

# An online survey on the association between the use of alcohol-based hand sanitizer and dermatitis in the Jizan Population

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## ABSTRACT

**Background:** Frequent use of alcohol-based hand sanitizers during the COVID-19 pandemic can cause skin irritation and dermatitis due to the removal of natural skin oils. This survey aims to assess the association between alcohol-based hand sanitizer use and dermatitis prevalence among the residents of Jizan, Saudi Arabia. **Methods:** This cross-sectional study was conducted using an online survey distributed between September and December 2021. The survey collected data on hand sanitizer usage patterns, dermatitis symptoms, and sociodemographic characteristics of 500 randomly selected Jizan residents aged  $\geq 18$  years. Associations between sanitizer use variables and dermatitis occurrence were analyzed using Chi-square and exact probability tests for instances with low frequencies. **Results:** The majority were 347 (69.4%) females, with a mean age of  $23.6 \pm 11.8$  years. A total of 402 (80.4%) used sanitizers, increasing to 395 (79%) during the pandemic. Dermatitis symptoms were reported in 138 patients (27.6%) after sanitizer use. Using sanitizers  $>6$  times daily was associated with 71.4% a dermatitis prevalence of 47.4% versus  $<3$  times daily ( $P = 0.003$ ). The use of 80–95% alcohol gels was linked to 68.8% dermatitis versus other products ( $P = 0.001$ ). The common symptoms included skin roughness (55.4%), itching (46.5%), and redness (37.6%). Onset was immediate (23.3%) and within hours or days (28.2%). **Conclusions:** This study demonstrated a clear association between frequent or high-concentration sanitizer use and increased dermatitis prevalence among Jizan residents. Public awareness campaigns and product guidelines are needed to promote proper usage of techniques that balance hygiene and skin health. Future research should explore effective prevention strategies, such as moisturizer combinations or lower risk alternatives.

**Keywords:** Alcohol sanitizers, COVID-19 pandemic, hand dermatitis, skin irritation

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## Background

The ongoing COVID-19 pandemic, declared a global health crisis by the World Health Organization (WHO) on 11 March 2020, has drastically impacted lives worldwide.<sup>[1,2]</sup>

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The rapid spread of this deadly virus occurs mainly through person-to-person contact, either directly by inhaling tiny droplets from infected individuals sneezing, coughing, or talking or indirectly through contact with contaminated surfaces.<sup>[1,2]</sup> Preventive measures without an effective antiviral treatment or vaccine against the virus have become crucial.<sup>[2,3]</sup> These include surface disinfectants, hand washing, hand sanitizers, face masks, physical distancing, and personal protective equipment (PPE).<sup>[3,4]</sup> Maintaining hand cleanliness is a crucial step in preventive healthcare. It has been observed that nations that rigorously follow protocols for lockdowns, social distancing, and hand sanitation report fewer instances of the disease, thereby reducing the overall health impact.<sup>[3,4]</sup> Handwashing with soap and water or alcohol-based sanitizers is a proven method for combating COVID-19. It is inexpensive, practical, simple, and can reduce the spread by 50% when done appropriately.<sup>[3,4]</sup>

However, the continued use of alcohol-based sanitizers removes natural skin oils, causing dehydration, fissures, and erosion.<sup>[4-6]</sup> This increased the risk of infection. Excessive soap and detergent use also disrupt the skin's lipid barrier, increasing sensitivity, redness, dermatitis, eczema, and other problems.<sup>[4,6]</sup> Both healthcare professionals and the general population have reported increased adverse skin reactions due to frequent handwashing and sanitization.<sup>[6-8]</sup> In Wuhan, 74.5% of healthcare workers developed hand eczema associated with frequent handwashing.<sup>[9,10]</sup> Similar findings have been reported in other countries worldwide.<sup>[8,11]</sup> Among the general population, hand hygiene reactions have also increased due to increased handwashing and sanitizing, with new hand eczema cases in urgent care.<sup>[8,10]</sup>

Limited research has been conducted on the relationship between alcohol-based sanitizers and dermatitis, particularly in Jizan, Saudi Arabia. Most studies have focused on healthcare professionals, excluding their effects on the general population. Therefore, this survey aims to assess the association between hand sanitizers and dermatitis and measure the prevalence among alcohol-based hand sanitizers in Jizan. The findings of this study could inform public health strategies to maintain hygiene while improving skin care. It would also further understand sanitizer side effects to develop both virus-preventive and gentle products that may lead to interventions that will enhance the quality of life and hygiene adherence.

