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Comparison of Acne Degree among Users of Disposable and KN95 Masks

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ABSTRACT

Background: Maskne is a variant of acne that arises from wearing a mask. One factor that influences the incidence of maskne is the type of mask. **Purpose***:* To compare the degree of acne vulgaris in disposable and KN95 mask wearers. **Methods:** This research was a cross-sectional descriptive study. The sample used was 444 people with acne vulgaris due to the use of disposable and KN95 masks. Acne vulgaris is classified based on the degree of acne. Data were analyzed bivariately using the Chi-square test. **Result***:* This study shows no significant difference between the type of mask and the incidence of acne vulgaris (p = 0.70,p> 0.05). **Conclusion***:* There is no difference in the degree of acne vulgaris in the incidence of maskne in individuals wearing disposable and KN95 masks.

Keywords: Acne vulgaris, Disposable mask, KN95 Mask, Maskne.

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BACKGROUND

Masks are mandatory for healthy and sick people, health workers, and the general public to prevent the spread of COVID-19.[1] Many types of masks can be used in everyday life. The recommended masks consist of three types: medical masks, cloth masks, and N95 masks.[2] The study by Techasatian et al. shows that the general public often uses four types of masks: surgical masks, cloth masks, surgical masks covered by a sheet, and FFP2 masks such as N95 or KN95. *Surgical masks* are masks that are commonly used by both medical personnel and the general public.[3,4]

During the pandemic, wearing masks took longer than before. Using masks for a long period of time can actually cause several skin problems, such as acne, dermatitis, redness, rosacea, folliculitis, and pigmentation on the face.[5] The problem that is most often caused is acne, which is around 25.7% and is referred to as acne due to wearing a mask, or maskne or mask-acne. This term is used for any skin condition with acne or irritation on the face, especially in areas covered by a mask, such as a nose-to-chin area[5,6] Maskne is generally influenced by three factors, namely acne exposure, called mechanical factors, personal hygiene, and climate.[7]

Around 59.6% of people who wear masks regularly have experienced acne[3] Maskne is found in medical personnel and the general public.[8,9] Approximately 78% of maskne cases occurred in samples wearing masks for more than 6 hours.[10]

Each mask has a different effect on the incidence of acne.[11] Surgical masks are riskier than cloth masks. [3] Other research shows that the continuous use of N95 masks causes acne, itching, and rashes on the face.[12] The KN95 mask is a type of FFP2 mask that resembles the N95 [11], and Hayat et al. research shows that this mask is also experienced by KN95 mask users.[10]

Based on the above, it is necessary to conduct research that compares the types of masks with the

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incidence of acne vulgaris, especially the degree of acne. This study used disposable/ surgical masks compared to KN95 in causing maskne.

METHODS

This research is a descriptive-analytic study with a cross-sectional design approach and purposive sampling method on Tadulako University students. A total of 444 respondents participated in this research and filled out the questionnaire. The inclusion criteria in this study were using KN95 and disposable masks (e.g., surgical masks) in daily activities and being diagnosed with maskne through anamnesis and dermatological examination by a Dermatologist. The incidence of acne vulgaris in this study was classified based on the degree or severity of the acne. The data obtained was then analyzed statistically using the Chi-square test.

This research has received ethical approval from the ethics committee of the Faculty of Medicine, Tadulako University (No. 7682/UN.28.1.30/KL/2022).

RESULT

The use of masks during the COVID pandemic is very important to prevent transmission. However, aside from that, masks can cause skin problems such as rosacea, dermatitis, and acne.[13] Table 1 details the respondent's age and characteristic gender.

Table 1. Characteristics of respondents

Characteristic	N	percentage (%)
Gender		
Male	124	28.38
Female	320	71.63
Age		
17-19 years old	100	22.52
20-22 years old	285	64.19
23-25 years old	59	13.29

Based on the table above, it can be seen that most respondents were female (71.63%), and most were between 20 and 22 years old (64.19%).

Table 2. Relationship between the degree of acne vulgaris based on the type of mask

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.227[a]	2	.073
Likelihood Ratio	5.059	2	.080
Linear-by-Linear Association	2.796	1	.095
N of Valid Cases	444		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.33.

The table above shows a p-value of 0.073, so it can be concluded that there is no difference in the degree of acne in the incidence of maskne based on the type of mask used.

Table 3. Comparison of the degree of acne vulgaris based on the type of mask

Acne vulgaris	Type of mask Disposable mask	KN95	Total
Grade 1	230 (62.2%)	36 (48.6%)	266 (59.9%)
Grade 2	80 (21.6%)	24 (32.4%)	104 (23.4%)
Grade 3	60 (16.2%)	14 (18.9%)	74 (16.7%)
Total	370 (100%)	74 (100%)	444 (100%)

The table shows that the majority degree of maskne was mild or grade 1, with disposable masks higher than KN95.

