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Sanitizer burns: An alcoholic problem

ABSTRACT

The use of alcohol-based sanitizer solutions has become ubiquitous during the COVID-19 epidemic. However, the public at large is not aware of the hazards associated with their use. In this article, through three representative cases, we discuss accidental burns occurring due to the use of alcohol-based sanitizers and highlight the hazards associated with flammability of the compound. We also would like to propose precautions to be followed during the sale and use of such products and discuss preventive measures for sanitizer burns.

Keywords: Alcohol sanitizer, burns, chemical, fire risk, hand hygiene

INTRODUCTION

The emergence of novel pathogens spreading to pandemic levels has always raised a major challenge to public health. In developing countries, public health challenges abound due to widespread poverty, overcrowding, and inadequate, inaccessible healthcare facilities.^[1] However, due to increased demand, not just pharmaceutical companies, breweries, perfumeries, and chemical industries have started manufacturing alcohol-based sanitizers.^[2] This has resulted in such products being available to the public.

The COVID-19 pandemic has forced hand hygiene and sanitary measures usually employed in a hospital environment to be adopted inside homes. Burns arising due to combustion of alcohol-based sanitizers are being increasingly reported in recent times.^[3,4] Although the management of the condition is akin to flame burns occurring due to other combustible substances, it usually occurs due to usage of the product near an open flame and hence is preventable. In this article, we report the case of sanitizer burns causing second-degree burns requiring treatment in an in-patient setting and discuss strategies of prevention.

CASE REPORTS

We present three cases of accidental flame burns occurring due to improper use of alcohol-based hand sanitizers. All

burns were major burns requiring in patient treatment with one of the cases requiring right upper limb fasciotomy for compartment syndrome. The clinical images of the patients are presented in Figures 1-3 along with Table 1 summarizing the clinical details.

DISCUSSION


Hand sanitizers are mainly of two types: nonalcohol-based hand sanitizers (NABHSs) and alcohol-based hand sanitizers (ABHSs). The NABHS contains benzalkonium chloride as the primary ingredient, which is a quaternary ammonium compound. It is nonflammable. ABHS contains ethanol, n-propanol, or isopropyl alcohol or a combination of these.^[5]

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Table 1: Clinical details of the patients sustaining accidental flame burns due to alcohol-based hand sanitizer combustion

Parameter	Case 1	Case 2	Case 3
Age	53	34	38
Sex	Male	Female	Male
Mode of Injury	Accidental burn during use of sanitizer while cooking in the kitchen over kerosene stove	Accidental burn during spillage of sanitizer bottle in the kitchen over an open flame of gas stove	Accidental burn while present in the kitchen when wife spilled sanitizer over an open flame of gas stove
Type of sanitizer used	Alcohol based	Alcohol based	Alcohol based
Other persons involved in the incident	No	Yes, husband	Yes, wife
Percentage of Burns	28-30%	58-60%	30-32%
Depth of Burns	Deep 2nd degree	Deep 2nd degree to 3rd degree	Deep 2nd degree
Inhalational burns	No	Yes	Yes
Management	Non-Operative	Surgical	Non-operative
Need for surgical intervention	No	Yes, right upper limb fasciotomy	No
Hospital stay	10 days on follow up in outpatient department	Currently admitted, Day 7	Currently admitted, Day 7



Figure 1: Clinical photograph of Case 1 with accidental flame burns due to alcohol-based sanitizer combustion



Figure 3: Clinical photograph of Case 3 with accidental flame burns due to alcohol-based sanitizer combustion



Figure 2: (a) Clinical photograph of the patient with accidental flame burns due to alcohol-based sanitizer combustion. (b) Clinical photograph of the right upper limb of Case 2 with compartment syndrome and postfasciotomy


hand sanitizers is promoted by the Indian Council of Medical Research to be used by the general public to prevent the spread of COVID-19. Alcohol-based disinfectant solutions used in operating rooms have been clearly documented as a fire hazard by the UK and USA regulatory bodies, especially when used with electrocautery devices. It forms one side of the “fire triangle” of the fuel-oxygen-ignition source triad.^[7,8] However, all three components can exist inside public spaces and homes as oxygen is ubiquitous and ignition sources being anything from cigarette lighters to gas stoves

The lack of warnings on the labels of such products can lead to careless use of these compounds inside homes and near open flames, leading to accidental burns which are completely preventable.

O’Leary and Price have described a case report of alcohol hand gel causing first-degree burns. A patient had returned a cigarette lighter to the healthcare worker following which she had applied alcohol hand rub, allowed it to dry, and then tested the lighter. Her hand was engulfed in flames which were put out with cold water. She complained of erythema and skin tightness which was managed with analgesics and emollients.^[4]

The Centers for Disease Control and Prevention recommends formulations containing 80% ethanol or 75% isopropyl alcohol. Alcohol levels between 60% and 95% are found among the commonly used sanitizer solutions.^[6] The use of

**BURN THE VIRUS NOT YOUR HANDS!!
SANITIZE YOUR HANDS FREQUENTLY & SAFELY**



- Alcohol based sanitizer solutions can catch fire and cause severe burns.
- Do not store in the kitchen or near electrical switches.
- Dispense only the amount required and avoid spillage.
- Wait for the solution to dry completely before resuming activity.

ISSUED IN PUBLIC INTEREST

Figure 4: Public awareness flyer posted in social media to raise awareness about the correct use of alcohol-based hand sanitizers to minimize fire risk

Amjadi and Greenwood have also reported a similar incident of 2% superficial burns occurring after application of alcohol gel over a small abrasion on the leg followed by lighting a cigarette. He required hospitalization and debridement under general anesthesia before regaining sufficient mobility for discharge. Due to the tenacious nature of the gel, the contact with skin increases and hence also severity of the burn.^[3]

In our patient, the entire bottle of sanitizer solution ignited leading to almost 30% burns which could have been life-threatening. It also poses a danger to other people in the vicinity of the incident.

To our knowledge, this is the first reported case of alcohol-based sanitizer, leading to extensive second-degree burns requiring significant in-patient care. With the number of COVID-19 infections rising exponentially day by day, such sanitizer solutions are the need of the hour to halt the spread of the virus and promote hand hygiene among the public. We

only expect such incidents to rise, given the almost universal use of such products.

Prevention of such incidents revolves around education, engineering, and enforcement of legislation. Education of the consumer with adequate warnings on the labels of the products regarding their flammability is a must. Creating public awareness with mass media platforms in social media and television regarding the safety hazards of such solutions needs to be done. The authors have also created a video for awareness of sanitizer burns prevention and freely accessible on social media and YouTube at the following link. <https://youtu.be/evqTUbB6c6U> [Figure 4].

Another possible solution is to manufacture these bottles with a dropper or plunger to prevent an excess amount to spill onto the hand or the surroundings.

At last, it should be mandatory upon the manufacturers to print labels with a fire hazard warning on such items in a clear and visible manner. Retail outlets should inform their customers regarding flammability at the point of sale to spread awareness among users.

Burns arising due to alcohol-based sanitizer solutions are only going to increase in incidence, and in this case, prevention is not just better than cure, it is the only cure.

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Conflicts of interest

There are no conflicts of interest.

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