

DOI: 10.5455/msm.2023.35.228-233

Received: Jul 20 2023; Accepted: Aug 25, 2023

© 2023 Vasiliki Papachristodoulou, Gregory Tripsianis, Theodoros C Constantinidis, Despoina D Kakagia

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORIGINAL PAPER

Mater Sociomed. 2023; 35(3): 228-233

Knowledge and Attitudes in First Aid Practices for Thermal Burns: a Cross-sectional Study Among Adults in Northern Greece

Vasiliki Papachristodoulou¹, Gregory Tripsianis², Theodoros C Constantinidis³, Despoina D Kakagia⁴

¹School of Medicine, Democritus University of Thrace, Alexandroupolis, Greece

²Laboratory of Medical Statistics, School of Medicine, Democritus University of Thrace, Alexandroupolis, Greece

³Laboratory of Hygiene and Environmental Protection, School of Medicine, Democritus University of Thrace, Alexandroupolis, Greece

⁴Department of Plastic Surgery & Burns, School of Medicine, Democritus University of Thrace, Alexandroupolis, Greece

Corresponding author: Vasiliki Papachristodoulou, M.D., Department of Plastic Surgery & Burns, School of Medicine, Democritus University of Thrace, Address: Perdika 31, Edessa, 58200, Greece, Phone: +30 6979208232, E-mail address: vaso_papa@yahoo.gr, ORCID ID: <https://orcid.org/0000-0001-7353-6621>.

ABSTRACT

Background: Burns are a major cause of morbidity, including prolonged hospitalization, disfigurement, disability, and emotional trauma. Long-term absence from work and high healthcare costs for burn treatment have a significant socio-economic impact. **Objective:** This study aims to evaluate the level of knowledge for burn management in the adult population of Thrace in Northern Greece and to determine factors associated with a better level of knowledge. **Methods:** A questionnaire-based cross-sectional study was conducted on a random sample of the adult population of Thrace. Data were collected using a structured pre-coded questionnaire, which included subjects' socio-demographic characteristics and the first aid practices for burns. Multivariate logistic regression analysis was used to determine the effect of subjects' characteristics on their knowledge of burn first aid practices. **Results:** A total of 711 subjects (49.6% males; mean age, 41.89±16.48 years) were included in the study. The incidence of a previous burn was 55.4%. Only 10.5% of the subjects would apply the optimal practice, consisting of rinsing the burn wound with cool running water for at least 10 minutes, applying only non-adhesive dressing on it and leaving the blisters intact. The optimal practice was independently associated with female gender (aOR=1.86, p=0.016), high education level (aOR=2.00, p=0.023), the presence of >3 children (aOR=2.27, p=0.009) and previous training in first aid (aOR=2.36, p=0.001). A large number of participants reported the application of toothpaste (38%), moisturizer (35.4%), aloe

(31.8%) or yogurt (27.7%) to the burn surface.

Conclusion: Only a small proportion of the participants were aware of the optimal burn first aid practices, most of them female, of high socioeconomic status. We recommend a more targeted approach in the design of health campaigns in the future, in order to reach vulnerable parts of the population.

Keywords: Burn, First aid, Attitudes, Socio-demographic characteristics.

1. BACKGROUND

Burns are a major cause of morbidity, including prolonged hospitalization, disfigurement, disability, and emotional trauma. Long-term absence from work and high healthcare costs for burn treatment have a significant socio-economic impact (1). In developed countries significant progress has been made in reducing the mortality and morbidity of burns, thanks to the implementation of prevention strategies combined with the improvement of the quality of burn care. Despite this, each year 11 million people worldwide continue to suffer from burns severe enough to require medical attention. Increased awareness and access to information of vulnerable populations and optimization of community education in first aid for burns will further reduce the effects of burns (2).

