



## Type and Duration of Mask Use Related To Acne Vulgaris During The Pandemic Period

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### A B S T R A C T

The masks' use has been a suggested strategy to counter COVID-19 transmission throughout this disease outbreak; however, wearing masks tightly closed for an extended period can cause acne vulgaris. The mask's form and duration of use are two factors that may affect the occurrence of acne vulgaris. Therefore, more research is needed to determine the impact of using masks on the prevalence of acne vulgaris. This study aimed to analyze the relationship between the type and duration of mask use and the prevalence of acne vulgaris in the citizens of Kawistowindu Village during the pandemic. This study used an analytical-observational study with a cross-sectional approach, with a sample of 63 people who met the inclusion and exclusion criteria throughout the neighborhood of RT.02 RW.01 Kawistowindu Village. The sample was chosen using a simple random sampling technique. Questionnaire forms, history-taking instruments, and physical examination techniques were used to collect data—the analysis used the Chi-Square test. The results showed that during the pandemic era, there was a significant correlation between the type of mask and the duration of mask use with the occurrence of acne vulgaris ( $p=0.000$ ;  $p=0.004$ ). In conclusion, in the pandemic era, the mask form and duration of mask use could be linked to acne vulgaris

## INTRODUCTION

COVID-19 has emerged as a global health problem since 2020. The World Health Organization then designated the COVID-19 pandemic on March 11, 2020 (Kemenkes RI, 2020a). The cause of COVID-19 is Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (Kemenkes RI, 2020b), whose virus allows it to be spread through aerosols or droplets directly or indirectly (Wang & Du, 2020; WHO, 2020d).

WHO recommends using masks to prevent and limit the spread and transmission of COVID-19 (Susilo et al., 2020). A mask is a self-protection device used to prevent and limit the spread of COVID-19 (WHO, 2020a). In general, masks are divided into three groups: medical masks, non-medical masks, and N95 masks. The Centers for Disease Control and Prevention (CDC) recommends wearing a cloth mask because some individuals with COVID-19 without symptoms can still transmit the SARS-CoV-2 virus (CDC & Centers for Disease Control and Prevention, 2020).

Medical masks are mandatory for all health workers and those entering hospitals or other health facilities. In addition, N95 masks are recommended for health workers who treat COVID-19 patients (WHO, 2020b). A Study had shown that prolonged use of tight masks may lead various skin problems such as

dermatitis, acne, pigmentation, and redness of the face. The most frequently reported problem is the acne incidence (Hidajat, 2020).

Acne is a chronic inflammatory skin disease and obstruction of the pilosebaceous gland that has diverse clinical images such as papules, comedones, pustules, scar tissue, and nodules (Han et al., 2020). There is a distinctive clinical picture of acne caused using masks, namely the acne on the face area covered by the mask, such as cheeks, nose, chin, and surrounding areas of the mouth. Acne caused by masks is estimated to be linked to various factors such as the material or type of mask, duration of use, acne history, and cosmetics use (Hidajat, 2020).

Acne caused by wearing a mask is estimated to be caused by a combination of stress, friction, and stretching caused by prolonged use of the mask. Prolonged use of a tight mask can lead to humid and heated conditions and may endanger local pressure on the skin to obstruct the pilosebaceous glands (Hidajat, 2020). High temperatures may as well affect acne because they negatively affect the sebum excretion rate (Sebum excretion rate/SER). SER will increase by 10% for every 1oC increase in temperature (Han et al., 2020). Changes in surface sebum composition and skin hydration can increase acne flares if masks are used for a long time during the COVID-19 pandemic (Hidajat, 2020).

The incidence of acne caused by masks has been reported in various research publications. In 2004, Tan reported two cases of acne in health workers with a history of about three months of continuous use of N95 masks. They all reported having the same distribution of acne exacerbations, namely in the cheek, chin, and perioral areas. Another study, conducted by Wasfa, involved 150 health professionals with mask-induced acne, which was reported at 56%. A previous study found that 24 people (28%) and while 61 people (72%) developed new acne lesions after starting to wear masks for extended periods (Wasfa et al., 2020).

Based on the above, mask use is strongly recommended to prevent the spread of COVID-19 during the pandemic. However, more attention is needed on the impact of mask use on the incidence of acne vulgaris so that researchers can identify the correlation between the type and duration of mask use.

