, Surabaya, July 2024

Education	Frequency (n)	Percentage (%)
Primary	3	9.38
Secondary	28	87.50
Higher	1	3.12
Total	32	100

Source: Primary Data, 2024

Table 2 shows that of 32 respondents, almost all (87.50%) had completed secondary education.

Table 3. Frequency Distribution of Respondents by Occupational Status at Keputih Health Center, Surabaya, July 2024

Occupation	Frequency (n)	Percentage (%)
Employed	3	9.37
Unemployed	29	90.63
Total	32	100

Source: Primary Data, 2024

Table 3 shows that of 32 respondents, almost all (90.63%) were unemployed.

Table 4. Frequency Distribution of Respondents by Parity at Keputih Health Center, Surabaya, July 2024

Parity	Frequency (n)	Percentage (%)
Primigravida	20	62.50
Multigravida	12	37.50
Grande multipara	0	0
Total	32	100

Source: Primary Data, 2024

Table 4 shows that of 32 respondents, most (62.50%) were primigravida.

Table 5. Frequency Distribution of Respondents by Family Presence during Labor at Keputih Health Center, Surabaya, July 2024

Family Presence	Frequency (n)	Percentage (%)
Present	32	100
Not present	0	0
Total	32	100

Source: Primary Data, 2024

Table 5 shows that all respondents (100%) were accompanied by a family member during labor.

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Special Data

Table 6. Frequency Distribution of Anxiety Levels before the Hypnobirthing Intervention at Keputih Health Center, Surabaya, July 2024

Anxiety Level	Frequency (n)	Percentage (%)
No anxiety	0	0
Mild anxiety	0	0
Moderate anxiety	4	12.50
Severe anxiety	28	87.50
Very severe anxiety	0	0
Total	32	100

Source: Primary Data, 2024

Table 6 shows that before the hypnobirthing intervention, almost all respondents (87.50%) experienced severe anxiety, with the median respondent falling in the severe-anxiety category (HARS score 28–41).

Table 7. Frequency Distribution of Anxiety Levels after the Hypnobirthing Intervention at Keputih Health Center, Surabaya, July 2024

Anxiety Level	Frequency (n)	Percentage (%)
No anxiety	22	68.75
Mild anxiety	10	31.25
Moderate anxiety	0	0
Severe anxiety	0	0
Very severe anxiety	0	0
Total	32	100

Source: Primary Data, 2024

Table 7 shows that after the hypnobirthing intervention, most respondents (68.75%) reported no anxiety, with the median respondent falling in the no-anxiety category (HARS score <14).

Table 8. The Effect of Hypnobirthing on Anxiety Levels among Women in Labor at Keputih Health Center, Surabaya, July 2024

Intervention	No Anxiety n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Very Severe n (%)	Total n (%)
Before	0 (0)	0 (0)	4 (12.50)	28 (87.50)	0 (0)	32 (100)
After	22 (68.75)	10 (31.25)	0 (0)	0 (0)	0 (0)	32 (100)

Wilcoxon Signed-Rank Test: $p < 0.001$. Source: Primary Data, 2024

Table 8 shows that, of 32 respondents, almost all (87.50%) had severe anxiety before the hypnobirthing intervention, whereas after the intervention most (68.75%) reported no anxiety and the remainder (31.25%) reported mild anxiety. The Wilcoxon Signed-Rank Test yielded $p < 0.001$, indicating a statistically significant reduction in anxiety following hypnobirthing. Because pre- and post-intervention categories did not overlap for any respondent, all 32 paired differences were in the direction of improvement, consistent with the large approximate effect size ($r \approx 0.87$) described in the Method section.

DISCUSSION

Anxiety Levels before the Hypnobirthing Intervention

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Table 6 shows that before the hypnobirthing intervention, almost all respondents (87.50%) experienced severe anxiety. This pattern likely reflected respondents' fears for their newborn's safety, difficulty pushing effectively, concern about possible complications, contraction-related pain, and the physical and psychological changes accompanying labor. This is consistent with Indriyanti's (2015) view that hormonal changes supporting fetal growth also produce physical and psychological shifts that act as stressors for laboring mothers, and with Sarkhel's (2009) observation that laboring mothers commonly worry about their baby's condition at birth and about the pain they are about to endure.

Anxiety in laboring mothers is shaped by several factors, including age, education, occupation, parity, and social support (Muliani, 2022). Table 1 shows that most respondents (81.25%) were aged 26–35 years, a period of early adulthood in which mothers are generally better able to process and cope with anxiety and tend to be more emotionally stable. This is consistent with Ritonga (2016), who described early adulthood (26–35 years) as a dynamic stage for managing physical, cognitive, and psycho-emotional change toward a more mature personality.

Table 2 shows that almost all respondents (87.50%) had completed secondary education. Education shapes how a person thinks and acts; more highly educated individuals tend to reason more systematically and to build more effective coping strategies. This is consistent with Muliani (2019), who argued that education influences how readily a person absorbs and understands information about pregnancy and childbirth, helping mothers approach delivery with a more mature psychological outlook and a lighter mental burden.

Regarding occupation, Table 3 shows that almost all respondents (90.63%) were unemployed. Mothers who are not employed are occupied mainly with household duties, which may limit their social interaction outside the home. Titisari, Setiani, and Antono (2020) suggested that paid work can distract pregnant women from anxious thoughts, since work demands sustained attention and focus, and Hanifah and Utami (2019) noted that employed pregnant women are more likely to exchange information and experiences with others, which can broaden their understanding of pregnancy and help them feel calmer.

Table 4 shows that most respondents (62.50%) were primigravida. For a primigravida, pregnancy and childbirth are entirely new experiences, which can make labor feel more alarming, whereas anxiety among multigravida mothers is more often tied to specific past experiences. This is consistent with Usman and Maulida (2019) and with Shodiqoh and Fahriani (2018), who reported that primigravida mothers experience higher anxiety than multigravida mothers because they lack prior childbirth experience and have not yet developed practical strategies for coping with labor.

Table 5 shows that all respondents (100%) were accompanied by a family member during labor. Spousal and family support contributes to pregnancy readiness and delivery preparedness—for example, by helping meet nutritional needs and providing psychological encouragement. The physical presence of

family can reinforce a mother's confidence and reduce anxiety around delivery, consistent with Friedman's concept of family support as cited in Zuhrotunida and Yudiharto (2017), which describes an active relationship between the family and its social environment that provides emotional, appraisal, instrumental, and informational support to its members.

Anxiety Levels after the Hypnobirthing Intervention

Table 7 shows that after the hypnobirthing intervention, most respondents (68.75%) reported no anxiety. This is consistent with the idea that hypnobirthing helps anxious laboring mothers build healthier coping responses, allowing them to relax and accept the delivery process with less resistance. Widaryanti and Riska (2019) describe several benefits of hypnobirthing, including a greater sense of comfort, safety, and deep relaxation before labor, better control over the sensation of pain during uterine contractions, reinforced inner calm, increased endorphin levels to ease contraction pain, and reduced fear, tension, and panic.

Table 8 shows that anxiety fell from the moderate-to-severe range before the intervention to the none-to-mild range afterward for every respondent, supporting a meaningful effect of hypnobirthing on anxiety levels among laboring mothers in this sample. Physiologically, a calmer, more settled mother is more likely to have her pituitary gland release oxytocin and endorphins, which in turn suppresses cortisol, the hormone associated with stress and anxiety; rising oxytocin and endorphin levels help relax the body and ease feelings of stress. Psychologically, these same hormones are thought to foster feelings of warmth and attachment between mother and fetus, which may further reduce fear during labor.

These findings align with several recent studies on hypnobirthing and labor anxiety. Agestin (2023), using the Wilcoxon test in a similar Indonesian primary-care context, reported a p-value of 0.001 for the effect of hypnobirthing on anxiety during the active phase of the first stage of labor, concluding that mothers who received the intervention felt more comfortable and settled during delivery. Nurbaya and Munawaroh (2023) likewise found that hypnobirthing relaxation had a significant effect on anxiety among primigravida mothers preparing for labor. Internationally, a quasi-experimental study by Zartasha, Naz, Khatoon, Karim, Atiq, and Khattak (2024) conducted in a tertiary hospital in Islamabad reported a very similar pattern to the present study: 87% of participants had high anxiety at baseline, falling to 33% after a hypnobirthing intervention ($p < 0.001$). A randomized controlled trial by Buran and Aksu (2022) found that hypnobirthing training reduced fear of childbirth and labor pain scores and increased vaginal delivery rates compared with routine care, and Mahmoud, Mahmoud, Gohar, Moustafa, and Elkhatib (2024) reported reduced anxiety and pain intensity together with higher birth satisfaction among parturient women who received hypnobirthing preparation in Egypt. Taken together with the broader synthesis offered by Alizadeh-Dibazari, Maghalian, and Mirghafourvand (2024) and the meta-analytic evidence reported by Arab et al. (2021), this body of work supports hypnobirthing as a plausible, low-risk

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complement to standard intrapartum care, while also underscoring that most of the strongest evidence still comes from controlled trials rather than one-group designs such as the present study.

Confounding Factors

Because this study used a one-group design without a comparison group, the demographic characteristics summarized in Tables 1–5—age, education, occupation, parity, and family presence—could not be statistically controlled and may have contributed to the observed reduction in anxiety alongside, or independently of, the hypnobirthing intervention itself. Most respondents were in early adulthood, had at least a secondary education, and were accompanied by family throughout labor; each of these characteristics has separately been associated with lower anxiety in the literature reviewed above. It is therefore possible that part of the improvement reflected these favorable baseline characteristics rather than the intervention alone. Future studies with a control group and, ideally, stratified or adjusted analyses would help disentangle the specific contribution of hypnobirthing from these co-occurring factors.

Limitations

Several limitations should be considered when interpreting these findings. First, the one-group pretest-posttest design lacks a control group, so the observed reduction in anxiety cannot be attributed to hypnobirthing with certainty; it may partly reflect history (the natural approach of delivery, which can itself change how anxiety is experienced), maturation (psychological adaptation over the course of labor), or a Hawthorne-type effect, in which awareness of being observed and assessed may itself have reduced reported anxiety regardless of the intervention. Second, the sample was small (n = 32), drawn from a single primary care facility, and relatively homogeneous in age, education, and parity, which limits how far the findings can be generalized to other settings. Third, for several respondents the hypnobirthing session extended to approximately 20 minutes rather than the intended 15 minutes because their contractions were already well established, introducing some variability in the intervention actually delivered. Finally, anxiety was assessed only immediately before and after the session using a categorical HARS classification; continuous scores were not retained for this analysis, and no longer-term follow-up was conducted, so it is not known whether the reduction in anxiety was sustained through the remainder of labor and the immediate postpartum period.

CONCLUSION

Before receiving the hypnobirthing intervention, almost all laboring mothers at Keputih Health Center, Surabaya, experienced severe anxiety; afterward, most experienced no anxiety and the remainder experienced only mild anxiety. Hypnobirthing was associated with a statistically significant reduction in anxiety levels ($p < 0.001$) among laboring mothers in this sample. Given the one-group design and the demographic and procedural limitations described above, these results should be interpreted as evidence of

association rather than definitive proof of a causal effect. Midwives at primary care facilities may consider incorporating brief, SOP-guided hypnobirthing sessions as a complementary, non-pharmacological option for supporting laboring mothers, while future research using randomized controlled trials with adequate control groups, larger and more diverse multi-center samples, and reporting of continuous HARS scores is needed to confirm the intervention's independent effect and to establish its effect size with precision.

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Personal Safety Skills Training: a Card Game Method and Its Effect on Knowledge Level and Self-Awareness in Preventing Child Sexual Violence

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A B S T R A C T

Child sexual abuse is a serious issue caused by children's low levels of knowledge and self-awareness in recognizing and reporting unsafe situations. This study aimed to analyze the effect of personal safety skill training using a card-playing method on children's knowledge and self-awareness in preventing sexual abuse. This study employed a pre-experimental one-group pretest–posttest design involving 38 third-grade students of MINU Lumpur Gresik as the total sample. The intervention was delivered through educational card media in three sessions, and the data were analyzed using the Wilcoxon Signed Rank Test with a significance level of 0.05. The results showed that before the intervention, most respondents had a moderate level of knowledge (84.2%) and a low level of self-awareness (65.8%). After the training, the majority of respondents experienced an improvement in knowledge to the good category (94.7%) and self-awareness to the good category (68.4%). The Wilcoxon test results showed a p-value of 0.000 ($p < 0.05$) for both knowledge and self-awareness variables, indicating that personal safety skill training through the card-playing method had a significant effect on improving children's knowledge and self-awareness in preventing sexual abuse. This study concludes that the card-playing method is effective as an interactive educational medium to improve children's ability to recognize, resist, and report. Game-based self-protection education programs need to be integrated into the school curriculum as a sustainable preventive strategy.

INTRODUCTION

Child sexual violence is a pressing global issue with multidimensional and long-term impacts. According to the World Health Organization (2022), it is estimated that up to 1 billion children aged 2–17 years worldwide experience various forms of violence, including sexual violence, within a single year. UNICEF (2024) reinforces this data by reporting that 1 in 5 girls and 1 in 7 boys experience sexual violence before the age of 18. In Indonesia, data from Simfoni-PPA up to mid-2025 recorded 13,845 cases of violence, with sexual violence being the most dominant form (The Jakarta Post, 2025). A similar trend is observed at the regional level in East Java and Gresik Regency, where sexual violence remains the most frequently reported type of violence (Harian Disway, 2025). These high numbers confirm that child sexual violence is a structural problem that has not yet been optimally addressed, particularly in terms of early prevention.

The main issue in the field shows a gap between the high risk of violence and the low level of children's knowledge and self-awareness. A preliminary study at MINU Lumpur Gresik found that most third-grade students were unable to distinguish between safe and unsafe touch and did not have the courage to report inappropriate experiences. Children at primary school age (8–9 years) are in the concrete operational cognitive stage and are highly vulnerable to grooming due to their limited ability for abstract thinking. Previously, self-protection materials have often been considered taboo or delivered in a frightening

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manner, causing children to feel embarrassed and confused when facing threats (Setiawan & Lestari, 2021). Therefore, strengthening knowledge and self-awareness is crucial to equip children with the ability to recognize body boundaries, differentiate types of treatment they experience, and optimize their personal safety skills as a form of self-protection.

Annazhifah et al. (2024) demonstrated that card game-based learning methods are effective in improving knowledge and health behaviors among elementary school students through an interactive approach. In line with this, Azizzah et al. (2024) emphasized that the use of card games as a health education medium significantly improves students' knowledge and attitudes compared to conventional methods. In the context of self-protection, Divayani et al. (2025) found that personal safety skill education significantly improves children's ability to distinguish safe and unsafe touch and understand how to report incidents. In addition, audiovisual media has also been proven by Mareta (2023) to enhance children's ability to prevent sexual violence through the recognize, resist, and report framework. At early childhood levels, Puriastuti et al. (2025) showed that visual educational cards are highly effective in building awareness of violence prevention and positive character development due to their alignment with children's developmental characteristics.

The novelty of this study lies in the use of a card game method as an interactive, tactile, and flexible intervention medium. Unlike audiovisual media or storybooks, card games enable intensive two-way discussions between researchers and children, as well as among children themselves, which is essential for building self-awareness at the concrete operational cognitive stage. This educational card media is specifically designed to simplify abstract concepts of body boundaries into practical, easily understood situations. This study does not only focus on increasing knowledge but also targets self-awareness as a deeper psychological foundation that enables children not only to recognize what is wrong but also to consciously perceive threats and develop an internal drive to act.

Theoretically, self-awareness is a key component of emotional intelligence that includes recognition of body rights and feelings of discomfort as an early warning system. Based on Piaget's cognitive development theory, children aged 8–9 years require physical representations to understand moral concepts and social rules. By integrating play-based learning into safety education through the recognize, resist, and report framework, this study attempts to address the gap in child-friendly and sustainable educational methodologies. Based on this urgency, this study aims to analyze the effect of personal safety skills training using a card game method on children's self-awareness in preventing sexual violence. The findings of this study are expected to serve as a scientific reference for the development of child protection curricula based on positive psychology approaches and active learning methods.

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METHOD

This study employed a descriptive-analytical design with a pre-experimental approach using a one-group pretest–posttest design. The population in this study consisted of all third-grade students of Madrasah Ibtidaiyah Nahdlatul Ulama (MINU) Lumpur Gresik in the 2025–2026 academic year, totaling 38 children. The sampling technique used was total sampling, in which all members of the population (38 children) were included as research respondents.

Data were collected using a questionnaire instrument to measure the dependent variables, namely children's knowledge and self-awareness before and after the intervention. The research instrument had undergone validity and reliability testing to ensure the accuracy of the data obtained. The research procedure began with administering a pre-test to the respondents, followed by the implementation of the independent variable intervention in the form of personal safety skills training using a card game method. The intervention used educational card media designed to be interactive to help children understand body boundaries and unsafe situations. The training was conducted in three sessions, each lasting 30–40 minutes. After the intervention was completed, a post-test using the same instrument was administered to measure changes in the level of self-awareness. The collected data were processed through several stages, including editing, coding, scoring, tabulating, and data entry. To test the research hypothesis, statistical analysis was performed using the Wilcoxon Signed-Rank Test with a significance level of $\alpha = 0.05$. This analysis aimed to determine whether there was a significant difference between pre-test and post-test results after the intervention using the card game method.

RESULT

Characteristics of Respondents

The results of the respondent characteristics data collection are presented in the following table:

Table 1. Characteristics of Respondents

Characteristics	Frequency	Persentage (%)
Gender		
Male	23	60,5
Female	15	39,5
Age		
< 9 Years	1	2,6
= 9 Years	35	92,1
> 9 Years	2	5,3
History of Sexual Violence Education		
Yes	2	5,3
No	36	94,7
Total	38	100

Based on the frequency distribution of respondent characteristics among third-grade students of MINU Lumpur Gresik, the respondents in this study were predominantly male, with 23 children (60.5%), while

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female students accounted for 15 children (39.5%). In terms of age, the majority of respondents were exactly 9 years old, totaling 35 children (92.1%), while 1 child (2.6%) was younger than 9 years old and 2 children (5.3%) were older than 9 years. The most notable finding was related to the history of receiving education on sexual violence prevention, where the majority of respondents, 36 children (94.7%), reported that they had never previously received any education regarding sexual violence prevention. Only a small proportion of respondents, namely 2 children (5.3%), had been previously exposed to such information or education. These findings indicate a high need for safety education interventions in the school setting, as almost all students lack adequate knowledge regarding self-protection from sexual violence.

Knowledge Level in Preventing Sexual Violence Before Personal Safety Skills Training Using the Card Game Method

Table 2. Knowledge Level in Preventing Sexual Violence Before Personal Safety Skills Training Using the Card Game Method

Knowledge Level	Frequency	Persentage (%)
Good	5	13,2
Moderate	32	84,2
Poor	1	2,6
Total	38	100

Table 2 shows that before the personal safety skills training using the card game method was implemented, the respondents' knowledge level regarding sexual violence prevention was predominantly in the moderate category, with 32 students (84.2%). Meanwhile, 5 students (13.2%) were categorized as having good knowledge, and a small proportion, namely 1 student (2.6%), was categorized as having poor knowledge.

Self-Awareness Level in Preventing Sexual Violence Before Personal Safety Skills Training Using the Card Game Method

Table 3. Self-Awareness Level in Preventing Sexual Violence Before Personal Safety Skills Training Using the Card Game Method

Self Awareness Level	Frequency	Persentage (%)
Good	0	0,0
Moderate	13	34.2
Poor	25	65.8
Total	38	100

Table 3 shows that the majority of respondents had a low level of self-awareness in preventing sexual violence before the intervention, with 25 respondents (65.8%). Meanwhile, 13 respondents (34.2%) had a moderate level of self-awareness, and no respondents (0.0%) were categorized as having good self-awareness.

Knowledge Level in Preventing Sexual Violence After Personal Safety Skills Training Using the Card Game Method

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Table 4. Knowledge Level in Preventing Sexual Violence After Personal Safety Skills Training Using the Card Game Method

Knowledge Level	Frequency	Persentage (%)
Good	36	94,7
Moderate	2	5,3
Poor	0	0
Total	38	100

Table 4 shows that after the personal safety skills training using the card game method was implemented, almost all respondents achieved a good level of knowledge, with 36 students (94.7%) in the good category. The number of students in the moderate category decreased significantly to only 2 students (5.3%), and no students (0.0%) remained in the poor category.

Self-Awareness Level in Preventing Sexual Violence After Personal Safety Skills Training Using the Card Game Method

Table 5. Self-Awareness Level in Preventing Sexual Violence After Personal Safety Skills Training Using the Card Game Method

Self Awareness Level	Frequency	Persentage (%)
Good	26	68,4
Moderate	12	31,6
Poor	0	0,0
Total	38	100

Table 5 shows that after the intervention, the majority of respondents had a good level of self-awareness, with 26 respondents (68.4%). Meanwhile, 12 respondents (31.6%) were in the moderate category, and no respondents (0.0%) remained in the poor category.

Analysis of the Effect of Personal Safety Skills Training Using the Card Game Method on Self-Awareness in Preventing Sexual Violence in Children

Table 6. Wilcoxon Signed-Rank Test Results 1 (Post-test vs Pre-test)

Test Statistics[a]	
	Post Test - Pre Test
Z	-5.488[b]
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Table 6 shows that before the intervention, the majority of respondents had a low level of self-awareness, namely 25 children (65.8%), and no respondents (0.0%) were in the good category. However, after the intervention using the card game method, there was a significant improvement, where most respondents achieved a good level of self-awareness, namely 26 children (68.4%), and no respondents (0.0%) remained in the poor category. The statistical test using the Wilcoxon Signed-Rank Test showed a Z value of -5.488 with a significance level of $p = 0.000$ ($\alpha < 0.05$), indicating that there was a significant

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effect of Personal Safety Skills training using the card game method on increasing children's self-awareness in preventing sexual violence at MINU Lumpur Gresik.

Alternative Wilcoxon Analysis of the Effect of Personal Safety Skills Training Using the Card Game Method on Self-Awareness in Preventing Sexual Violence in Children

Table 7. Wilcoxon Signed-Rank Test Results 2 (Post-test vs Pre-test)

Test Statistics[a]	
	Sesudah - Sebelum
Z	-5.596[b]
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test b. Based on negative ranks.	

Table 7 shows similar findings, where before the intervention most respondents had low self-awareness (25 children; 65.8%), and none were in the good category (0.0%). After the intervention, most respondents had good self-awareness (26 children; 68.4%), and none remained in the poor category (0.0%). The Wilcoxon Signed-Rank Test results showed a p-value of 0.000 ($p < 0.05$), indicating that there was a statistically significant effect of Personal Safety Skills training using the card game method on improving children's self-awareness in preventing sexual violence.

DISCUSSION

Knowledge Level in Preventing Sexual Violence Before Personal Safety Skills Training Using the Card Game Method

Based on the results of the study, it was found that before the personal safety skills training using the card game method was implemented, most children had a moderate level of knowledge regarding sexual violence prevention, while a small proportion had a low level of knowledge. These findings indicate that prior to the intervention, students' understanding of sexual violence prevention was still not optimal.

According to Notoatmodjo (2018), a child's level of knowledge is influenced by several factors, such as age, experience, environment, information exposure, and health education received. Knowledge can improve when individuals obtain sufficient information through education or learning experiences. The lack of exposure to information regarding personal safety skills caused children to have limited understanding of forms of sexual violence, self-protection strategies, and appropriate actions when facing dangerous situations.

In the researcher's view, the moderate level of knowledge among respondents before the intervention was due to the fact that sexual violence prevention materials are rarely specifically provided to school-aged children. In addition, children tend to have limited understanding of body boundaries and self-protection

when they have not received age-appropriate education. Therefore, an engaging and child-friendly learning method such as a card game is needed to improve the effectiveness of information delivery.

Self-Awareness in Preventing Sexual Violence Before Personal Safety Skills Training Using the Card Game Method

The study showed that before the intervention, most children had a low level of self-awareness in preventing sexual violence, and none of the children had a good level of self-awareness. These findings indicate that students' awareness in recognizing and preventing sexual violence was still low prior to the intervention.

According to Goleman & Davidson (2022), self-awareness is the ability of individuals to recognize themselves, understand their surroundings, and be aware of potential threats that may endanger them. Self-awareness is a core component of emotional intelligence that enables individuals to understand their feelings, thoughts, and appropriate responses in different situations. In school-aged children, self-awareness is still developing and requires appropriate stimulation and education to help them recognize harmful behaviors, including sexual violence.

