



The Effect of Tummy Time Exercise on Gross Motor Skills in Babies Aged 3-6 months

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A B S T R A C T

Tummy time exercise involves positioning the baby on their stomach, allowing them to support their body weight. The purpose of this study was to determine the effect of tummy time exercise on gross motor skills in babies aged 3-6 months. This research design employed analytics using a One-Group Pretest-Posttest Design approach. The population consisted of 43 babies aged 3-6 months at the Integrated Health Service Post, known as Posyandu, in Arjowilangun Village, Malang Regency. The sampling technique was a total sampling. The time of intervention was 2 weeks. Data analysis employed the Wilcoxon Signed Ranks Test. Before giving tummy time exercise intervention, most respondents had normal gross motor skills (97.7%), and a small proportion had delayed gross motor skills (2.3%). After intervention, all respondents had advanced gross motor skills (100%). Based on the results of the Wilcoxon Signed Rank Test, there was a significant influence on gross motor skills in babies aged 3-6 months before and after the intervention, as indicated by a p-value of 0.000 and a calculated z-value of -6.487. In conclusion, tummy time exercises can significantly increase gross motor skills in babies aged 3-6 months. Parents should apply tummy time exercises to babies regularly to promote the development of gross motor skills in babies aged 3-6 months, enabling them to achieve gross motor milestones more quickly.

INTRODUCTION

Baby development is a natural, distinctive, dynamic, and continuous process. Two main factors influence it, namely genetic and environmental factors. Genetic factors are inherited traits that are inherited through gene instructions in fertilized egg cells. Meanwhile, environmental factors are everything around the baby that determines whether its genetic potential can be achieved or not (Reiss et al., 2022). One way to help a baby reach their genetic potential in terms of growth and motor development is through stimulation. This stimulation is an activity designed to enhance the basic abilities of babies aged 3-6 months, enabling them to grow and develop optimally. A form of stimulation can be exercise therapy, which aims to improve physical condition and provide continuous stimulation to the baby's body to achieve optimal development (Mujahidah et al., 2021). One of them is tummy time exercise.

Tummy time exercise involves positioning the baby on their stomach, allowing them to support their body weight. This exercise helps improve head control and strengthen the muscles of the neck, shoulders, arms, and back. The Chartered Physiotherapist in Paediatrics recommends tummy time because it can help prevent delays in the development of motor skills in babies. Therapeutic exercises in the prone position for babies aged 1-4 months could help improve the baby's ability to lift their head (Zhou et al., 2023). Providing play equipment during tummy time to babies aged 2.5-3 months resulted in an increase in the

longer duration of neck control against gravity compared to the initial conditions of the experiment (Reyhanita et al., 2023).

At three months, babies begin to develop the gross motor skills to lift their heads. At four months, when pulled up to a sitting position, they can lift their heads briefly. At five months, babies can begin rolling from a prone position to their back. By six months, babies can sit with support (Kiebzak, 2021). Gross motor skills, such as lifting the head in infants aged 3-6 months, enable them to maintain a head position for extended periods of time. This head control is crucial in preparation for the next stage of development, as it helps infants develop motor skills that support movement control and other physical activities (Tupsila et al., 2022). The purpose of this study was to determine the effect of tummy time exercise on gross motor skills in babies aged 3-6 months at the Integrated Health Service Post, known as *Posyandu*, in Arjowilangun Village, Kalipare District, Malang Regency.

METHOD

This research design employed analytics using a One-Group Pretest-Posttest Design approach. The population in this study was 43 babies aged 3-6 months at *Posyandu* in Arjowilangun Village, Kalipare District, Malang Regency. Furthermore, the sampling technique used in this research was a total sampling, with the research sample comprising all babies aged 3-6 months. The instrument utilized the Standard Operating Procedure (SOP) for tummy time exercises and the Denver II to assess gross motor development. The time of intervention was 2 weeks. Data analysis employed the Wilcoxon Signed Ranks Test, using the SPSS 25 application, to determine the effect of tummy time exercise on gross motor skills in babies aged 3 to 6 months. This research underwent an ethical feasibility test by the Ethics Commission of the Institute of Science and Health Technology, Dr. Soepraoen Hospital, Malang, with certificate number 017/028/II/EC/KEPK/2024.

RESULT

Posyandu in Arjowilangun Village, Kalipare District, Malang Regency, Arjowilangun *Posyandu* had one midwife and two nurses. It had 1 Auxiliary Health Center, known as *Pustu*, and 16 *Posyandu* units. In the 16 *Posyandu* units, there were 43 babies aged 3 to 6 months.