## Materials and Methods

### Study design and setting

This study employed a quantitative descriptive cross-sectional approach implemented via a self-administered survey from September 2021 to December 2021. This research was conducted in Jazan Province, located at the extreme southwestern tip of Saudi Arabia. This area is the second-smallest region in the kingdom, second only to Al Bahah, and spans 11,671 square kilometers. According to the 2017 census, it is home to 1,567,547

residents, making it the region with the highest population density in Saudi Arabia. It shares its borders with the Aseer region to the north and east, the Red Sea to the west, and the Republic of Yemen to the south and southeast.

### Study population

The target population included all Jazan 18 years or older residents who used electronic media.

### Inclusion criteria

Individuals residing in the Jazan region aged 18 years or older were eligible to participate in the study. This eligibility specifically targeted those who had had dermatitis due to the use of alcohol-based sanitizers.

### Exclusion criteria

The study excluded individuals under 18 years of age, those who chose not to participate, and residents outside the Jazan region. Furthermore, Individuals with dermatitis for reasons other than using alcohol-based sanitizers. In addition, Individuals who do not use alcohol-based sanitizers.

### Sampling method

The study's sample was compiled using the convenient method of non-random sampling, and snowball technique to ensure a diverse and comprehensive representation. To enhance the response rate, we sent follow-up reminders to those who did not respond to the initial survey invitation.

### Sample size

Using the Raosoft sample size calculator (Raosoft Inc., Seattle, WA, USA, raosoft.com) (<http://www.raosoft.com/samplesize.html>), it was determined that a minimum sample of 385 participants from the 1,637,361 Jazan residents would provide a 95% confidence level with a 5% margin of error. The nonresponse rate was estimated as 30%, so the total is approximated to 500 participants.

### Data collection instruments

Data were gathered through a self-administered survey consisting of obligatory multiple-choice questions in Arabic. The survey, created using Google Forms, was disseminated via social media platforms, such as Telegram, WhatsApp, and Facebook, within groups specific to the Jazan population. The survey includes a variety of questions. These covered social demographic data, such as gender, age, education, and occupation. Additionally, it inquired about the use of alcohol sanitizers, including the frequency and amount of use, place of purchase, and source of information about the product. The survey also sought to identify the presence of dermatitis, clarifying that any reported dermatitis should not be due to history; however, it linked explicitly to general sanitizer use or an allergic reaction to a particular type of sanitizer. The questionnaire asked about the symptoms that appeared and the timing of their onset.

## Instruments validation

The pilot study was carried out on 40 subjects. the results of the pilot study are not included in the final results of the study.

## Data analysis

The data collected was reviewed, categorized, and entered into IBM SPSS version 22 statistical software (SPSS, Inc., Chicago, IL, USA) for analysis. Using the frequency and percentage distribution, a descriptive analysis was performed on all research variables, such as demographic data, hand sanitizer usage, and related dermatitis information. Graphs were created to illustrate dermatitis symptoms, patterns, and onset. The relationship between the usage pattern of alcohol-based hand sanitizers and the incidence of dermatitis was evaluated using cross-tabulation. This assessment employed Pearson's Chi-square and exact probability tests for instances with low frequencies. All statistical tests were two-sided; a *P* value below 0.05 was deemed statistically significant.

## Ethical considerations

The Research Ethics Committee at Jazan University approved this study via a letter dated 2 May 2021 (approval number REC42/1/113). An initial consent question was included in the survey to ensure voluntary participation. The survey link was automatically terminated if the participant declined to consent. The participants were informed that they could withdraw from the study at any point without any negative consequences. All participants' personal information was kept confidential throughout the study period.