In the researcher's opinion, the low level of self-awareness among respondents before the intervention was due to insufficient education regarding self-protection and body boundaries. In addition, elementary school children tend to have high levels of trust toward people around them, making it difficult for them to identify potentially dangerous situations. The lack of training in refusal skills, recognizing inappropriate touch, and seeking help also contributed to the low level of self-awareness.

Knowledge Level in Preventing Sexual Violence After Personal Safety Skills Training Using the Card Game Method

The results showed that after the personal safety skills training using the card game method, almost all respondents achieved a good level of knowledge, and none remained in the poor category. These findings indicate a significant improvement in students' knowledge after the intervention.

According to Notoatmodjo (2018), knowledge is the result of human sensory perception of an object, primarily through sight and hearing. The use of card game media allows students to more easily receive information because it involves visual activities, communication, and active participation during the learning process. In addition, game-based learning can improve children's concentration and memory retention.

In the researcher's view, the success of the card game method in improving students' knowledge was due to its ability to create a fun and non-monotonous learning environment, which increased students' enthusiasm. School-aged children tend to understand material more effectively through play-based activities rather than conventional lecture methods. Through the card game, students were able to understand personal safety skills in a simple and memorable way.

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Self-Awareness in Preventing Sexual Violence After Personal Safety Skills Training Using the Card Game Method

The study found that after the intervention, most children had a good level of self-awareness, and none remained in the poor category. These results indicate an improvement in students' self-awareness after the training.

According to Goleman & Davidson (2022), interactive health education methods can help improve children's awareness of potentially dangerous situations. Daniel Goleman also emphasizes that self-awareness involves recognizing emotions, understanding one's condition, and determining appropriate actions in response to situations. Through personal safety skills training, children are taught to recognize body boundaries, understand unsafe behaviors, and learn how to protect themselves when facing potential sexual violence.

In the researcher's opinion, the card game method is effective in improving self-awareness because it creates an active and enjoyable learning atmosphere. Children are able to understand the material more easily because learning is delivered through games that match their developmental stage. In addition, the use of cards helps students remember key self-protection concepts such as saying "no," avoiding dangerous situations, and seeking help from trusted adults.

Effect of Personal Safety Skills Training Using the Card Game Method on Self-Awareness in Preventing Sexual Violence in Children

The results showed that before the intervention, most respondents had a low level of self-awareness (25 children; 65.8%), and none were in the good category. However, after the intervention, there was a significant improvement, where most respondents achieved a good level of self-awareness (26 children; 68.4%), and none remained in the poor category. The Wilcoxon Signed-Rank Test showed a Z value of -5.488 with a significance level of $p = 0.000$ ($\alpha < 0.05$), indicating a statistically significant effect of personal safety skills training using the card game method on improving children's self-awareness in preventing sexual violence at MINU Lumpur Gresik.

These findings are consistent with theories stating that interactive learning methods can improve children's understanding and awareness of health-related behaviors. According to Goleman & Davidson (2022), self-awareness is the ability to recognize oneself, understand the situation faced, and determine appropriate actions against threats or dangers in the environment. Personal safety skills training helps children recognize body boundaries, understand safe and unsafe touch, and develop the courage to refuse and report inappropriate behavior.

In the researcher's opinion, the increase in self-awareness occurred because the card game method successfully engaged students actively during the learning process. Children were able to understand the material more easily because information was delivered through visual media and play-based activities.

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Repetition through games also helped students remember self-protection strategies and improved their ability to respond to potential threats.

Effect of Personal Safety Skills Training Using the Card Game Method on Self-Awareness in Preventing Sexual Violence in Children

The findings showed that before the intervention, most children had a low level of self-awareness (25 children; 65.8%), and none were in the good category. After the intervention, there was a significant improvement, with most children achieving a good level of self-awareness (26 children; 68.4%), and none remaining in the poor category. The Wilcoxon test results showed a significance value of $p = 0.000$ ($p < 0.05$), indicating a significant effect of the intervention on improving children's self-awareness in preventing sexual violence.

These results are in line with theories stating that health education delivered through active and engaging learning methods can improve children's awareness of self-protective behaviors. According to Goleman & Davidson (2022), self-awareness involves understanding one's condition, recognizing emotions, and identifying appropriate actions in different situations. Through personal safety skills training, children are taught about body ownership, unsafe behaviors, and strategies to protect themselves from sexual violence. In the researcher's opinion, the card game method is effective because it creates a fun and non-threatening learning environment. Elementary school children are more interested in game-based learning than lecture-based methods, making the material easier to understand and retain. In addition, the method encourages active participation, discussion, and practice in recognizing dangerous situations and refusing inappropriate behavior.

CONCLUSION

This study found that card game-based personal safety skills training was associated with significant improvements in children's knowledge and self-awareness regarding sexual violence prevention. Following the intervention, most participants achieved good levels of both knowledge and self-awareness. These findings suggest that an interactive card game may be a promising, child-friendly approach to delivering personal safety education in elementary school settings. Further studies with larger samples, longer follow-up periods, and controlled designs are recommended to confirm the effectiveness and sustainability of this intervention.

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Factors Related to Early Marriage Among Adolescent Girls in Samarinda

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A B S T R A C T

Adolescent marriage remains a persistent social and health problem in Indonesia. This was related to the suboptimal physical, mental, and spiritual development of adolescent girls. They have to take on the additional roles of wife and mother, creating a double burden. Early marriage exposes them to challenges across various areas, including health, finances, and dual roles. This study aimed to identify factors associated with adolescent marriage among women in the Loa Bahu Public Health Center area, Samarinda. This was a quantitative cross-sectional study involving 40 married women as respondents, selected using a purposive sampling technique with inclusive criteria: girls who married before age 20 and who lived in the Loa Bahu Public Health centre area. Data were collected using questionnaires and analyzed through chi-square tests. Results: The study found that 85% of respondents were married between ages 14 and 19. Knowledge (p = 0.008), economic level (p = 0.024), and cultural support (p = 0.001) were significantly associated with adolescent marriage, while education level was not significant (p = 0.153). Interventions to improve knowledge, strengthen economic resilience, and address cultural norms are required to reduce adolescent marriage in Samarinda.

INTRODUCTION

Adolescent marriage is a marriage occurring before the age of 20 years (WHO, 2019), that continues to be recognized as a harmful practice and a form of gender-based violence that undermines girls' health, education, and life opportunities (UNICEF, 2023). Indonesia ranks among the countries with a high burden of child and adolescent marriage, with more than one million women aged 20–24 having been married before 18 years of age (Girls Not Bridges: The Global Partnership to End Child Marriage, 2021). Despite legal reforms to raise the minimum age of marriage to 19 years for both men and women, a substantial number of underage marriage dispensations continue to be granted through the courts(Nabila, Roswiyani, & Satyadi, 2022).

Child and adolescent marriage is associated with increased risks of adolescent pregnancy, maternal and neonatal morbidity and mortality, mental health problems, and intergenerational cycles of poverty (UNICEF, 2023). In Indonesia, recent evidence shows that early marriage remains prevalent and is driven by a complex interplay of low educational attainment, poverty, limited employment opportunities, conservative sexual norms, and strong local cultural expectations around marriage and family honor (Wahyuni & Rungreangkulkij, 2023; UNICEF, 2023; Plan International, 2026). A systematic review of child marriage determinants in Indonesia concluded that beliefs, culture, poverty, limited access to

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education, and weak law enforcement are key drivers of the practice (Nur, Amanda, Hanifa, & Ayudiputri, 2024).

Kalimantan is reported as one of the regions with the highest likelihood of child marriage in Indonesia, where economic stressors and entrenched gender norms strongly influence decisions to marry off daughters at a young age (Amalia, Handayani, & Kusvitasari, 2023). In these settings, early marriage is often perceived as a strategy to reduce household expenses, secure daughters' future, and preserve family reputation. At the same time, global and national agendas, such as Sustainable Development Goal (SDG) target 5.3 to eliminate child marriage, emphasize the importance of integrated policies, education, and community engagement to address this issue.

Samarinda, the capital of East Kalimantan, is undergoing rapid urban and economic development, yet pockets of socio-economic vulnerability and strong traditional values persist in peri-urban communities (BPS Kota Samarinda, 2025). However, local empirical data on determinants of adolescent marriage at the primary health care level remain limited. Understanding contextual factors such as knowledge, education, economic status, and culture among married women in Samarinda is essential for designing targeted preventive interventions.

This study aimed to identify factors associated with adolescent marriage in the working area of the Loa Bahu Public Health Center, Samarinda, by analyzing the association between age at marriage and knowledge, education level, economic level, and cultural support.

METHOD

This research used a quantitative analytic study with a cross-sectional design conducted in the working area of Loa Bahu Public Health Center, Samarinda, East Kalimantan, Indonesia. The area represents a peri-urban setting with mixed ethnic composition (Banjarnese, Javanese, Kutainese, Bugisnese) and diverse socio-economic backgrounds. The target population was married women residing in the catchment area of the Loa Bahu Public Health Center. The inclusion criteria were: (1) married at ≤24 years of age, (2) currently aged 20–24 years at the time of data collection, (3) residing in the area for at least one year, and (4) willing to participate and sign informed consent. Exclusion criteria included women with severe cognitive or communication impairments. A total of 40 respondents were selected using purposive sampling based on these criteria.

Data were collected using a structured, interviewer-administered questionnaire developed from previous literature on determinants of child and adolescent marriage in Indonesia and similar contexts. The questionnaire included sections on sociodemographic characteristics (age, education, ethnicity, occupation, age at first marriage, knowledge of early marriage, perceived economic status, and cultural perceptions of marriage age. Face validity and content relevance were reviewed by experts in maternal

and reproductive health. Data were coded and entered into a statistical software package. Descriptive statistics (frequencies and percentages) were used to describe respondents' characteristics. Bivariate analysis using the chi-square test was performed to examine the association between age at marriage (adolescent vs young adult) and each independent variable (knowledge, education level, economic level, and culture). A *p-value* < 0.05 was considered statistically significant.

The study adhered to the ethical principles of autonomy, beneficence, non-maleficence, and justice. Respondents provided informed consent after receiving an explanation of the study objectives, procedures, confidentiality, and voluntary participation. This study obtained ethical approval from the Faculty of Medicine, Mulawarman University, No. 128/KEPK-FK/VI/2024 on June 19, 2024.

RESULT

The study results showed that respondents' sociodemographic as Table 1 below:

Table 1. Frequency Distribution of Respondents Based on Age at Marriage, Education Level, Ethnic Group, Marriage Status, Pregnant before Marriage, and Occupation

Variables	n	%
Age of Marriage		
14-19 years old	34	85
20-24 years old	6	15
Education		
Elementary School	5	12.5
Junior High School	7	17.5
Senior High School	28	65
Ethnic Group		
Banjarnesse	16	40
Javaness	12	30
Kutainess	4	10
Bugisness	8	20
Marriage Status		
Unregistered Married	15	37.5
Registered Married	25	62.5
Pregnant before Married		
Yes	11	25.6
No	29	67.4
Occupation		
Housewife	40	100

Most respondents (85%) reported marrying in adolescence (14–19 years), while only 15% married at 20–24 years. The majority had completed senior high school (65%), followed by junior high school (17.5%) and elementary school (12.5%). Banjarnese (40%) and Javanese (30%) were the dominant ethnic groups, with Kutainese and Bugisnese comprising 10% and 20% respectively. The highest marriage status was registered marriage (62.5%), and the lowest was unregistered marriage (37%). 25.6% of girls had been pregnant before marriage. All respondents were housewives at the time of data collection.

Factors associated with age at marriage are shown in Table 2 below:

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Table 2. Cross-tabulation of factors associated with age at marriage in Loa Bahu Public Health Center, Samarinda (n = 40)

Variables	Age Marriage				p-value
	Adolescent Marriage		Young Adult Marriage		
	n (34)	% (85)	n (6)	% (15)	
Knowledge					
Good	11	64.7	6	35.3	0.008
Poor	23	100	0	0	
Education					
Middle-Level	22	78.6	6	21.4	0.153
Low-Level	12	100	0	0	
Economic Level					
High	16		6		0.024
Low	18	100	0	0	
Culture					
Support	18	75	6	25	0.001
Unsupported	16	100	0	0	

There was a statistically significant association between knowledge and age at marriage (p = 0.008). Among respondents with poor knowledge, all (100%) experienced adolescent marriage, whereas among those with good knowledge, 64.7% married in adolescence and 35.3% in young adulthood. Economic level also showed a significant relationship with age at marriage (p = 0.024); all women in the low economic group married in adolescence, whereas a proportion of women in the high economic group married in young adulthood. Cultural support was strongly associated with adolescent marriage (p = 0.001); in culturally unsupportive environments, all respondents married in adolescence, whereas in culturally supportive contexts, a larger proportion still married early, but some married later. Education level did not show a statistically significant association with age at marriage (p = 0.153), although, descriptively, adolescent marriage remained high in both the Motherslow and middle education categories.

DISCUSSION

This study revealed that adolescent marriage remains highly prevalent in the Loa Bahu area of Samarinda, with 85% of respondents reporting marriage between 14 and 19 years. This proportion is substantially higher than the national averages reported for early marriage (UNFPA, 2023), but consistent with evidence that certain regions, including Kalimantan, carry a disproportionately high burden of child and adolescent marriage shaped by economic and socio-cultural vulnerabilities. The predominance of adolescent marriage among housewives further illustrates how early marriage is closely linked with early transition to motherhood and domestic roles, limiting girls' life chances.

Knowledge and adolescent marriage

The significant association between knowledge and age at marriage suggests that a limited understanding of the health, social, and legal consequences of early marriage contributes to early union formation (Fitri et

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al., 2026). Women with poor knowledge in this study were exclusively in the adolescent marriage group, highlighting the protective role of information and awareness. Similar findings have been documented in Indonesian settings, where a lack of awareness about reproductive health, legal marriage age, and risks of adolescent pregnancy increases vulnerability to early marriage (UNICEF, 2026; UNFPA, 2023). Global evidence likewise underscores that inadequate access to sexual and reproductive health information and services leaves adolescents ill-equipped to negotiate delayed marriage and prevent early pregnancy.

Health promotion strategies that provide age-appropriate, culturally sensitive information about early marriage and its consequences, delivered through schools, community health workers, and digital platforms, have been recommended as a key component of preventing child marriage. In the context of Samarinda, integrating comprehensive sexuality and reproductive health education into school curricula and community-based youth programs may enhance adolescents' capacity to make informed decisions.

Education level

Interestingly, education level was not significantly associated with age at marriage in this sample, even though prior studies consistently identify low education as a major determinant of child and adolescent marriage. A possible explanation is the relatively homogeneous educational profile, with most respondents having completed senior high school, which limits the variability needed to detect statistically significant differences. In addition, completion of formal schooling does not always equate to exposure to critical thinking skills or comprehensive reproductive health content, particularly where curricula remain exam-focused and avoid sensitive topics such as sexuality and gender norms. In a prior study, even though adolescent girls have graduated from high school and gone through the process of maturing into marriage, they still get married early (Amalia et al., 2023).

National data demonstrate that adolescent girls with only primary education are many times more likely to experience early marriage than those with tertiary education (Plan International, 2026). However, even among those with secondary education, early marriage persists in settings where economic pressures and cultural expectations remain strong (Wahyuni & Rungreangkulkij, 2023). In this region, this implies that while keeping girls in school is necessary, it is not sufficient; school environments must also equip girls with negotiation and life skills and foster aspirations beyond early marriage.

Economic level

The significant association between economic level and adolescent marriage in this study aligns with the well-established link between poverty and child marriage. Respondents from low-income households all experienced adolescent marriage, reflecting how economic hardship can push families to view early marriage as a coping or survival strategy (Chen, Bonfert, Wadhwa, & Charron, 2025). In many Indonesian communities, marrying off daughters early is perceived to reduce household expenses, transfer financial

responsibility to the husband's family, or secure economic protection for the girl (Zulfa, Hasanah, & Kusaini, 2024).

Global overviews similarly show that child marriage is nearly twice as common in fragile and impoverished settings, where families face limited livelihood opportunities and weak social protection (Maulidar, Aliasuddin, & Seftarita, 2021). In line with prior study results, poverty is one of many reasons for early marriage among girls (Aliyah, Octhatriani, Wulandari, & Undaryati, 2024). Economic interventions such as conditional cash transfers, scholarships, skills training, and livelihood programs targeting adolescent girls and their families have been highlighted as promising approaches to reduce early marriage by alleviating financial pressure and expanding girls' alternative life trajectories. To proof these programs, collaboration among the health, social, and labor sectors to strengthen economic resilience may indirectly help delay marriage age.

Cultural factors

Culture emerged as a strong determinant of adolescent marriage in this study, reflecting findings from qualitative and review studies in Indonesia that underscore the role of religious, customary, and gender norms in normalizing early marriage. In several Indonesian communities, including parts of Kalimantan, parents and youth often believe that marrying off girls early preserves family honor, prevents premarital pregnancy, and fulfills religious or cultural expectations (Saskara, 2018). Conservative sexual morality and the stigma of remaining unmarried beyond a socially acceptable age can create strong pressure to accept early marriage proposals (Niam, 2021).

The strong association between cultural support and adolescent marriage in this sample suggests that even when legal frameworks and national policies promote delayed marriage, local norms can undermine these efforts. WHO and international agencies emphasize that laws alone are insufficient without community-level dialogue and norm change interventions. Engaging local religious leaders, customary authorities, and community influencers in Samarinda to reinterpret cultural and religious teachings in favor of girls' education, health, and delayed marriage could be a strategic approach. Social and behavior change communication campaigns that highlight positive role models and alternative markers of family honor (such as daughters' educational achievements) may help transform norms over time.

Implications for policy and practice

The findings from this study support the view that adolescent marriage is a multi-dimensional issue requiring integrated responses. At the health system level, primary care facilities such as Loa Bahu Public Health Center can expand adolescent health services, including counseling on reproductive health, life skills, and relationship negotiation. At the educational level, partnerships between schools, health facilities, and community organizations can foster comprehensive education programs that address early marriage, gender equality, and career aspirations.

At the socio-economic level, targeted social protection and livelihood programs for low-income families can reduce the financial incentives for early marriage. At the cultural level, participatory interventions involving parents, religious and community leaders are essential to challenge beliefs that equate early marriage with protection and honor and to promote alternative pathways for girls' fulfillment.

Limitations

This study has several limitations. The cross-sectional design precludes causal inference because exposure and outcome were measured simultaneously. The small sample size (n = 40) and use of purposive sampling in a single health center limit the generalizability of the findings to other settings in Samarinda or East Kalimantan. Self-reported data may also be subject to recall and social desirability bias, particularly regarding cultural perceptions. Future studies could employ larger, probabilistic samples and mixed-methods approaches to explore the nuanced interactions between knowledge, economic constraints, and cultural norms.

CONCLUSION

Adolescent marriage is highly prevalent among married women in the Loa Bahu Public Health Center area of Samarinda, with the majority entering marriage between 14 and 19 years of age. Knowledge, economic level, and cultural support were significantly associated with age at marriage, while education level was not statistically significant in this sample. The results highlight that informational deficits, economic vulnerability, and deeply rooted cultural norms together sustain the practice of adolescent marriage.

To prevent adolescent marriage in Samarinda, multi-sectoral interventions are needed, including strengthening adolescent reproductive health education, improving the economic resilience of families, and engaging cultural and religious leaders to reform norms that favor early marriage. Further research with larger, more diverse samples is recommended to refine context-specific strategies and monitor progress toward SDG target 5.3 to end child marriage.

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Factors Influencing Mortality in Neonates with Gastroschisis in Bali, Indonesia

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A B S T R A C T

Gastroschisis is a congenital abdominal wall defect requiring immediate surgical intervention. The high mortality rate in gastroschisis patients, particularly in developing countries, underscores the importance of a deeper understanding of factors that may influence clinical outcomes. This study aims to analyze factors affecting the risk of mortality in neonates with gastroschisis. A retrospective cohort study was conducted over five years and included 37 neonates with gastroschisis who were treated in the neonatal intensive care unit at Prof. I.G.N.G. Ngoerah Hospital. The majority of subjects were male (54.1%) and preterm (62.2%), with 18 patients (48.6%) surviving and 19 (51.4%) deceased. Surgical management primarily involved primary closure compared to staged closure, with most closures occurring within the first day of life. Sixteen subjects were identified with complex gastroschisis. The risk of mortality decreased by 56% in the simple gastroschisis group compared to the complex gastroschisis group (RR 0.44; 95% CI 0.23–0.87; p=0.01). The risk of mortality was found to be lower in neonates with simple gastroschisis compared to those with complex gastroschisis. There were no significant differences in mortality risk based on the method of closure, timing of closure, or incidence of sepsis.

INTRODUCTION

Congenital malformations remain a significant issue and the primary cause of mortality among neonates. Gastroschisis is a congenital condition associated with increased mortality and morbidity rates. It is characterized by a defect in the abdominal wall, resulting in the herniation of visceral organs outside the body, without any of a protective membrane (Bhat et al., 2020). Gastroschisis can be categorized into simple and complex types based on the condition of the intestines. A simple type of gastroschisis occurs when the intestines are in a normal state without complications, but a complex form is characterized by the presence of complications such as atresia, perforation, ischemia, necrosis, or volvulus (Bergholz et al., 2014). Approximately 10% of infants with gastroschisis also suffer from intestinal problems, including stenosis or intestinal atresia (Bhat et al., 2020).

The prevalence of gastroschisis has been rising in recent decades. Previous studies shows that the prevalence of gastroschisis in the US ranges from 4 to 5 per 10,000 live births (Short, 2019). The incidence is reported at a lower rate of 2.74 per 10,000 live births in Europe (Caldeman et al., 2021), whereas in Asia, namely in China, it is observed at 2.63 per 10,000 live births (Gao et al., 2024). Information regarding the prevalence or incidence of gastroschisis in Indonesia remains scarce. A study conducted by Rahayatri et al. in 2024 documented 49 instances of gastroschisis over a two-year period, revealing a death rate of 67% in the preterm neonate and 73% in the aterm neonate (Rahayatri et al., 2024).

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Neonatal mortality in cases of gastroschisis is affected by various factors, including antenatal diagnosis, mode of delivery, defect repair procedure, and type of gastroschisis (Brebner et al., 2020). The majority of gastroschisis cases can be detected antenatally with ultrasonography at 12 weeks of gestation, effectively differentiating between simple and complex gastroschisis (Sun et al., 2022). Prior research indicates that the survival rate of infants with gastroschisis can exceed 90% in well-resourced health settings (Bhat et al., 2020; Youssef et al., 2016). The inconsistent distribution and standardization of healthcare facilities in Indonesia pose a difficulty that could impact the death rate of newborns with gastroschisis across different locations.

The management of gastroschisis, encompassing the repair of abdominal wall defects and the repositioning of visceral organs into the abdominal cavity, typically commences within hours post-delivery. The promptness of treatment is crucial to avert fluid depletion, maintain body temperature, diminish the likelihood of infection, and prevent the exacerbation of intestinal circulation abnormalities (Haddock & Skarsgard, 2018). The management of gastroschisis can be categorized into primary closure and progressive closure, the latter involving the use of silos during the initial phase. A meta-analysis by Kunz et al. indicated that progressive closure correlated with improved outcomes and significant reductions in ventilator utilization, the timing of initial oral nourishment, and the incidence of infection. This correlates with a reduction in intra-abdominal pressure and enhancement of splanchnic circulation perfusion, thereby diminishing the risk of infection and necrotizing enterocolitis (NEC) (Kunz et al., 2013). Numerous further investigations have found that there is no substantial difference between primary and progressive closure techniques (Poola et al., 2019; Schmidt et al., 2011).

Understanding the mortality risk factors in neonates with gastroschisis is crucial for establishing the optimum therapeutic approach. The author intends to examine the determinants influencing infant mortality associated with gastroschisis in Bali. This study's findings may serve as a foundation for the formulation of more uniform clinical guidelines for the treatment of gastroschisis in Indonesia.

METHOD

The design of this study is a retrospective cohort and conducted under approval from Medical Ethic Committee of Udayana University with approval number: 283/UN14.2.2.VII.14/LT/2024. Data sampling was carried out using medical records and the registry of patients who received treatment in the neonatal intensive care unit at Prof. I.G.N.G. Ngoerah Hospital, spanning from October 2019 to December 2024. The inclusion criteria consist of neonatal medical record data for individuals aged 0-28 days who have been diagnosed with gastroschisis and received treatment in the neonatal intensive care unit at Prof. I.G.N.G. Ngoerah Hospital. The exclusion criteria include patients who have incomplete medical record

data and those who have undergone treatment for closure of abdominal wall defects at other hospitals. The sample collection method in this study uses total sampling due to the limited number of populations.

