Knowledge, Prevention, and Practice of Heat Strokes Among the Public in the United Arab Emirates

Mohamad Baraa Alebaji,[1] Tasnim Hossam Elzini,[1] Haneen Basim Ali Shahin,[1] Abdelwahab Bashir Mohamed Suleiman,[1] Harshitha Richard,[1] Raed Imad Aldin Dali.[1]

Abstract

Background: Heat stroke is a predictable and preventable occurrence. Public awareness of the condition and preventative practices are essential in hot and humid regions. This study aims to assess the level of awareness (knowledge, prevention, and management) of heat stroke among United Arab Emirates (UAE) residents. **Methods:** This is a survey-based study of knowledge and practices of heat stroke in a random sample of adults (≥18 years) in four different cities in the UAE. Each correct answer was equal to one point, and total and average scores were calculated, with the average score used as the cutoff point. Multivariate logistic regression was used to identify factors associated with below-average awareness. **Results:** A total of 402 people participated in the study, with an average age of 33 ± 12 years, and 48.5% were female. Only 1 person achieved a perfect score, and 0.7%, 10%, and 17.7% achieved above-average scores in knowledge, practices, and management, respectively. Seven percent of participants had never heard of a heat stroke. A third of participants (32%) were unaware that severe heat strokes could lead to death. Males are at a higher risk of having a poor level of knowledge (Odds ratio [OR]=1.65; 95% confidence interval [95%CI]=1.10-2.47). The older the population, the poorer the knowledge of heat stroke was (OR=1.39, 95%CI=1.03–1.89). **Conclusion:** The results of this study show that a huge proportion of the population in the UAE does not have sufficient knowledge about heat stroke, its prevention, and management. Governmental institutes should increase awareness of heat stroke.

Key Words: Health Knowledge, Attitudes, Practice; Heat stroke; Prevention; Saudi Arabia; Heat wave (Source: MeSH-NLM).

Introduction

Heat stroke is a frequent adolescent life-threatening condition that affects individuals across all ethnic groups and has a severe impact on both physical and psychological health.[1] It is a medical emergency that can result in higher rates of morbidity and fatality, with a mortality rate of 71%.[2,3] Excessive heat is a significant weather risk related to a higher ratio of mortality and morbidity all over the world.[4] It is a condition caused by overheating body temperature and central nervous system (CNS) dysfunction, which can include combativeness, hallucination, seizures, and coma.[4] Generally, this problem occurs due to prolonged heat exposure or any physical exertion in high temperatures.

Prolonged exposure to heat, which can result from an amalgamation of extrinsic thermal surroundings, occupational heat provenance, and internal heat creation through excessive muscle effort, can result in various conditions recognized as heat-related illnesses. Signs and symptoms of heat stroke include fever, rapid breathing, heart palpitations, dizziness, and an altered mental state.[5] The risk of developing a heat stroke increases when wearing dark-colored clothing during hot weather and being dehydrated by not drinking adequate amounts water to balance fluid lost through sweating. It can cause problems like acute failure of vital organs and even death.[6]

Mortality and morbidity rates from heat stroke are related to the duration of the temperature exposure, public education on heat illnesses, behavioral interchanges, imposed rests and fluid protocols, acclimatization, and organized provisions of cooling facilities in hot areas. Therefore, the condition can be prevented and managed to avoid a fatal outcome.[7] The prognosis of patients is connected to the degree and duration of hyperthermia. As a result, aside from prevention, quick cooling is the most crucial feature in managing heat stroke.[8]

Although several studies recommend that patients with heat stroke should be treated with ice water or cold-water immersion, there is evidence that evaporative cooling is just as effective.[9] Heat-related illnesses are becoming more common as the world warms, and they are recognized in tropical regions such as most Arab countries.[10] Heat stroke is common and avoidable, and therefore sufficient awareness about knowledge and practices regarding heat strokes is essential in an extremely high-temperature country such as the UAE.[11]

Sufficient awareness regarding heat-related illnesses could assist in identifying and treating these disorders at an early stage. Numerous factors influence the public's key performance parameters (KPP), including the local climate, people's socioeconomic status, and general public behaviors. KPP data can be considered as the indicator of heat wave awareness in a specified and limited area. The study's main objective is to assess the knowledge, prevention, and practices amongst the public in the UAE, regarding general awareness of heat stroke.

