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Research Article

Investigating the Risk Perception of Arbaeen Pilgrims Regarding Heat Stroke

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Abstract

Introduction: The Arbaeen walking ceremony is a significant religious event that draws millions of people to the Arbaeen terminals in Iraq annually. Like other mass gatherings, this religious activity can cause numerous health concerns. Heatstroke is one of the main concerns in this event. This study was conducted to assess the risk perception of Arbaeen pilgrims with regard to heat stroke in 2023.

Methods: This descriptive cross-sectional study assessed statistical population which included everyone who participated in the Arbaeen Walk in 2023. The sampling was random. The sample size was determined by using the statistical formula: (1067 people). The data collection tool was a demographic information checklist and a researcher-made questionnaire to assess the risk of heat stroke. The data was analyzed using SPPS24 software, descriptive statistics, t-tests, and variance analysis.

Results: The average score of people's risk perception based on cognitive, functional, physical, and psychological dimensions was 4.12±31.36, 1.88±16.92, 3.31±23.35 and 25.28±5.15, respectively. Also, the mean and standard deviation of the total risk perception score was 96.92±14.47. 51. Eighteen percent of pilgrims were in a good situation regarding risk perception. The results showed that the average score of people's risk perception based on age, gender, and level of education were significant in all dimensions (P=0.00).

Conclusion: According to the study results, the studied pilgrims had a high-risk perception of heat stroke. Public training for climate risk reduction management should be promoted and widely implemented to prevent heat stroke.

Keywords: Risk Perception, Pilgrim, Arbaeen, Heat Stroke.

Introduction

The Arbaeen walking ceremony is a significant religious event that annually draws millions of people to the Arbaeen terminals in Iraq. When this march occurs in hot summer, it can cause heat-related morbidity and mortality 1. Like other collective gatherings such as Hajj, this religious activity can cause numerous health concerns related to communicable and non-communicable diseases. Heatstroke is one of the main problems in this event [2]. The air temperature in the Arbaeen region is very high in the summer months. This air heat can harm the participants, who will suffer from heatstroke if they do not observe their hygiene [3].

Heat stroke is a medical condition that occurs when the weather is extremely hot. In this condition, the body cannot release heat, and its temperature rises rapidly. Heat stroke can lead to death if not treated in time [4]. The symptoms of heatstroke are high body temperature, fatigue and weakness, heavy sweating, headache and confusion, heart palpitations and shortness of breath, etc. [5].

20,000 people suffered from heatstroke in 2020. Heatstroke resulted in 7,500 deaths and 14,000 disabilities worldwide in 2020 [6]. The cost of treating heatstroke in 2020 was 1.4 billion dollars globally. In

general, the economic burden of heatstroke on the health system in the world was 1.2 billion dollars. By understanding the annual damage caused by heatstroke to humans, we can prevent these medical conditions and protect our health [7].

The religious ceremonies of Hajj and Arbaeen become an important challenge in heatstroke due to the hot and dry weather conditions in Hijaz and Iraq, especially in the hot months of the year. In this situation, people participating in religious ceremonies are exposed to the risk of heatstroke [8]. In Hajj, more than 70% of participants in religious ceremonies are exposed to the risk of heatstroke [9]. During Arbaeen, more than 80% of participants in religious ceremonies are exposed to the risk of heat stroke [1].

The causes of pilgrims' heatstroke during the Arbaeen walking ceremony are related to hot air, intense physical activity, lack of water, old age, poor health, and the use of anti-inflammatory drugs, among other things. Also, most pilgrims do not have a proper understanding of the dangers of heat and do not use protective equipment such as umbrellas during the hike during the peak of heat or even do not use enough water and food [9].

Risk perception deals with being aware of the existence of a risk and evaluating the probability of its occurrence and the severity of its consequences. Risk perception is a key concept in healthcare that helps people to be aware of and avoid risks. Understanding the risk of health conditions helps people to be aware of the risk of heat stroke and prevent it. According to research, 70% of people who understand the risk of health conditions are not exposed to heat stroke [9].

Soltani et al., in the study they conducted in 2017, reported a lack of preparation, ignorance, and low-risk perception of pilgrims as challenging health factors [2]. In the 2008 study by Noweir et al. [10]. among pilgrims, they concluded that pilgrims need to gain knowledge and understanding of exposure to heat and have yet to receive special training in this field. Also, most pilgrims do not adequately understand the dangers of heat and do not use protective equipment such as a blanket or umbrella during the hike during the peak of the heat, or even do not use enough water and food [10].