Data was extracted from medical records, including sex, gestational age, referral status, birth weight, type of gastroschisis, closure method, age at closure, incidence of sepsis, and mortality status. The gestational age is determined using the New Ballard Score (NBS). Gastroschisis is categorized into simple type (without intestinal issues) and complex type (including abnormalities or complications in the intestines, such as stenosis, intestinal atresia, necrosis, or adhesions). The closing procedure is categorized into primary closure and staged closure, with silo installation occurring prior to primary closure. The age at closure is categorized into 0-1 days and greater than 1 day. The occurrence of sepsis is categorized as sepsis and non-sepsis. Mortality status is classified as either survival or death.

The collected data is subsequently entered into SPSS® version 27 software for statistical analysis. The study was conducted in phases, commencing with univariate analysis to examine the frequency, percentage, and distribution of numerical data. A bivariate analysis was subsequently conducted to assess the association among risk factors. Bivariate analysis was conducted with a statistical method for categorical data, specifically the chi-square test or Fisher's exact test. The threshold for statistical significance was established at $p < 0.05$.

RESULT

From October 2019 to December 2024, this study included a total of 37 neonates with gastroschisis. The predominant demographic comprised males, namely 20 out of 37 patients, accounting for 54.1%, and were delivered at a gestational age of less than 37 weeks, indicating premature birth (62.2%). The patients' birth weights varied, predominantly within the range of 1,500–2,500 grams (75.7%). Approximately 59.5% of patients were either referred or born outside the research hospital. Only a small proportion of 6 out of 37 patients (16.2%) were diagnosed with gastroschisis prenatally.

Simple gastroschisis was identified in 56.8% of individuals, while 16 patients exhibited complex gastroschisis, accounting for 43.2%. The technique for closing abdominal wall abnormalities differs, although the majority of patients (59.5%) receive primary closure. Age at closure was also evaluated, with 25 of the 37 patients receiving early closure within 0-1 day. The occurrence of sepsis, encompassing both culture-positive and just clinical cases, was recorded in 91.9% of patients. The majority of patients received treatment for more than 14 days (59.5%), with an average hospitalization length of 20 days. The attributes of the sample from this investigation are presented in Table 1.

Table 2 presents the findings of the bivariate analysis concerning the link between factors influencing mortality status in neonates with gastroschisis. Data interpretation involved evaluating statistical significance using p-value and clinically assessing importance through relative risk (RR) and a 95%

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confidence interval (CI). The type of gastroschisis variable exhibited a clinically significant relationship, as evidenced by the p-value and relative risk: p = 0.01, RR 0.44, and 95% CI 0.23-0.87. This indicated a 56% reduction in mortality in the neonate group with simple type gastroschisis compared to the complex type. Simultaneously, no substantial correlation was observed between the kind of gastroschisis, closure method, age at closure, prenatal diagnosis, and the prevalence of sepsis affecting mortality in neonates with gastroschisis (p > 0.05).

Table 1. Clinical characteristics of neonates with gastroschisis

	Total sample, n = 37 N (%)
Sex, n (%)	
Male	20 (54.1)
Female	17 (45.9)
Gestational age, n (%)	
Preterm	23 (62.2)
Aterm	14 (37.8)
Median (range), weeks	36 (26-40)
Birthweight, n (%)	
<1.500 gram	2 (5.4)
1.500 – 2.500 gram	28 (75.7)
≥2.500 gram	7 (18.9)
Mean (SD), gram	2190.2 (475.3)
Referral, n (%)	
Yes	22 (59.5)
No	15 (40.5)
Prenatal diagnosis, n (%)	
Yes	6 (16.2)
No	31 (83.8)
Type of gastroschisis, n (%)	
Simple	21 (56.8)
Complex	16 (43.2)
Closure methods, n (%)	
Primary closure	22 (59.5)
Staged closure	15 (40.5)
Age at closure, n (%)	
0 – 1 day	25 (67.6)
>1 days	12 (32.4)
Sepsis, n (%)	
Yes	34 (91.9)
No	3 (8.1)
Length of stay, n (%)	
<14 days	15 (40.5)
≥14 days	22 (59.5)
Mean (SD), days	20.2 (16.1)

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Table 2. Analysis of risk factors affecting mortality status of neonates with gastroschisis

	Death n = 19	Survive n = 18	RR (95% CI)	p-value
Type of gastroschisis, n (%)				
Simple	7 (33.3)	14 (66.7)	0.44 (0.23-0.87)	0.01*
Complex	12 (75.0)	4 (25.0)		
Closure methods, n (%)				
Primary closure	10 (45.5)	12 (54.5)	0.75 (0.41-1.40)	0.383
Staged closure	9 (60.0)	6 (40.0)		
Age at closure, n (%)				
0 – 1 day	11 (44.0)	14 (56.0)	0.66 (0.36-1.19)	0.19
>1 days	8 (66.7)	4 (33.3)		
Sepsis, n (%)				
Yes	18 (52.9)	16 (47.1)	1.6 (0.31-8.11)	0.60[a]
No	1 (33.3)	2 (66.7)		

[a]*Fisher exact test*; *significance at level <0.05

DISCUSSION

The current study identified 37 cases of gastroschisis, predominantly among male patients. This aligns with a prior study by Salinas-Torres et al., which similarly indicated that the majority of gastrocystic neonates were male (Salinas-Torres et al., 2018). Furthermore, no notable changes were observed concerning referral and referral status. Raymond et al.'s investigation revealed comparable findings, indicating no disparity in fatality rates between neonates born at the primary hospital and those born in other healthcare institutions (or referral cases). Nevertheless, the study revealed that among the neonates delivered outside the primary hospital, there was an escalation in the length of mechanical ventilation utilization (Raymond et al., 2020).

Fourteen out of thirty-seven newborns with gastroschisis were delivered at a gestational age exceeding 36 weeks or at term. This aligns with prior research indicating that the majority of patients with gastroschisis present at a lower gestational age or in a preterm state (Baer et al., 2019; Raymond et al., 2020). Gastroschisis is linked to a placental inflammatory disease and a heightened risk of intrauterine infection. Preterm birth is favored when gastroschisis is identified during the prenatal period to mitigate problems (Mesas Burgos et al., 2015; Overcash et al., 2014). The majority of patients exhibit a low birth weight, defined as less than 2,500 grams. Low birth weight results from growth restriction initiated in utero, mediated by inflammatory mechanisms in the intestines, diminished nutritional absorption, and restricted abdominal capacity, all of which impede foetal growth (Bottu & Manzar, 2024).

Gastroschisis can be classified into simple and complex types, with the majority of individuals in our study exhibiting a simple type (Bergholz et al., 2014). Sixteen patients in this study were born with a complicated type of gastroschisis. This study finds that simple type gastroschisis decreases the mortality risk by 56% in comparison to complex type gastroschisis (p=0.01; RR 0.44; 95% CI 0.23-0.87). This suggests that simple gastroschisis has a protective effect on mortality. A study by Raymond et al. supports

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the finding of this study, which states that the survival rates of newborns with simple gastroschisis are 96% and complex gastroschisis are 87% (Raymond et al., 2020).

The primary closing procedure in this study has predominantly been performed on subjects aged 0-1 day. Bivariate study revealed no significant correlation between the closure method and the age of closure concerning the mortality status of infants with gastroschisis. The research conducted by Gurien et al. similarly revealed no significant disparity in mortality between the primary closure group (0-1 day) and the gradual closure group (4-14 days); however, the gradual closure group exhibited an extended treatment duration and a reduced duration of ventilator dependence (Gurien et al., 2017). A study by Rahayatri et al. conducted in Indonesia shown that a rapid closure, occurring within 0-1 day, can reduce the risk of mortality. An extended length prior to closure correlates with the danger of infection, hypothermia, dehydration, and electrolyte imbalances, which may exacerbate the patient's condition and result in mortality (Kamal, 2023).

Individuals with gastroschisis are predisposed to infections, particularly early-onset newborn sepsis. The research revealed that 20 of the 26 neonates with gastrosthesis experienced sepsis, and there was no correlation between the occurrence of sepsis and mortality in neonates with gastroschisis. These findings contradict a cohort research study by Fullerton et al., which identified sepsis as the sole statistically significant predictor of mortality (Fullerton et al., 2017). The exposure of visceral organs to the external environment heightens the risk of infection due to microbial contamination, potentially resulting in sepsis (Wallace et al., 2023). Moreover, predisposing variables such as gestational age and delayed intrauterine growth, together with low birth weight, correlate with the patient's underdeveloped immune system, hence elevating the risk of sepsis and mortality (Skertich et al., 2020).

This study has some limitations, the primary one being the limitedsample size (n = 37), which may impact the ability to identify statistically significant differences or relationships. The second is the retrospective cohort research methodology, wherein data is acquired from medical records that exhibit constraints regarding completeness and correctness. This may result in information bias, particularly if data is absent or inconsistent.

CONCLUSION

The mortality risk was decreased in neonates with simple gastroschisis compared to those with complex types. Nonetheless, there was no substantial disparity across closure procedures, age at closure, prenatal diagnosis, and the occurrence of sepsis regarding mortality risk. Additional research with bigger samples is essential to get more precise, population-representative outcomes, hence facilitating the formulation of more effective and standardized protocols for the management of neonates with gastroschisis.

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The Relationship Between Knowledge Level and Attitude of Parents/Guardians with Acceptance of Human Papillomavirus (HPV) Vaccine Among 5th Grade Elementary School Students in Ambon City in 2024

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A B S T R A C T

Cervical cancer is one of the diseases caused by HPV virus infection. Cervical cancer ranks second as the leading cause of death in women in Indonesia. Based on WHO recommendations, HPV vaccine administration is the main prophylaxis to prevent cervical cancer which can be given from the age of 9 years. The effectiveness of the HPV vaccination program is influenced by one's knowledge and attitude. The purpose of this study was to determine the relationship between the level of knowledge and attitude of parents/guardians with the acceptance of the Human papillomavirus (HPV) vaccine in 5th grade elementary school students in Ambon City in 2024. This study used a correlation analytic design with a cross sectional approach. There were 112 respondents from ten grade 5 elementary schools selected by total sampling technique. Data were collected using a questionnaire research instrument of knowledge level, attitude, and acceptance of HPV vaccine. The data analysis technique used the Chi-square test. The results showed that the majority of respondents had a high level of knowledge (92.0%) with a high attitude (83.9%), and the majority accepted (50.9%). There was no relationship between knowledge and acceptance (p=0.015) with a value of r=0.105. There is no relationship between attitude and acceptance (p=0.734), with a value of r=0.735. So, it can be concluded that there is no significant relationship between the level of knowledge and attitude of parents/guardians with HPV vaccine acceptance.

INTRODUCTION

Cervical cancer is a primary malignant neoplasm growth that develops in the cervix, and occurs in the epithelium or outer surface layer of the cervix. The Human papillomavirus (HPV) virus is responsible for 99.7% of cervical cancer infections (Kementerian Kesehatan Republik Indonesia, 2015; Vera Novalia, 2023). Transmission of the HPV virus can occur through several ways, namely intrauterine, oro-genital or oro-oral sexual methods, and vertical indirect transmission (Sono et al., 2024). In the early stages of cervical cancer, the symptoms are usually insignificant, making it difficult to detect. This condition is quite a big problem in the medical world, because on average the majority of sufferers are only detected after they have entered an advanced stage (Rahmadini et al., 2022). HPV is a double-chain DNA virus, and is one of the most common sexually transmitted infections (Alnaeem et al., 2023). HPV vaccines function as HPV prophylaxis so that the immune response produced can recognize foreign objects so that the defense produced is more optimal (Zakiyah, 2023).

According to the World Health Organization, up to 604,000 women worldwide had cervical cancer in 2020, and about 342,000 of them lost their lives due to this disease (Sono et al., 2024). According to WHO data from 2022, cervical cancer accounted for 36,633 cases or 9.2% of all cancer cases worldwide, making it the second most

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common type of cancer (Rahmadini et al., 2022). With 15,000 cases each year, 50% of cervical cancer patients die, making Indonesia the country with the second highest number of cervical cancer patients in the world after China. Approximately 20 women are estimated to lose their lives to cervical cancer every day, and there are an estimated 41 new cases of the disease every day (Widyaningsih et al., 2023). 5,4% of all cervical cancer cases worldwide are reported in Indonesia (Zakiyah, 2023). According to data from the Global Cancer Observatory (Globacan), there were 21,003 deaths from cervical cancer and 36,633 new cases of cervical cancer in Indonesia in 2020, or 17.2% of all cases. This data also shows that after breast cancer, cervical cancer ranks second (Rahmadini et al., 2022; Thieny H.I Mumekh et al., 2022). WHO recommends that HPV vaccine administration should begin when girls are 9 years old (Kamolratanakul & Pitisuttithum, 2021).

According to information from the Maluku Provincial Health Office, in 2021 there were 15 women in Maluku suspected of having cervical cancer, 34 people in 2022, and 5 people in 2023 (Dinas Kesehatan Provinsi Maluku, 2023). HPV vaccination coverage in Ambon city according to data from the Ambon City Health Office in 2023 was 60.3% or as many as 1,634 5th grade students had been vaccinated against HPV and 39.7% or around 1,077 students were not vaccinated (Dinas Kesehatan Kota Ambon, 2023). Based on data from the Ambon City Government in 2024, it states that the Ambon City Education Office has conducted a mapping of education units in Ambon City whose students have not been immunized, so that it can be an effective step to achieve the targets (Pemerintah Kota Ambon, 2024). Based on government policy stated in the Regulation of the Minister of Health of the Republic of Indonesia Number 12 of 2017 concerning the implementation of immunization, every girl over the age of nine must receive vaccine immunization (Menteri Kesehatan Republik Indonesia, 2017). HPV vaccination is aimed at primary school children in grades 5 and 6, and can be obtained free of charge (Ansiga et al., 2024). In order to expand the Human Papillomavirus (HPV) Vaccine immunization pilot program for 2020-2024 as a development and introduction into the national immunization program, the stages of HPV immunization as stipulated in the Decree of the Minister of Health Number HK.01.07/Menkes/449/2020 must be implemented. This program is carried out in stages every year to coincide with the Immunization Month for School Children, which is targeted at girls in primary schools (Menteri Kesehatan Republik Indonesia, 2021). The first stage of HPV vaccine administration is given in two doses with an interval of 6 to 15 months (Sono et al., 2024). WHO has set the 90-70-90 target as part of its cervical cancer elimination strategy to be achieved by 2030. It is expected that 90% of girls aged 15 years receive the full range of vaccinations as well as the HPV vaccine, 70% of women undergo accurate screening for cervical cancer by age 35 years, and 90% of women identified with cervical cancer (invasive cancer stage or pre-cancer stage) should undergo effective care and treatment (World Health Organization, 2020).

HPV vaccine is most effective when given to individuals who have never engaged in sexual activity, so the vaccine can be started in elementary school-aged children. However, if the vaccine is given to someone who has

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been sexually active, the benefits and effectiveness of the vaccine will decrease. HPV vaccination is intended to prevent HPV virus infection and reduce female mortality from cervical cancer, not to treat pre-existing HPV infections (Dewi Ayumaruti, 2021). The effectiveness of the HPV vaccination program as a preventive measure for cervical cancer is strongly influenced by parents attitudes and understanding of the vaccine (Sinshaw et al., 2022). Based on the description of the problem above, the researcher is interested in conducting a study entitled "The Relationship between the Level of Knowledge and Attitudes of Parents / Guardians with the Acceptance of Human Papillomavirus (HPV) Vaccine in 5th Grade Elementary School Students in Ambon City in 2024". The general purpose of this study was to analyze the relationship between the level of knowledge and attitudes of parents/guardians with the acceptance of the Human papillomavirus (HPV) vaccine in 5th grade elementary school students in Ambon City in 2024. The specific objectives are to determine the level of knowledge of parents/guardians of 5th grade elementary school students in Ambon City in 2024 regarding the Human papillomavirus (HPV) vaccine, to determine the attitude of parents/guardians of 5th grade elementary school students in Ambon City in 2024 towards the Human papillomavirus (HPV) vaccine, to determine the acceptance of parents/guardians of 5th grade elementary school students in Ambon City in 2024 towards the Human papillomavirus (HPV) vaccine, to determine the relationship between knowledge and the acceptance of parents/guardians of 5th grade elementary school students in Ambon City in 2024 regarding the Human papillomavirus (HPV) vaccine, and to determine the relationship between attitudes and the acceptance of parents/guardians of 5th grade elementary school students in Ambon City in 2024 regarding the Human papillomavirus (HPV) vaccine.

METHOD

This study used a correlation analytic design with a cross sectional approach. The data collection process was carried out by distributing research questionnaires to 5th grade homeroom teachers in 10 selected elementary schools, then the questionnaires were distributed to 5th grade female students to be sent home and filled in by the parents of the students. However, there were also parents who filled in the questionnaires directly at school, because they crossed paths with teacher and parent/guardian meetings at school. Parents/guardians were excluded as subjects in this study if they refused to participate. The questionnaires that have been filled in, will then be collected back to be analyzed and processed by the researcher. The research sample was selected based on the inclusion criteria, namely parents/guardians of 5th grade students in 10 selected elementary schools, parents/guardians of students who were willing to become research respondents, and students who had never received the first and second doses of HPV vaccine. The exclusion criteria were parents/guardians of 5th grade schoolgirls who did not fill out the questionnaire clearly and completely. 112 samples were obtained from parents/guardians of 5th grade

students in ten elementary schools, including 5 elementary schools selected based on the highest HPV vaccination coverage in 2023, and 5 elementary schools selected based on the lowest HPV vaccination coverage in 2023. Sampling was conducted using a total sampling technique. The research instrument used was a structured questionnaire. The questionnaire used was a questionnaire developed from the research of Frianto D et al (2022), and has gone through validity and reliability tests. Data analysis used univariate analysis to identify the characteristics of respondents, and to process data from questionnaires to find the level of knowledge (low, high) and attitudes (low, medium, high), while bivariate analysis to find the relationship between parental/guardian knowledge and acceptance, and parental/guardian attitudes with HPV vaccine acceptance.

The statistical test used is the Chi-square test which is used to determine whether the two variables are related or not, with a significance level of 0.05. H0 can be accepted if the p-value is >0.05, meaning that there is a relationship between the two variables, and Ha is accepted if the p-value is <0.05, meaning that there is a relationship between the two variables studied.

RESULT

Table 1. Frequency Distribution of Respondent Characteristics (n=112)

Characteristics	Frequency (n)	Percentage (%)
Age		
12 - 18 Years	1	0,9
19 - 40 Years	63	56,3
40 - 65 Years	47	42,0
>65 Years	1	0,9
Gender		
Male	19	17,0
Female	93	83,0
Last Education		
Elementary	5	4,5
Junior High School	10	8,9
Senior High School	66	58,9
Diploma	6	5,4
Bachelor	23	20,5
Not in school	2	1,8

Table 1 shows that the majority of respondents were between 19-40 years old (56.3%). The majority of respondents were female (83.0%), and the majority of respondents were high school graduates (58.9%).

Table 2. Frequency Distribution of Parents/Guardians Knowledge Level about HPV Vaccine and Cervical Cancer

Knowledge	n	%
Low	9	8,0
High	103	92,0
Total	112	100

Table 2 shows that out of 112 respondents, most respondents had high knowledge (92.0%).

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Table 3. Frequency Distribution of Parents/Guardians Attitudes Towards HPV Vaccine

Attitude	n	%
Low	3	2,7
Medium	15	13,4
High	94	83,9
Total	112	100

Table 3 shows that out of 112 respondents, the majority of respondents had a high attitude (83.9%).

Table 4. Frequency Distribution of Parent/Guardians Acceptance of HPV Vaccine

Acceptance	n	%
Yes	57	50,9
No	55	49,1
Total	112	100

Table 4 shows that of the 112 respondents, the majority accepted (50.9%). However, the proportion of acceptance and rejection was almost equal, with the level of acceptance only slightly higher than rejection (difference of 2 respondents or 1.8%).

Table 5. Frequency Distribution of the Relationship between Parents/Guardians Knowledge Level and HPV Vaccine Acceptance

Knowledge	HPV vaccine acceptance				Total		*p-value*	*r*
	Yes		No					
	n	%	n	%	n	%		
Low	1	0,9	8	7.1	9	8,0		
High	56	50,0	47	42,0	103	92,0	0,015	0,105
Total	57	50,9	55	49.1	112	100		

Table 5 shows that out of 112 respondents, most respondents (50%) who received the HPV vaccine had high knowledge. Meanwhile, most respondents (42%) who refused the HPV vaccine also had high knowledge. The results of the statistical test analysis to find the relationship between knowledge and acceptance used Fisher's exact test as an alternative Chi-square test because the conditions were not met (there was an expectation value of less than 5 as much as 50%). Based on the results of the test, the p-value was 0.015 ($p>0.05$) which indicates that H0 is accepted, meaning that there is no relationship between the level of knowledge of parents/guardians and the acceptance of the HPV vaccine. With a value of $r = 0.105$, indicating a very weak relationship between the two variables or a weak positive correlation.

Table 6. Frequency Distribution of the Relationship between Parent/Guardian Attitude and HPV Vaccine Acceptance

Attitude	HPV vaccine acceptance				Total		*p-value*	*r*
	Yes		No					
	n	%	n	%	n	%		
Low-Medium	8	7,1	10	8,9	18	16,1		
High	49	43,8	45	40,2	94	83,9	0,734	0,735
Total	57	50,9	55	49,1	112	100		

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Table 6 shows that out of 112 respondents, most respondents (43.8%) who received the HPV vaccine had high knowledge. Meanwhile, most respondents (40.2%) who refused the HPV vaccine also had high knowledge. The results of statistical test analysis using the Chi-square test obtained a p-value of 0.734 (p>0.05) which indicates that H0 is accepted, meaning that there is no relationship between parental/guardian attitudes and HPV vaccine acceptance. With a value of r = 0.735, it shows the strength of the strong relationship between the two variables or a strong positive correlation. The more positive the attitude of parents/guardians towards the HPV vaccine, the higher the level of vaccine acceptance for their children.

DISCUSSION

The research findings regarding the level of knowledge of respondents found that most respondents had a high level of knowledge. A person's high level of knowledge can be influenced by several factors including one of which is the surrounding environment. In this case, based on research findings from conditions in the field, direct interaction between fellow respondents can provide space for them to discuss with friends next to them while filling out the questionnaire. This can lead to a high level of knowledge. In addition, the fact that most of the questionnaires were distributed to schoolgirls at school and then completed by their parents at home also gave parents the opportunity to seek further information about the HPV vaccine, either through the internet or by asking others before completing the questionnaire. Most likely, this also contributed to their high level of knowledge of the HPV vaccine and cervical cancer. Supported by Annisa et al. (2024), that social media was the main source of information for respondents who had heard about HPV and vaccination. In this case, the main source of their knowledge about HPV vaccination was obtained through social media and the internet (Annisa Fitri Rahmadini, Lela Zakiah, Nina Yusnia, Fadia Rasyidin, 2024).

Other factors that influence a person's knowledge are age and education (Notoatmodjo S, 2010). A person's ability and maturity in thinking and working will develop with age. Therefore, age plays an important role in raising parents awareness of the superiority of the HPV vaccine in cervical cancer prevention efforts. Education is an effort to develop one's personality and skills both inside and outside the classroom. Education and knowledge are closely related, and it is assumed that people with higher education will have greater knowledge (Nahak et al., 2018).

Based on the results of the analysis of respondents attitudes towards the HPV vaccine, the majority of respondents had a high attitude. This is because parents, especially mothers, are more aware of the need to avoid HPV virus infection to reduce the risk of cervical cancer. In this case, a person's understanding of cervical cancer can also increase their awareness. Parents who have sufficient information about cervical

cancer and the HPV vaccine can generate feelings and generate emotions that motivate them to participate in HPV immunization.