## Results

In this study [Table 1], a diverse group of 500 participants was engaged, overcoming a notable nonresponse challenge to illuminate important demographic characteristics and their implications for the research focus. The age span of participants from 18 to 35 years, with a notable mean age of  $23.6 \pm 11.8$  pointing towards a younger demographic, suggests the potential influence of generational perspectives on the subject matter of the study. The predominant representation of female participants (approximately 69.4%) and Saudi nationals (over 98%) offers unique insights into the cultural and gender dynamics at play.

A significant portion of the sample (71%) held university degrees, highlighting a highly educated cohort that may possess distinct awareness or attitudes toward the issues under investigation. The distribution of employment status, with a noteworthy segment of healthcare staff (41.4%), underscores the varied professional backgrounds interacting within the study, possibly affecting the interpretation and application of findings in practical settings.

Finally, participants represented a broad spectrum of monthly incomes, indicating diverse economic backgrounds. This diversity allows for a more comprehensive exploration of the impact of economic status on the research variables.

**Table 1: Sociodemographic characteristics of study participants (n=500)**

Socio-demographics	n	%
Age in years		
18–25	270	54.0%
26–30	89	17.8%
31–35	62	12.4%
>35	79	15.8%
Gender		
Male	153	30.6%
Female	347	69.4%
Nationality		
Saudi	491	98.2%
Non-Saudi	9	1.8%
Educational level		
Secondary/below	114	22.8%
University graduate	355	71.0%
Post-graduate	31	6.2%
Employment		
Unemployed/retired	102	20.4%
Student	94	18.8%
Non-health care staff	97	19.4%
Health care staff	207	41.4%
Monthly income		
<5000 SR	125	25.0%
5000–10000 SR	139	27.8%
10000–15000 SR	115	23.0%
>15000 SR	121	24.2%

n; Number. (%); Percentage. SR: Saudi Riyal

Table 2. Sanitizers have been used during the COVID-19 pandemic in Jazan, Saudi Arabia. An overwhelming majority of the study's participants (80.4%) incorporated the use of sanitizers into their health safety practices, reflecting a heightened public awareness and response to the pandemic's transmission risks. The data further reveal a significant behavioral shift, with 79% of respondents reporting an increase in sanitizer usage, which indicates a proactive approach to personal and public health in the face of the virus's spread. Notably, daily use was reported by 18.4% of participants, suggesting a routine integration of sanitization practices into their daily lives, while over half (55.6%) used sanitizers as needed, demonstrating a situational awareness of risk.

The study also shed light on pre-existing skin conditions among participants, with 23.8% reporting diagnoses of skin allergies before the pandemic. Following the increased use of sanitizers, 21.6% suffered from skin issues such as redness, rashes, ulcers, or rough skin on their hands, highlighting a potential area of concern for public health advisories regarding sanitizer use. The adoption of sterilizers, particularly when visiting crowded places, was noted in 39.2% of the cohort as a usual practice, with an additional 47.2% doing so sometimes, underlining the community's adaptive measures to safeguard against the virus in high-risk environments.

Table 3. Frequency of current use of sanitizers among study participants. 63.8% continue their use, illustrating an enduring

commitment to preventive health practices even as the immediate crisis of the pandemic may wane. This ongoing vigilance is contrasted by a noteworthy perspective among non-users, where a majority (92.3%) perceived no necessity for continued sanitizer use, potentially reflecting a broader debate on the balance between precautionary measures and perceived risk post-pandemic. Meanwhile, a small fraction of non-users (7.7%)

abstained due to skin allergies, pointing to personal health considerations influencing public health behaviors.

Among those who persisted in using sanitizers, a diverse range of usage patterns emerged, with 53.6% applying sanitizers less than three times daily and 37.6% using them 3-6 times daily, suggesting varying levels of concern or different interpretations of what constitutes adequate preventive measures. Furthermore, the quantity of sanitizer used reveals a split in practice; while 31% of users applied only a few quantities, believing it sufficient, a larger group (60.2%) opted for a more thorough application, ensuring coverage of all hand surfaces. This distinction underscores a critical aspect of public health messaging on effective sanitization techniques.