Table 1. The Characteristics of Respondents

The Characteristics of Respondents	Frequency (n)	Percentage (%)	Mean $\pm$ SD
Age			
3-month-old	15	34.9	
4-month-old	9	20.9	
5-month-old	9	20.9	
6-month-old	10	23.3	
Sex			
Boy	24	55.8	
Girl	19	44.2	
Gestational Age at Birth			
Normal	42	97.7	
Premature	1	2.3	
Immature	0	0	
Birth History			
Normal	26	60.5	
Sectio Secarea	17	39.5	
Weight of Birth			3.04 $\pm$ 0.373
Length of Birth			64.63 $\pm$ 3.230

Table 1 shows that the percentages of babies aged 3 months, 4 months, 5 months, and 6 months are 34.9%, 20.9%, 20.9%, and 23.3%, respectively—a boy-to-girl ratio of 55.8%:44.2 %. The normal gestational age at birth is 97.7%, while babies born prematurely account for 2.3% of respondents. The history of normal births is 60.5%, while the history of caesarean births is 39.5%. The baby's birth weight has a mean of 3.04%, and a standard deviation of .373%. The birth body length of the baby has a mean of 64.63%, and a standard deviation of 3.230%.

Table 2. Gross Motor Skills Before and After Tummy Time Exercise in Babies Aged 3-6 months

Gross Motor Skills	Pretest		Posttest		Δ	<i>p</i>
	F	%	f	%		
Advanced	0	0	43	100		
Suspect	0	0	0	0		
Normal	42	97.7	0	0		
Delay	1	2.3	0	0		
	3.02 $\pm$ 0.152		1.00 $\pm$ 0.000		-6.487	0.000

Before giving tummy time exercise intervention, most respondents had normal gross motor skills (97.7%), and a small proportion had delayed gross motor skills (2.3%). After intervention, all respondents had advanced gross motor skills (100%). Based on the results of the Wilcoxon Signed Rank Test, there was a significant influence on gross motor skills in babies aged 3-6 months before and after intervention, as indicated by the *p*-value (*p*=0.000) and the difference (Δ =-6.487) (Table 2).

DISCUSSION

The results of this paper showed that, in the pretest, 42 respondents fell into the normal category, indicating gross motor development in accordance with the standards or age range generally expected. One was in the delayed gross motor skills, meaning the baby showed signs that his ability to develop gross motor skills was delayed or occurred later than in babies his age. The posttest results showed that 43

respondents fell into the advanced category, demonstrating increased gross motor skills after receiving tummy time exercise for 2 weeks (Table 2). Thus, babies aged 3-6 months made significant progress in gross motor skills after giving tummy time exercises for 2 weeks. Later, after the research, parents were able to continue tummy time exercise independently.

The results of this research are supported by motor development theory (Gesell and McGraw). Tummy time exercises promote the development of directed gross motor movement patterns, such as head control, arm pushing, and the ability to roll over. It is in line with the sequential stages of motor development, where babies develop muscle control gradually from head to toe (cephalocaudal development) (Lovell et al., 2024). According to psychosocial theory (Erik Erikson), this occurs during the trust vs. mistrust stage. Babies from 0 to 1 year build a sense of security through interactions with caregivers. Parents who are involved during tummy time exercise help build the baby's self-confidence through attention and stimulation (Ernandini & Wiryaputra, 2024).

According to researchers, tummy time exercises play a crucial role in supporting the development of babies aged 3 to 6 months. The goal is not only to strengthen the neck and shoulder muscles, but also to help babies prepare basic motor skills such as rolling over, sitting up, and crawling. Apart from that, tummy time exercise is also a simple way to prevent problems such as plagiocephaly (flat head), which often occurs in babies who lie on their backs for too long (Nisa & Sulistyorini, 2024). This activity also provides sensory and visual stimulation, which is beneficial for the baby's cognitive development. Tummy time exercise is not just about physical exercise. It also creates an opportunity for parents to interact with their baby, strengthen emotional bonds, and provide a sense of security and comfort. So, tummy time exercise is a holistic form of stimulation that supports the baby's overall growth (Hewitt et al., 2020). However, this must be done carefully, paying attention to the baby's comfort, because not all babies immediately feel comfortable when lying on their stomachs. A gradual approach and responsiveness to the baby's needs are key to maximizing the benefits of tummy time exercises (Zachry & Woods, 2023).

