달고나에 의한 화상의 임상적 특징

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한일병원 성형외과

Clinical Investigation of Burns from Caramelized Sugar Candy (*Dalgona*)

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Purpose: *Dalgona*, a kind of candy made of caramelized sugar, is a popular snack for children. Given the popularity of preparing *dalgona*, increasingly many patients are treated for burns sustained while preparing *dalgona*. We report the clinical features and dangers of burns from *dalgona*.

Methods: We retrospectively reviewed the clinical records of 11 inpatients and outpatients who had been treated for burns they received while preparing *dalgona* from March 2020 to December 2020. The data reviewed were age, sex, the severity of the burn, the size and location of the burn, the type of treatment, and the place where the injury occurred.

Results: The age of the patients ranged from 3 to 19 years, and the average age was 10.2 years (2 male, 9 female). Three patients had superficial second-degree burns, while eight had deep second-degree or third-degree burns. Most of the cases were treated with a local skin flap or skin graft. All the burned lesions were on the hands and feet. In all cases, the burns occurred at home due to accidental spillage.

Conclusion: Most of the patients were children and teenagers, and they had serious burns. Therefore, we report these findings to emphasize the need for public awareness of the potential for burn injuries to occur during *dalgona* preparation. (J Korean Burn Soc 2021;24:30-33)

Key Words: Burns, Pediatric, Sugar, Caramel coloring

INTRODUCTION

During the coronavirus disease 2019 (COVID-19) pandemic, eating out has generally not been permitted, and with increasing time spent at home, cooking has become more popular as a leisure activity. Making sweets has also become fashionable due to the influence of smart devices and online video services.

Dalgona is a type of candy made by mixing sweetened sugar and sodium carbonate and heating it to melt and

caramelize it. It has been a popular street snack for a long time. Since it is tasty and easy to make, online videos about *dalgona* preparation have become popular, and it has become increasingly common to make *dalgona* at home.

Traditionally, most burns sustained during cooking have been caused by boiling water, steam, or oil. *Dalgona*, the preparation of which involves heating and melting sugar, could be a new cause of burns. The heated and melted sugar is similar to a liquid when it is first dropped onto the skin, but it solidifies within a few seconds after contacting the skin; therefore, the burns caused by melted sugar combine the features of scalding burns and contact burns. Therefore, we investigated the clinical features and characteristics of burns experienced during *dalgona* preparation.

The purpose of this investigation was to raise public

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Table 1. Patient demographics

Age	Sex	Wound site	Wound size	Wound depth	Treatment
3	M	2 nd , 3 rd finger, Lt.	1×0.5 cm ²	Superficial 2 degree	Secondary healing
3	F	Dorsum of hand, 3~5 th finger, Rt.	3×6 cm ²	Deep 2 nd and 3 rd degree	Skin graft
10	F	Dorsum of foot, 5 th toe, Lt.	2.5×4 cm ²	3 rd degree	Skin graft
10	F	2 nd finger, Lt.	1×1.5 cm ²	Deep 2 degree	Local skin flap
11	F	Dorsum of hand, Lt.	2×1 cm ²	3 rd degree	Local skin flap
15	F	Dorsum of hand, Lt.	5×4 cm ²	Superficial 2 degree	Secondary healing
19	F	Dorsum of hand, both	1×1 cm ² , 2×1 cm ² , 1×1 cm ²	Superficial 2 degree	Secondary healing
15	F	Dorsum of foot, both	4×4 cm ² , 1×4 cm ² , 3×4 cm ² , 1.5×3 cm ² , 0.5×0.5 cm ²	Deep 2 degree & 3 rd degree	Skin graft
9	M	2 nd finger, Lt.	0.5×0.5 cm ²	Deep 2 degree	Secondary healing
9	F	2 nd web of hand, Rt.	1×0.8 cm ²	3 rd degree	Local skin flap
8	F	Wrist, Rt.	1.5×0.8 cm ²	3 rd degree	Local skin flap

awareness of the potential of *dalgona* preparation to cause burn injuries, the severity of these burns, and the need for early recognition and treatment.

MATERIALS AND METHODS

We retrospectively reviewed the medical records of patients who were treated for burns during *dalgona* preparation from March 2020 to December 2020 (The survey period was limited to the period when 'Making *dalgona*' was included in the search rankings of personal video service). Data were extracted on patients' age, sex, burn severity, the location and size of the burn lesion, the type of treatment for the burn, and the place where the injury occurred.

All burn wounds were evaluated by a single experienced burn surgeon. Multiple burn wounds localized at a single site were considered to be a single wound.

The burn was classified as a superficial second-degree burn if it had a wet, edematous, and pinkish wound bed, and as a deep second-degree burn if it had a mottled or pale white wound bed. If the wound had an eschar or dry wound bed, it was classified as a third-degree burn.

We treated the burn wounds with an appropriate dressing foam and antibiotic ointment. Surgical treatment was recommended for patients with deep second-degree or third-degree burns.