Methods

This was an analytical study done in the College of Medicine at the University of Sharjah, UAE, from January 2020 to December 2020. The Ethical Review Board of the University of Sharjah, UAE approved the study (Ref# REC-20-01-22-01).

The sample size was calculated according to the Epi-Info, version 3.5.1, by taking the expected prevalence of knowledge at 50%. The worst acceptable frequency was 12.3%, and the confidence interval of 95%. After adding 20% of the non-response rate, the minimum sample size was 377; however, 500 participants were invited to the study. All genders, aged more than 18 years, were included through random sampling of public places. The cities included were Abu Dhabi, Ajman, Dubai, and Sharjah. The interview used a structured questionnaire of 37 questions in four domains: demographics (9 questions), knowledge (18 questions), practices, and management of heat strokes (10 questions). The total mean score was 17.06, and therefore 17 was used as a cutoff point. Any total score below 17 was below average and any score of 17 and above was considered as average and above (*Figure 1*).

A wide spectrum of questions asked determined which aspect of knowledge about heat strokes the community lacks, whether it was prevention, signs and symptoms of a heat-related illness, or risk factors. The correct answer was equal to one point, and this point system was used to calculate the total scores. The average

Figure 1. Mean Total Score of Participants in the Study.

of the total scores was then used to determine good and poor knowledge.

v26 was the program used for analysis. Total (all questions), knowledge, and practice scores were calculated. The Chi-Square test was used for comparative analysis of sociodemographic characteristics with average and below-average scores. The null hypothesis was rejected by a p-value of less than 5%, which was considered statistically significant. The average total score was taken as the cut-off point for good and poor knowledge (KPM). Multivariate logistic regression analysis was run using gender, age, nationality, and occupation as covariates. The results were expressed as an odds ratio (OR) and a 95% confidence interval (95%CI). The dependent variable was coded as 0 for above-average knowledge and 1 for below-average knowledge.

Results

In this study, 500 participants were invited, of which 402 participated. The response rate was 80.4%. Out of 402, 207 (51.49%) were male, and 195 (48.51%) were female. The study participants were divided into three groups based on age. The mean age of the participants was 33.45 ±12.2 years. The majority of the participants, 178 (44.27%), were aged 18–25. Half of the participants (204, 50.74%) were Arabs by nationality. Regarding occupation, most of the participants, 159 (39.58%), were in business, sales, and engineering categories. The majority of the participants, 345 (85.82%), were from Abu Dhabi. *Table 1* shows the demographic data of the participants. In our study, occupations were divided according to heat exposure; 40% were business, sales, and engineering jobs, which were the most exposed; 32% were governmental and medical jobs, which were moderately exposed; and finally, 29% were students who were considered to be the least exposed. We compared the knowledge, practices, and management scores between the cities tested. Thirty-two percent of the sample did not know that severe heat strokes can lead to death.

Our results showed that only one person in the entire sample achieved a perfect score on knowledge, management, and practices. Moreover, 0.7%, 10%, and 17.7% of the total sample achieved a score above-average in knowledge, practices, and management, respectively. Most of the participants (52%) did not follow sufficient preventative measures to meet the set average practice score. Moreover, 50% and 47% of the sample had below-average scores in total and knowledge scores, respectively. It is also considerable to note that 7% of the sample have never heard of a heat stroke before. As expected, there was a strong correlation between the chosen sources of knowledge of the participants and how that affected their knowledge and total scores. For the participants who chose "medical" as their source of knowledge, 70.6% achieved an above-average score on the knowledge test (p=0.61). Only 47% of those who chose "family and friends" as their source of knowledge achieved an average or above-average total score (*Table 2*).