The provision of appropriate first aid is a well-documented determinant of burn outcomes. Inappropriate first aid practices have been reported from developed as well as developing countries. The immediate and cor-

	Total sample	Appropriate burn management	p value	OR (95% CI)
Number of subjects	711	75 (10.5)		
Gender			0.012	
Men	353 (50.4)	27 (7.6)		Ref.
Women	358 (49.6)	48 (13.4)		1.87 (1.14-3.07)
Age			0.164	
18-30 years old	263 (37.0)	12 (8.0)		0.60 (0.35-1.03)
31-60 years old	346 (48.7)	44 (12.7)		Ref.
≥61 years old	102 (14.3)	10 (9.8)		0.75 (0.52-1.54)
Cultural status			0.828	
Christian	631 (88.7)	66 (10.5)		Ref.
Muslim	80 (11.3)	9 (11.3)		1.09 (0.52-2.27)
Place of residence			0.931	
Urban	490 (68.9)	53 (10.8)		Ref.
Semi-urban	144 (20.3)	14 (9.7)		0.89 (0.48-1.65)
Rural	77 (10.8)	8 (10.4)		0.96 (0.44-2.10)
Marital status			0.343	
Married/Divorced	406 (57.1)	46 (11.3)		1.29 (0.80-2.15)
Single	289 (40.6)	26 (9.0)		Ref.
Widow	16 (2.3)	3 (18.8)		2.33 (0.63-8.73)
Number of children			0.021	
None	357 (50.2)	31 (8.7)		Ref.
1-2 children	263 (37.0)	27 (10.3)		1.20 (0.70-2.07)
≥ 3 children	91 (12.8)	17 (18.7)		2.42 (1.27-4.60)
Education level			0.010	
Low	93 (13.1)	5 (5.4)		Ref.
Medium	146 (20.5)	10 (6.8)		1.29 (0.43-3.91)
High	472 (66.4)	60 (12.7)		2.56 (1.00-6.57)
Work status			0.218	
Employed (white collar)	328 (46.1)	43 (13.1)		Ref.
Employed (blue collar)	107 (15.0)	7 (6.5)		0.46 (0.20-1.07)
Unemployed	37 (5.2)	1 (2.7)		0.18 (0.03-1.38)
Student	129 (18.1)	13 (10.1)		0.74 (0.38-1.43)
Retired	92 (12.9)	10 (10.9)		0.81 (0.39-1.68)
Household	18 (2.5)	1 (5.6)		0.39 (0.05-3.01)
Financial status			0.005	
Low	159 (22.4)	11 (5.9)		Ref.
Middle	226 (31.8)	22 (9.7)		1.71 (0.81-3.62)
High	185 (26.0)	24 (15.1)		2.81 (1.33-5.94)
First aid training			0.001	
No	212 (29.8)	40 (8.0)		Ref.
Yes	499 (70.2)	35 (16.5)		2.27 (1.40-3.69)
Burn history			0.382	
No	317 (44.6)	37 (11.7)		Ref.
Yes	394 (55.4)	38 (9.6)		0.81 (0.50-1.30)
Treated by a professional			0.543	
No	246 (62.4)	22 (8.9)		Ref.
Yes	148 (37.6)	16 (10.8)		1.23 (0.63-2.43)

Table 1. Appropriate burn management (rinsing the burn wound with cool running water for at least 10 minutes) in relation to the characteristics of the participants

rect application of appropriate measures aims to limit the thermal damage, remove any chemical caustic agents, cover and protect the burn area and provide adequate analgesia, thus leading to a reduction in the number of complications, better healing and reduced need for surgical intervention (3, 4, 5).

Current burn first aid best practices include flushing the burn with cool running water for 10-20 minutes and cover with sterile gauze (6), avoiding the application of

inappropriate substances on the burn area (7), and leaving the blisters intact (8).

Unfortunately, the data published in Greece regarding the level of knowledge of the population, the beliefs and the first aid practices for burns are very limited (9). According to a paper published in 2006 regarding the level of first aid knowledge of the Cretan population for a variety of emergency situations, only 25% of the participants would place the burnt area under running

water (10). Accordingly, in a 2018 study conducted in several pediatric hospitals in Attica which assessed the level of knowledge of parents regarding first aid for burns in children, it was found that 43.1% of the respondents would apply cool, running water to the burn (11). In none of the above studies participants were asked about the use of traditional treatments, such as toothpaste, yogurt, aloe vera, honey, etc., nor about how they would manage the presence of blisters.

Recent massive reshuffles of populations and increase in cultural diversity in many European countries, including Greece, render assessment of population awareness difficult, though essential in re-designing and implementing effective prevention and public health promotion strategies.