Based on the research findings regarding HPV vaccine acceptance, the majority of parents/guardians were willing to accept the HPV vaccine for their daughters. However, the proportion of acceptance and rejection of the HPV vaccine tends to be balanced, with acceptance only slightly higher than rejection with a difference of 2 respondents. This could be due to parents lacking access to reliable sources of information to find out the truth about false information and conspiracies about vaccines circulating in the community. In this case, from the results of brief discussions with parents and homeroom teachers during the study, it was found that parents had never previously received counseling or socialization about HPV vaccination, which is thought to have affected their level of knowledge and resulted in their acceptance of the HPV vaccine being lower. Parents also mentioned that since this was the first time they had heard of the HPV vaccine, they did not know much about it and wanted more accurate information before making a decision. Nevertheless, even though they have never received or even heard previous information and explanations regarding the HPV vaccine, based on the findings of this study, the majority of parents and guardians have high knowledge, because it is possible that they received information about the HPV vaccine via the internet at the time of filling out the questionnaire, especially in the digital era like now. This is in line with research by Grandahl M et al. (2017), which noted that most parents obtained information about HPV vaccination through mass media and the internet (Grandahl et al., 2017). In addition, more accurate and reliable information is needed from health service providers so that the public is not consumed by distorted issues about vaccines.

The results of this study also show that there is no relationship between the level of knowledge of parents/guardians and the acceptance of the HPV vaccine. This is supported by Hendra (2021), showing that there is no significant correlation ($p>0.05$) between interest in HPV vaccination and knowledge about cervical cancer ($p=0.403$). According to their study, the lack of interest in vaccination was due to lack of knowledge (Hendra, 2021). Although social media contributes to the expansion of knowledge, exposure to information from social media can also be one of the factors contributing to low interest in HPV vaccination, as it can present confusing information. Based on experiences that occurred in the field during this study, there were several reasons for parents rejection of the HPV vaccine, where most parents and guardians were afraid that their children would be vaccinated immediately when they filled out the questionnaire. Even the homeroom teacher reported that there were students who did not want to go to school because they were afraid of being vaccinated. Most parents also said they had only heard of this vaccine, so they needed accurate information regarding the vaccine. Knowledge based on experience supported by concrete facts is often more quickly accepted when making decisions to act. In this case,

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respondents said that because their children had previously experienced Post-Immunization Adverse Events (AEFI) as a side effect of immunization (excluding HPV vaccination), they were more reluctant to accept the HPV vaccine. Therefore, the more people know about the HPV vaccine, the more likely they will be motivated to receive the vaccination (Namira Wadjir Sangadji, Ira Marti Ayu, 2024). In line with research by Forster AS et al. (2015), respondents who refused HPV vaccination were due to several factors, including lack of parental consent, safety concerns due to fear that vaccination could cause side effects that had not previously occurred, feeling that the HPV vaccine was unnecessary, needing more information, and procedural issues due to fear of needles, health reasons in this case it was reported that some children were allergic to ingredients contained in the vaccine, and other reasons that were not clearly given (Forster et al., 2015). Parents who have better information and knowledge tend to be willing to do HPV vaccination because they understand the important role of the vaccine to avoid cervical cancer (Zulfa et al., 2023). In line with research by Zulfa A et al. (2023), which explains that a sign of parents acceptance of the HPV vaccine is shown by their readiness to carry out HPV vaccination. The reason for acceptance was most often mentioned, namely because of the vaccine's ability to protect children from HPV infection and cervical cancer (Zulfa et al., 2023). According to the findings of this study, a mother's knowledge plays a very important role, because the more knowledgeable a woman is, the formation of her attitude will be much better so that she will be more likely to accept the HPV vaccine.

The results of this study indicate that there is no significant relationship between parents/guardians attitudes and HPV vaccine acceptance. Both parents who choose to accept or reject HPV vaccination for their children both have high attitudes. In line with research findings by Frianto D et al. (2020), which showed that the overall attitude of respondents about the HPV vaccine and the acceptance of parents of schoolgirls were not significantly correlated ($p = 0.364$). Despite having a relatively high overall attitude score, respondents still rejected the HPV vaccine due to limited information so they did not know about it (Frianto et al., 2020). In addition, a person's interest is also strongly influenced by the surrounding environment so that sometimes someone is interested in doing something because they follow the crowd (Hendra, 2021). Attitudes affect the formation of interest and tend to accept, reject, or not respond to objects (Fitri & Elviany, 2018). Based on experiences that occurred in the field, most parents who rejected the HPV vaccine were because they were worried about side effects and dangerous chemical content in the vaccine. In addition, most parents also said that their experience with the Covid-19 pandemic and the side effects of the Covid-19 vaccine had influenced their thinking and made them more reluctant to accept the HPV vaccine. This is supported by Dapari R et al. (2024), where vaccine hesitancy and concerns about side effects and potential vaccine safety issues were the main reasons for women's vaccine hesitancy (Dapari et al., 2024). On the other hand, parents received the HPV vaccine because they realized the

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importance of the vaccine to protect their daughter from dangerous diseases such as cervical cancer. Parents beliefs or attitudes regarding their child's susceptibility to HPV and the severity of infection, as well as prevention efforts against HPV virus infection contributed to their desire to have their child receive the HPV vaccine. In addition, some of them also considered receiving the HPV vaccine for their children because they were supported by the government-funded free vaccination/immunization program. Parents attitudes did not directly influence their decision to receive the HPV vaccine. In other words, even if parents have a positive attitude towards the vaccine, it does not necessarily mean they will be willing to receive the vaccine for their child (Zulfa et al., 2023).

CONCLUSION

Based on the results of the above study, it can be concluded that the majority of respondents had a high level of knowledge, with a high attitude, and most accepted the HPV vaccine, however, the proportion of acceptance and rejection of the HPV vaccine was almost balanced. The results of this study also showed that there was no significant relationship between the level of knowledge and attitude of parents/guardians with the acceptance of HPV vaccine among 5th grade elementary school students in Ambon City in 2024.

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Evaluation of BPJS Financing Efficiency and Characteristics of Outpatient ENT Patients In 2023 – 2025 Based on INA CBGs Rates at RS X Surabaya

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A B S T R A C T

The National Health Insurance Program (JKN) through BPJS Kesehatan uses the INA-CBGs payment system to improve financing efficiency and the quality of hospital services. However, the increase in service complexity and changes in patient characteristics can affect service efficiency, especially in Ear, Nose, Throat (ENT) specialist services. This study aims to evaluate changes in patient characteristics, distribution of service financing, efficiency of INA-CBGs tariffs, and management of BPJS services for outpatient ENT Poly at Surabaya Islamic Hospital in 2023–2025. The research uses an evaluative method with a descriptive quantitative approach. The research data came from secondary data on TXT BPJS outpatient ENT which included patient characteristics, diagnosis, service cost components, hospital rates, and INA-CBGs rates. The sampling technique used total sampling of all BPJS patients in the outpatient ENT period of the study period. The results showed that patient visits were dominated by women and adult age groups. The most common cases are other minor chronic diseases. Total hospital costs increased from IDR 256,479,954 in 2023 to IDR 369,708,595 in 2025 with the largest cost component coming from consultations and medicines. Although the rate of INA-CBGs is still higher than the cost of hospitals, the difference in profits has decreased significantly. This study concludes that it is necessary to strengthen service efficiency, control costs, and optimize service management to maintain the financial sustainability of hospitals.

INTRODUCTION

The National Health Insurance (JKN) Program through BPJS Kesehatan is one of the government's strategic policies in Peraturan Menteri Kesehatan No.26 Tahun (2021) increase access to equitable, equitable, and sustainable health services for the people of Indonesia. In its implementation, hospitals use the Indonesia Case Base Groups (INA-CBGs) payment system, which is a package payment system based on the diagnosis and severity of the disease. The INA-CBGs system is designed to encourage cost efficiency and improve the quality of health services through controlling the financing of hospital services (Kementerian Kesehatan Republik Indonesia, 2022). However, several studies show that the implementation of INA-CBGs still faces various challenges, especially related to the mismatch between the real cost of hospital services and the claim rates received. These conditions can affect the efficiency of services and the financial sustainability of hospitals, especially in specialist services with high complexity of cases (Nuurjannah, 2021).

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One of the specialist services that has quite complex financing challenges is the Ear, Nose and Throat (ENT) service. ENT services have a wide variety of cases ranging from acute diseases, chronic diseases, diagnostic measures, to procedural actions that require the continuous use of drugs, medical devices, and supporting examinations (Andi Roesbiantoro et al., 2025). Previous research related to BPJS services in specialist polyclinics generally only focused on the analysis of unit costs and the difference between INA-CBGs and hospital costs without evaluating changes in patient characteristics and longitudinal distribution of service financing (Roesbianto et al., 2022). In fact, changes in patient demographic trends, an increase in chronic cases, and changes in service patterns can affect the financing structure and the level of hospital service efficiency (Elhuriyah & Lendrawati, 2025).

Based on these conditions, an evaluative study is needed to analyze changes in patient characteristics, the distribution of service financing components, the efficiency of INA-CBGs tariffs, and the management of BPJS services at the ENT Poly of the Surabaya Islamic Hospital for the period 2023-2025 (Rita et al., 2025). This study has novelty because it integrates the analysis of changes in patient demographic profiles with the evaluation of service financing and tariff efficiency of INA-CBGs longitudinally in ENT outpatient services (Purba et al., 2023; Syesharini et al., 2020). This study is different from previous studies which mostly only assessed the difference in rates or unit costs of services without evaluating the relationship between changes in patient characteristics to the financing structure and efficiency of hospital services (Wilis, 2025).

The formulation of the problem in this study includes how the demographic characteristics of BPJS patients at the ENT Poly of Surabaya Islamic Hospital in 2023–2025 have changed, how the distribution of the BPJS service financing component has changed, how the level of service efficiency is based on the difference in hospital rates and INA-CBGs claims, and how to evaluate the management of the ENT Poly services in dealing with changes in patient characteristics and BPJS financing efficiency demands. The purpose of this study is to evaluate changes in patient characteristics, analyze the distribution of service financing, assess service efficiency based on INA-CBGs rates, and prepare recommendations for more effective and efficient service management in ENT outpatient services (Nasel et al., 2025; Wijaya & Winoto, 2025).

This study uses an evaluative descriptive quantitative approach by utilizing secondary data from BPJS outpatient ENT at Surabaya Islamic Hospital in 2023–2025. The analysis was carried out on patient characteristics based on age, gender, and disease diagnosis, as well as service cost components such as consultations, drugs, medical procedures, supporting examinations, radiology, and laboratories. The results of the research are expected to make a scientific contribution to the development of BPJS service

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management based on efficiency and service quality, as well as become the basis for hospital policy making in controlling health service costs without reducing the quality of service to patients.

METHOD

This study uses an evaluative research method with a descriptive quantitative approach to evaluate changes in patient characteristics (Firman, 2024), distribution of service financing, efficiency of INA-CBGs tariffs, and management of BPJS services in outpatient cases of ENT at Surabaya Islamic Hospital for the period 2023–2025. The source of research data comes from secondary data in the form of outpatient BPJS TXT data obtained from the medical record unit and the hospital's BPJS claims section. The study population was all BPJS patients who were outpatient with ENT cases during the study period with sampling techniques using total sampling, so that all patient data that met the inclusion criteria was analyzed. The data used included patient characteristics based on age and gender, disease diagnosis, type of service action, service cost component, hospital rates, INA-CBGs rates, and the number of patient visits. Before analysis, the data is cleaned, coding, and validated to ensure the completeness and suitability of the research data.

Data analysis was carried out in an evaluative descriptive manner with the help of statistical software to describe changes in patient characteristics, distribution of service financing components, and service efficiency levels based on the difference in hospital rates and INA-CBGs claims (Nilmawati et al., 2025; Irdhina Putri Batrisyia, Fadli Robby Amsriza, 2024). Analysis was also carried out on changes in service costs such as consultation fees, nursing, medicines, supporting examinations, radiology, laboratories, and the use of medical devices. The results of the analysis were then evaluated to identify factors that affect service efficiency and changes in BPJS's financing structure in outpatient ENT services. Based on the results of the evaluation, recommendations were prepared for a more effective, adaptive, and efficient service management strategy in supporting the sustainability of BPJS services at the Surabaya Islamic Hospital (Nita Perlita, 2020). This study has passed the ethical review process at RS Islam Surabaya A. Yani with Ethical Clearance Number: 151.EC.KEP.RSIAY.07024.

RESULT

Table 1. Gender Distribution of BPJS Patients at the ENT Outpatient Clinic of RS X Surabaya, 2023–2025

No	Gender	2023	2024	2025
1	Men	798	884	958
2	Women	1,133	1,294	1,126
		1,931	2,178	2,084

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From Table 1 Overall, BPJS outpatient visits at the ENT Poly are dominated by female patients, despite an increase in the proportion of male patients in 2025. This shows that the ENT Poly service still has a high and consistent utilization rate by BPJS participants at the Surabaya Islamic Hospital.

Table 2. Age Classification of BPJS Patients at the ENT Outpatient Clinic of RS X Surabaya, 2023–2025

No	Age Classification	2023	2024	2025
1	Infant (< 1 year)	16	9	11
2	Toddler(1-4 Years)	94	101	102
3	Child (5 - 9 Years)	177	191	132
4	Teenagers (10 - 18 Years Old)	182	201	202
5	Adults (19-59 years)	950	1,101	1,194
6	Senior (>60 years old)	512	575	443
		1,931	2,178	2,084

From Table 2 Outpatient BPJS patient visits at the Surabaya Islamic Hospital are dominated by the adult age group (19–59 years) with an increasing trend from 950 patients in 2023 to 1,194 patients in 2025. The elderly group ranks second, despite declining in 2025. Meanwhile, visits to patients of infant, toddler, children, and adolescents are relatively stable. Overall, total visits increased in 2024 and decreased slightly in 2025.

Table 3. INA-CBGs Codes of BPJS Patients at the ENT Outpatient Clinic of RS X Surabaya, 2023–2025

No	Type of Disease / Action	2023	2024	2025
1	Fracture	1	0	0
2	Other minor acute diseases	62	27	1
3	Other minor chronic diseases	1.719	1.896	1.099
4	Miscellaneous diagnostic procedures on the ears, nose, mouth, and throat	1	6	5
5	Miscellaneous procedures on the ears, nose, mouth, and throat	119	105	212
6	Function test procedures on the ears, nose, mouth, and throat	29	70	91
7	Miscellaneous CT scan	0	1	0
8	Consultation or other examinations	0	66	664
9	Gynecological minor procedures	0	1	0
10	Miscellaneous minor procedures on the ears, nose, mouth, and throat	0	1	2
11	Minor procedures on the skin	0	2	0
12	Moderate procedures on the ears, nose, mouth, and throat	0	1	2
13	Physical therapy procedures and small musculoskeletal procedures	0	1	0
14	Individual psychotherapy in children with mental health problems	0	1	0
15	Wound care	0	0	3
16	Cauterization and packing procedures in the nasal cavity	0	0	2

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17	Minor procedures on the thyroid gland, parathyroid, and thyroglossal ducts	0	0	1
18	Minor procedures on nodules of the spleen and tymus	0	0	1
19	Gynecological ultrasound procedure	0	0	1
	Grand total	1.931	2.178	2.084

From Table 3 The number of BPJS visits to the outpatient ENT Poly at Surabaya Islamic Hospital in 2023–2025 is dominated by "Minor Chronic Diseases", with the highest number of cases in 2024 of 1,896 cases, then decreased to 1,099 cases in 2025. In addition, there has been an increase in "Consultation or miscellaneous examinations" which has increased sharply to 664 cases by 2025. The actions "Miscellaneous procedures on the ears, nose, mouth, and throat" and "Function test procedures" also show an increasing trend from year to year. Overall, total visits increased from 1,931 cases in 2023 to 2,178 cases in 2024, then decreased slightly to 2,084 cases in 2025.

Table 4. Revenue Classification Based on INA-CBGs Tariffs of BPJS Patients at the ENT Outpatient Clinic of RS X Surabaya, 2023–2025

No	Item	2023	2024	2025
1	Pasein Mansion	1931	2178	2084
2	Non-Surgical Procedures	8,920,000	5,260,000	28,455,300
3	Surgical Procedure	-	150,000	405,800
4	Konsultasi	116,300,000	131,122,900	118,696,800
5	Nursing	2,025,000	14,505,000	9,178,800
6	Tickets	58,010,000	65,510,000	62,575,000
7	Tool Rental	375,000	5,489,300	8,886,200
8	Support	60,000	1,583,000	11,834,500
9	Radiologi	4,315,000	4,592,700	7,375,000
10	Laboratory	250,000	840,000	3,670,000
11	Medication	66,224,954	88,767,225	118,631,195
12	Total Hospital Costs	256,479,954	317,820,125	369,708,595
	Cost/Patient	132,822	145,923	177,403

From Table 4. The cost of service for outpatient BPJS patients at the ENT Polytechnic of Surabaya Islamic Hospital shows an increasing trend during 2023–2025. Total hospital costs increased from IDR 256,479,954 in 2023 to IDR 317,820,125 in 2024 and IDR 369,708,595 in 2025. In line with that, the average cost per patient also increased from IDR 132,822 to IDR 177,403 per patient. The largest cost component comes from consultations and medications, which continue to increase every year. In addition, the cost of non-surgical, supportive, radiology, laboratory, and equipment rental procedures has also increased, indicating an increase in the complexity of services and the use of supporting measures in outpatients of the ENT Poly.

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Table 5. Difference Between INA-CBGs Tariffs and Hospital Tariffs of BPJS Patients at the ENT Outpatient Clinic of RS X Surabaya, 2023–2025

No	Price	2023	2024	2025
1	INA CBGS Price	413,674,400	468,325,500	431,827,600
2	Hospital Price	256,479,954	317,820,125	369,708,595
3	Differences	157,194,446	150,505,375	62,119,005
		81,406	69,103	29,808

From Table 5 The INA-CBGs rate for BPJS patients in the outpatient Poli ENT at Surabaya Islamic Hospital during 2023–2025 is still higher than hospital costs, so it still provides a positive difference. However, the value of the difference has decreased from IDR 157,194,446 in 2023 to IDR 150,505,375 in 2024 and decreased significantly to IDR 62,119,005 in 2025. The average difference per patient also decreased from IDR 81,406 to IDR 29,808 per patient. This shows that the profit margin of BPJS outpatient services at the ENT Poly is decreasing from year to year.

DISCUSSION

Based on the results of the study, the demographic characteristics of BPJS patients in the outpatient Poly ENT at Surabaya Islamic Hospital in 2023–2025 showed changes in the number of visits, age distribution, and gender of patients. The number of visits increased from 1,931 patients in 2023 to 2,178 patients in 2024, then decreased slightly to 2,084 patients in 2025.

By gender, female patients still dominate visits, but the number of male patients is increasing every year. By age group, adult patients aged 19–59 years are the largest group and will continue to increase until 2025, while the elderly group will continue to occupy a large proportion despite a decline in the last year of the study. These findings show that ENT poly services are more widely used by productive age groups and patients with repetitive control needs. These results are in line with the research of BPJS services in Indonesian hospitals which states that the adult and elderly groups are the main users of specialist outpatient services due to the high prevalence of chronic and degenerative diseases (Elhuriyah & Lendrawati, 2025)

The change in the distribution of the BPJS service financing component at the ENT Poly shows an increase in total hospital costs from IDR 256,479,954 in 2023 to IDR 369,708,595 in 2025. The largest cost component comes from consultations and medications. In addition, the cost of supporting materials, radiology, laboratories, and equipment rental has also increased. This condition shows an increase in the complexity of services and the use of diagnostic examinations in BPJS patients. The increase in drug costs also indicates the increasing need for therapy in patients with chronic ENT disease. The results of this study are in accordance with the theory of cost of care in health services which states that increasing

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service utilization, supporting examinations, and long-term therapy will have a direct impact on the increase in hospital service costs (Andi Roesbiantoro et al., 2025).

The level of service efficiency of the ENT Poly based on the difference in hospital rates and INA-CBGs claims shows that the service still provides a surplus for the hospital during the research period. The rate of INA-CBGs was recorded higher than hospital costs in the entire year of the study. However, the value of the surplus has decreased significantly from IDR 157,194,446 in 2023 to IDR 62,119,005 in 2025. The average difference per patient also decreased from IDR 81,406 to IDR 29,808 per patient. These findings show that service efficiency began to decline due to the increase in hospital operating costs faster than the increase in INA-CBGs rates (Roesbiantoro et al., 2022).

This condition is in line with various studies on the implementation of INA-CBGs in Indonesian hospitals which stated that hospitals face challenges in maintaining efficiency due to the increase in the price of drugs, consumable medical materials, and the complexity of BPJS patient cases (Azhari et al, 2020). The evaluation of the service management of the ENT Poly shows that hospitals need to strengthen service management to deal with changes in patient characteristics and the demands of BPJS financing efficiency. The dominance of adult patients and chronic disease cases shows the need to develop services based on continuity of care, strengthening clinical pathways, as well as controlling the use of drugs and supporting examinations so that services remain effective and efficient. In addition, the increase in diagnostic actions and examination of ENT function illustrates a change in service patterns towards more comprehensive and technology-based services. From the perspective of hospital management, this condition supports the theory of health service efficiency which emphasizes the importance of a balance between service quality, cost control, and financial sustainability of hospitals in the era of National Health Insurance.

CONCLUSION

Based on the results of the study, the characteristics of BPJS patients in the outpatient ENT Polytechnic at the Islamic Hospital Surabaya in 2023–2025 are dominated by female patients and the adult age group, with a relatively stable number of visits. The service financing component has increased every year, especially in the cost of consultations, drugs, and supporting examinations, which shows the increasing complexity of services. Although the INA-CBGs rate is still higher than the hospital cost so that the service still provides a surplus, the value of the difference in profits has decreased significantly from year to year. Therefore, it is necessary to strengthen service management through cost efficiency, optimization of clinical pathways, and control of the use of resources so that the quality of service and financial sustainability of hospitals are maintained.

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Sociodemography and Diseases Suffered by Prospective Hajj Pilgrimages 2025 in Batu City

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A B S T R A C T

The Hajj pilgrimage is a mass gathering of Muslims from all over the world facing extreme physical and environmental conditions. Indonesian Hajj pilgrims, as one of the largest contributors, are dominated by older adults with comorbidities, so they are at high risk of experiencing health problems during the Hajj pilgrimage. This study aimed to describe the sociodemographic characteristics and types of diseases suffered by prospective Hajj pilgrims in Batu City in 2025 to support more targeted health intervention planning. This study is a quantitative descriptive study with a cross-sectional approach involving 123 prospective Hajj pilgrims in Batu City in 2025 and using the total sampling technique. Data were collected through questionnaires, confirmed with the Batu City Health Office data, and analyzed univariately. The results of the study showed the majority of respondents were women (51.22%), adults (65.85%), and had a bachelor's degree (36.60%). Most prospective Hajj pilgrims suffer from more than one chronic disease. The most common diseases suffered include hypertension (55 people), obesity (35 people), musculoskeletal diseases (20 people), sleep disorders (17 people), and digestive disorders (14 people). This finding emphasizes the need to strengthen the Hajj health development program more intensively and comprehensively, especially for high-risk groups.

INTRODUCTION

The Hajj pilgrimage is one of the largest mass gatherings in the world and presents unique public health challenges. Millions of Muslims worldwide gather each year to perform the Hajj pilgrimage in Mecca, Saudi Arabia. The Hajj pilgrimage is one of the five pillars of Islam. It is, therefore, obligatory for all Muslims who are physically and financially able to travel to Mecca once in their lifetime (Aldossari et al., 2019). Each year, 2-3 million pilgrims of varying ethnic backgrounds, socioeconomic statuses, and ages, and the majority of them elderly from around 184 countries around the world, gather at the holy site "Haram" in Mecca, Saudi Arabia, to perform the Hajj (Masud et al., 2016; Gaddoury & Armenian, 2024)
The Hajj pilgrimage area is a sandy valley surrounded by rugged mountains exposed to the sun. In Mecca, especially from May to September, the temperature ranges from 38°C to 50°C, with a relative humidity of 25% to 50% (Ramadan & Zahra, 2016). The performance of Hajj and its rituals are physically demanding, and there is crowding due to the large number of pilgrims. During Hajj, pilgrims face harsh environments, crowding, physical disturbances, and mental stress due to difficult journeys, steep climbs, sun exposure, extreme temperatures, continuous walking during religious rituals, and traffic jams at specific times and places. Many pilgrims are injured, tired, sick, exhausted, and dehydrated (Ali & Abideen, 2024; Pane et al., 2019). It can also cause complications and burden physiological functions, including the heart, chest,

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abdomen, and kidneys, for those suffering from chronic diseases. In addition to disease issues, the crowding of pilgrims can cause several other significant problems, including lost and stranded pilgrims, injuries, and even death (Masud et al., 2016). Environmental and physical stress and changes in eating and sleeping patterns experienced during the Hajj can also lead to the exacerbation of non-communicable diseases (NCDs). NCDs and their complications can pose significant health risks during the Hajj and are a major cause of hospitalization and death among pilgrims (Ali & Abideen, 2024).

