





report changes and 26% ($n = 67$) reported worsening of their cutaneous clinical condition during presence of symptoms, without significant differences between treatment groups. Most respondents (85%) did not report changes in AD/PsO treatment. Twenty-nine percent ($n = 175$) of respondents felt more susceptible for an infection (with a more severe course), and 74% ($n = 441$) of the respondents experienced an increased level of stress. Respondents with systemic therapy were found to feel more vulnerable (42%) compared to respondents without systemic therapy (11%) ($P < 0.00001$). Moreover, our results showed that respondents with systemic therapy were more satisfied with the information concerning COVID-19 provided by the hospital compared to respondents without systemic therapy. This might be explained by the information regarding therapy and COVID-19 that was sent only to patients with systemic therapy. Limitations of this study include the limited number of people tested for SARS-CoV-2 resulting from limited testing capacity in the Netherlands during the study period. Therefore, we also report on COVID-19 related symptoms accompanied by predictive values which are associated with a positive COVID-19 test.¹⁰ Furthermore, a recall bias could not be ruled out due to the retrospective design, although it is expected to be the same in both treatment groups. This study gives more insight into COVID-19 (related symptoms) and the effect of the COVID-19 pandemic in respondents with inflammatory skin diseases treated with or without systemic therapy. We did not find significant differences in the number, nature, and duration of symptoms and infections between both treatment groups ($P > 0.05$). This might suggest that there is no difference in susceptibility for a (severe) COVID-19 infection in respondents using systemic versus respondents without systemic therapy, with an increased psychological burden in respondents with systemic therapy.

Conflicts of interest

The authors have no conflict of interests to declare.

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Adverse skin reactions following different types of mask usage during the COVID-19 pandemic

Dear Editor,

Since the onset of the COVID-19 pandemic, an abrupt behavioural change in the form of the widespread wearing of masks has become prominent.¹ Wearing a mask is beneficial in lowering the risk of virus transmission. However, this measure is also known to cause various facial skin problems,^{2,3} and their incidence might differ with the type of mask used.

The primary objective of this study was to determine and compare the incidences of adverse skin reactions for the mask types used by the general population during the COVID-19 pandemic. This survey study was conducted in Thailand in May 2020, during the national lockdown. Self-administered questionnaires were distributed via an online platform. Healthcare workers were excluded.

A total of 1231 participants completed the questionnaires. Most respondents were female (73.8%) and aged above 30 years (72.1%). The most common baseline skin type was oily skin (45.3%) and mild acne (55.8%). Most participants wore facial masks for less than 4 h per day (53.8%). As to the type of mask,

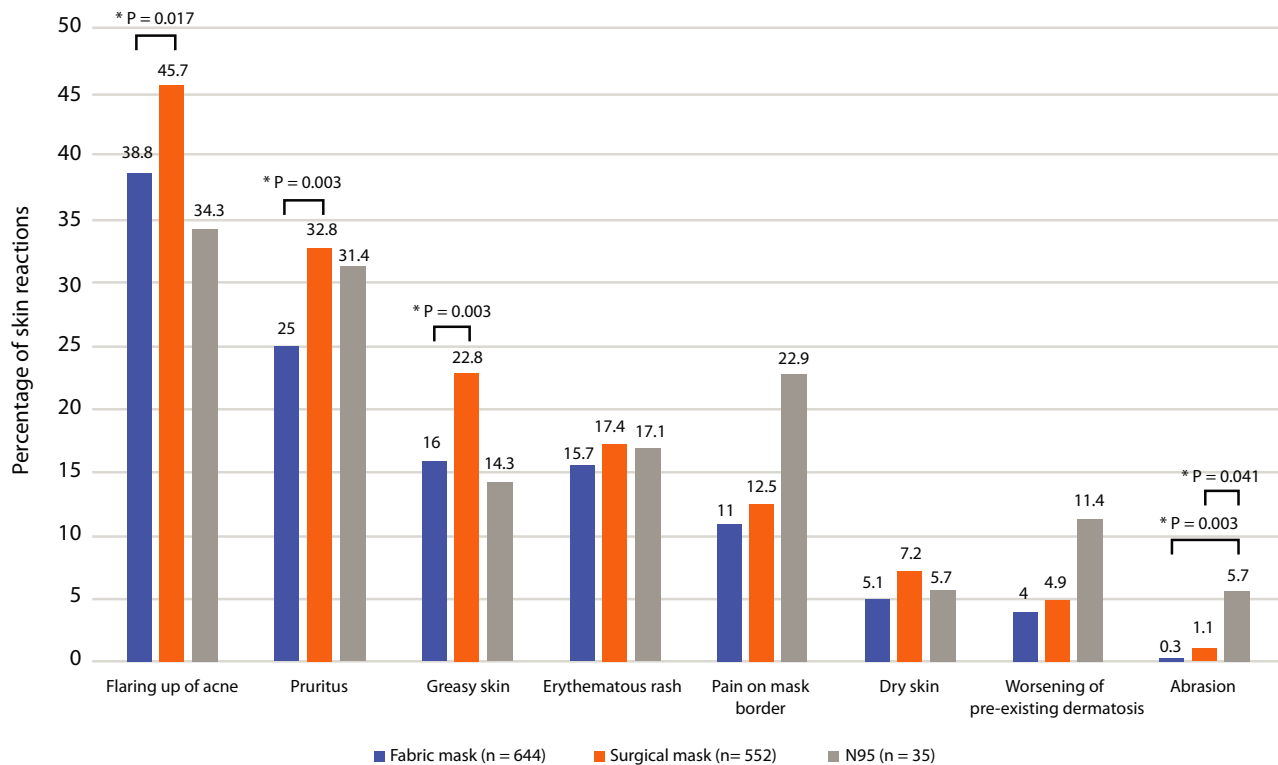


Figure 1 Percentage of skin reactions from fabric, surgical and N95 masks.