2. OBJECTIVE

The aim of this study was to investigate the level of knowledge for burn management in the population of Thrace in Northern Greece and to determine the factors associated with a better level of knowledge.

3. MATERIAL AND METHODS

Study population – Sampling scheme

The study was conducted between June 2021 and October 2022 and included adults (aged ≥18 years) living in the region of Thrace, randomly selected by a telephone number generator. After the aim of the study was explained to them, the participants agreed to have field researchers visit their homes, to complete the study questionnaires in a 15-min interview. The overall response rate was 77%.

Sample size

Power analysis determined that a minimum sample size of 588 subjects was required to estimate the proportion of the general population with good knowledge of the current burn first aid best practices with precision ±3.5% and a confidence level of 95%, assuming that this proportion in the Greek population was ~25%⁷ (https://www.openepi.com/Menu/OE_Menu.htm).

Ethical approval

The study was approved by the Ethics Committee of the Democritus University of Thrace (Protocol Number DUTH/EC/37239/339/02-03-2021). Participation was anonymous and voluntary. Written informed consent was obtained from all participants of the study.

The questionnaire

The first part of a structured questionnaire was used to collect the following subjects’ sociodemographic characteristics: gender, age, cultural status, place of residence, marital status, number of children, education level (low: basic education (≤nine years); medium: up to high school or technical colleges; high: university), working status, and financial status (mean monthly household income; low: ≤1000€; medium: 1001-2000€; high: >2000€). In addition, previous history of burns, treatment by a professional and first aid training was

	Number of subjects	Percentage (%)
Do you apply water to the burn area?		
No	304	42.8
Yes	407	57.2
If you apply water, do you use.... (n=407)		
Cold water	189	46.4
Cool water	218	53.6
If you apply water, do you use... (n=407)		
Bowl of water	65	16.0
Running water	342	84.0
How long do you apply running water? (n=342)		
< 1 minute	68	19.8
1-10 minutes	190	55.6
> 10 minutes	84	24.6
Substance applied to the burn		
Toothpaste	270	38.0
Moisturizing cream	252	35.4
Aloe vera	226	31.8
Yogurt	197	27.7
Hypericum oil	148	20.8
Ice	49	6.9
Tomato paste	37	5.2
Cucumber	35	4.9
Butter	29	4.1
Olive oil	29	4.1
Vaseline	20	2.8
Honey	18	2.5
Tea tree oil cream	16	2.3
Egg white	15	2.1
Curcubita oil	10	1.4
Baking soda	6	0.8
I cover the burn with...		
Nothing	434	61.0
Clean towel/kitchen paper	68	9.6
Adhesive bandage	24	3.4
Gauze	185	26.0
The blisters should...		
Be left intact	497	69.9
Be broken	26	3.6
Be broken and the skin be removed	19	2.7

Table 2. Burn management

also recorded. In the second part the practices applied and material used in first aid for burns were assessed. Participants with answers that included rinsing the burn with cool running water for at least 10 minutes and not applying traditional treatments were considered to have adequate knowledge, while all others were classified as insufficiently knowledgeable about first aid for burns.

Statistical analysis

Statistical analysis of the data was performed using IBM Statistical Package for Social Sciences (SPSS), version 19.0 (IBM Corp., Armonk, NY, USA). Quantitative variables were expressed as mean±standard deviation (SD) and qualitative variables were expressed as absolute and relative (%) frequencies. The association of the knowledge of best practices in first aid for burns with subjects’ characteristics was assessed using the chi-square test. To assess the independent effect of de-

mographic characteristics on first aid knowledge, multivariate stepwise logistic regression analysis was also performed. Odds ratios (OR) with their 95% confidence intervals (CI) were estimated as the measure of the above associations. All tests were two-tailed and statistical significance was considered for p values <0.05 .

4. RESULTS

A total of 711 participants, 353 (49.6%) males and 358 (50.4%) females, with a mean age of 41.89 ± 16.48 years (range, 18-86 years; median age, 43 years) were included in the study. Participants' characteristics are summarized in Table 1. The majority of the participants had a previous burn history (55.4%), while only 29.8% had been trained in first aid.