The incidence of skin allergies post-pandemic among 14.2% of patients introduces an essential dimension to the conversation on sanitizer use, emphasizing the need for a balanced approach that considers both the effectiveness of such preventive measures and their potential impact on individual health. These findings collectively suggest a complex landscape of sanitizer use, marked by varied practices, perceptions, and health outcomes, which could inform future guidelines and educational efforts aimed at optimizing public health strategies while minimizing adverse effects.

Table 4. Dermatitis associated with sanitizer use among study participants. 27.6%, reported dermatitis symptoms such as burning sensations, swelling, itching, or dryness, underscoring the dermatological impact of frequent sanitizer use. This finding calls attention to the need for guidelines on safe sanitizer use that minimizes adverse skin reactions, especially in a public health crisis context. The analysis of sanitizer types preferred by participants reveals a diverse usage pattern, with alcohol-based sanitizers (60–75% gel) being the most prevalent choice, followed closely by traditional liquid soap and water, and then alcohol sanitizer sprays. This variety reflects a broad spectrum of public preferences, potentially influenced by availability, perceived effectiveness, and individual skin sensitivity. The occurrence of side effects, such as dehydration in 18% of patients using specific sterilizers, further emphasizes the importance of selecting appropriate sanitizer formulations to prevent unintended health consequences. The primary sources for these sanitizers, predominantly pharmacies, indicate a trust in formal healthcare settings for reliable products, while the influence of the Ministry of Health (MOH) and doctors on sanitizer use decisions for nearly 70% of users highlights the effectiveness of authoritative health guidance in shaping public behavior.

Figure 1: Symptoms of sanitizer use-associated dermatitis among the study participants. The predominance of skin roughness, reported by over half of the affected individuals (55.4%), highlights an immediate tactile impact, potentially influencing daily comfort and the consistency of sanitizer use. Itching, experienced by nearly half of the participants (46.5%), and redness, affecting over a third (37.6%), further underscore

**Table 2: Sanitizers used during the COVID-19 pandemic**

Sanitizers used in the COVID-19 pandemic	n	%
Do you use hand sanitizer?		
Yes	402	80.4%
No	98	19.6%
Has the Corona pandemic affected your use of sterilizers?		
Increased use	395	79.0%
Same use	71	14.2%
Never used	34	6.8%
How often did you use sterilizers before the pandemic?		
Daily	92	18.4%
When need	278	55.6%
Never used	130	26.0%
Have you ever been diagnosed with a skin allergy before the COVID-19 pandemic?		
Yes	119	23.8%
No	381	76.2%
Do you suffer from skin redness, rashes, ulcers, or rough skin on your hands before using sanitizers?		
Yes	108	21.6%
No	392	78.4%
After the coronavirus pandemic, how often do you use sterilizers in crowded places (hospitals, markets)?		
Usually	196	39.2%
Sometimes	236	47.2%
Never	68	13.6%

n; Number. (%); Percentage

**Table 3: Frequency of current use of sanitizers among study participants**

Current use	n	%
Are you still using sanitizer?		
Yes	319	63.8%
No	181	36.2%
If not, why?		
I had a skin allergy	14	7.7%
No need	167	92.3%
How many times do you use hand sanitizer a day?		
<3 times	171	53.6%
3–6 times	120	37.6%
> 6 times	28	8.8%
How much quantity do you use?		
Few quantity	99	31.0%
The quantity that makes my hands wet	28	8.8%
Enough quantity to cover all hands	192	60.2%
Have you suffered from skin allergies after the pandemic?		
Yes	71	14.2%
Maybe	62	12.4%
No	367	73.4%

n; Number. (%); Percentage



the discomfort and potential deterrent these symptoms pose to maintaining hand hygiene practices, which are crucial in controlling the spread of infectious diseases.

Moreover, more severe conditions such as skin rash (31.7%), peeling (29.2%), and ulcers (23.3%) indicate the risk of long-term dermatological issues that could arise from prolonged sanitizer usage, especially with products that may not be suited to all skin types. These findings serve as a reminder of the delicate balance between the effectiveness of sanitizers in pathogen control and their potential to cause harm to the skin, the body's first line of defense.