It is estimated that the number of Muslims with chronic diseases performing the Hajj could exceed 300,000 per year. However, this may be an underestimate, as the prevalence of chronic diseases in Arab and Muslim countries is higher than in non-Muslim countries (Gaddoury & Armenian, 2024). Indonesia is the country with the largest Muslim population in the world. Indonesian Hajj pilgrims are the largest contributors each year, at 10%, and have relatively high health risks, so pilgrims are at risk of receiving treatment and dying while performing the Hajj (Riskiyah et al., 2024). The profile of Indonesian Hajj pilgrims is mostly elderly, and most have a risk of chronic and degenerative diseases. According to the 2017 Hajj Health report, in the last 10 years, the most common diseases among Hajj pilgrims include cardiovascular disease, respiratory infections, chronic obstructive pulmonary disease (COPD), diabetes, hypertension, stroke, urogenital disorders, geriatrics, psychiatric and malignant diseases (Rustika et al., 2019)**.** East Java Province ranks first in Indonesia for hajj pilgrims who are at high risk (Wahjudi & Putriana, 2014).

In addition to disease, sociodemographic profiles such as age, gender, and education level can affect the health conditions of pilgrims and their understanding of health risks during the Hajj. Age has a strong correlation with an increased risk of death, especially among Hajj pilgrims (Fajriani, 2024). Based on data from the Batu City Ministry of Religious Affairs Office, in 2023, the number of Hajj pilgrims departed reached 204 people, while in 2024, it was 140 pilgrims, and the majority were elderly. Most Hajj participants were over 60 years old, with a higher prevalence of chronic diseases in older people (Gaddoury & Armenian, 2024). Biologically, the aging process results in decreased organ function, endurance, and the ability to adapt to extreme environments such as hot weather in Saudi Arabia. In addition, elderly Hajj pilgrims also tend to have comorbidities that worsen their health conditions during the physically demanding Hajj (Fajriani, 2024). Men generally dominate Hajj pilgrim deaths that occur within five years of the Hajj because men are responsible for their wives or elderly pilgrims during the Hajj, especially when throwing stones, so this can be one of the factors that burden the physical activity and responsibility of male pilgrims during the Hajj (Febriyanti & Adisasmita, 2023). For education level, the higher the level of education is significantly related to the lower prevalence of chronic diseases and also the lower frequency of suffering from health complaints during the Hajj because education is

generally believed to be related to improved health, life expectancy, and quality of life (Alamri et al., 2020).

Prospective hajj pilgrims need to be aware of the risks and the importance of health to ensure that the pilgrims perform the hajj safely (Ali & Abideen, 2024). Therefore, understanding the sociodemographic factors and diseases suffered by prospective hajj pilgrims is crucial in improving their health readiness before departing for the hajj pilgrimage (Rustika et al., 2019). Based on the background above, this study aims to determine the sociodemographic picture and diseases suffered by prospective hajj pilgrims in Batu City in 2025. The results of this study are expected to contribute to the planning of more targeted health programs and increase the effectiveness of Hajj health development to improve the health readiness of pilgrims before leaving for the Holy Land. Thus, the risk of health complications during the hajj pilgrimage can be minimized, and pilgrims can perform the pilgrimage more smoothly and safely.

METHOD

This study used a quantitative descriptive research design with a cross-sectional approach to determine the sociodemographic picture and identify diseases suffered by prospective Hajj pilgrims in Batu City in 2025 before they departed for Hajj. This study was conducted from August to December 2024 in Batu City. The sample was selected using a total sampling technique: all Prospective Hajj Pilgrims who will depart for Hajj in 2025 registered at the Batu City Ministry of Religion office and the Batu City Health Office, totaling 123 people. The inclusion criteria for this study were prospective Hajj pilgrims in Batu City in 2025 who can be contacted and are willing to be research respondents. The sociodemographic profile of respondents, including age, gender, education, and data on diseases suffered by prospective Hajj pilgrims, were obtained using a questionnaire containing questions about age, gender, education level, and health history. Information about prospective Hajj pilgrims' health history was rechecked using the Health Office Batu City data. Sociodemographic data and various diseases suffered by respondents used univariate analysis, which was displayed in the form of frequency distribution and percentage.

RESULT

According to data from the Ministry of Religion, the number of prospective Hajj pilgrims in Batu City in 2025 is 157 people. Still, in this study, only 123 prospective Hajj pilgrims were obtained because several prospective Hajj pilgrims could not be contacted/no home address was found, and the location was outside Batu City, withdrew, or postponed. Sociodemographic data of Hajj pilgrims is only divided by gender, age, and education level, as presented in Table 1 below. The following is the sociodemographic data of Hajj pilgrims.

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Table 1. Sociodemographic Characteristics Data of Prospective Hajj Pilgrims

Characteristics Respondents	Number (n)	Percentage (%)
Gender		
Male	60	48.78 %
Female	63	51.22 %
Age		
Teenagers (10-18 Years)	0	0 %
Adults (19-59 Years)	81	65.85 %
Elderly (60 Years and above)	42	34.15 %
Education		
Elementary School	15	12.20 %
Junior High School	23	18.70 %
High School	32	26.01 %
Diploma 1	3	2.43 %
Bachelor's degree 1	45	36.60 %
Bachelor's degree 2	5	4.06 %

Some of the 2025 Batu City Hajj Candidates Suffer from more than 1-2 Diseases. The following are some of the Diseases Suffered by Prospective Hajj Pilgrims Presented in table 2.

Table 2. Diseases Suffered by Prospective Hajj Pilgrims in Batu City in 2025

Disease	Frequency
Hypertension	55
Obesity	35
Musculoskeletal Diseases (joint pain, muscles, bones, kyphosis)	20
Sleep Disorders (insomnia)	17
Gastrointestinal Disorders (GERD, Gastritis, Constipation, Unable to Control Defecation, Hemorrhoids)	14
Dyslipidemia	14
DM (Diabetes Mellitus)	13
Non-hypertensive Cardiovascular Diseases (CHD, Heart Failure, Arrhythmia)	11
Hyperuricemia	9
Mental Disorders (Depression, Anxiety)	8
Nervous System Disorders (CVA, Vertigo, Migraine)	10
Eye Disorders (Cataracts)	7
Neuropathy	5
Respiratory System Disorders (Asthma, Chronic Cough)	4
Urogenital Urinary Disorders (Prostate, Urinary Disorders)	3
Skin Disorders (Dermatitis Atopy and Urticaria)	3
Cognitive Decline	1
Hypotension	1

DISCUSSION

Sociodemographic Characteristics of Respondents

The gender distribution in this study was slightly more dominant in females, namely 63 people (51.22%), three more than men. Prospective female hajj pilgrims were at 2.113 times the risk of having an unfit physical fitness status compared to prospective male hajj pilgrims. This difference is due to differences in hormone development and function (Yusri et al., 2020). This is in contrast to the research, which stated that the majority of Indonesian hajj pilgrims who died were in the male group (Febriyanti & Adisasmita, 2023). The weaker male immune system influences this compared to women because women produce

more antibodies, which can last longer in circulation than men, making men more susceptible to various infectious diseases (Ardini, 2023).

The age distribution of prospective hajj pilgrims shows that the majority are adults (19-59 years), as much as 65.85%, followed by the elderly group, as much as 42 people (34.15%). The large number of prospective elderly hajj pilgrims in 2025 needs to be a concern for the government. Elderly hajj pilgrims have health in the high-risk category. The elderly are included in the at-risk group because they are often accompanied by declining health status, especially physical health. The declining health status of the elderly and increasing age will affect their quality of life because it will be accompanied by the emergence of various diseases, decreased body function, body balance, and the risk of falling. The elderly also often experience decreased cognitive abilities, so they often forget, are disoriented about time, place, or space, do not easily accept new things, and are even unable to carry out normal daily activities (Wara & Boy, 2021). The elderly who also have a history of comorbidities and do heavy physical activities while performing the hajj pilgrimage will be at risk of worsening their illness and can even cause the pilgrim to die. In addition, the high mortality and morbidity rates among Hajj pilgrims in Saudi Arabia are closely related to the age factor of the pilgrims who are elderly accompanied by chronic diseases and the climate, which is very different from that in Indonesia (Elwindra, 2020).

The level of education of prospective Hajj pilgrims is quite diverse, but in this study, the majority had a bachelor's degree, namely 45 people (36.60%). A person with a higher education tends to consider health important, and it is easier to accept and absorb information (Fatimah & Indrawati, 2019). Higher education makes a person think more logically and rationally and see an issue from various sides to analyze and solve a problem. In addition, a person's high education can also affect health because they have a healthier lifestyle and a greater awareness of health and disease (Pradona & Sulistyowati, 2014 ; Harahap & Nurwahyuni, 2019).

Diseases Suffered by Prospective Hajj Pilgrims

The diseases suffered by Prospective Hajj Pilgrims of Batu City in 2025 are diverse. Most prospective hajj pilgrims do not only suffer from 1 disease but 2-3 diseases. The 10 most common diseases suffered by prospective hajj pilgrims in Batu City in 2025 include hypertension, obesity, musculoskeletal diseases, sleep disorders (insomnia), digestive disorders, dyslipidemia, diabetes mellitus, non-hypertensive cardiovascular diseases (CHD, heart failure, and arrhythmia), hyperuricemia, mental disorders (depression, anxiety).

In terms of diseases suffered by CJH Batu City in 2025, hypertension is the most dominant disease, occupying the first level of as many as 55 people. In 2023, hypertension is also the most common disease suffered by Solo embarkation Hajj pilgrims, followed by hypercholesterolemia, diabetes mellitus, and cardiomegaly (Amada et al., 2025). Hypertension is a major risk factor for stroke, cardiovascular disease,

and kidney disease. In addition, hypertension is also the largest metabolic risk factor in the world, which causes 19% of global deaths, and only 20% of hypertension sufferers can control their blood pressure (Yezli et al., 2021). In 2017, it was reported that 49% of Indonesian Hajj pilgrims died due to cardiovascular disease, the majority of whom had risk factors such as hypertension (53.4%) (Sakti et al., 2019). Therefore, strict blood pressure management is an important strategy in the health development of prospective pilgrims so that their blood pressure can be properly controlled.

Obesity ranks second as a disease suffered by prospective Hajj pilgrims in 2025 in Batu City, with as many as 35 people; this shows that many prospective Hajj pilgrims face significant metabolic challenges. Obesity is an imbalance between height and weight caused by too much fat tissue (Jayanti et al., 2019). Obesity has a detrimental effect on humans and causes various impacts on other diseases, such as worsening asthma, back pain, osteoarthritis, gallstone formation, and sleep apnea (Toar et al., 2023). The Hajj pilgrims who suffer from non-communicable diseases, 80% are included in the pilgrims who suffer from obesity (Saidah et al., 2023). In East Java Hajj pilgrims from 2017 to 2019, there were 38,403 (36.36%) Hajj pilgrims who were categorized as overweight and 14,301 (13.54%) Hajj pilgrims who were categorized as obese (Utami & Ardiana, 2021). Being overweight and obese increases the risk of cardiovascular disease and diabetes as well as hypertension. Prospective Hajj pilgrims with obesity had a 1.555 times higher risk of developing hypertension than those with a normal body mass index (Harahap & Nurwahyuni, 2019).

Twenty prospective pilgrims are suffering from musculoskeletal diseases. Musculoskeletal diseases can directly impact the pilgrims' ability to carry out rituals requiring high mobility, such as tawaf and sai. The Hajj pilgrimage is an activity that requires heavy physical activity, so pilgrims need physical strength and good physical fitness so that they can carry out a series of worship activities smoothly. Problems often complained about by pilgrims are pain in the neck, shoulders, knees, waist, and other body parts. If these complaints are not handled properly, they will hinder the Hajj process later (Santoso et al., 2024). 80.46% of 1,715 pilgrims reported experiencing musculoskeletal pain during the Hajj. The most common pain reported was in the ankles/feet (38.34%), legs (29.89%), lower back (28.47%), and knees (21.84%). Factors such as advanced age, female gender, and high body mass index (BMI) are associated with an increased prevalence of musculoskeletal pain. This condition can lead to limited mobility, severe pain, and even total inability to complete the Hajj rituals (Alshehri et al., 2021).

Sleep disorders (insomnia), anxiety, and depression often occur together and influence each other, especially in high-pressure conditions such as those experienced by prospective Hajj pilgrims. In this study, 17 pilgrims experienced insomnia, and 8 showed symptoms of mental disorders such as anxiety and depression. Hajj's emotional and social aspects are very important in shaping pilgrims' mental and physical health. The challenges pilgrims face during Hajj include heat exposure, physical exhaustion,

overcrowding, lack of sleep, and fear of getting lost. These factors can cause physical and emotional stress that can lead to anxiety, depression, and other mental health problems (Alzeer & Abuzinadah, 2024). Muslims may have pre-existing mental illnesses or may experience mental illness for the first time during Hajj. Pilgrims who are performing Hajj for the first time and the elderly are at high risk of developing mental illness. Common mental illnesses seen during Hajj are stress, psychosis, insomnia, and mood disorders (Hankir et al., 2019). Sleep disorders/insomnia, if not treated immediately, can affect the overall health of the pilgrims. Sleep disorders in the form of lack of sleep or restless sleep make the body feel tired and can also affect the quality of a person's health (Nugroho et al., 2022 ; Wahyuningrum et al., 2015). Causes of insomnia include stress, hormonal changes, and chronic disorders, depression (Wahyuningrum et al., 2015). The Hajj pilgrimage can also cause anxiety for pilgrims due to social pressure and the busy rhythm of the journey (Islamiyah et al., 2024). Pilgrims experience anxiety, especially during activities such as staying overnight in Muzdalifah and throwing pebbles. Sources of this anxiety include environmental factors, weather conditions, and the physical and emotional conditions of the pilgrims. To overcome their anxiety, these elderly pilgrims use various methods, including praying and maintaining a positive mindset. Their strong intentions and good spirits also play an important role in reducing their anxiety levels (Thirafi & Hakim, 2018).

Gastrointestinal Disorders such as GERD, gastritis, constipation, inability to control bowel movements, and hemorrhoids are also experienced by many prospective hajj pilgrims, as many as 14 people. Gastrointestinal system disorders are one of the common health problems that occur during the hajj. Several reports indicate that the incidence of gastrointestinal diseases is relatively high and has a comparable incidence rate with several other diseases. However, respiratory disorders remain the most common health problem. One report noted the prevalence of gastrointestinal disorders at 6.3% (Shaikh-Omar et al., 2013).

The number of prospective hajj pilgrims suffering from type 2 diabetes mellitus (DM) is not as large as those suffering from hypertension and obesity, only 13 people, but this still needs to be a concern for the government. The number of hajj pilgrims with DM has increased from 2022, namely from 38 people (13.06%) to 130 people (19.1%) in 2023 (Ekawati et al., 2024). Diabetes mellitus has been identified as a cause of morbidity and mortality during the hajj. Diabetic patients face various logistical and environmental constraints that can complicate the management of their disease, including exposure to extreme heat, prolonged physical activity, and difficulty in accessing and storing their medications (Helmizar et al., 2024). Approximately 20% of pilgrims with underlying diseases who visit Mecca have diabetes. These people are at higher risk of serious complications such as hypoglycemia, hyperglycemia, diabetic ketoacidosis, cardiovascular disease, heat exhaustion, heat stroke, dehydration, leg injuries, and some infectious diseases (Helmizar et al., 2024; Ekawati et al., 2024).

Several prospective hajj pilgrims suffer from cardiovascular diseases, including coronary heart disease (CHD), heart failure, and arrhythmia, for as many as 11 people. Cardiovascular disease is the most common cause of morbidity (34.1%) in patients requiring hospitalization in Mecca during the 2005 hajj. The Saudi Arabian Ministry of Health reported that cardiovascular disease is the most common cause of death compared to other diseases, both infectious and non-infectious (Ardiana et al., 2023). In 2017, in Indonesia, it was reported that 49% of hajj pilgrims died due to cardiovascular disease (Pratiwi & Helda, 2024). In addition, 14 hajj pilgrims have dyslipidemia. Dyslipidemia is related to cardiovascular disease, where dyslipidemia is a significant risk factor for atherosclerotic cardiovascular disease (Tokgozoglu et al., 2022). Increased LDL cholesterol is a major aspect of dyslipidemia and is associated with increased cardiovascular risk, especially in atherosclerotic cardiovascular disease (Tall et al., 2022).

CONCLUSION

Most of the prospective hajj pilgrims in Batu City in 2025 will consist of adults and older people with a fairly high educational background. Most of them do not only have one type of disease but also suffer from more than one health problem. Hypertension and obesity are the most common conditions found, followed by musculoskeletal diseases, sleep disorders (insomnia), and digestive disorders. Interestingly, not only physical conditions are of concern, but also psychological aspects such as anxiety and depression begin to appear before departure. Data and information regarding the health conditions of prospective hajj pilgrims are very useful in planning and implementing health services for all parties, especially the government, health workers, and families, so that they can pay more attention to the physical and mental readiness of prospective hajj pilgrims. More comprehensive health guidance, not only from a medical perspective but also psychosocially, needs to be carried out before departure so that pilgrims can carry out their worship safely, comfortably, and safely until they return to their homeland.

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The Effect of Weight-Bearing Exercise on Improving Muscle Tone in Post-Stroke Patients

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A B S T R A C T

Stroke is a neurological disorder that can cause a decline in motor function, one of which is a decrease in muscle tone. One of the interventions that can be carried out in the rehabilitation of post-stroke patients is weight bearing exercise (WBE). This study aims to determine the effect of weight bearing exercise on the improvement of muscle tone in post-stroke patients. This study uses a quasi-experimental design with a pretest-posttest with control group approach. The sample in this study consisted of 19 respondents in the treatment group. Measurements were taken before and after the intervention using a muscle tone scale. Data analysis was performed using the paired t-test. The research results showed that before the intervention, most respondents were in the low muscle tone category, with grade 2 totaling 10 people (52.6%) and grade 3 totaling 9 people (47.4%). After the intervention, there was an increase to grade 4 totaling 12 people (63.2%) and grade 5 totaling 7 people (36.8%). The mean value increased from 2.47 to 4.37 with a standard deviation from 0.513 to 0.496. The paired t-test results showed a p-value = 0.000 ($p < 0.05$). The conclusion of this study shows that weight bearing exercise has a significant effect on increasing muscle tone in post-stroke patients.

INTRODUCTION

Stroke is one of the most common noncommunicable diseases leading to disability and death worldwide. An interruption in blood flow to the brain can cause a stroke, which damages brain tissue and disrupts neurological function (Wulandari et al., 2025). This condition can lead to various complications, such as sensory impairments, speech disorders, loss of balance, and hemiparesis—or muscle weakness on one side of the body.

Motor function, including reduced muscle strength and tone, typically occurs in stroke patients. According to Mustafa (2023), reduced muscle tone can lead to difficulty moving, imbalance, and dependence on assistance for daily activities such as walking, standing, and transferring. Patients' quality of life may decline due to these impairments and increase the risk of additional complications, such as contractures and muscle atrophy, if not properly managed.

Data from the World Health Organization (WHO) indicate that stroke-related deaths remain one of the leading causes of death globally, and this figure continues to rise annually (Liu et al., 2025). Stroke incidence rates in Indonesia are also rising, particularly among adults and the elderly. This increase results in more patients requiring long-term rehabilitation to restore their motor functions (Rahayu et al., 2025).

The goal of post-stroke rehabilitation is to help patients regain bodily functions, improve their mobility, and maintain the ability to perform daily activities independently. Weight-Bearing Exercise (WBE) is a type of exercise involving weight-bearing on the extremities, aimed at improving muscle activation,

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balance, coordination, and postural control in patients. It is one of the rehabilitation therapies that can be provided (Sasahira, 2025).

Weight-Bearing Exercise enhances neuromuscular activity and motor control in post-stroke patients through proprioceptive stimulation of muscles and joints (Yuliana, 2024). This exercise, performed gradually and repeatedly, aids the brain's neuroplasticity process in re-establishing neural pathways damaged by stroke. Weight-bearing exercises can also help patients maintain their posture, stand, and walk independently.

There are still a significant number of post-stroke patients with mobility impairments and muscle weakness at the Kebomas Community Health Center. According to initial observations, most patients experience movement limitations in both the upper and lower extremities. Therefore, effective rehabilitation exercises are needed to improve patients' muscle tone and enhance their functional abilities. However, post-stroke patients have not yet been performing weight-bearing exercises on a regular basis. Considering this issue, the researchers aim to conduct a study on how weight-bearing exercises impact the improvement of muscle tone in stroke patients at the Kebomas Community Health Center. It is hoped that this study will serve as one of the non-pharmacological intervention alternatives capable of enhancing motor skills and quality of life for stroke patients.

METHOD

Using a quasi-experimental design, this study employed a pre-test and post-test control group design. The study involved post-stroke patients in the service area of the Kebomas Community Health Center. A purposive sampling technique was used based on inclusion and exclusion criteria. Muscle tone was the dependent variable in this study, and weight-lifting exercises were the independent variable.

The manual muscle strength assessment tool (MMT) was used to measure muscle tone. The research process began with an initial measurement (pre-test). Subsequently, the treatment group received weight-lifting exercises, while the control group received no exercises. After the intervention period ended, a final measurement (post-test) was conducted to assess changes in muscle tone. Subsequently, the data were statistically analyzed to determine differences before and after the intervention, as well as differences between the treatment and control groups. Ethical considerations such as informed consent, anonymity, and respondent confidentiality were also addressed in this study.

RESULT

Characteristics of Respondents by Age

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Tabel 1. The characteristics of respondents based on the age of post-stroke patients at the Kebomas Community Health Center in Gresik Regency

Age	Treatment group		Control group	
	n	%	n	%
Early-aged elderly category (41–50 years old)	6	32 %	5	26%
Middle-aged elderly category (51–60 years old)	13	68 %	14	74%
Total	19	100%	19	100%

Table 1 shows that the majority of respondents in the treatment group fell into the middle-aged elderly category (51–60 years old), totaling 13 people (68%), while 6 people (32%) fell into the early-aged elderly category (41–50 years old). In the control group, the majority of respondents were also in the middle-aged elderly category (51–60 years old), totaling 14 people (74%), while the early-aged elderly category (41–50 years old) comprised 5 people (26%). Thus, the majority of respondents in both groups fell within the 51–60-year-old age range.

Characteristics of Respondents by Gender

Table 2 Gender of Respondents at the Kebomas Community Health Center

Gender	Treatment group		Control group	
	n	%	n	%
Male	13	68%	14	74%
Female	6	32 %	5	26%
Total	19	100%	19	100%

Table 2 shows that the majority of respondents in the treatment group were male, totaling 13 people (68%), while 6 were female (32%). In the control group, the majority of respondents were also male, totaling 14 people (74%), while females numbered 5 (26%). Thus, the majority of respondents in both groups were male.

Characteristics of Respondents by Occupation

Table 3. Respondents Occupations at the Kebomas Community Health Center

Occupations	Treatment group		Control group	
	n	%	n	%
Homemakers	5	26%	2	10%
Civil servant	1	6 %	4	22%
Self-employed individuals	7	36%	3	15%
Retirees	6	32%	10	53%
Total	19	100%	19	100%

Table 3 shows the occupations of respondents in the treatment group: 7 self-employed individuals (36%), 6 retirees (32%), 5 homemakers (26%), and 1 civil servant (6%), while in the control group, there were 10 retirees (53%), 4 civil servants (22%), 3 self-employed individuals (15%), and 2 homemakers (10%).

Respondent Characteristics Based on Time Since Stroke

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Table 4. Time Since Stroke Among Respondents at the Kebomas Community Health Center

Time Since Stroke	Treatment group		Control group	
	n	%	n	%
1-5 months	15	78%	12	64%
6-10 months	3	16%	5	26%
1 year	1	6%	2	10%
Total	19	100%	19	100%

Table 5.5 shows that the duration since stroke onset for respondents in the treatment group was 1–5 months for 15 people (78%), 6–10 months for 3 people (16%), and 1 year for 1 person (6%), while in the control group, 12 participants (64%) had a duration of 1–5 months, 5 participants (26%) had a duration of 6–10 months, and 2 participants (10%) had a duration of 1 year. Thus, the majority of participants in both groups had a post-stroke duration of 1–5 months.