IJMS INTERNATIONAL JOURNAL of MEDICAL STUDENTS

Original Article

Alebaji MB, et al.   Knowledge, Prevention, and Practice of Heat Strokes Among the Public in the United Arab Emirates
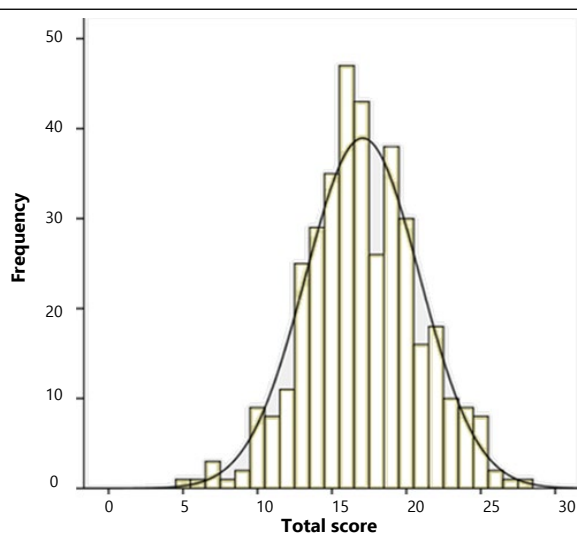
Table 1. Demographic Data of the Participants (n=402).

Variable	Frequency (%)
Gender	
Male	207 (51.49)
Female	195 (48.51)
Age group	
18-25 years	178 (44.27)
26-35 years	143 (35.57)
>36 years	81 (20.14)
Nationality	
Local	62 (15.46)
Arabs	204 (50.74)
Non- Arabs	136 (33.83)
Occupation	
Business, sale, engineers	159 (39.58)
Students	115 (28.60)
Medical, government, education	128 (31.84)
Place of residence	
Abu-Dhabi	345 (85.82)
Dubai	13 (3.23)
Sharjah	34 (8.5)
Ras Al Khaimah	9 (2.23)
Umm AL Qaiwain	1 (0.24)

Table 2. Cross Tabulation of the Demographic Data with the Average Score of Knowledge, Practice, and Management.

Characteristic	Heat stroke knowledge, treatment, management score		p-value
	Below average	Above average	
Age, mean (SD)	32.39 (10.5)	34.51 (11.9)	0.01[+]
Sex, n (%)			0.07[*]
Female	86 (44.1)	109 (55.9)	
Male	116 (56.0)	91 (43.9)	
Nationality, n (%)			0.12[‡]
Local	54 (87.0)	8 (12.9)	
Arabs	104 (51.0)	100 (49.0)	
Non-Arabs	84 (61.7)	52 (38.1)	
Occupation, n (%)			<0.001[‡]
Business, sale, engineers	95 (59.7)	64(40.6)	
Students	90 (78.2)	25 (21.8)	
Medical, government, education	79 (61.7)	49 (37.6)	

Legend: [+] t-test; [*] Fisher's exact test; [‡] Chi-square test.

Only 58% of the participants drank water when thirsty, and even 44% did not know that they should give water to a victim suffering from a heat stroke. Finally, there was a relationship between the place of residence and the average score of the participants (p=0.02); participants from Abu Dhabi got 34.2% above the average total score, while Dubai and Sharjah got 24.8% and 27.2%, respectively.

Results of multivariate logistic regression analysis revealed that males are at higher risk of having a poor level of knowledge (OR=1.65; 95%CI=1.10-2.47, p=0.01) and the older the population, the poorer the knowledge about heat stroke (OR=1.39, 95%CI=1.03-1.89, p=0.03). Nationality and occupation were not associated with a below-average level of heat stroke knowledge (*Table 3*).

Table 3. Predictors of Below-Average Heat Stroke Knowledge Among the Participants: Multivariate Logistic Regression Analysis.