Regarding the onset and pattern of appearance of symptoms of sanitizer use-associated dermatitis in Figure 2, a significant fraction of participants (28.2%) experienced symptoms within mere hours or days of sanitizer application, pointing to a rapid

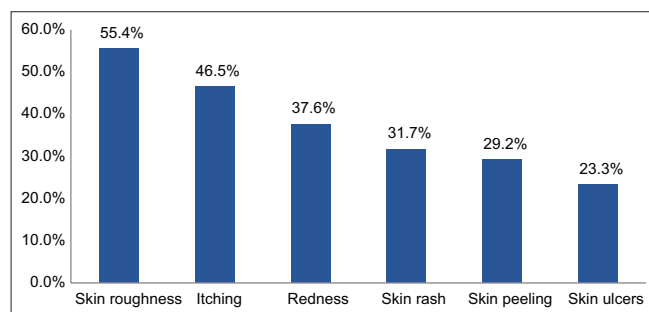
onset for some users. This immediate response, coupled with the 23.3% of individuals who reported instant symptoms upon use, underscores the potential for acute sensitivity in a substantial subset of the population. Such rapid reactions necessitate urgent consideration in the formulation and recommendation of sanitizing products, highlighting the need for immediate and clear guidelines on alternative hygiene practices for those at risk.

Furthermore, the correlation between the frequency of sanitizer use and the emergence of symptoms provides invaluable data for understanding risk factors. Specifically, 37.9% of participants encountered dermatological issues after using sanitizers 1–5 times, indicating that even minimal exposure can trigger adverse effects in sensitive individuals. Conversely, a considerable proportion (35%) only developed symptoms after more extensive use, suggesting that cumulative exposure plays a significant role in dermatological reactions for another subset of the population.

**Table 4: Dermatitis associated with sanitizer use among study participants**

Dermatitis data	No	%
Do you suffer from a burning sensation, swelling of the skin on your hands, itching, or dryness after using sterilizers?		
Yes	138	27.6%
No	362	72.4%
What type of sterilizer do you use?		
Alcohol sanitizer 60–75 gel	177	35.4%
Alcohol sanitizer 80–95 gel	82	16.4%
Alcohol sanitizer spray	116	23.2%
Liquid soap and water	145	29.0%
I don't know	162	32.4%
Do you experience any side effects when using a specific sterilizer, such as dehydration?		
Yes	90	18.0%
No	410	82.0%
Source of sanitizers		
Pharmacy	353	70.6%
Public markets	77	15.4%
Luxuries market	63	12.6%
Hospital	7	1.4%
Factors motivating people to use sanitizers		
Advice from the Ministry of Health and doctors	349	69.8%
Reputation and spread of the product	81	16.2%
Promotional advertisements	70	14.0%

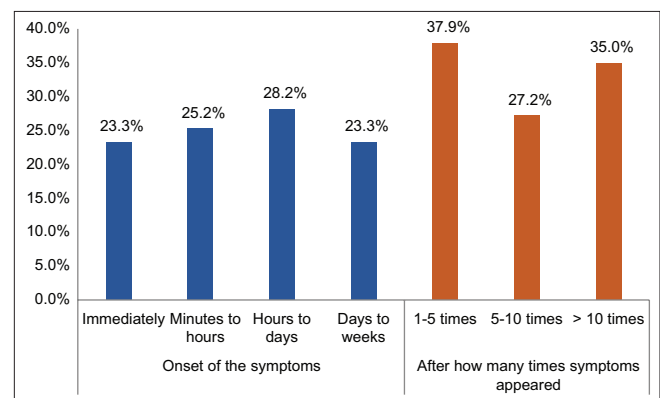
n; Number. (%); Percentage



**Figure 1: Symptoms of sanitizer-associated dermatitis among the study participants**

Table 5. Regarding the association between the pattern of alcohol-based hand sanitizer use and the occurrence of dermatitis. Notably, the frequency of hand sanitizer use emerges as a critical determinant, with application more than six times per day significantly heightening the risk of dermatitis, as observed in 71.4% of those with frequent use ( $P = 0.003$ ). This stark correlation underscores the importance of moderating hand hygiene practices to mitigate adverse dermatological effects, highlighting the need for public health guidelines to balance infection prevention with skin protection.