DISCUSSION

Based on the research findings, it was found that prior to the weight-bearing exercise intervention, the majority of respondents were in the low muscle tone category. This indicates that post-stroke patients experience a significant decline in motor function, which affects their mobility. Following the intervention, there was a significant increase in muscle tone among all respondents. Most respondents improved to grade 4 and grade 5. This indicates that weight-bearing exercise is effective in improving muscle tone in post-stroke patients.

Based on the results of the paired t-test, a p-value of 0.000 ($p < 0.05$) was obtained, leading to the conclusion that there is a significant effect of weight-bearing exercise on muscle tone improvement. Theoretically, weight-bearing exercise is a form of training that applies mechanical stress to muscles and joints, thereby stimulating proprioceptive receptors. This stimulation sends signals to the central nervous system, which in turn enhances neuromuscular activation. Additionally, repetitive exercises can strengthen motor pathways and improve muscle contraction.

The results of this study align with previous research indicating that weight-bearing exercises can improve muscle strength and motor function. In this study, the increase in muscle tone occurred due to repeated sensorimotor stimulation and the patient's active participation in the exercises. The researchers suggest that improved muscle tone is influenced not only by physical exercise but also by the consistency of the exercises and the patient's active participation throughout the rehabilitation process. Thus, weight-bearing exercise can serve as an effective intervention for enhancing muscle tone in post-stroke patients.

CONCLUSION

Research findings indicate that weight-bearing exercises have a significant effect on improving muscle tone in stroke patients. The neuromuscular stimulation that occurs during these exercises enables this

intervention to help improve motor function. Weight-bearing exercises can stimulate the proprioceptive system and gradually increase muscle activation by improving muscle tone. This indicates that weight-bearing exercises are an effective rehabilitation technique to aid in the recovery of stroke patients.

Additionally, the success of this intervention is influenced by the patient's active participation in the exercises and consistency in therapy implementation. Repetitive exercises enhance muscle and nerve adaptation, which helps patients perform daily activities. Therefore, to improve muscle tone and quality of life for post-stroke patients, resistance training can be incorporated into a structured rehabilitation program.

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The Effect of Vitamin-D Supplementation on HDAC2 Levels in Stable COPD Patients

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A B S T R A C T

Chronic Obstructive Pulmonary Disease (COPD) is the third leading cause of global mortality, with persistent lung inflammation contributing to its progression. This inflammation is partially due to reduced levels of the Histone deacetylase 2 (HDAC2) protein. Research shows that Vitamin D can modulate HDAC2 levels and slow the advancement of COPD. This experimental study aimed to evaluate the effect of vitamin D supplementation on HDAC2 expression in stable COPD patients at Jemursari Islamic Hospital. Five randomly selected COPD patients received a daily dosage of 5000 IU of Vitamin D for three months. Serum levels of 25(OH) D and HDAC2 were measured before and after the intervention. The results showed a significant increase in both Vitamin D and HDAC2 levels, with a notable, though not statistically significant, improvement in lung function. The findings suggest that consistent Vitamin D supplementation can reduce inflammation by raising HDAC2 levels, potentially slowing lung damage in COPD patients. Therefore, Vitamin D treatment is beneficial in managing COPD by improving lung health and preventing disease progression.

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a chronic progressive lung medical condition characterised by respiratory problems and chronic airflow blockage, often resulting from exposure to toxic chemicals, notably cigarettes. Chronic Obstructive Pulmonary Disease (COPD) is globally recognised as a leading cause of high mortality rates. This condition ranks as the third leading cause of death globally and has a prevalence of over 80% in nations with poor to moderate incomes. Within Indonesia, the estimated risk level is at 9.2 million individuals (Jarhyan et al., 2022). Chronic obstructive pulmonary disease (COPD) involves persistent inflammation of the lungs, leading to a decline in quality of life by disrupting daily activities. Chronic obstructive pulmonary disease (COPD) patients see incomplete recovery due to persistent inflammation resulting from the release of pro-inflammatory cytokines and chemokines. This inflammation can lead to tissue damage and obstruction of airflow in the lungs (Global Initiative for Chronic Obstructive Lung Disease, 2022). According to estimates, up to 85% of individuals with COPD are smokers due to the substantial reduction in lung function caused by exposure to tobacco smoke. Several specific medications, including Theophylline, beta2-agonists (LABA), and inhaled corticosteroids, are beneficial in treating this condition. Nevertheless, the incidence of COPD cases continues to rise swiftly (Li et al., 2020).

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Histone deacetylase 2 (HDAC2) is an enzyme essential for gene regulation in the process of chromatin remodelling. Individuals with COPD experience a reduction in HDAC2 gene expression, leading to elevated histone acetylation and the production of pro-inflammatory genes. The immunomodulatory action of vitamin D involves its binding to receptors, including macrophages, B cells, and T cells, therefore enhancing the immune response through the reduction of inflammation. At present, vitamin D is utilised as a medication that has a significant impact on cases of COPD due to its ability to influence associated systemic effects and its gene regulatory activities that are believed to provide protection against lung illness. Most of the synthesis of vitamin D occurs from pre-vitamin D3 in the skin of humans. By means of solar radiation, it will undergo synthesis from 7-dehydrocholesterol. Furthermore, fish liver oil, fish fat, liver, egg yolks, and cheese were identified as sources of vitamin D (Li et al., 2020).

According to Sultana et al., (2022), the presence of vitamin D inhibits the growth of Th 1 and Th17 cells, which play a role in inflammation. Consequently, insufficient levels of vitamin D can exacerbate symptoms by reducing lung function and increasing the frequency of lung exacerbations. The primary role of this vitamin is to facilitate bone metabolism. Furthermore, it has the ability to decrease the synthesis of inflammatory cytokines (IL-5, IL-9, and IL-13) in type-9 T-helper cells and so act as producers of the immune system. Nevertheless, this can be impaired if the patient suffers from a lack of vitamin D, which has implications for lung function, inflammation, and the prognosis of associated disorders (Li et al., 2020). Furthermore, there is a correlation between vitamin D insufficiency and chronic illnesses, including autoimmune disorders, cardiovascular disorders, and cancer (Janssens et al., 2012). Vitamin D, when used in long-term treatment and at the correct dosage, can effectively prevent acute exacerbations in individuals with COPD. Prolonged exposure to cigarette smoke as a catalyst for COPD will activate intracellular pathways (NF-B and MAPK p38) that are responsible for initiating inflammation. Furthermore, these results suggest that vitamin D may provide protection against inflammation and injury to lung tissue by blocking intracellular signaling pathways and stimulating profibrotic mediators (Khan et al., 2017).

Prior research has demonstrated that vitamin D exerts a therapeutic impact by regulating HDAC2 levels in individuals with chronic obstructive pulmonary disease (COPD). In order to decrease inflammation and enhance responsiveness to corticosteroids, vitamin D has the ability to enhance the activity of HDAC2. According to Janssens W et al. (2012), augmenting HDAC2 levels can mitigate oxidative damage caused by vitamin D supplementation. Additional research indicates a correlation between insufficient levels of vitamin D and pulmonary function, elucidated by variations in lung volume. This correlation can be linked to the association between chronic obstructive pulmonary disease (COPD) and the vitamin D status inside the body. (Nur Aini et al., 2023). Furthermore, a similar study elucidated that the rising occurrence of vitamin D insufficiency among patients with chronic obstructive pulmonary disease (COPD) will lead to a decline in their quality of life. Therefore, the administration of Dini vitamins as a medication can

effectively lower the occurrence of exacerbations. Nevertheless, there is currently no robust evidence indicating that this supplementation can effectively mitigate harm to the pulmonary organs (Mullin & Milne, 2023). The efficacy of vitamin D supplementation in managing COPD has been extensively established, however numerous studies have failed to yield consistent findings. Therefore, we undertook a study specifically targeting COPD patients. The objective of this study is to assess the efficacy of vitamin D supplementation in improving lung function in patients with chronic obstructive pulmonary disease (COPD).

METHOD

Research Design

This research is a true experimental study using a pre-test and post-test method. The levels of HDAC2 were measured pre and post-supplementation of vitamin D given for 3 months. This research will be conducted at the Pulmonary Clinic of Islamic Hospital Jemursari Surabaya. The research will take place from April 2024 to June 2024. The sample in this study consists of some COPD patients who meet the inclusion and exclusion criteria as follows: Inclusion criteria: a. Diagnosed with COPD stage GOLD 2 and GOLD 3, b. COPD patients who regularly seek treatment and receive standard bronchodilator therapy, c. Willing to sign informed consent, d. Patients with 25(OH)D levels < 32 ng/ml, e. Male gender aged 40-80 years, f. Normal liver function, g. Normal kidney function. Exclusion criteria: a. Suffering from respiratory diseases other than COPD, b. Allergy to vitamin D. Drop-out criteria: a. Moving to an address that cannot be contacted, b. Passing away, c. Not taking vitamin D for two consecutive weeks.

Vitamin D Delivery

This vitamin exists in two active forms: vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol). Calcitriol, also known as 1,25-(OH)2D3, is a pleiotropic hormone that emerges as the active form of vitamin D following its conversion by the kidneys from calcidiol, which is excreted by the liver. This conversion process is facilitated by the enzyme cytochrome P450 hydroxylase 1-alpha. Salivary 25(OH)D indicates the level of vitamin D. Patient administration of vitamin D consists of Cholecalciferol at a dosage of 5000 IU. Patients who are chosen will thereafter be administered vitamin D at a dosage of 5000 IU for a duration of 3 months. Monthly monitoring of adherence and regular intake of vitamin D will be conducted. Upon completion of the study period, the patient's blood will be collected for the purpose of assessing Vitamin D levels and conducting other test.

Pulmonary Function Test

Assessments of pulmonary function are performed weekly using a calibrated spirometer to measure volume and flow. The mouthpiece and nose clip are intended for one-time usage only. Conditions of the patients: The patient should abstain from smoking for a minimum of 2 hours before the examination, avoid

excessive eating immediately before the examination, avoid wearing too tight clothing, use short-acting bronchodilators at least 8 hours before the examination, and use long-acting bronchodilators at least 24 hours before. The testing protocol involves measuring height and calculating the expected values using the standard lung function statistics from the Pneumobile Project Indonesia. The examination is conducted while standing, evaluating VC, FVC, FEV1, and FEF25-75 ratios.

VitD level Examination

The Vitamin D ELISA kit was purchased from BT LAB (Bioassay Technology Laboratory, Cat. No E1981 Hu). This kit operates based on the principle of Enzyme-Linked Immunosorbent Assay (ELISA). Previous to use, the plate has been coated with antibodies targeting human CYP27B1. The CYP27B1 enzyme found in the sample is introduced and forms complexes with the antibodies presented on the plate. Following that, biotinylated human CYP27B1 antibodies are introduced and selectively attach to the CYP27B1 present in the sample. Next, streptavidin-HRP is introduced and forms a complex with the biotinylated CYP27B1 antibodies. Following incubation, any unbound Streptavidin-HRP is removed by washing during the washing process. A substrate solution is subsequently introduced, and the coloration follows a proportional relationship with the quantity of human CYP27B1. The addition of an acidic stop solution terminates the process, and absorbance is measured at 450 nm.

HDAC2 Examination

An ELISA kit for the HDAC2 enzyme was acquired from BT LAB (Bioassay Technology Laboratory, Cat No E0988 Hu). The plate has been previously coated with human HDAC2 antibodies. HDAC2 in the sample that was added binds to the antibodies that were coated on the wells. Next, biotinylated human HDAC2 antibodies are added and find HDAC2 in the sample. Subsequently, streptavidin-HRP is added and binds to the biotinylated HDAC2 antibodies. During the washing step, the unbound Streptavidin-HRP is washed after incubation. The substrate solution is then added, and the colour develops in proportion to the amount of human HDAC2. The reaction was terminated by adding an acid-stop solution, and the absorbance was measured at 450 nm.

RESULT

Supplementing with 5000 IU of Vitamin D substantially boosts vitamin D levels during a span of 3 months.

The empirical findings suggest that the administration of vitamin D at a dosage of 5000 IU over a period of 3 months can substantially enhance vitamin D levels in comparison to the levels before the supplementation (pre vs post, 7.63 ± 2.73 vs 14.26 ± 2.43). Regrettably, these findings have not had a substantial effect on the enhancement of lung function. Administration of vitamin D for an extended period of study may result in improved outcomes in enhancing lung function.

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Plasma HDAC2 levels show a substantial increase within 3 months following vitamin D therapy.

The research findings suggest that the treatment of vitamin D for a duration of three months resulted in a notable alteration in HDAC2 levels both before and after the study (1.50 ± 1.02 vs 3.90 ± 1.39, P=0.006). The results indicate that vitamin D supplementation is helpful in raising vitamin D levels and improving lung function as seen by an increase in pulmonary function test scores, however the observed differences were not statistically significant.

Table 1 COPD patient's lung function tests and after vit-D 5000iu treatment.

Characteristic	Pre (n=5)	Post (n=5)	P-Value
Age (±mean)		61	
Pulmonary function tests (mean ± SD)			
VC	59.4 ± 9.23	72.4 ± 19.16	.145
FVC	55 ± 20.94	67.8 ± 22.9	.158
FEV1	40 ± 5.43	56.6 ± 20.05	.096
FVC/ FEV1	76.8 ± 18.71	85.00 ± 19.65	.312
Vit-D levels measure (mean ± SD)			
Vit-D levels (ng/mL)	7.63 ± 2.73	14.26 ± 2.43	.023
HDAC2 measure (mean ± SD)			
HDAC2 levels (ng/mL)	1.50 ± 1.02	3.90 ± 1.39	.006

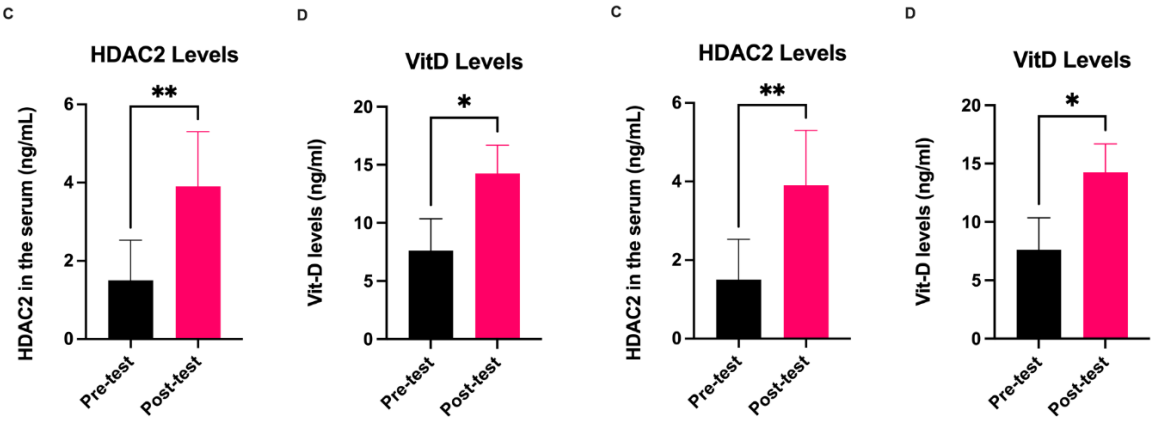


Figure 1 Vit-D 5000iu effect in VitD and HDAC2 serum levels after 3 months administration. A. Increased HDAC2 level. B. Increased VitD level. C. Significant HDAC2 different pre-post. D. Significant VitD different pre-post. Data represented as mean ± SEM. * p < 0.05, **p<0.01.

DISCUSSION

Supplementing with 5000 IU of Vitamin D substantially boosts vitamin D levels during a span of 3 months.

Additionally, a study conducted at RSI Jemursari demonstrated that 25(OH)D levels increased from 7.63 ± 2.73 ng/mL prior to supplementation to 14.26 ± 2.43 ng/mL following Vitamin D supplementation. In elderly patients, daily supplementation with a Vitamin D dose of 5000 IU has been demonstrated to elevate

25(OH)D levels to over 85 nmol/L after three months. This level is deemed adequate to maintain the optimal function of Vitamin D in the body (Mastaglia et al., 2006).

In the meta-analysis conducted by Li et al., (2020), the frequency of exacerbations in patients with Chronic Obstructive Pulmonary Disease (COPD) was significantly reduced by Vitamin D supplementation, particularly in those with severe Vitamin D deficiency and low Vitamin D levels (<25 nmol/L) (Jolliffe et al., 2018).

Vitamin D is essential for COPD due to its complex mechanisms, which include the reduction of inflammation and the modulation of the immune system. Vitamin D inhibits the NF-κB signalling pathway, which is involved in excessive inflammatory processes, due to its anti-inflammatory properties. Decreased respiratory function, increased exacerbations, and hospitalisations are all linked to vitamin D deficiency. Furthermore, Vitamin D increases the expression of VDR (Vitamin D Receptor) in type II alveolar epithelial cells, which promotes surfactant synthesis and mitigates oxidative stress in the airways (Li et al., 2020).

Plasma HDAC2 levels show a substantial increase within 3 months following vitamin D therapy.

In patients with Chronic Obstructive Pulmonary Disease (COPD), HDAC2 is a critical regulator of inflammation. By suppressing NF-κB activity through histone deacetylation, HDAC2 reduces the activity of inflammatory genes, thereby inhibiting the expression of pro-inflammatory genes. The reduction of HDAC2 in COPD is linked to increased oxidative stress and cigarette smoke exposure, which speed up the degradation of HDAC2 by phosphorylating and nitrosylating specific residues. As corticosteroids are the primary treatment for COPD management, this condition exacerbates the patient's response to them (Zwinderman et al., 2019).

The levels of HDAC2 in the blood increased from 1.50 ± 1.02 ng/mL to 3.90 ± 1.39 ng/mL, as indicated by this study. Recent research has demonstrated that Vitamin D supplementation has a substantial impact on the improvement of respiratory function in patients with Chronic Obstructive Pulmonary Disease (COPD). A study conducted at RSI Jemursari showed that stable COPD patients experienced a substantial increase in HDAC2 levels ($p = 0.006$) because of Vitamin D supplementation for three months. This increase contributes to the reduction of histone acetylation and the expression of pro-inflammatory genes. These results indicate that Vitamin D may improve corticosteroid sensitivity, which may alleviate inflammation in COPD patients (Li et al., 2020).

The corticosteroid sensitivity of COPD patients is improved by the increase in HDAC2 levels, which in turn enhances the control of inflammation. As a result, the HDAC2 pathway has the potential to modulate inflammation and enhance clinical outcomes in COPD patients through vitamin D supplementation (Liao et al., 2020).

CONCLUSION

Vitamin D has the potential to reduce inflammation in COPD patients by enhancing corticosteroid sensitivity and functioning as an immunomodulator, as concluded by this study. Consequently, the optimal therapeutic benefits of long-term Vitamin D supplementation at the appropriate dosage in the management of COPD can be achieved by delaying the progression of the disease through increased HDAC2 levels.

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The Relationship Between Age, And Occupation Of Pregnant Women With Compliance In Conducting K4 Antenatal Care (ANC) Coverage At Bpm Marmina Empat Lawang In 2023

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A B S T R A C T

Antenatal Care (ANC) is health care that is delivered to pregnant women before and during pregnancy with the aim of early detection of maternal and fetal health problems, The factors that influence ANC visits include: Age, Parity, Occupation, Education, and socioeconomics. The purpose of this study was to determine whether there is a relationship between education, age and maternal employment with Antenatal Care (ANC) visits. Analytic survey research design using a cross sectional approach. The population taken was all pregnant women who made Antenatal Care (ANC) visits at BPM Marmina Empat Lawang, totaling 517 people. Sampling using the Random Sampling method totaling 226 people. From the results of the Chi Square Test, there was a relationship between education and antenatal care visits (ANC) (p value = 0.000), and there was a relationship between age and antenatal care visits (ANC) (p value = 0.008), and there was a relationship between work and antenatal care visits (ANC) (p value = 0.013). The results of this study indicate a significant relationship between education, age and work with antenatal care visits (ANC) at the Midwife Practice BPM Marmina Empat Lawang in 2023. Conclusion to health workers, especially in the Midwife Practice Mandiri Marmina Palembang to be able to maintain and improve the quality of service to pregnant women and add counseling and counseling about the importance of Antenatal Care Visits (ANC) in pregnant women.

INTRODUCTION

K1 coverage is a description of the number of pregnant women who make their first visit to a health care facility, to get antenatal care. The K4 coverage rate is pregnant women who receive antenatal care according to the standard at least 4 times with the distribution of service delivery at least 1 time in the first quarter, 1 time in the second quarter, and 2 times in the third quarter (Indonesian Ministry of Health, 2020).

The coverage of visits to pregnant women in Indonesia in 2021 reached K1 95.25% and K4 86.85% and in 2022 increased to K1 97.86% and K4 as much as 89.33% (Ministry of Health RI, 2022). Meanwhile, in South Sumatra Province, the number of visits to pregnant women in 2020 K1 reached 98.08%, and K4 until December 2021 reached 93.86% (South Sumatra, 2021).

According to data from the Palembang City Health Office, the number of pregnant women who made K1 and K4 visits was obtained. Based on program reports from all Palembang City health centers in 2020, the number of pregnant women who made K1 visits was 99.96% and K4 visits was 98.97%. The coverage of visits by pregnant women in Palembang city for the last 5 years has continued to increase every year and exceeded the target. This reflects the high awareness of pregnant women about the importance of pregnancy check-ups (Palembang City Health Office, 2020).

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According to data from the Marmina Independent Practice Midwife in Empat Lawang, the coverage of Antenatal Care (ANC) visits in 2019-2023 was 517 mothers (Profile of Marmina Independent Practice Midwife, 2023).

METHOD

Research method is a systematic way to answer the problem being studied, using scientific methods that are organized and complete. This study used an analytic survey method with a cross sectional approach where the independent variables (Education, Age and Occupation) and the dependent variable (Antenatal Care Visit (ANC)) were collected at the same time. and the dependent variable (antenatal care (ANC) visit) were collected at the same time.

RESULT

Univariate Analysis

Table 1. Frequency Distribution of Respondents Based on Antenatal Care (ANC) Visits at Midwife Independent Practice Marmina Empat Lawang Year 2023

Antenatal Care Visit (ANC)	Frequency	Percentage (%)
Yes	196	86,7
No	30	13,3
Total	226	100

Based on the table above, it can be seen that out of 226 respondents, 196 respondents (86.7%) made Antenatal Care Visits (ANC) according to the standard compared to respondents who made Antenatal Care Visits (ANC) not according to the standard as many as 30 respondents (13.3%).

Table 2. Frequency Distribution of Respondents Based on Maternal Education at Midwife Independent Practice Marmina Empat Lawang in 2023

Education	Frequency	Percentage (%)
High	177	78.3
Low	49	21.7
Total	226	100

From the table above, out of 226 respondents, 177 respondents (78.3%) had a high education, more than respondents with a low education as many as 49 respondents (21.7%).

Table 3. Frequency Distribution of Respondents Based on Maternal Age at Midwife Independent Practice Marmina Empat Lawang in 2023

Mother's age	Frequency	Percentage (%)
Productive	196	86,7
Not Productive	30	13,3
Total	226	100

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From the table above of 226 respondents, respondents whose productive age level was 196 respondents (86.7%) were more than respondents whose age level was not productive as many as 30 respondents (13.3%).

Table 4. Frequency Distribution of Respondents Based on Mother's Work at Midwife Independent Practice Marmina Empat Lawang in 2023

Jobs	Frequency	Percentage (%)
Not working	190	84.1
Working	36	15.9
Total	226	100

Based on the table above, out of 226 respondents, 190 respondents (84.1%) did not work, more than respondents who worked as many as 36 respondents (15.9%).

Bivariate Analysis

Table 5. Relationship between Education and Antenatal Care (ANC) Visits at Midwife Independent Practice Marmina Empat Lawang Year 2023

Education	ANC visit				Total		P-Value
	Yes		No				
	n	%	n	%	n	%	
High	165	93.2	12	6.8	177	100	0,000 (meaningful)
Low	31	63.3	18	36.7	49	100	
Total	196	86.7	30	13.3	226	100	

Based on the table above, out of 226 maternal respondents with higher education, 177 respondents made antenatal care (ANC) visits according to the standard 165 respondents (93.2%), more than those who did not make antenatal care (ANC) visits according to the standard as many as 12 respondents (6.8%). While respondents with low education 49 respondents, who made Antenatal Care (ANC) visits according to the standard 31 respondents (63.3%) were more than those who did not make Antenatal care (ANC) visits according to the standard as many as 18 respondents (36.7%).