Gross motor skills in babies aged 3-6 months show that strengthening the neck and back muscles at this age enables them to begin learning to lift their head and chest when sleeping on their stomach (tummy time) (Fajzrina et al., 2022). In this study, 43 respondents participated in both a pretest and a posttest, yielding advanced gross motor skills in all respondents. The progress made by respondents/babies in strengthening their neck, back, and shoulder muscles is vital for further gross motor development. Babies begin to learn to balance their bodies when moving, such as when they try to lift their chest or push themselves to roll over. Many babies start to learn to roll over from their back to their stomach or vice versa. By the end of 6 months, most babies begin to strengthen the muscles needed to sit with support or even sit on their own without assistance for a short time. Through gross motor activities such as lifting, rolling, and kicking, babies begin to explore the world around them (Organization, 2025).

The results of this research are supported by Gesell's theory of motor development, which is based on the principle of maturation (Maturation Theory). Arnold Gesell stated that motor development occurs as a result of the maturity of the central nervous system, so that babies follow a regular development pattern, such as at 3 months they can lift their heads when lying on their stomachs, at 4 months they can roll over from their stomachs to their backs, at 5–6 months they can support their bodies with their hands when prone, trying to sit with support. According to motor development theory, milestones represent the development of control over physical movements through the coordinated activity of nerve centers, nerves, and muscles. Supportive stimulation, such as tummy time exercise, physical interaction, and a safe environment, is vital (Maciak et al., 2024).

In addition, the role of parents and caregivers is crucial in creating an environment that supports the development of babies' gross motor skills. Additionally, consultation with a healthcare professional is necessary if the baby appears to be experiencing significant delays. A balanced approach between stimulation and attention to the baby's needs will help them reach gross motor milestones optimally (Ishlah et al., n.d.).

In addition, the Wilcoxon Signed Rank Test yielded a p -value of 0.000, indicating a significant influence on gross motor skills in babies aged 3-6 months before and after tummy time exercise (Table 2). Babies who regularly engage in tummy time exercises tend to control their head movements more quickly than babies who are not given similar stimulation. During tummy time exercises, babies learn to support their bodies with their hands and push up. This activity strengthens the muscles of the arms, back, and abdomen, which support the ability to roll over. The prone position reduces pressure on the back of the baby's head, thereby preventing head deformity from prolonged lying on the back. Research shows that babies who frequently engage in tummy time exercises tend to reach gross motor milestones, such as rolling over, sitting up, and crawling, more quickly. During tummy time exercises, babies learn to move their heads, arms, and legs in a coordinated manner, laying the critical foundation for developing balance and mobility. In the prone position, babies have a different perspective from which to observe the environment, motivating them to reach for objects or people, which stimulates gross motor and cognitive skills (Maciak et al., 2024).

Based on Gesell's developmental theory (Maturation Theory), Arnold Gesell states that motor development is the result of the nervous system's maturity, which follows a regular pattern. Tummy time exercises support this development because they engage large muscles, such as the neck, shoulders, and back, which are essential for achieving gross motor milestones. It also helps babies overcome primitive reflexes, including the asymmetrical tonic neck reflex, which allows for control of the head and movement—a more coordinated body (Murtiningsih et al., 2025). According to Arnold Gesell, in Kamaruddin Husin, human growth follows patterns that can be learned. Structure precedes function. The set of muscles is complete

before they can be used fully. Tummy time provides necessary environmental stimulation to strengthen the muscles of the neck, shoulders, and back, which are the foundation for gross motor skills such as rolling over, sitting up, crawling, and walking (Hewitt et al., 2020). Vygotsky and Bandura referred to it as the theory of social learning through the environment, encompassing interactions with parents or caregivers. When babies are given tummy time, support and encouragement from parents (such as placing toys in front of the baby) motivates the baby to move and explore his environment, which supports gross motor development (Rattler, 2024).

Tummy time exercises have a profoundly positive influence on the gross motor development of babies aged 3-6 months. This activity not only helps babies develop the strength of their large muscles, such as the neck, shoulders, back, and arms, but also prepares them for subsequent gross motor milestones, including rolling over, sitting up, and crawling. However, it is also vital to ensure that tummy time exercise is done in a fun and safe way, as some babies may feel uncomfortable at first. With the right approach, such as incorporating toys or engaging in interaction with parents, babies will enjoy this activity more. Overall, tummy time exercise is a simple yet crucial step in supporting the gross motor development of babies aged 3–6 months, as well as laying a strong foundation for future movement and mobility.