## **METHOD**

This study used an analytic observational method with a cross-sectional approach. This study was conducted in January 2022 in RT.02 RW.01 Kawistowindu Village, Duduksampeyan District, Gresik, East Java. The sample of 63 people was calculated using the Slovin formula and chosen with a simple random sampling technique. The inclusion criteria are being registered as a member of the Kawistowindu Village community of RT. 02 RW. 01 and use masks for daily activities outside the room, aged between 14 and 40. The exclusion criteria are suffering from facial skin diseases such as perioral dermatitis and rosacea, current menstruation, family history of severe acne, and daily use of cosmetics. The signing of

the informed consent was carried out before data collection. Data were collected using a questionnaire that was distributed to the subjects and by taking anamnesis, as well as a physical examination accompanied by a general practitioner to assess the type of skin and UKK (Ujud of Skin Disorders) experienced by the sample. Data were analyzed using the Chi-Square test. This study has been approved by the Faculty of Medicine Ethics Committee, University of Muhammadiyah Semarang No.149/EC/FK/2021.

## RESULT

Table 1. The Characteristics of the sample community RT.02 RW.01 Kawistowindu Village.

Variable	Frequency (%)
Age	
14-27	28 (44,4)
28-40	35 (55,6)
Gender	
Male	32 (50,8)
Female	31 (49,2)
Occupation	
Unemployed	15 (23,8)
Entrepreneur	12 (19,0)
Farmer	22 (34,9)
Trader	11 (17,5)
Farm Worker	3 (4,8)
Skin Type	
Dry	2 (3,2)
Normal	21 (33,3)
Oily	14 (22,2)
Combination	26 (41,3)
Mask Type	
Medical Mask	25 (39,7)
Non-Medical Masks	38 (60,3)
Duration of Mask Usage	
≥ 6 hours	30 (47,6)
< 6 hours	33 (52,4)
The Incidence of Acne Vulgaris	
With Acne	23 (36,5)
Without Acne	40 (63,5)
Area of Acne Vulgaris	
No acne	40 (63,5)
Cheek	11 (17,5)
Nose	2 (3,2)
Chin	9 (14,3)
Around the Lips	1 (1,6)

In Table 1, the most significant sample was aged 28–40, with equal to 35 people (55.6%). By gender, the sample ratio is 1:1. Most samples are farmers, of which 22 people (34.9%). There are 26 samples (41.3%) of the complex skin types, 38 people (60.3%) used non-medical mask types, 33 samples (52.7%) used the masks less than 6 hours a day, 40 people (63.5%) did not develop acne vulgaris, and 11 samples (17.5%) of the most common area of acne were cheeks.

**Table 2. The correlation between mask types and duration of use and the incidence of acne vulgaris.**

Variable	incidence of Acne Vulgaris		p	RP (CI 95%)
	Yes n (%)	No n (%)		
Mask Type				
Medical Mask	17 (68)	8 (32)	0,000	4,307 (1,970-9,413)
Non-Medical Mask	6 (15,8)	32 (84,2)		
Duration of Mask Usage				
≥ 6 hours/day	17 (56,7)	13 (43,3)	0,004	3,117 (1,417 –6,857)
< 6 hours/day	6 (18,2)	27 (81,8)		

Based on table 2, the results show that the sample using medical masks who experienced acne vulgaris was 17 people (68%), while the sample using non-medical masks who did not experience acne vulgaris was 32 people (84.2%). The analysis showed a significant correlation between the type of mask used and the incidence of acne vulgaris ( $p=0.000$ ). According to the table, the value of  $RP=4.307$  (CI 95% 1,970-9,413). This finding indicates that people who use a medical mask are four times more likely to experience acne than those who use a non-medical mask.

In addition, based on Table 2, the samples using masks with more than six hours per day were 17 people (56.7%), while the samples using masks with less than six hours per day were 27 people (81.8%). This result shows that people who use masks for more than six hours a day have a higher incidence of acne than those who use masks for less than six hours. This analysis found that the duration of mask use was significantly related to the incidence of acne vulgaris ( $p=0.004$ ). Based on this table, the value is  $RP=3.117$  (CI 95% 1.417-6.857). It shows that those who use masks for more than six hours per day are three times more likely to develop acne vulgaris than those who use masks for less than six hours.

## DISCUSSION

This study has shown that the types of masks are related to the incidence of acne vulgaris. Samples using medical masks are more likely to develop acne than non-medical masks. This result is consistent with a *cross-sectional* study conducted by Alkubaisi that showed a significant correlation between mask types and skin diseases. This study found that the sample that experienced the most acne vulgaris was the sample that used the type of medical mask (Alkubaisi, 2020). Research conducted by Leelawade also revealed that wearing a medical mask showed a two times higher risk of adverse skin reactions than wearing a non-medical mask. Based on this, it is hoped that the public can use this non-medical mask to avoid skin disorders, especially the acne vulgaris. (Techasatian et al., 2020). Chanxu Han revealed that most of his research samples who had a previous history of acne experienced exacerbations or recurrences after using medical masks (Han et al., 2020).