Table 6. Relationship between Maternal Age and Antenatal Care (ANC) Visits at Midwife Independent Practice Marmina Empat Lawang Year 2023

Age	ANC visit				Total		P-Value
	Yes		No				
	n	%	n	%	n	%	
Productive	175	89.3	21	10.7	196	100	0,008 (meaningful)
Not Productive	21	70.0	9	30.0	30	100	
Total	196	86.7	30	13.3	226	100	

Based on the table above, of the 226 respondents who had productive age 196 respondents, who made antenatal care (ANC) visits according to the standard 175 respondents (89.3%), more than those who did not make antenatal care (ANC) visits according to the standard as many as 21 respondents (10.7%). While respondents of unproductive age 30 respondents, who made Antenatal Care (ANC) visits according to the

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standard 21 respondents (70.0%) were more than those who did not make Antenatal care (ANC) visits according to the standard as many as 9 respondents (30.0%).

Table 7. The Relationship Between Maternal Occupation and Antenatal Care (ANC) Visits at Mandir Marmina Practice Midwife Empat Lawang in 2023

Jobs	ANC visit				Total		P-Value
	Yes		No				
	n	%	n	%	n	%	
Not Working	170	89.5	20	10.5	196	100	0,013 (meaningful)
Working	26	72.2	10	27.8	30	100	
Total	196	86.7	30	13.3	226	100	

Based on the table above, out of 226 respondents, mothers who did not work 190 respondents, who made antenatal care (ANC) visits according to the standard 170 respondents (89.5%), more than those who did not make antenatal care (ANC) visits according to the standard as many as 20 respondents (10.5%). While 36 respondents who worked, who made Antenatal care visits (ANC) according to the standard 26 respondents (72.2%) more than those who did not make Antenatal care visits (ANC) according to the standard as many as 10 respondents (27.8%).

DISCUSSION

The results of univariate analysis obtained 226 respondents, mothers who made Antenatal Care (ANC) visits according to standards were 196 respondents (86.7%), more than respondents who did not make Antenatal Care (ANC) visits according to standards as many as 30 respondents (13.3%).

Based on this study, maternal education is divided into 2 categories, namely high (if the mother's education ≥ SMA) and low (if the mother's education < SMA). Univariate analysis results obtained from 226 respondents, respondents with high education were 177 respondents (78.3%), more than respondents with low education as many as 49 respondents (21.7%).

This research is in line with Anggun's research (2019) at Hj. Maimunah Kertapati Independent Practice Midwife Palembang, which concluded that pregnant women who had an education level ≥ SMA were 29 people (65.9%) more when compared to respondents who had low education, namely 15 people (34.1%).

Based on this study, maternal age is divided into 2 categories, namely productive (if in reproductive age 20-35 years), and unproductive (if in unproductive age <20 and >35 years). the results of univariate analysis obtained from 226 respondents, respondents whose productive age were 196 respondents (86.7%), more than respondents whose unproductive age were 30 respondents (13.3%).

This research is in line with Anggun's research (2019) at Midwife Independent Practice Hj. Maimunah Kertapati Palembang, it is known that out of 44 respondents who have healthy reproduction, 25 people (56.8%) are more when compared to respondents who have unhealthy reproduction, namely 19 people (43.2%).

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Based on this study, maternal employment is divided into 2 categories, namely not working (if the mother does activities but does not make money), and working (if someone does activities and makes money). Based on the results of univariate analysis obtained from 226 respondents, 190 respondents (84.1%) did not work, more than mothers who worked as many as 36 respondents (15.9%).

This research is in line with research (Anggun, 2019) at Midwife Independent Practice Hj. Marmina Empat Lawang, it is known that of the 44 respondents who did not work as many as 28 people (63.6%), more when compared to respondents who worked, namely 16 people (36.4%). Because, a study revealed that working too much can actually affect the size of the fetus at birth.

From the results of this study, the researcher assumes that work is one of the factors that influence pregnant women not to make ANC visits according to standards because a working pregnant woman tends to spend her time doing her work activities rather than having to make Antenatal Care (ANC) visits. Meanwhile, pregnant women who do not work have more time to do their daily activities and go to the health service to check their pregnancy.

CONCLUSION

Most respondents conducted standardized antenatal care (ANC) visits. Standardized ANC visits were mostly carried out by respondents who had a high level of education, were at productive age, and did not work. In addition, there is a significant relationship between education level, age, and employment status with compliance in conducting ANC visits at Marmina Independent Practice Midwife, Empat Lawang, in 2023.

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The Relationship Between Exclusive Breasfeeding and Freguent Antenatal Care Visite with Stunting Incidence in Under-Five in Sadai Village, Working Area Sungai Panas Primary Health Care Batam City

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A B S T R A C T

Stunting is a short and very short body condition that exceeds a -2 SD deficit below the median length or height. Stunting is a public health problem because it is associated with an increased risk of morbidity and mortality, delayed motor development, and stunted mental growth. The purpose of this research I relationship between exclusive breastfeeding and the frequency of antenatal care visits with the incidence of stunting is known and the dominant factor that causes stunting in toddlers is known. This study was a quantitative study with a Case Control design and involved 23 mothers whose toddlers were diagnosed with stunting as respondents (cases) and 23 mothers whose toddlers were not diagnosed with stunting (as controls). This research was conducted in the Sadai sub-district, the working area of the Sungai Panas Public Health Center in Batam.Data processing and analysis chi square test (bivariate) and multiple logistic regression (multivariate).The results of the analysis using the chi square test showed that there was a significant relationship between exclusive breastfeeding and the frequency of antenatal care visits with the incidence of stunting. The results of the multivariate analysis show variablesthe dominant influence on the incidence of stunting is the variable Frequency of Antenatal Care visits. The government, if it wants to reduce the prevalence of stunting in Sadai village, the working area of the Sungai Panas Health Center, should increase education to the public, especially pregnant women, about the importance of regular quality pregnancy checks according to the rules.

INTRODUCTION

Stunting is a condition of too short stature or stunting of a person as measured by looking at the Z-score based on height based on age. Stunting is a serious problem that must be addressed immediately (Gasparinho & , Maria Helena Gonçalves, Assucênio Chissaque, Giovani L. Silva, 2022). As many as 43% of children or around 162 million children under the age of 5 in low- and middle-income countries are believed to be at risk of losing their potential for development and stunted growth which can experience morbidity and death, causing financial losses (Blessing Jaka Akombi, 2017). Millions of children around the world are not only stunted in their growth and development, but also experience health problems that affect cognitive development which is not optimal so that the ability to understand is slower for children of their age (Kencana Sari, 2021). The causes of stunting are multifactor, namely most of them are inadequate nutritional conditions (Republic of Indonesia Ministry of Health, 2019).

Three main sources of the importance of intervention in the first 1000 days of live birth, namely (Barirah Madeni, Hasritawati, 2023): 1) nutritional needs (high protein or as a food supplement given from conception to 2-3 years of age); 2) analysis of 54 nationally representative surveys from low- and middle-

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income countries shows a universal pattern of steep decline in height-for-age Z-score (HAZ) in children from birth to 23 months of age, without evidence of additional impairment

between the ages of 24 and 59 months (Upadhyay et al., 2022); 3) the prenatal period (adequate nutrition during pregnancy, the importance of pregnancy visits to get the right information so as to reduce gestational age as a 20% contributor to stunting (Leroy, 2014).

(UNICEF, 2021) states that one way to treat stunting is exclusive breastfeeding for the first 6 months without any other additional food. Exclusive breastfeeding contributes 30% to preventing stunting, in other words preventing stunting as a form of fulfilling one of the nutritional needs in the first 1000 days of life. Research result (Amaha & Woldeamanuel, 2021)stated that each visit to the ANC clinic reduced the likelihood of stunting by 6.8% ($p < 0.0001$). The likelihood of being stunted decreased by 7% ($p = 0.028$) for each class a girl spent in school.

Maternal and child health problems contributing to stunting are as follows: Before pregnancy: anemia 32% (Amaha & Woldeamanuel, 2021). Pregnant women – giving birth: Anemia 48.9%, (pregnant women: Anemia 48.9% and KEK 17.3%) besides that it is also found in pregnant women with a 28% risk of complications. Infants – Toddlers: Born prematurely 29.5%, Low Birth Weight 6.6%, Birth Length <48

cm 19.4%, Toddlers with diarrhea 9.8%, Toddlers with pneumonia 1.7%, Toddlers with malnutrition and malnutrition 7.1 %.(Kemenkes RI., 2021).

The Indonesian Nutrition Status Survey (SSGI) at the BKKBN National Working Meeting, Wednesday (25/1) where the prevalence of stunting in Indonesia fell from 24.4% in 2021 to 21.6% in 2022. The target I conveyed was 14% in 2024 The problem of stunting in the city of Batam in the last three years has decreased where in 2000 it was 7.21%; in 2021 it will be 6.02% and in 2022 it will be 2.24%. Even though the stunting rate at the city level has decreased, there are still many children who are stunted in the working area of the puskesmas. The number of stunted children under five is 59,466. If not handled properly, stunting will cause a state economic loss of 3% of Gross Domestic Product.

Indonesia is projected to experience a peak of productive growth (Demographic Bonus) in 2035(Kemenkes RI, 2023). However, this demographic bonus will be useless and will even become a burden to the state, if the prevalence of under-five stunting is not corrected at this time (Salwa Saif Said AL Harthi, Judie Arulappan & Zaabi, 2024). Based on this, it is necessary to handle stunting in an integrated manner from all elements (Hamid et al., 2021). Stunting research has been carried out a lot, but the research findings of this research will be valuable findings and will receive special attention from various policy makers in handling and reducing stunting in Indonesia (Rika Nurmayanti, Harsono Salimo, 2017).

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METHOD

The design of a community-based case-control study was carried out from research carried out in January – February 2023 in Sadai Village, the working area of the Sungai Panas Batam Health Center in 2023.The required sample size for this research is determined byusing the formula (Lemeshow, 1997) the calculation results obtained 23 people as cases and 23 people as controls.

The sampling technique uses non-probability sampling, namely systematic sampling based on the order of members of the population (Ketut, 2014), according to predetermined inclusion and exclusion criteria (secondary data from puskesmas). Children with height for age z scores for height ≤ −2 SD were enumerated as cases, whereas children with z scores for height ≥ 2 SD to z scores for height +2 SD were counted as controls (SYAFRIDA HAFNI SAHIR, 2022). With the following inclusion criteria: 1) Mothers under five who live in Sadai Sub-District, Batam City Health Center work area; 2) Mothers of toddlers who have toddlers diagnosed with stunting; 3) Mothers of toddlers who are willing to be respondents. While the inclusion criteria are mothers of toddlers who have toddlers diagnosed with stunting who have comorbidities such as congenital diseases or congenital abnormalities.

After the households with cases and households with controls were identified, the sample size was allocated proportionally using a systematic sampling technique from a total population of 138 individuals. The first household is selected by simple random method and the rest are selected systematically by using an odd number (Sugiyono, 2011).

Data collection procedures and instruments data was collected through house to house visits. The questionnaire was developed from various sources of information according to the research variables. The research step was to conduct home visits according to data from sampling from the population (secondary data), then face-to-face interviews were carried out with subjects who met the requirements using a questionnaire that had been developed and had been tested for validity and reliability (Masturoh & Nauri, 2018).

RESULT

This research was carried out from Januari – Februari 2023 in Sadai Village the working area of the Sungai Panas Batam Health Center. This data is collected from 46 respondents who met the inclusion and exclusion criteria

Respondent Characteristics

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Table 1. Frequency Distribution of Characteristics of Mothers of Toddler

Variabel	Total	%
Mother's job		
Doesn't work	25	54,3
Work	21	47,5
Education		
Elementary School	24	52,2
High School	22	47,8
Income		
< 4.500.000,-	24	52,2
≥ 4.500.000	22	47,8
Age		
0 - 12 month	4	8,7
24 - 36 month	36	78,3
37 - 59 month	6	13,0

Table 1 describes the research respondents, in this case mothers of toddlers in the Sadai sub-district, the working area of the Sei Panas health center, Batam city, in 2023 it was found that 54.3% were not working, The majority of mothers of toddlers with a basic education level are 65.2%, with a small income of 4,500,000,- as much as 52.2%. Most of the children aged 24 to 36 months are 78.3%.

Relationship between Exclusive Breastfeeding and Stunting

Table 2 The Relationship between Exclusive Breastfeeding and Stunting

	Stunting				OR 95 % CI	P value
	Yes	%	No	%		
Unexclusive Breastfeeding	18	78,3	7	30,4	8,229	0,003
Exclusive Breastfeeding	5	21,7	16	69.6		
Total	23	100	23	100		

The Table shows The majority of toddlers who experience stunting in the Sadai sub-district, the working area of the Sei Panas Community Health Center, do not provide exclusive breastfeeding, as much as 78.3%. The results of the Chi Square test showed a p-value of 0.003, meaning that there is a significant relationship between exclusive breastfeeding and the incidence of stunting. The results of OR calculations show that babies who are not given exclusive breast milk will be 8,229 times more likely to experience stunting.

Relationship between Antenatal Care Visits and Stunting Events

Tabel 3. Relationship between Antenatal Care Visits and Stunting Events

Antenatal care Visits	Stunting				OR 95 % CI	P value
	Yes	%	No	%		
Unmatch	17	73,9	9	39,1	4,407	0,037
Match	6	26,1	14	60,9		
Total	23	100	23	100		

Table 3 shows that mothers of toddlers who do not carry out pregnancy checks according to the regulations are 73.9% more likely to experience stunting. The results of statistical tests using Chi Square

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showed a p-value = 0.037, meaning that there was a relationship between Ante Natal Care (ANC) visits and the incidence of toddler stunting. The OR calculation results show that pregnant women who do not carry out pregnancy checks according to the regulations will be at risk of stunting 4,407 times in their toddlers.

Multiple regression test

Furthermore, the results of the multivariate test using the multiple regression test obtained the strong value of the β effect from the ANC visit of 0.168, meaning that there was an effect of ANC visits on the incidence of stunting of 16.8%. And it was also obtained that the effect of exclusive breastfeeding was 0.096, meaning that there was an effect of exclusive breastfeeding on the incidence of stunting of 9.6%. Thus it can be concluded that the variable that has the dominant influence on the incidence of stunting is the variable ANC visits.

DISCUSSION

The results of hypothesis testing with statistical tests using the Chi Square test obtained a p value of 0.003, meaning that there is a significant relationship between exclusive breastfeeding and stunting. The OR calculation results show that babies who are not given exclusive breastfeeding will be at risk of 8,229 times experiencing stunting. These results are supported by research (Louis et al., 2022), stated that the results of the chi square test obtained p = 0.000 (0.000 <0.05), meaning that there is a relationship between exclusive breastfeeding and the incidence of stunting in toddlers. Meanwhile, in the odds ratio test, the value of OR = 61 was obtained, which means that children who are not exclusively breastfed have a 61 times greater chance of experiencing stunting compared to toddlers who are exclusively breastfed. Exclusive breastfeeding can reduce the risk of occurrence.

These results are supported by the theory (Ministry of Villages, Development of Disadvantaged Regions & Indonesia, 2017), Stunting is a condition where a person's height is shorter than the height of other people of the same age. Stunting can be caused directly or indirectly. The direct causes include: 1) chronic lack of nutrient intake, 2) the occurrence of infectious diseases resulting in metabolic disorders and increased nutrional needs. Indirect causes of stunting can be caused by mothers under five who have poor nutritional status before and during the mothers pregnancy (Zhang et al., 2024), lack of knowledge, economic factors, and environmental sanitation (Vita Camelia & Jannah, 2020). This result is also supported by the theory that services are still limited, including ANC services-Ante Natal Care (health services for mothers during pregnancy (Munanadia, 2022).

The results of this study are in line with research (Diani Magasida & Erawati, 2022), stated that the quality of antenatal care was significantly related to the incidence of stunting, including the frequency of

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antenatal care visits and the standard of antenatal care, but the quality of antenatal care was not significantly related to the incidence of stunting, namely the place of antenatal care visits. Furthermore, the results of this study also reveal the dominant factor that influences stunting in the Sadai sub-district, namely the variable frequency of antenatal care visits.

CONCLUSION

Based on the results of the data analysis and discussion that has been described, this study concludes that exclusive breastfeeding, the frequency of visits to maternal services during pregnancy (antenatal care), is significantly related to the occurrence of stunting and the frequency of visits to maternal services during pregnancy (antenatal care) is a variable. which is the most dominant as a cause of stunting so that it must receive special attention. If the government wants to reduce the prevalence of stunting in the Sadai sub-district, the working area of the Sungai Panas Health Center, it should increase counseling to the public, especially pregnant women, about the importance of regular quality prenatal check-ups according to the rules.

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The Relationship Between Maternal Nutritional Intake During Aterm Pregnancy and Infant Birth Weight in The Working Area of Anak Air Public Health Center Padang City in 2025

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A B S T R A C T

Infant birth weight is an important indicator of neonatal health status. Low maternal nutritional intake during pregnancy, especially in aterm pregnancy, has the potential to increase the risk of low birth weight (LBW). This study aims to determine the relationship between maternal nutritional intake during pregnancy, both macronutrients (carbohydrates, protein, fat) and micronutrients (vitamins and minerals) with infant birth weight. Quantitative research with a cross-sectional design on 59 postpartum mothers with a history of aterm pregnancy at Puskesmas Anak Air Padang City (January-May 2025). Data were collected through questionnaires and SQ-FFQ, analyzed univariately and bivariately using chi- square test (95% CI; $p<0.05$). Results showed that most babies (81.4%) were born with normal weight and there was a significant relationship between birth weight and There was a significant relationship between birth weight and intake of carbohydrates ($p=0.011$), protein ($p=0.002$), fat ($p=0.008$), vitamins ($p=0.011$), and minerals ($p=0.016$). The quality of pregnant women's nutritional intake, both macro and micronutrients, has a significant effect on infant birth weight. Nutrition education needs to be improved to prevent LBW.

INTRODUCTION

Pregnancy is the most important period in a woman's life cycle, because during pregnancy women not only fulfill nutrition for themselves but also for themselves and their fetuses (Sulistiyono et al., 2021). Good nutrition is useful for the growth and development of the fetus in the womb, this is influenced by the food intake consumed by the mother during pregnancy (Andarwulan et al., 2022). Chronic Energy Deficiency (CHD) is one of the nutritional problems of pregnant women and the most common disorders that occur in pregnant women (Temu Herawati, Sabtian Sarwoko, 2024).

WHO in 2022 reported that the global prevalence of chronic undernutrition in pregnancy is 35-75%. This prevalence is significantly higher in the third trimester than in the first and second trimesters of pregnancy (Febrika Usiyanti, Intan Sari, Arie Anggraini, 2023). The Indonesian Basic Health Survey (SDKI) reported that the prevalence of Chronic Energy Deficiency (CHD) among pregnant women in Indonesia was 16.9% (SDKI, 2023).

Factors that can cause a pregnant woman to experience SEZ, namely the nutritional intake of pregnant women (Kementrian Kesehatan, 2023). Nutrition of pregnant women is food or nutrients such as macronutrients (carbohydrates, protein, fat) and micronutrients (vitamins and minerals) needed by a pregnant woman both in the first trimester, second trimester and third trimester and must be sufficient in the amount needed, so that the fetus she is carrying can grow well, and has no disorders (D dan A, 2021).

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In Padang City, data from the Health Office shows that the prevalence of pregnant women with SEZ is quite high, including in the Anak Air Health Center working area. In 2023, 12.9% of pregnant women in the area experienced LBW. This correlates with the high incidence of LBW, which reached 3.5% (Simbolon, 2018). This fact shows that interventions to fulfill the nutrition of pregnant women, especially in aterm pregnancy (≥37 weeks), are very important in reducing the prevalence of LBW and improving the quality of neonatal health.

Therefore, this study was conducted to further explore the relationship between nutritional intake of pregnant women at term and birth weight of infants in the working area of Puskesmas Anak Air Kota Padang.

METHOD

This study used a quantitative approach with a cross sectional design. This research was conducted in the working area of the Anak Air Health Center in Padang City in January - May 2025. The sample of this study was 59 new mothers with a history of aterm pregnancy who met the inclusion and exclusion criteria. Data were collected using a structured questionnaire and Semi Quantitative Food Frequency (SQ-FFQ) questionnaire. Data analysis used univariate and bivariate through chi-square test, with 95% CI ($p<0.05$).

RESULT

Table 1. Characteristics of respondents

Characteristics of respondents	f (n = 59)	%
Age		
At risk (<20 and >35)	9	15,3
Not at risk (21-35)	50	84,7
ANC		
0-5 times	0	0,0
≥ 6 times	59	100,0
Parity		
>3 (at risk)	8	13,6
≤ 3 (not at risk)	51	86,4
Education		
Low	7	11,9
High	52	88,1
Occupation		
Not working	46	78,0
Working	13	22,0
Family Income		
Below the minimum wage	32	54,2
Above the minimum wage	27	45,8
Family Dependents		
Large dependents (≥5)	1	1,7
Small dependents (<5)	58	98,3

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Lila		
KEK	3	5,1
Normal	56	94,9
Gender of the baby		
Male	34	57,6
Female	25	42,4

Based on Table 1. it can be seen that 84.7% of respondents were not at risk (aged 20–35 years), while 15.3% were at risk (<20 and >35 years). All respondents received antenatal care (ANC) at health facilities regularly (≥6 times) during pregnancy (100%). the majority of respondents had a parity of ≤3 (non-risk group) at 86.4%, the majority of respondents had a high level of education (high school and university) at 88.1%, and the majority of respondents were unemployed at 78.0%, the majority of respondents came from families with incomes below the minimum wage (Rp2,994,193.47) at 54.2%, with 98.3% of respondents' family dependents falling into the category of small family dependents, the majority of respondents had normal birth weight at 94.9%, and the majority of newborns were male at 57.6%

Table 2. Frequency Distribution of Infant Birth Weight

Infant Condition	f	%
LBW	11	18,6
Not LBW	48	81,4
Total	59	100

Based on table 2. above shows that respondents with babies who have normal birth weight are more, namely 48 (81.4%) respondents. While respondents with LBW babies were only 11 (18.6%).

Table 3. Frequency Distribution of Macronutrient and Micronutrient Intake of Mother during aterm pregnancy

Variable	f (n=59)	%
Carbohydrate Intake		
Not fulfilled	28	47,5
Met	32	52,5
Protein intake		
Not met	29	49,2
Met	30	50,8
Fat Intake		
Not Met	27	45,8
Met	32	54,2
Vitamin intake		
Not Met	28	47,5
Met	31	52,5
Mineral intake		
Not Met	29	49,2
Met	30	50,8

Based on table 3. above, it can be seen that out of 59 respondents there were 32 people (52.5%) with fulfilled carbohydrate intake, 28 people (47.5%) with unfulfilled carbohydrate intake, 30 people (50.8%) with fulfilled protein intake, 29 people (49.2%) with unfulfilled protein intake, 32 people (54,2%) with fulfilled fat intake and 27 people (45.8%) with unfulfilled fat intake, 28 people (47.5%) with unfulfilled

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vitamin intake, 31 people (52.5%) with fulfilled vitamin intake, 29 people (49.2%) with unfulfilled mineral intake and 30 people (50.8%) with fulfilled mineral intake.

Table 4. Relationship between Maternal Carbohydrate Intake during Aterm Pregnancy and Infant Birth Weight

Carbohydrate Intake	Infant Birth Weight				Total		P Value
	LBW		Not LBW				
	f	%	f	%	f	%	
Not fulfilled	9	32,1	19	67,9	28	100	0,028
Fulfilled	2	6,5	29	93,5	31	100	
Total	11	21,2	48	78,8	59	100	

Based on Table 4. it can be seen that out of 28 respondents with inadequate carbohydrate intake, 9 respondents (32.1%) had low birth weight babies and 18 respondents (67.9%) had normal birth weight babies. Meanwhile, among the 31 respondents with adequate carbohydrate intake, 2 respondents (6.5%) had babies with low birth weight (LBW) and 29 respondents (93.5%) had babies without LBW. The statistical test yielded a p-value of 0.028 ($p < 0.05$), indicating a significant association between carbohydrate intake and infant birth weight.