644 participants (52.3%) wore fabric masks, whereas 552 (44.8%) wore surgical masks. Only 35 participants (2.8%) were using N95 respirators during the pandemic.

In all, 767 participants (62.3%) complained of 1,594 adverse skin events following mask usage. The flare-up of acne accounted for the highest proportion of reports (32.2%), followed by pruritus (22.1%) and greasy skin (14.7%). The remaining skin reactions included erythematous rash (12.7%), pain on mask border (9.3%), dry skin (4.7%), worsening of pre-existing dermatoses (3.6%) and abrasion (0.6%).

Comparing the adverse skin reaction between different types of masks (Fig. 1), the incidence of adverse skin reactions from surgical mask usage was higher than that for fabric masks for every type of adverse skin reaction, with statistically significant differences for acne, pruritus and greasy skin. Most surgical masks are typically composed of 3–4 layers of the fabric, supplemented by two filter sheets.⁴ In comparison, cloth masks are made from various textiles, such as cotton, polyester or silk fabric.⁵ The greater number of layers in surgical masks might produce a more pronounced occlusion effect than cloth masks.

Of the three mask types, N95 respirator usage in general population demonstrated the highest incidence for only three skin reaction types: abrasion, pain at mask borders and a worsening

of pre-existing dermatoses. The incidence of common adverse skin reactions arising from N95 respirator usage, such as acne, was lower than for the two other types of mask. However, our participants were non-medical personnel, and they might not have known the proper wearing method for N95 respirator. Their respirators might not have fitted tightly against their faces. Hence, the rate of adverse skin reactions from N95 respirator usage in this study was also lower than those previously reported for healthcare workers.^{6,7}

The factors associated with the adverse skin reactions were analysed (Table 1). Being female, an age below 40 years, having oily skin, having acne before starting to wear masks and long durations of mask usage (>4 h daily) were significantly associated with skin reactions. Interestingly, mask reuse did not increase the risk of skin reactions, whereas reuse with cleaning seemed to lower the risk. If mask reuse is unavoidable, prior cleaning should alleviate the risk of skin reactions.

In conclusion, this study revealed and compared the incidences of adverse skin reactions arising from the usage of three types of masks in daily life. Our data indicated that acne flare-up was the most common reaction and that fabric, or cloth, masks had the lowest rates of skin reactions. About one-third of the respondents reported being comfortable with wearing masks.

Table 1 Factors associated with skin reactions in mask wearers during the COVID-19 pandemic

	Skin reactions (n = 767) N (%)	No skin reactions (n = 464) N (%)	Univariate analysis		Multivariate analysis	
			Crude OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Sex						
F	591 (65.1)	317 (34.9)	1.56 (1.20–2.02)	0.001	1.67 (1.25–2.23)	0.001
M	176 (54.5)	147 (45.5)	Reference	—	Reference	—
Age (year)						
18–30	266 (77.3)	78 (22.7)	4.18 (3.05–5.73)	<0.001	2.53 (1.78–3.60)	<0.001
31–40	302 (68.0)	142 (32.0)	2.61 (1.98–3.43)	<0.001	1.93 (1.43–2.59)	<0.001
> 40	199 (44.9)	244 (55.1)	Reference	—	Reference	—
Education						
Below undergraduate	56 (58.9)	39 (41.1)	0.84 (0.55–1.29)	0.428	NA	NA
Undergraduate and above	711 (62.6)	425 (37.4)	Reference	—	Reference	—
Skin type						
Dry skin	162 (59.3)	111 (40.7)	1.47 (1.08–2.01)	0.014	1.31 (0.94–1.83)	0.117
Normal skin	199 (49.8)	201 (50.2)	Reference	—	Reference	—
Oily skin	406 (72.8)	464 (27.2)	2.70 (2.06–3.54)	<0.001	1.80 (1.33–2.44)	<0.001
Degree of acne before starting to wear masks						
No acne	210 (44.8)	259 (55.2)	Reference	—	Reference	—
Mild acne	495 (72.1)	192 (27.9)	3.18 (2.48–4.07)	<0.001	2.08 (1.57–2.76)	<0.001
Moderate acne	56 (82.4)	12 (17.6)	5.76 (3.01–11.02)	<0.001	2.82 (1.40–5.68)	0.004
Severe acne	6 (85.7)	1 (14.3)	7.4 (0.88–61.95)	0.065	2.14 (0.25–18.75)	0.491
Time wearing mask per day (h)						
0–4 h	357 (53.9)	305 (46.1)	Reference	—	Reference	—
4–8 h	316 (70.5)	132 (29.5)	2.05 (1.59–2.64)	<0.001	1.83 (1.38–2.39)	<0.001
> 8 h	94 (77.7)	27 (22.3)	2.97 (1.88–4.69)	<0.001	2.44 (1.51–3.95)	<0.001
Disposing of mask every day						
Reusing mask	218 (70.6)	91 (29.4)	Reference	—	Reference	—
Reusing with cleaning	549 (59.5)	373 (40.5)	—	—	—	—
Reusing without cleaning	445 (58.4)	317 (41.6)	0.59 (0.44–0.78)	<0.001	0.69 (0.51–0.94)	0.020
Reusing without cleaning	104 (65.0)	56 (35.0)	0.78 (0.52–1.16)	0.220	0.85 (0.54–1.33)	0.471

Significant *P* values (<0.05) are in Bold.

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