The World Health Organization (WHO) regulates that masks are divided into two types: medical masks and non-medical masks. Medical masks are composed of respirators and surgical masks (WHO, 2020b).

The surgical mask is a disposable mask with three to four layers in the middle as a filter layer. The respirator mask is a medical mask with high filtration power, and it prevents virus exposure because there are no gaps or leaks. Respirator masks are classified according to standards such as KN95 (Chinese standard), N95 (American NIOSH standard), KF95 (Korean standard), and FFP2 (European standard). These medical masks are made of synthetic fiber polypropylene, and non-medical masks are made of other materials such as cotton (WHO, 2020c). The combination of fabrics used in masks determines filterability and breathing convenience (Dwirusman, 2020). Fabrics made from natural fibers such as cotton, linen, silk, and lyocell are more breathable to the skin than synthetic fibers that tend to remove moisture from the skin (Chua et al., 2020).

Tan's research suggests that acne is the most frequently reported adverse reaction to medical masks, which has two plausible explanations (Foo et al., 2006; Tan, 2004). First, a heated and humid microclimate is formed on the part of the face covered with a tight mask that is prone to acne. Second, occlusion of the pilosebaceous duct due to local skin pressure from the masks can lead to acne (Dréno et al., 2018; Foo et al., 2006).

This study found a significant relationship between the duration of mask use and the incidence of acne vulgaris. The longer duration of mask use, the higher the acne vulgaris incidence. Leelawade's *cross-sectional* study, there is a significant correlation between acne and long-term mask use (Techasatian et al., 2020). Wasfa Hayat's study also showed a significant increase in acne incidence among subjects who wore masks for more than six hours a day (Wasfa et al., 2020).

Long-term use of masks can cause exacerbation not only of existing acne but also increases the incidence of mechanical acne, such as lesions caused by long-term contact with the ingredients used in the mask. The increased warmth and moisture of the facial skin due to exhaust air and sweat can worsen this matter (Han et al., 2020; Wasfa et al., 2020).

According to Changxu Han's research, areas of the face that often have acne vulgaris are the cheek and nose. The incidence of acne was significantly higher in samples using masks for more than six hours per day than in samples using masks for less than six hours per day (Han et al., 2020). Another study of health workers conducted by Lan and others also found that samples using masks for more than 6 hours had twice the risk of developing skin disease compared to samples using masks for less than 6 hours (Lan et al., 2020).

Hua evaluated that changes in the skin after long-term use of the mask can lead to changes in the skin microenvironment, such as dehydration, increased sebum, and increased pH. Trans-epidermal water loss and sebum dysregulation are pro-comedogenic factors that cause the development of *Cutibacterium acnes* bacteria so innate immune responses can lead to inflammatory lesions (Hua et al., 2020). Sebum excretion also increased two hours after using the mask and continued to increase four hours after use.

These findings may encourage individuals to take 15-minute break every four hours (Howard et al., 2020; Hua et al., 2020).

Acne caused by wearing a mask is called a Maskne. Maskne is caused by friction, repeated stress, sweat, and skin stress (Pervun & Babenko, 2021). Long-term use of a tight mask can lead to wet and hot conditions and may put local pressure on the skin to block the pilosebaceous gland (Hidajat, 2020). High temperatures are also closely correlated with acne, negatively affecting the sebum secretion rate (Sebum Excretion Rate/SER). When sebum excretion rate changes directly with local temperature changes, the sebum excretion increases by 10% for every 1°C increase, and squalene significantly affects surface lipids as temperature increases (Rudd & Walsh, 2021; Searle et al., 2021). High skin humidity can also cause acne due to clogged pores and irritation at the top of the pilosebaceous duct. Changes in sebum composition and moisture on the skin surface and destruction of the skin's protective layer can lead to the imbalance of bacterial microflora on the skin and cause acne (Gomolin et al., 2020; Teo, 2021). This finding is consistent with studies showing that most of the samples using masks in this study had the combination and oily skin types.

## CONCLUSION

The type and duration of mask use were significantly related to the incidence of acne vulgaris during the pandemic period in the community of RT.02 RW.01 Kawistowindu, Duduksampeyan District, Gresik, East Java.

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