Regarding the first aid applied by the participants to the burn, the majority (57.2%) would apply water on the burn surface, 53.6% would use cool water and 84% of them would use running water, but only 84 participants (24.6%) would flush the burn for more than 10 minutes. A large number of participants report adopting inappropriate practices, such as applying toothpaste (38%), moisturizer (35.4%), aloe (31.8%) or yogurt (27.7%) to the burn surface. Covering the burn surface with sterile gauze was reported by only 26%, while, 69.9% would leave the blisters intact. (Table 2)

Seventy-five participants (10.5%, 95% CI=8.4%-13.0%) reported rinsing the burn with cool running water for at least 10 minutes and not applying traditional treatments, which was considered the best practice in first aid for burns. The prevalence of knowledge of best practices in relation to participants' characteristics is shown in Table 1; it was more frequent among females ($p=0.012$) and those previously trained in first aid ($p=0.001$), while it was increasing as the number of children in the family ($p=0.021$), education level ($p=0.010$) and financial status ($p=0.005$) were increasing. On the contrary, the knowledge of best practices was independent of age ($p=0.164$), cultural status ($p=0.828$), place of residence ($p=0.931$), marital status ($p=0.343$), working status ($p=0.218$), previous burn history ($p=0.543$) and treatment by a professional ($p=0.543$).

Multivariate logistic regression analysis demonstrated (percentage of correct prediction, 89.5%) that the knowledge of best practices was independently associated with female gender (aOR=1.86, 95% CI=1.12-3.09, $p=0.016$), high education level (aOR=2.00, 95% CI=1.10-3.64, $p=0.023$), the presence of more than 3 children (aOR=2.27, 95% CI=1.23-4.18, $p=0.009$) and previous training in first aid (aOR=2.36, 95% CI=1.44-3.88, $p=0.001$).

5. DISCUSSION

This study attempts to determine the level of knowledge, beliefs and practices applied in first aid for burns in a sample of the general adult population in Thrace. Only one in ten people knew enough about first aid for thermal burns.

It is well established that an immediate flush of the burn with cool running water is the most important

practice for reducing burn morbidity. In 2006, Cuttle et al. found that when cool water at $2-15^{\circ}\text{C}$ was applied for 20 minutes to a porcine partial-thickness wound model it significantly improved healing, accelerated the rate of re-epithelialization, and had a better aesthetic outcome (12). Although there is no consensus on the optimal water temperature and duration of flushing, the mechanisms of action have been thoroughly investigated. Running cold water stops the combustion process (13) and prevents cell necrosis in a stop zone (14) by reducing cell metabolism (15) and capillary permeability (16), increasing skin perfusion (17), and restoring blood flow (18). Cold water has also been found to reduce the inflammatory response and subsequent edema (3), by reducing histamine and lactic acid release (4), prostaglandin and thromboxane levels (5), and inhibiting kallikrein activity, and subsequent formation of quinine (19).

The use of traditional treatments used in burns is passed down from one generation to another and some of them are of ethnopharmacological interest. However, the use of inappropriate treatments in the present study was by no means limited to any particular ethnic group of participants, as toothpaste was popular among all groups "for its ability to soothe burning and reduce blistering."

Previous studies have shown that raw egg white, oil, honey, yogurt, toothpaste, tomato paste, and ice are just some of the agents applied as first aid in countries such as Ghana, the United Kingdom, Australia and Turkey (20, 21, 22, 23). In addition to the fact that these agents are not sterile and may contaminate the wound, some of them form a film or crust, as happens with toothpaste and yogurt, making cleaning the wound even more painful. A study published in 2018 in the Journal of the International Society for Burn Injuries reports that toothpaste can actually seal in heat and slow down the cooling and healing of the burn (24). In addition, whitening agents and fragrances contained in toothpaste can have an irritating effect on the skin and cause permanent skin discoloration (25).

Hypericum perforatum has long been investigated for its antioxidant, anti-inflammatory, and healing properties and is a popular traditional remedy used topically on burns, wounds, and ulcers. Safflower oil has been found to protect hair follicles and sebaceous glands in second-degree burns in rats and significantly accelerate re-epithelialization and neo-angiogenesis compared to silver sulfadiazine, which is the main topical agent applied to burns (26). However, further clinical studies are needed to prove its effectiveness as a first-aid treatment for human burns. Similarly, several studies support the beneficial effects of honey in limiting infections and accelerating burn healing (27). For all these traditional treatments further research is needed to establish their safety and effectiveness in first aid for burns.