DISCUSSION

There have been some problems with skin reactions to wearing masks during a pandemic, not only for health workers but also for the general public [3]. Maskne (acne resulting from a mask) is one of the most common skin reactions. Furthermore, research has shown a relationship between frequency, type of mask, history of acne, and the clinical spectrum caused by masks [5,10,14].

The difference in the use of disposable masks (surgical masks) with KN95 masks on the degree of acne vulgaris is based on the effect each type of mask has on the degree of acne incidence in samples during clinical examinations by dermatovenereologists.

This study showed that most acne occurred in females (71.63%). Besides that, the respondents are young adults. This result is in line with several studies that examined the effect of masks on the incidence of acne vulgaris.[3,7,10,14,15] In addition, females have twice the risk of developing acne vulgaris than males.[15] The difference in acne prevalence between males and females is thought to be influenced by the melanocortin-1 receptor factor on sebocyte and keratinocyte cells, androgen, and estrogen hormone levels.[16] Young adults, predominantly female, are a risk factor for mask cases.[17] Females and young people are more concerned about their skin and are more likely

to go to the doctor for skin health, which also increases healthcare behavior.[10,14]

Most people experience acne for the first time from puberty to young adulthood, with its severity increasing in late adolescence (17-22 years old). Insulin-like Growth Factor-1 (IGF-1) levels are thought to increase androgen receptor sensitivity, which plays a role in sebum and keratinocyte hypersecretion. Therefore, according to age, serum levels will decrease along with a decrease in the incidence of acne vulgaris.[16]

The results of the statistical analysis showed a p-value = 0.73 ($p>0.05$), indicating no significant difference in the degree of acne vulgaris between the disposable or surgical mask group and the KN95 mask. Both masks indicate that the user has grade 1 acne (Table 1).

Techasatian et al. research shows that surgical masks are riskier than cloth masks.[3] In addition, a study by Damayanti showed that out of 105 respondents, 81% were found to be suffering from maskne with the use of surgical (disposable) masks (42%), compared to KN95 masks (34%).[18] In a study in Lahore, maskne occurred in 56% of KN95 mask users, 30% of surgical mask users, and 14% of N95 mask users.[10]

Research conducted by Villani found that the severity of acne was in the moderate category (54%).[19] This study does not explain the type of mask used. Research by Nagani et al. showed that the use of N95 masks had the highest level of acne severity (82%) compared to the use of surgical masks (75.5%) and cloth/cotton masks (65.6%).[20] Other studies showed that the majority of subjects suffered from mild acne, with a higher number of cases reported in cloth masks (66.7%), followed by N95 masks (58.9%) and surgical masks (51.6%). Moderate and severe acne were mainly observed in those wearing N95 and surgical masks.[21] However, the study did not explain the significance of the relationship between the type of mask and the degree of acne. Apart from that, the type of mask used was different from that used in this study. This result can also be attributed to the fact that the number of KN95 mask users in our study was lower than that of disposable masks.

Tunçer Vural stated that maskne could be used on people with or without a history of acne, and the use of personal protective equipment has been proven to worsen acne.[15] The leading cause of maskne is friction, repeated pressure, sweat, or stress on the skin that causes acne or exacerbations of existing acne.[5,8,22]

The mask makes the skin moist and hot, especially in the U zone, O zone, or both (around the mask area)[9], and increases sebum production. Every 1°C temperature change will affect sebum production by 10%.[5,23] Furthermore, squalene can become more significant on the surface of lipids when the temperature increases. Increased moisture acts through the effects of pore occlusion, irritation, and inflammation on the skin. Sweat and moisture build-up can cause acute obstruction and exacerbate acne. A mask causes the air temperature between the skin and the mask to become higher. This increases sweat retention, especially in people with hyperhidrosis. Conversely, it can reduce air recirculation and increase the deposition of damp hair and exhaled toxins.[11,15]

Both masks can disrupt the balance of normal flora in facial skin due to changes in sebum levels and skin hydration, which cause the skin barrier to be damaged. The mask influences the environmental conditions of the face covered by it, increasing the multiplication of microbiota such as *Cutibacterium acnes* and the immune response, leading to inflammatory papules and acne pustules.[9,11,24]

As for the inflammatory reaction factors obtained from using the two types of masks, continuous friction between the skin and the mask releases the inflammatory mediator IL-1α. In this case, the levels of these inflammatory mediators will increase along with the prolonged friction. In addition, IL-1α triggers keratinocyte hyperproliferation and the formation of microcomedones.[25]

Another factor that causes maskne is the length of time spent using masks and hygiene.[22] Many people reuse their masks a few times before changing. This factor increased the risk of maskne by up to 1.5 times in the group that reused masks and replaced them every 2 to 3 days compared to the group that changed masks every day.[3] Makeup can affect humidity and increase the likelihood of irritation of the pilosebaceous ducts [10]. The limitation of this study is that it did not examine the history of acne or the skin type.

In this study, it can be concluded that there is no difference in the degree of acne vulgaris in the incidence of acne vulgaris in individuals who use disposable masks, in this case, surgical masks, and in individuals who wear KN95 masks.

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