Further intensifying the discussion on sanitizer use is the finding that sanitizers with a high alcohol concentration, specifically those within the 80–95% gel range, are notably more likely to induce dermatitis, affecting 68.8% of users of such products ( $P = 0.001$ ). This result points to the alcohol content as a key irritant, prompting a reevaluation of current sanitizer formulations to identify alternatives that remain effective against pathogens while being gentler on the skin. Interestingly, the amount of sanitizer used and the source from which it was obtained did not exhibit a significant association with dermatitis occurrence ( $P > 0.05$ ). This observation suggests that while the volume of sanitizer applied per use might not escalate dermatitis



**Figure 2: Onset and pattern of dermatitis symptoms after sanitizer use among study participants**

**Table 5: Association between the pattern of alcohol-based hand sanitizer use and occurrence of dermatitis**

Sanitizers use pattern	Dermatitis after using sanitizers				P
	Yes		No		
	n	%	n	%	
How many times do you use hand sanitizer a day?					0.003*
<3 times	81	47.4%	90	52.6%	
3–6 times	44	36.7%	76	63.3%	
>6 times	20	71.4%	8	28.6%	
How much quantity do you use?					0.065
Few amount	50	50.5%	49	49.5%	
The amount that makes my hands wet	17	60.7%	11	39.3%	
Enough amount to cover all hands	78	40.6%	114	59.4%	
What type of sterilizer do you use?					0.001*
Alcohol sanitizer 60–75 gel	89	54.3%	75	45.7%	
Alcohol sanitizer 80–95 gel	53	68.8%	24	31.2%	
Alcohol sanitizer spray	59	55.7%	47	44.3%	
Liquid soap and water	53	46.1%	62	53.9%	
I don't know	47	39.8%	71	60.2%	
What is the source of sanitizer?					0.705§
Pharmacy	146	47.9%	159	52.1%	
Public markets	28	45.9%	33	54.1%	
Luxuries market	26	56.5%	20	43.5%	
Hospital	3	50.0%	3	50.0%	

n; Number. (%); Percentage. P; Pearson X<sup>2</sup> test. §: Exact probability test. \*P<0.05 (significant).

risk, the composition of the sanitizer and the frequency of its application are paramount considerations.

## Discussion

This cross-sectional survey provides new critical insights into the association between alcohol-based hand sanitizer use and dermatitis prevalence among the general population in Jazan, Saudi Arabia. Unlike most prior studies focusing on healthcare workers, this research analyzed sanitizer effects specifically in the community. The key findings demonstrated a clear link between more frequent daily sanitizer use, products containing higher alcohol concentrations, and increased occurrence of dermatitis.

The prevalence of dermatitis symptoms after sanitizer use was 27.6% in Jazan. This is comparable to other recent COVID-19 studies that assessed dermatitis associated with hand hygiene. A study in the Mecca Region of Saudi Arabia reported that 31.7% of healthcare workers developed skin irritation from intensive infection control measures.<sup>[7]</sup> Another study at Prince Sattam Bin Abdulaziz University of Saudi Arabia found that 34.8% of participants reported skin changes or symptoms in their hands.<sup>[12]</sup>

Another study conducted in Indonesia revealed that the incidence of irritant contact dermatitis due to the use of hand sanitizers is 33.5%.<sup>[13]</sup> Another study in Iran found that the prevalence of hand dermatitis among hospital staff was 88.02%.<sup>[14]</sup> The similarity of our community-based findings in Jazan to these studies, which focused on healthcare settings or regions, underscores how widespread dermatitis has become a side effect of heightened hand hygiene during COVID-19 across

diverse populations. Additionally, our analysis's most common specific dermatitis symptoms, including skin roughness, itching, and redness, closely align with previous evidence regarding irritant contact dermatitis associated with handwashing and sanitizers.<sup>[7,8]</sup> The consistency between dermatitis prevalence and clinical manifestations reinforces that this is a prevalent issue needing evidence-based solutions.