High level of education and first aid training significantly determined increased degree of awareness. Several similar studies from both developed and developing countries have demonstrated the importance of first aid training as a key determinant of the adequacy of knowledge in proper burn management (28). Training is

provided either in school or in the workplace or even in the form of a seminar addressed to the general public in the context of prevention. Davies et al. conducted a study with participating parents and caregivers attending the first aid and antenatal care department of a University Hospital and found that first aid training was the most significant predictor of adequate first aid knowledge for burn management, regardless of how long before the assessment the participants had received the training (29). In the same study, low socioeconomic status was statistically significantly associated with insufficient burn first aid knowledge, a finding also supported by the present study. The facts that socioeconomic status reflects the educational level and most highly educated individuals had some previous first aid training while people of low socio-economic status widely use traditional treatments may explain these findings.

A history of burns in the family did not correlate with higher best practices awareness in our study. In a recent study in Saudi Arabia the majority of the participants had dealt with burn injuries in the past five years (93.3%) (30), while in our study only half of the participants (55.4%) reported previous burn history.

6. CONCLUSION

Only a small proportion of the adult population was aware of the best practices in burn management, as is demonstrated in our study. The use of traditional treatments is still quite common, while there were factors, such as female gender and high education level, that were associated with better knowledge about burn management. The increase in immigration to southern European countries dictates the need to re-design campaigns in order to better communicate burn first aid guidelines to target vulnerable parts of the population. Improved access to correct information through the media, including the internet and social media, will eliminate language barriers, may increase awareness and reduce the morbidity of burn injuries.

- **Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.
- **Authors' contribution:** Conceptualization and design: G.T., T.C. and D.K., data acquisition: V.P., G.T. and D.K., analysis and data interpretation: V.P., G.T., T.K. and D.K., original draft preparation: V.P., G.T., T.K. and D.K., review and editing: G.T., T.K. and D.K. All authors have read and agreed to the published version of the manuscript. authors were involved in preparation this article. Final proofreading was made by the first author.
- **Conflict of interest:** The authors declare that they have no conflict of interest.
- **Financial support and sponsorship:** None.