CONCLUSION

In conclusion, tummy time exercises can significantly increase gross motor skills in babies aged 3-6 months. Parents should apply tummy time exercises to babies regularly to promote the development of gross motor skills in babies aged 3-6 months, enabling them to achieve gross motor milestones more quickly.

REFERENCES

- Ernandini, E., & Wiryaputra, J. A. (2024). Making Physical Activities a Part of a Child's Life. In *Updates on Physical Fitness in Children*. IntechOpen.
- Fajzrina, L. N. W., Ngaisah, N. C., & Pratamasari, I. (2022). Analysis of Detection of Growth and Development In Gross Motor Toddlers (Case Study of Babies Aged 6 Months Cannot Pronning, Roll and Crooked). *JOYCED: Journal of Early Childhood Education*, 2(2), 206–217.
- Hewitt, L., Kerr, E., Stanley, R. M., & Okely, A. D. (2020). Tummy time and infant health outcomes: a systematic review. *Pediatrics*, 145(6), e20192168.
- Ishlah, N., Hilmi, M. I., & Himmah, I. F. (n.d.). Parental Stimulation in Gross Motor Development at 3-4 Years Old at KB Aisyiyah 08 Kranji Lamongan. *Indonesian Journal of Adult and Community Education*, 6(1), 10–17.
- Kiebzak, W. (2021). Basics of physiological carrying babies. *Polish Annals of Medicine*, 28(1).
- Lovell, B., Watt, A., & Spittle, M. (2024). Theoretical context for a wakeful prone and vestibular infant

- movement program to support early infancy motor development. *Journal of Occupational Therapy, Schools, & Early Intervention*, 17(4), 883–902.
- Maciak, M., Koszela, K., Beniuk, A., & Woldańska-Okońska, M. (2024). Development of postural-motor, coordination, and reflex functions in children in the first year of life. *Polski Merkuriusz Lekarski*, 52(5).
- Mujahidah, N., Damayanti, E., & Afiif, A. (2021). The role of Storytelling Methods using hand puppets in early children's language development. *Child Education Journal*, 3(2), 78–91.
- Murtiningsih, M., Peristiowati, Y., Ellina, A. D., & Wardani, R. (2025). Effect of ATNR (Asymmetrical Tonic Neck Reflexes) Primitive Reflexes on Postural Control and Focus of Children Aged 5-8 Years at the Touch Care Mataram Physiotherapy Clinic. *Journal Of Nursing Practice*, 8(2), 448–454.
- Nisa, H. K., & Sulistyorini, S. (2024). The Effect of Tummy Time Exercise on Gross Motor Skills in Babies Aged 3-6 Months. *Journal of Educational Innovation and Public Health*, 2(4), 25–29.
- Organization, W. H. (2025). *Infant and young child feeding: model chapter for textbooks for medical students and allied health professionals*. World Health Organization.
- Rattler, M. (2024). *Tummy Time Toolkit: Incorporating Social-Emotional Strategies to Increase Caregiver Home Programming Compliance*. University of Nevada, Las Vegas.
- Reiss, D., Ganiban, J. M., Leve, L. D., Neiderhiser, J. M., Shaw, D. S., & Natsuaki, M. N. (2022). Parenting in the context of the child: Genetic and social processes. *Monographs of the Society for Research in Child Development*, 87(1–3), 7–188.
- Reyhanita, A. R. N. A., Jayadi, A. J. A., & Putri, A. P. A. (2023). Pengaruh Tummy Time Exercise Terhadap Kekuatan Otot Leher Bayi Pada Saat Usia 3 Bulan Di Puskesmas Manggar Balikpapan. *Infokes*, 13(02), 75–82.
- Tupsila, R., Siritaratiwat, W., Bennett, S., Mato, L., & Keeratisiroj, O. (2022). Intra-individual variability in gross motor development in healthy full-term infants aged 0–13 months and associated factors during child rearing. *Children*, 9(6), 801.
- Zachry, A. H., & Woods, L. (2023). Using the theoretical domains framework and the behavior change wheel to design a tummy time intervention. *Journal of Occupational Therapy, Schools, & Early Intervention*, 16(3), 239–251.
- Zhou, X., Li, X., & Du, Q. (2023). Pediatric Rehabilitation. In *In Utero Pediatrics: Research & Practice* (pp. 297–312). Springer.