Alcohol-based hand sanitizers more than six times daily raised the odds of developing dermatitis by 71.4% compared to less frequent sanitizer use in our Jazan population sample. This finding aligns with previous evidence demonstrating that the cumulative effect of excessively frequent hand cleansing strips away from natural skin oils progressively damages the skin barrier and increases irritation over time.<sup>[15,16]</sup> A clinical trial found that nurses washing their hands more than ten times per shift had significantly higher rates of hand dermatitis than nurses washing less than five times per shift.<sup>[17]</sup> Another study reported that healthcare workers washing their hands more than ten times per hour had a 3.7 times risk of developing hand dermatitis than those who washed their hands less frequently.<sup>[18]</sup> The 71.4% increased odds of dermatitis associated with using hand sanitizers more than six times daily in our general population corroborates and quantifies the association between repetitive, excessive hand hygiene and dermatitis risk across groups.

Additionally, our study found that alcohol-based hand sanitizers containing higher concentrations of alcohol, 80–95%, increased the likelihood of developing dermatitis compared to sanitizers with lower alcohol content. This concurs with previous research demonstrating dose-dependent skin irritation and disruption of the skin barrier function associated with higher alcohol

concentrations in cleansers.<sup>[19]</sup> Higher alcohol levels lead to a more significant stripping of natural moisturizing factors and lipids.<sup>[20,21]</sup>

Hand sanitizers with at least 60% alcohol concentration are recommended by the Centers for Disease Control and Prevention (CDC) to effectively kill germs, including viruses like SARS-CoV-2.<sup>[22,23]</sup> This is because alcohol can denature proteins in the virus and break down its protective envelope.<sup>[24,25]</sup> However, lower alcohol concentrations may not be as effective in killing the virus as they may not be able to denature the proteins or break down the envelope effectively.<sup>[23–25]</sup> Therefore, finding the optimal balance between antimicrobial efficacy and skin tolerability of alcohol-based sanitizers requires careful consideration and well-designed clinical comparisons. However, some studies have focused on developing gentle cleansers that do not compromise the skin's barrier function or moisture content.<sup>[26]</sup> Additionally, some studies have suggested that enhancing the stratum corneum lipid structure can improve skin barrier function and protect against irritation in adults with dry, eczema-prone skin.<sup>[27]</sup>

### Study limitations

This study has some limitations. First, using a cross-sectional study design meant causation could not be determined as exposure and outcome were measured simultaneously. Longitudinal studies can help establish temporal relationships. Second, the study relied on self-reported data through an online survey, subject to recall and reporting biases. An objective clinical assessment of dermatitis was not performed. Third, the study population was limited to Jazan residents who accessed electronic media, which may not fully represent the total population. Excluding non-Internet users could introduce selection bias. Finally, other potential confounding factors for dermatitis, such as climate, genetic predispositions, and concurrent medical conditions, were not evaluated. Overall, while providing valuable initial insights, further research with more robust study designs is required to confirm these results.

### Conclusions

This cross-sectional study demonstrated an association between frequent or high-concentration sanitizer use and increased occurrence of dermatitis. Using sanitizers more than six times daily or products containing 80–95% alcohol gels significantly increased the dermatitis risk compared to less frequent or lower alcohol exposure. Common symptoms include skin roughness, itching, and redness, with onset ranging from immediate to several days. Although hand hygiene remains crucial during the ongoing pandemic, these findings indicate the need for public health strategies that promote appropriate sanitizer application techniques and gentle skin care. Raising awareness regarding balancing infection control and skin health is warranted. Future research exploring effective preventive approaches, such as lower-risk alternatives or moisturizer combinations, could help minimize sanitizer risks and allow sustained adherence to hygiene measures over the long term. Overall, this study enhances the

understanding of sanitizer side effects and provides guidelines supporting quality of life and public well-being.

### Author contributions

All authors have contributed equally to this paper's research, writing, and editing. All authors have read and agreed to the published version of the manuscript.

### Institutional review board statement

The study was conducted by the Declaration of Helsinki and approved by the Standing Committee for Scientific Research Ethics- Jazan University (HAPO-10-Z-001) via a letter dated 2 May 2021 bearing approval number REC42/1/113

### Informed consent statement

Collected online from all agreed participants, ensuring strict adherence to confidentiality, privacy, and necessary approvals.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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