REFERENCES

1. World Health Organization. Burn prevention, success stories, lessons learned. 2011. Available at <https://apps.who.int/iris/handle/10665/97938>.
2. World Health Organization. A WHO plan for burn prevention and care. 2008. Available at <https://apps.who.int/iris/handle/10665/97852>.
3. Cho Y, Choi Y. Comparison of three cooling methods for burn patients: A randomized clinical trial, *Burns*, 2017; 43(3): 502-508, ISSN 0305-4179.
4. Friedl HP, Till GO, Trentz O. Roles of histamine, complement and xanthine oxidase in thermal injury of skin. *Am J Pathol*. 1989. 135(1): 203-217.
5. Herndon DN, Abston S, Stein MD. Increased thromboxane B2 levels in the plasma of burned and septic burned patients. *Surg Gynecol Obstet*. 1984; 159(3): 210-213.
6. Griffin B, Cabilan CJ, Ayoub B, et al. The effect of 20 minutes of cool running water first aid within three hours of thermal burn injury on patient outcomes: A systematic review and meta-analysis. *Australas Emerg Care*. 2022; 25(4): 367-376.
7. Kattan AE, AlShomer F, Alhujayri AK, et al. Current knowledge of burn injury first aid practices and applied traditional remedies: a nationwide survey. *Burns Trauma*. 2016 2;4:37.
8. Murphy F, Amblum J. Treatment for burn blisters: debride or leave intact? *Emerg Nurse*. 2014; 22(2): 24-27.
9. Efstathiou F, Svardagalou P. Clinical profile of burn injured patients. *Health & Research Journal*, 2016; 2(2): 80-93.
10. Dimitrakopoulos, Lamprakis, Lionakis, First aid and attitudes of the population in the prefectures of Chania, Heraklion, Lassithi. and Messinias, Bachelor Theses, T.E.I. of Crete, School of Health and Welfare Services (SEYP), Nursing Department, 2006. Available at <http://hdl.handle.net/11713/1542>.
11. Strakantouna, Estimation of the level of knowledge of parents in first aid practices for burns in children, Master Theses, National and Kapodistrian University of Athens, 2018. Available at <https://pergamon.lib.uoa.gr/uoa/dl/frontend/file/lib/default/data/2775680/theFile>.
12. Cuttle L, Kempf M, Phillips GE, et al. A porcine deep dermal partial thickness burn model with hypertrophic scarring. *Burns*. 2006; 32(7): 806-820.
13. Sutton D, Wright MD. Cooling for Thermal Burns: Clinical Effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2019 17. Available at <https://www.ncbi.nlm.nih.gov/books/NBK541209/>.
14. Hettiaratchy S, Dziewulski P. ABC of burns: pathophysiology and types of burns. *BMJ*. 2004 12; 328(7453): 1427-1429.
15. Venter T, Karpelowsky J, Rode H. Cooling of the burn wound: The ideal temperature of the coolant. *Burns*. 2007; 33: 917-922. 10.1016/j.burns.2006.10.408.
16. Chi Y, Liu X, Chai J. A narrative review of changes in microvascular permeability after burn. *Ann Transl Med*. 2021; 9(8): 719.
17. Tobalem M, Harder Y, Tschanz E, et al. First-aid with warm water delays burn progression and increases skin survival. *J Plast Reconstr Aesthet Surg*. 2013; 66(2): 260-266.
18. Jeschke MG, van Baar ME, Choudhry MA, et al. Burn injury. *Nat Rev Dis Primers*. 2020; 13; 6(1): 11.
19. Paskhina TS, Nartikova VF, Dotsenko VL, et al. Sostoianie kininovoï sistemy pri ozhogovom shoke i rannee toksemii [State of the kinin system in burn shock and early toxemia]. *Vopr Med Khim*. 1976; 22(5): 696-707.
20. Gyedu A, Mock C, Nakua E, et al. Pediatric First Aid Prac-

- tices in Ghana: A Population-Based Survey. *World J Surg.* 2015; 39(8): 1859-1866.
21. Graham HE, Bache SE, Muthayya P, et al. Are parents in the UK equipped to provide adequate burns first aid? *Burns.* 2012; 38(3): 438-443.
 22. Harvey LA, Barr ML, Poulos RG, et al. A population-based survey of knowledge of first aid for burns in New South Wales. *Med J.* 2011; 195(8): 465-468.
 23. Karaöz, Weller, Banu. First-aid Home Treatment of Burns Among Children and Some Implications at Milas, Turkey. *Journal of emergency nursing.* 2010; 36: 111-114. 10.1016/j.jen.2009.12.018.
 24. Bennett CV, Maguire S, Nuttall D, et al. First aid for children's burns in the US and UK: An urgent call to establish and promote international standards. *Burns.* 2019; 45(2): 440-449.
 25. Karaoz B. First-aid home treatment of burns among children and some implications at Milas, Turkey. *J Emerg Nurs.* 2010; 36(2): 111-114.
 26. Kıyan S, Uyanıkgil Y, Altuncı YA, et al. Investigation of acute effects of *Hypericum perforatum* (St. John's Wort-Kantaron) treatment in experimental thermal burns and comparison with silver sulfadiazine treatment. *Ulus Travma Acil Cerrahi Derg.* 2015; 21(5): 323-336.
 27. Subrahmanyam M. Topical application of honey for burn wound treatment—an overview. *Ann Burns Fire Disasters.* 2007; 20(3): 137-139.
 28. Wallace HJ, O'Neill TB, Wood FM, et al. Determinants of burn first aid knowledge: Cross-sectional study. *Burns.* 2013; 39(6): 1162-1169.
 29. Davies M, Maguire S, Okolie C, et al. How much do parents know about first aid for burns? *Burns.* 2013; 39(6): 1083-1090.
 30. Al Dhafiri M, Kaliyadan F, Alghadeer MA, et al. Knowledge, Attitudes, and Practices toward First Aid Management of Skin Burns in Saudi Arabia. *Clin Pract.* 2022; 12(1): 97-105.