Variable	Odds Ratio	95% Confidence Interval	p-value
Gender: Male	**1.65**	**1.10 - 2.47**	**0.01**
Age	**1.39**	**1.03 - 1.89**	**0.03**
Nationality	1.08	0.79 - 1.46	0.62
Occupation	1.09	0.83 - 1.43	0.52

Discussion

This was a cross-sectional study performed in different cities in the UAE to identify the public's awareness of heat stroke among adults. Heat stroke is common in summer in the UAE, where the environmental temperature is extremely hot and humid compared to the rest of the world's regions. It is a dangerous disorder produced by the body's overheating and is linked to a high rate of death and morbidity due to its sequelae, including critical organ damage. Participants who cited medical experts as their primary source of information, as well as Arab nationalities, scored higher than the other nationals. In addition, Abu Dhabi outperformed all other cities. In general, the percentage of participants who scored above average on knowledge, prevention, and practices of heat strokes was low, and our findings revealed that a large segment of the community in the UAE lacks adequate understanding of heat strokes, their prevention, and management.

Studies from other regions have recognized that heat stroke has severe adverse effects on the human body that may lead to long-lasting abnormalities.[12,13] A heat wave came upon the metropolitan city of Karachi, Pakistan, in 2015, resulting in the deaths of hundreds of residents in this city.[14] The general public in the UAE is aware of this worsening condition but does not have sufficient knowledge regarding its management and control. Worldwide and nationally, inadequate research has been conducted to ascertain the public's knowledge, prevention, and practices regarding heat strokes. In our study, just one person

Original Article

Alebaji MB, et al.   Knowledge, Prevention, and Practice of Heat Strokes Among the Public in the United Arab Emirates

achieved a perfect score on knowledge, management, and practices, while 52% of the participants did not follow sufficient preventative measures to meet the set average practice score.

Most participants believe that avoiding outdoor activities can prevent heat strokes, which contradicts the findings of a study conducted in the United States.[15] The Arab nationals achieved good knowledge, practice, and management scores with regards to heat stroke compared to other nationals. They consider fever and vomiting to be the major symptoms of heat stroke, which are in good correlation with studies conducted in China.[16,17] 32% of our study participants were unaware of the worse consequences of heat strokes. During the heat strokes, most participants did not know that victims of heat strokes should be given water and need to be moved under shade. In hot weather, people should wear an umbrella when heading out, drink plenty of water, limit their outdoor activities, and protect their heads with a damp towel as a preventive measure. While studying the demographic characteristics, we found that males are at a higher risk of having a poor level of knowledge (OR=1.65). This finding was in good correlation with the study by Li et al.[15] Old age was also associated with poorer knowledge of heat strokes (OR=1.39), which is in good correlation with the findings of a study by Wang et al.[16] and in contrast to another study by Li et al.[15]

Nowadays, social media is a source of information for many people across the globe, and access to it is extremely easy, especially for those in high-income areas. This could be a reason why people in high-income countries are more conscious of the current state of the global environment than people in low- and middle-income ones.[12,13,15] Individuals, local governments, and national institutions must all work more to improve the KAP about heatwaves by using mass and social media such as radio, television, newspapers, and the internet, as highlighted in other studies.

The limitations of the study include those of a cross-sectional study design. In addition, a high percentage of participants were young, not all seven Emirates were covered, and the questionnaire was conducted in only two languages (English and Arabic). However, this is the first approach to the topic in the region and the country's official language is Arabic, which allowed us to cover most of the target population.

Conclusion

Our results showed that a huge proportion of the population in the UAE did not have sufficient knowledge about heat stroke, prevention, and management. The data showed that people with medical sources of knowledge had the highest scores in terms of knowledge and practices. Unfortunately, those with information from medical sources were one of the minorities, which explains why many people did not have optimal knowledge about heat strokes. Based on these findings, we request our healthcare sectors and governmental institutes to increase awareness of heat stroke among UAE residents by using media outlets, medical staff, and even medical students to help prevent heat strokes in the UAE.