This study was approved by the local ethics committee of Hanil General Hospital (IRB no: HGH-2021-OTH-004)

Fig. 1. Depth of burns from *Dalgona*.

and complied with the Declaration of Helsinki and its further amendments.

The requirement for informed consent was waived. The study was approved by the local ethics committee of Hanil General Hospital (approval no: HGH-2021-OTH-004). This study adhered to the ethical principles outlined in the Declaration of Helsinki and all patients provided consent for the procedure.

RESULTS

The demographic and clinical characteristics of the patients are shown in Table 1. The patients ranged in age from 3 to 19 years (mean age 10.2 years), and all of the patients were children or teenagers. Most of the patients

Table 2. Type of treatment for burn

Treatment	No. patient (%)
Secondary healing	4 (36.3%)
Surgical treatment	7 (63.6%)
Local flap	3
STSG	4

STSG = split thickness skin graft.

were female (9 female, 2 male). All of the burn lesions were on the hands and feet.

Superficial second-degree burns were present in three patients, while eight patients had deep second-degree or third-degree burns (Fig. 1). In four patients, the burns were treated by healing by secondary intention, while seven patients received surgical treatment. The main surgical procedures were local flaps and split-thickness skin grafts (Table 2).

The mean size of the burn wounds was 5.03 cm² (range, 0.25~20 cm²). The wounds were relatively small, which is thought to be due to the fact that the melting sugar was initially liquid, but rapidly solidified after contacting the skin (Fig. 2).

All of the patients were injured at home while they were preparing *dalgona* themselves.

DISCUSSION

In South Korea, *dalgona* has been a popular street snack (often sold in front of schools) since the 1960s. It is a candy-like snack, in which sodium carbonate hydrate is mixed with melted sugar, put in a ladle, and then poured on an iron plate to cool.

During the COVID-19 pandemic, with the ease of use of video-based media platforms, it has been common for cooking to serve as a type of entertainment enjoyed at home. In particular, as an easy-to-make, sweet-tasting delicacy, there has been a trend in videos about making *dalgona* at home.

Sugar, a combination of glucose and fructose, starts to melt and caramelize as it dehydrates when heated. Its melting point is 186°C. It is well-known that even a few seconds of contact with a heat source of 60°C will cause second-degree or even more severe burn damage [1]. Therefore, melted and caramelized sugar can cause severe

Fig. 2. Relationship between the width and height of the burns.

burns.

The burn patients analyzed in this study ranged in age from 3 to 19 years old—that is, they were all children or teenagers. There was also a striking preponderance of female patients, perhaps because girls more frequently cook at home as a leisure activity.

Dalgona is simple to make and takes little time, but children have minimal cooking experience and are inexperienced in handling tools. Approximately 70% of burns in children are caused by scalds [2]. It is thought that their inexperience leads to accidental spills that cause burns.

All of the burn lesions in this study were on patients' hands and feet. Initially, melted sugar has a similar consistency to that of water, making it easy for small amounts to drip (like water droplets) when handling the cooking tool. The wounds were relatively small and tended to be circular or oval-shaped. Caramelized sugar solidifies within seconds after touching the skin. Hardened caramelized sugar is sticky and does not flow like water. Thus, it does not cause large burns, like scalding burns. These properties of melted sugar explain the shape and size of the wounds analyzed in this study.

First aid at home must start by stopping the burning process, removing the burning agent, and irrigating the burn site with water. Clothing's shouldn't be stuck to the burn site. Parents or caretakers must cool the burn with running cold tap water (15°C) for 20 min at least and mustn't use ice. Do not remove the blister, and use sterile or clean dressing. Especially in children, it is better to cover wound with dry dressing and keep warm to avoid hypothermia [3].

It is utmost importance to remove the burning material as soon as wound injured to stop the progression of the burn. However, caramelized sugar is difficult to remove because it undergoes solidification and becomes sticky. As the contact time with the source of a burn increases, the burn becomes more severe.

There have been reports of the risk of burns caused by hot adhesive substances, including chemical products such as super glue, nail glue, and cyanoacrylate adhesive [4-7]. To date, no reports have described burn injuries from sticky food substances such as *dalgona*.

This study has important limitations, such as the short investigation period and the small number of patients. However, all of the burns sustained while preparing *dalgona* were observed in children or teenagers, and most of the burns were severe. The burn accidents all occurred at home while children watched videos and prepared *dalgona* themselves. Although videos about making *dalgona* are trendy, they provide no guidance on the dangers of burns due to accidental spillage, as occurred in the cases presented herein.

CONCLUSION

The purpose of this paper is to provide information and raise awareness of the dangers of burns that occur while preparing *dalgona*. The absence of care and attention from parents or caretakers leads to this type of trauma. Public awareness of the potential of *dalgona* to cause severe burns would help prevent trauma cases involving

burns experienced while preparing *dalgona*.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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