Table 5. Association between Maternal Protein Intake during Aterm Pregnancy and Birth Weight

Protein Intake	Infant Birth Weight				Total		P Value
	LBW		Not LBW				
	f	%	f	%	f	%	
Not fulfilled	10	34,5	19	65,5	29	100	0,006
Fulfilled	1	3,3	29	96,7	30	100	
Total	11	18,6	48	81,4	59	100	

Based on Table 5. it can be seen that out of 29 respondents with inadequate protein intake, 10 respondents (34.5%) had LBW babies and 19 respondents (65.5%) had non-LBW babies. Meanwhile, among the 30 respondents with adequate protein intake, 1 respondent (3.3%) had a low birth weight (LBW) infant, and 29 respondents (96.7%) had infants without LBW. The statistical test yielded a p-value of 0.006 ($p < 0.05$), indicating a significant association between protein intake and infant birth weight.

Table 6. Association between Maternal Fat Intake during Aterm Pregnancy and Birth Weight

Fat Intake	Infant Birth Weight				Total		P Value
	LBW		Not LBW				
	f	%	f	%	f	%	
Not fulfilled	9	33,3	18	66,7	27	100	0,020
Fulfilled	2	6,3	30	93,8	32	100	
Total	11	18,6	48	81,4	59	100	

Based on Table 5.7, it can be seen that out of 27 respondents with insufficient fat intake, 9 respondents (33.3%) had LBW babies and 18 respondents (66.7%) had non-LBW babies. Meanwhile, among the 32 respondents with adequate fat intake, 2 respondents (6.3%) had babies with low birth weight (LBW) and 30 respondents (93.7%) had babies without LBW. The statistical test yielded a p-value of 0.020 ($p < 0.05$), indicating a significant association between fat intake and infant birth weight.

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Table 7. Association between Vitamin Intake during Aterm Pregnancy and Birth Weight

Vitamin Intake	Infant Birth Weight				Total		P Value
	LBW		Not LBW				
	f	%	f	%	f	%	
Not fulfilled	9	32,1	19	67,9	28	100	0,028
Fulfilled	2	6,5	29	93,5	31	100	
Total	11	18,6	48	81,4	59	100	

Based on Table 5.8, it can be seen that out of 28 respondents with inadequate vitamin intake, 9 respondents (32.1%) had LBW babies and 19 respondents (67.9%) had non-LBW babies. The statistical test yielded a p-value of 0.028 ($p < 0.05$), indicating a significant association between vitamin intake and infant birth weight.

Table 8. Association between Maternal Mineral Intake during Aterm Pregnancy and Birth Weight

Mineral Intake	Infant Birth Weight				Total		P Value
	LBW		Not LBW				
	f	%	f	%	f	%	
Not fulfilled	9	31,0	20	69,0	29	100	0,039
Fulfilled	2	6,7	28	93,3	30	100	
Total	11	18,6	48	81,4	59	100	

Based on Table 5.9, it can be seen that of the 29 respondents with inadequate mineral intake, 9 respondents (31.0%) had LBW babies and 20 respondents (69.0%) had non-LBW babies. The statistical test resulted in a p-value of 0.039 ($p<0.05$), so it can be concluded that there is a relationship.

DISCUSSION

Relationship between Carbohydrate Intake and Infant Birth Weight

Based on the results of the research conducted, it was found that of the 28 respondents with unmet carbohydrate intake, there were 9 people (32.1%) respondents with LBW babies and 18 people (67.9%) respondents with babies who were not LBW. The results of the Chi-square statistical test obtained a p value of 0.028 (<0.05), this indicates that there is a significant relationship between carbohydrate intake and infant birth weight in the Anak Air Health Center Working Area of Padang city.

These results are in line with research conducted by Dila F (2024) that there is a significant relationship between carbohydrate consumption and the incidence of LBW in the West Pasaman Ophir Health Center Work Area, with the results of the Chi-square statistical test, namely p value 0.000 (Dila, 2024). The results of research conducted by Fathurrahman, et al showed the opposite results with the result that there was no correlation between carbohydrate intake and infant birth weight (p=0.938, r=0.006) (Fathurrahman Ramadhana Akbar, Nur Indrawaty Lipoeto dan Syahrul, 2024). This is because macronutrient intake such as carbohydrates is not the main predilection in determining length and birth weight. However, there are

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several other factors that affect the length and birth weight of infants such as maternal education, maternal age, gestational age, sex of the newborn (Dila, 2024).

Relationship between Protein Intake and Infant Birth Weight

Based on the results of the research conducted, it was found that of the 29 respondents with unmet protein intake, there were 10 people (34.5%) respondents with LBW babies and 19 people (65.5%) respondents with babies who were not LBW. The results of the Chi-square statistical test obtained a p value of 0.006 (<0.05), this indicates that there is a significant relationship between protein intake and infant birth weight in the Anak Air Health Center Working Area of Padang city.

These results are in line with research conducted by Dila F (2024) that there is a significant relationship between protein consumption and the incidence of LBW in the West Pasaman Ophir Health Center Working Area, with the results of the Chi-square statistical test, namely p value 0.000 (Dila, 2024). The results of research conducted by Marwang, et al showed opposite results with the results of the Chi- square statistical test obtained p value 0.342 greater than the p value <0.05. So it can be concluded that there is no significant relationship between maternal protein intake and infant birth weight (Amrang et al., 2020).

Relationship between Fat Intake and Infant Birth Weight

Based on the results of the research conducted, it was found that of the 27 respondents with unmet fat intake there were 9 people (33.3%) respondents with LBW babies and 18 people (66.7%) respondents with babies who were not LBW. The results of the Chi-square statistical test obtained a p value of 0.020 (<0.05), this indicates that there is a significant relationship between fat intake and the birth weight of babies in the Working Area of the Anak Air Health Center in Padang.

The results of this study are in line with research conducted by Dila F (2024) that there is a significant relationship between fat consumption and the incidence of LBW in the West Pasaman Ophir Health Center Working Area, with the results of the Chi-square statistical test, namely p value 0.000 (Dila, 2024). Research conducted by Fathurrahman, et al (2024), showed opposite results with the results of statistical tests found p value 0.885, meaning that there was no correlation between fat intake with baby birth weight or with baby birth length (Fathurrahman Ramadhana Akbar, Nur Indrawaty Lipoeto dan Syahrul, 2024).

Relationship between Vitamin Intake and Infant Birth Weight

Based on the results of the research conducted, it was found that of the 28 respondents with unmet vitamin intake, there were 9 people (32.1%) respondents with LBW babies and 19 people (67.9%) respondents with babies who were not LBW. The results of the Chi-square statistical test obtained a p value of 0.028 (<0.05), this indicates that there is a significant relationship between vitamin intake and infant birth weight in the Anak Air Health Center Working Area of Padang city.

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Vitamin components that are mostly fulfilled by pregnant women in this study are vitamins A, B6, C and folic acid. However, there are still babies with LBW conditions found. This is in line with research conducted by Marwati, et al (2017) which showed a relationship between the level of vitamin A intake and infant birth weight (Marwati, Lestari dan Afa, 2017). research conducted by Nurul (2023) shows the results of the chi-square statistical test obtained a p value of 0.016 (<0.05), meaning that there is a significant relationship between vitamin A intake and the incidence of LBW. Pregnant women with unmet vitamin A intake have a 3.3 times chance of giving birth to LBW babies compared to mothers with met vitamin A intake (Nasution, 2023).

Relationship between Mineral Intake and Infant Birth Weight

Based on the results of the research conducted, it was found that out of 29 respondents with unmet mineral intake there were 9 people (31.0%) respondents with LBW babies and 20 people (69.0%) respondents with babies who were not LBW. The results of the Chi-square statistical test obtained a p value of 0.039 (<0.016), this indicates that there is a significant relationship between mineral intake and the birth weight of babies in the Anak Air Health Center Working Area of Padang city.

Mineral components that are mostly fulfilled by pregnant women in this study are iron, calcium, zinc and phosphorus. However, there are still babies with LBW conditions found. This is in line with research conducted by Dila F (2024), showing that iron consumption with the incidence of LBW has a significant relationship. In accordance with the results of the chi-square statistical test obtained a p value of 0.001 (Dila, 2024).

Research conducted by Aprisia and Demsa (2022), showed that the consumption of Fe tablets was associated with the birth weight of babies. Mothers who consume Fe tablets not according to recommendations are at risk of giving birth to babies with LBW compared to mothers who consume Fe tablets according to recommendations (Aprisia dan Simbolon, 2022).

Research conducted by Nurul (2023), showed that there was a significant relationship between zinc intake and the incidence of LBW. In accordance with the results of the chi-square statistical test, the p value was 0.001 (<0.05) (Nasution, 2023).

CONCLUSION

Based on the findings of this study, most infants born to mothers in the working area of Anak Air Health Center, Padang City, had normal birth weight (NBW), while among the nine mothers with inadequate carbohydrate, protein, and fat intake, five gave birth to low birth weight (LBW) infants and four gave birth to infants with normal birth weight. More than half of the respondents had adequate macronutrient and micronutrient intake during term pregnancy. The findings also demonstrated a significant association

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between maternal macronutrient and micronutrient intake during term pregnancy and infant birth weight in the working area of Anak Air Health Center, Padang City.

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The Effect of Mindfulness-Based Congnitive Therapy on Emotion Regulation to Reduce Aggressive Behavior in Vulnerable Groups of Bullies

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A B S T R A C T

The phenomenon of bullying in schools is frequently triggered by high levels of aggressive behavior and poor emotional regulation among students. Mindfulness-Based Cognitive Therapy (MBCT) is an intervention approach combining mindfulness exercises with cognitive techniques to help individuals respond to negative emotions more adaptively. This study aims to evaluate the effect of Mindfulness-Based Cognitive Therapy (MBCT) on emotion regulation to reduce aggressive behavior in vulnerable groups of bullies among vocational school adolescents. This research utilized a quasi-experimental design with a Pretest-Posttest Control Group Design. The study was conducted on 11th-grade students at SMK YPI Darussalam 2 Cerme, Gresik, during the 2026/2027 academic year, with a sample size of 31 students selected via purposive sampling (16 in the experimental group, 15 in the control group). Instruments included an Aggressive Behavior Scale, emotion regulation questionnaires, and an adapted MBCT intervention module. Data analysis was performed using Paired Sample T-Tests and Wilcoxon Signed Rank Tests scores after administering MBCT intervention in the experimental group ($p<0.05$). The results showed that the majority of adolescents in the vulnerable group who are perpetrators of bullying have a high tendency to apply expressive suppression strategies and low scores on cognitive reappraisal strategies

INTRODUCTION

The ability to control emotions and manage emotional aspects is a crucial psychological construct known as emotion regulation (Gross, 2021). Emotions typically manifest as cognitive responses to specific environmental stimuli. A majority of adolescents struggle to process their emotions effectively, rendering them highly vulnerable to stress, depression, and impulsive outbursts. Teenagers who lack constructive outlets for emotions such as anger, frustration, and sadness often resort to externalized behaviors, including physical aggression, interpersonal conflict, and bullying, which inflict harm upon both themselves and others. Consequently, juvenile delinquency and school bullying are frequently rooted in weak emotional regulation capacity (Purwadi, 2021).

Historically, research on emotion regulation and bullying has predominantly focused on the "victims," while very few studies have targeted the "perpetrators" as the primary subjects of psychological intervention.

To effectively break the vicious cycle of school violence, interventions must address the root cause by engaging perpetrators directly in-depth. Prior studies, such as those by Merdekasari et al., demonstrated that MBCT interventions successfully reduce the frequency of students' aggressive behaviors across pre-, during, and post-treatment phases, offering robust mechanisms for sustained emotional control.

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The consequences of this bullying behavior are very detrimental to adolescent development, such as the negative impact on psychology with an increased risk of depression, anxiety, and stress, a bad impact on society with difficulties in building and maintaining healthy relationships, difficulty interacting with the environment, academic impacts can occur a decrease in academic achievement, difficulty concentrating on learning, so that the bad effects that occur have legal impacts, high risk of engaging in criminal activities, and high risk of experiencing other legal problems. Interestingly, the long-term impact on mental health and the difficulty of building harmonious relationships are also experienced by the abuser himself (Sukmawati et al., 2021).

According to WHO, specific data on bullying cases in Indonesia According to data from the Indonesian Child Protection Commission (KPAI), from 2023 to 2024, 3,877 bullying cases have been received, consisting of 40% of children who are victims and 60% of children who are perpetrators from the case data. This data is not much different from the data obtained by the Ministry of Social Affairs of the Republic of Indonesia. Until June 2025, the Ministry of Social Affairs received 967 reports of cases; 117 of them were in bullying cases. Specific data from KPAI East Java nationally recorded 241 reported cases. 17% of the data on cases that occurred. Data in Gresik Regency at the high school/vocational school level bullying cases will reach 40% by 2025. Based on the results obtained from a survey at high schools/vocational schools in Cerme District, 20% of bullying perpetrators occurred at school.

Rigby revealed that adolescents who are often involved in bullying at school tend to experience unstable emotions, difficulties in building close relationships with others and peers, lack of empathy for others, as well as irritable, inconsistent, irritable, impulsive, and not feeling guilty or remorse (Rahmadhony, 2020). Jennifer and Cowie revealed that poor emotional regulation or aggressive nature in individuals can be one of the factors that trigger bullying behavior. In this case, individuals with low emotional control abilities often experience behavioral problems and tend to choose to engage in bullying. Bullying behavior in adolescents often arises due to inability to manage emotions and inaccuracies in dealing with emotional problems (Prasetio et al., 2021). Based on the background of this problem, the research conducted aims to evaluate the effect of mindfulness-based cognitive therapy targeted at vulnerable groups of bullies in vocational school adolescents.

METHOD

In this study, a quasi-experimental method was applied with a pre-test post-test design. This study is 11th grade students of SMK YPI Darussalam 2 Cerme Gresik for the 2026/2027 school year, with a sample of 31 students determined using purposive sampling techniques. The instruments used are the scale of aggressive behavior towards vulnerable groups of bullies and the MBCT module that has been adapted. To test the significance of the data, it was carried out using the independent sample T-Test or Pairet T-test

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technique to measure the difference in aggressive levels before and after the intervention. The results showed that there was a significant decrease in the aggressive behavior score after the administration of MBCT intervention in the experimental group ($p<0.05$).

RESULT

Univariate analysis

1. Characteristics of Respondents by Age

Table 1. Characteristics of respondents by age at SMK YPI Darrusalam 2 Cerme

Age	Regulation of Emotions for Vulnerable Groups of Bullying Perpetrators			
	Experimental Groups		Control Groups	
	N	%	N	%
16 Years	7	48%	7	39%
17 Years	9	52%	8	61%
Total	16	100%	15	100%

A distribution table of respondents' characteristics by age shows that Most subjects are in the late phase of adolescence. Of the total 31 respondents, in the experimental group, most of them were at the age of 17 years (52%). Meanwhile, in the control group, most of the 17-year-olds were 8 people (61%). In the experimental group with an average age of 16 years, there were 7 people (48%). Meanwhile, in the control group, there were 7 people aged 16 years (39%). The average age of respondents in this study was generally dominated by adolescents aged 17 years.

2. Characteristics of Respondents by Gender

Table 2. Characteristics of respondents by gender at SMK YPI Darrusalam 2 Cerme

Gender	Regulation of Emotions for Vulnerable Groups of Bullying Perpetrators			
	Experimental Groups		Control Groups	
	N	%	N	%
Female	16	51,6%	15	48,4%
Total	16	51,6%	15	48,4%

The table shows the distribution of respondents by gender in the vulnerable group of bullies. Of the total 31 respondents, most of them were female, namely 31 people (100%). This shows that the majority of participants in this study are women.

3. Characteristics of Respondents by Class

Table 3. Characteristics of respondents based on class at SMK YPI Darrusalam 2 Cerme

Classes	Regulation of Emotions for Vulnerable Groups of Bullying Perpetrators			
	Experimental Groups		Control Groups	
	N	%	N	%
11	16	51,6%	15	48,4%
Total	16	51,6%	15	48,4%

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The table shows the distribution of respondents by class. Of the total 31 respondents, most of the 11th grade high school students were 31 people (100%).

Bivariate Test

1. Identification of the experimental group of emotional regulation of the vulnerable group of the bully before being given MBCT therapy

Tabel 4. Identification of emotional regulation of vulnerable groups of bullies at SMK YPI Darussalam 2 Cerme on February 20-March 20

Emotion Regulation	Pre-Test		Post-Test	
	n	%	N	%
High	0	-	5	40%
Moderate	10	56%	8	45%
Low	6	44%	3	15%
Total	16	100%	16	100%

The table show it can be seen that the distribution of Pre Post respondents in the experimental group, before the intervention was carried out, was placed (56%) in the medium category, while (44%) students in the low regulatory category. After being given the Pre-Experiment intervention, some students were in the high category (40%), and (45%) respondents in the medium category, in the low category (15%).

2. Identification of the Control Group Before and After Receiving MBCT Therapy

Table 5. Emotion regulation of the control group at SMK YPI Darussalam 2 Cerme from February 3 to March 3, 2026

Emotion Regulation	Pre-Test		Post-Test	
	n	%	N	%
High	0	-	-	-
Moderate	10	75%	12	80%
Low	5	25%	3	20%
Total	15	100%	15	100%

Based on Table 5 above, it shows the distribution of emotion regulation criteria for the control group in the pre-test, where the moderate emotion regulation category was obtained by as many as 10 respondents (75%), and the low category by 5 respondents (25%). In the post-test, respondents in the moderate emotion regulation category were obtained (80%).

3. The Effect of Mindfulness-*Based Cognitive Therapy* (MBCT) on the Group Vulnerable to *Bullying* Behavior

Table 6. Statistical Test Results of the Intervention Group Using Paired T-Test

Emotion Regulation	Pre-Test		Post-Test	
	n	%	N	%
High	0	-	5	40%
Moderate	10	56%	8	45%
Low	6	44%	3	15%
Total	16	100%	16	100%
	Pre-test Mean: 29.29		Post-test Mean: 43.82	
Paired T-test : p-value = 0.000 (alpha < 0.05)				

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Table 6 shows that the Paired T-test yielded a Sig (2-tailed) value in the intervention group of p = 0.000 (alpha < 0.05). Based on these results, hypothesis H1 is accepted and H0 is rejected, which indicates that there is an effect of Mindfulness-based cognitive therapy on the experimental group.

Table 7. Statistical Test Results of the Control Group Using the Wilcoxon Test

Emotion Regulation	Pre-Test		Post-Test	
	n	%	N	%
High	0	-	0	-
Moderate	10	75%	12	80%
Low	5	25%	3	20%
Total	15	100%	15	100%
Wilcoxon signed rank test : p-value = 0.003 (alpha > 0.05)				

Table 5.7 for the control group shows the results of the Wilcoxon signed rank test: p value = 0.003 (alpha > 0.05), so H1 is rejected and H0 is accepted, indicating that there is no effect on the control group regarding the emotion regulation of the group vulnerable to bullying behavior

DISCUSSION

1. Identifying the regulation of emotions decreases the aggressive behavior of vulnerable groups of bullies

The level of emotion regulation in the group vulnerable to bullying behavior before the intervention was administered was mostly in the low to moderate categories. In the experimental group before being given the intervention, the majority of respondents were in the moderate category (56%) and the low category (44%). After the intervention was administered, the experimental group experienced a significant increase in the high category (40%), while the moderate category stood at (45%), and the low category at (15%). For respondents in the low category, it can be interpreted that adolescents' emotion regulation ability is multifactorial, but can be chronically influenced by initial emotional stability under family environmental pressure and compliance with independent skills.

The research results show that regarding the age of respondents in the intervention group, almost half of the intervention group respondents were 17 years old, numbering 9 people (52%), and those aged 16 years numbered 7 people (48%). Adolescent emotional capacity is multifactorial, chronically influenced by early emotional stability, family environmental pressures, and adherence to self-regulation skills (Gross, 2021). Age distribution analysis revealed that respondents were primarily 17 years old (52%). According to developmental theorists such as Gross (2021) and Steinberg (2023), ages 16–17 mark a critical developmental window characterized by significant structural brain maturation (particularly prefrontal cortex and limbic system dynamics) and hormonal fluctuations. This neurodevelopmental phase is crucial for impulse suppression, stress mitigation, and social adaptation. Difficulties in managing

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emotions during this period directly impair psychological well-being and fuel interpersonal aggression (Casey et al., 2024).

Gender distribution indicated that 100% of participants were female. Recent psychological literature (e.g., Youth & Roberts, 2024) emphasizes that female adolescents aged 16–17 are particularly vulnerable to internalizing distress and emotion regulation difficulties. Young females frequently utilize rumination strategies (brooding and overthinking social stressors), leading to emotional internalisation such as anxiety, which can paradoxically manifest as reactive behavioral outbursts when processing intense emotional triggers (Zeman et al., 2022). Low emotion regulation stems from cognitive developmental lags, emotional intensity, adverse peer experiences, and deficient social support structures (Firdays, 2023). Effective emotion regulation requires cognitive reappraisal and expressive suppression management as outlined by Gross and Thompson (2020), aspects of adolescent emotion regulation include cognitive strategies such as cognitive reappraisal, behavioral strategies such as expressive suppression, emotional acceptance, problem-solving skills, as well as emotion monitoring and evaluation to manage the intensity and duration of emotions, enabling adolescents to adapt and function adaptively in their environment.

2. Identifying Emotion Regulation of the Control Group Before and After Being Administered Mindfulness-Based Cognitive Therapy in the Group Vulnerable to Bullying Behavior

Based on the results of data analysis in the control group, it was found that the majority of respondents were still in the moderate and low regulation categories. This shows that without intervention in the control group, the emotion regulation capacity of adolescents aged 16–17 years tends to remain static or is even vulnerable to worsening due to school environmental pressure and late adolescent emotional fluctuations. This condition reinforces the theory that recovery from emotional dysregulation in groups vulnerable to bullying behavior requires cognitive reconstruction that trains individuals to monitor their emotions.

This stagnation in the control group underscores the theoretical premise that without active cognitive reconstruction, adolescent emotional dysregulation does not resolve spontaneously; rather, it remains vulnerable to worsening under the cumulative pressures of late-adolescent academic stress and social friction. As highlighted by Segal et al. (2022) and Andini et al. (2024), spontaneous maturation alone is insufficient for mitigating severe emotional dysregulation in bullying-vulnerable youth. Recovery requires systematic interventions that train individuals to cultivate meta-awareness and monitor their internal emotional states before behavioral translation occurs.

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3. Analyzing the Effect of Mindfulness Therapy on the Group Vulnerable to Bullying Behavior Before and After Being Administered the Intervention

Based on Table 6, it is known that there is a significant change in the experimental group after being administered MBCT therapy. Before the intervention was administered, the majority of respondents were in the low to moderate categories. In the experimental group, it shows that the Paired T-test yielded a Sig (2-tailed) value in the experimental group of p=0.000 (α<0.05). Based on these results, hypothesis H1 is accepted and H0 is rejected, which indicates that there is an effect of Mindfulness based cognitive therapy on the experimental group. Meanwhile, in the control group, the results of the Wilcoxon signed rank test yielded p-value=0.003 (α>0.05), so H1 is rejected and H0 is accepted, indicating that there is no effect on the control group regarding the emotion regulation of the group vulnerable to bullying behavior.

Several researchers have shown that Mindfulness-Based Cognitive Therapy (MBCT) in improving emotional awareness in adolescents can vary depending on each individual. The application of mindfulness has been commonly carried out at the individual level to overcome various mental health problems in adolescents, providing a positive effect not only on cognitive aspects, but also on psychological stress conditions, coping abilities, and individual mental resilience (Firdays 2023). Several studies in America have shown that individuals experiencing mental disorders have low levels of mindfulness. This is proven in the neural differences between individuals experiencing depression and individuals with high levels of mindfulness (Fourianalistyawati et al., 2018 - 117).

The application of Mindfulness-Based Cognitive Therapy (MBCT) in adolescent bullying perpetrators is a highly relevant approach. Bullying perpetrators often have problems with emotion regulation, lack of empathy, and self-defense mechanisms in the form of problem externalization (blaming others). According to 2025, adolescent bullying perpetrators usually act based on.

CONCLUSION

This study found a statistically significant difference in aggressive behavior among adolescents vulnerable to bullying perpetration following mindfulness-based cognitive therapy (MBCT). The findings suggest that MBCT may be a promising non-pharmacological intervention to help adolescents regulate emotions and reduce aggressive behavior. However, further studies are needed to confirm its effectiveness and long-term impact on bullying prevention..

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