References

1. Cohen-Ronen N, Rimon A, Cohen N, Capua T. Heat stroke: knowledge and practices of medical professionals in pediatric emergency medicine departments - a survey study. Isr J Health Policy Res. 2021;10(1):35

2. Argaud L, Ferry T, Le QH, Marfisi A, Ciorba D, Achache P, et al. Short- and long-term outcomes of heatstroke following the 2003 heat wave in Lyon, France. Arch Intern Med. 2007;167(20):2177-83

3. Abareen S. A study to assess the effectiveness of structured teaching programme on knowledge & prevention of Heat Stroke among the adolescent studying in selected high schools at Gulbarga. Int J Adv Nur Management. 2014;2(1):28-30

4. Aljumaan M, Alhawaj F, Alkhalifa S, Alhussain N, Alhashim A, Alahmadi L, et al. Awareness of heat-related illnesses in population of Saudi Arabia. The Egyptian Journal of Hospital Medicine. 2019;74(4):802-8.

5. Nichols AW. Heat-related illness in sports and exercise. Curr Rev Musculoskelet Med. 2014;7(4):355-65

6. Binkley HM, Beckett J, Casa DJ, Kleiner DM, Plummer PE. National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses. J Athl Train. 2002;37(3):329-43.

7. Rublee C, Dresser C, Giudice C, Lemery J, Sorensen C. Evidence-Based Heatstroke Management in the Emergency Department. West J Emerg Med. 2021;22(2):186-95.

8. Leon LR, Bouchama A. Heat stroke. Compr Physiol. 2015 Apr;5(2):611-47.

9. Joubert D, Thomsen J, Harrison O. Safety in the Heat: a comprehensive program for prevention of heat illness among workers in Abu Dhabi, United Arab Emirates. Am J Public Health. 2011;101(3):395-8.

10. Zander KK, Moss S, Garnett ST. Climate Change–Related Heat Stress and Subjective Well-Being in Australia. Weather, Climate, and Society. 2019;11(3):505-20.

11. Shen T, Howe HL, Alo C, Moolenaar RL. Toward a broader definition of heat-related death: comparison of mortality estimates from medical examiners' classification with those from total death differentials during the July 1995 heat wave in Chicago, Illinois. Am J Forensic Med Pathol. 1998;19(2):113-8

12. Zhang Y, Yu C, Yang J, Zhang L, Cui F. Diurnal Temperature Range in Relation to Daily Mortality and Years of Life Lost in Wuhan, China. Int J Environ Res Public Health. 2017;14(8):891.

13. Mustafa A, Khan HM, Hussan J, Khan SZ, Ullah MI. Knowledge, attitude and practices regarding heat stroke in general public of Islamabad and Rawalpindi. JKCD. 2018;8(1):41-3

14. Sheridan SC. A survey of public perception and response to heat warnings across four North American cities: an evaluation of municipal effectiveness. Int J Biometeorol. 2007;52(1):3-15

15. Li J, Xu X, Ding G, Zhao Y, Zhao R, Xue F, et al. A Cross-Sectional Study of Heat Wave-Related Knowledge, Attitude, and Practice among the Public in the Licheng District of Jinan City, China. Int J Environ Res Public Health. 2016;13(7):648.

16. Wang X, Xia D, Long X, Wang Y, Wu K, Xu S, et al. Knowledge, Attitudes, and Practices of Military Personnel Regarding Heat-Related Illness Risk Factors: Results of a Chinese Cross-Sectional Study. Front Public Health. 2021;9:707264

17. Akompab DA, Bi P, Williams S, Grant J, Walker IA, Augoustinos M. Heat waves and climate change: applying the health belief model to identify predictors of risk perception and adaptive behaviours in Adelaide, Australia. Int J Environ Res Public Health. 2013;10(6):2164-84.

Cite as

Alebaji MB, Elzini TH, Shahin HBA, Suleiman ABM, Richard H, Dali RIA. Knowledge, Prevention, and Practice of Heat Strokes Among the Public in the United Arab Emirates. Int J Med Stud. 2022 Apr-Jun;10(2):175-9.