The Arbaeen walking ceremony is considered a political and religious ceremony. Therefore, protecting pilgrims' health is an important issue that increases their satisfaction, and the annual prosperity of this ceremony is vital. It is necessary to examine the factors that improve people's health. Risk perception is an important factor in creating attitude and behavior. Understanding risk helps people to be aware of risk and avoid it.

According to the review of the conducted research, no study has been done that has investigated the perception of the risk of heat stroke among pilgrims. Therefore, the present study investigated the perception of the risk of heatstroke among Arbaeen pilgrims in 2023.

Methods

This study is descriptive-cross-sectional in 2023. The research's statistical population includes everyone who participated in the Arbaeen walk in 2023. According to official statistics, about three million pilgrims from Iran entered Iraq in April 2023. Random sampling was done by drawing file numbers of people who visited Red Crescent medical centers on the walking route. The sample size was determined using the following statistical formula: 1067 people.

The confidence level of 0.95 from the normal distribution table was equal to 1.96. The standard deviation of the questionnaire is 5, which was obtained from the formula.

$$\sigma = \frac{R}{6} \qquad n = (\frac{Z\sigma}{d})^2$$

D=0.3 n=1067

The data collection tool in this study was a demographic information checklist and a researcher-made questionnaire on understanding the risk of heat stroke. Demographic information included age, gender, education, occupation, marital status, and income adequacy.

The criteria for entering the study were all pilgrims who traveled from the border of Mehran to Iraq, and the criteria for leaving the questionnaire needed to be completed (about 100 people).

The heatstroke risk perception questionnaire was designed by reviewing related texts and articles and interviews with professors and health experts in disasters and health education, environmental health, experienced doctors, and nurses [11-14].

This questionnaire was designed in the form of 30 questions based on the Likert scale (agree, agree, no opinion, disagree, disagree entirely) in cognitive (8 questions), functional (4 questions), physical (6 questions), and psychological (7 questions) dimensions.

After designing the questions of the questionnaire, in order to confirm the validity of the questionnaire, it was reviewed and judged by six professors of health education, health in disasters, and environmental health, and the opinions and changes considered by the professors were applied to the questionnaire until finally the validity of the instrument was confirmed. Cronbach's coefficient of error was used to determine the reliability of the questionnaire. Thus, 30 questionnaires were completed among the students of the target group. The Cronbach's alpha coefficient was 0.87, and the reliability was confirmed. Each person scored within the range. Each question was scored from 1 to 5. Therefore, each person scored in the range of 25-125.

A score of less than 25-60 (poor risk perception level), 60 to 95 (moderate risk perception level), and more than 95 (good risk perception level) was reported.

Four trained interviewers attending Red Crescent medical centers completed the questionnaire. After obtaining the pilgrims' informed consent, providing the necessary explanations regarding the purpose of the research, and emphasizing the confidentiality of the received information, the questionnaires were given to the individuals. Each questionnaire took an average of 20 minutes to complete. The study participants were 16 years old and older.

After collecting the data, it was entered into SPSS24 software and analyzed using descriptive statistics, t-test, and analysis of variance. A significance level of 0.05 was considered in this study.

Results

The average age score of the participants in the research was 39.74+9.82. Five hundred-one people (46.8%) were in the age range of 30-50. Seven hundred ninety-six people (74.46%) were men. Eight hundred twenty-one people (76.80%) were married. The level of education of 713 people (66.70%) was university. Four hundred seventy-seven people (44.66%) were employed. The income status of 621 people (58.09%) was average (Table 1).

According to Table 2, the average score of people's perception of risk based on cognitive, functional, physical, and psychological dimensions was 4.12±31.36, 1.88±16.92, 3.31±23.35 and 25.28±5.15, respectively. Also, the mean and standard deviation of the total risk perception score was 96.92±14.47. 51.18% of pilgrims were in a good situation regarding risk perception.

Also, Table No. 3 states the mean and standard deviation of risk perception and its dimensions based on demographic variables. The results showed that the average score of people's risk perception based on age, gender, and level of education is significant in all dimensions (P=0.0001).

Table 1: Frequency distribution of demographic variables

Demographic		Frequency	
		Number	Percent
Age(year)	<30	74	7
	30-50	501	46.8
	>50	495	46.2
Gender	female	273	25.54
	male	796	74.46
Marital status	single	248	23.20
	Married	821	76.80
Employment status	self-employment	303	28.37
	student	182	17.04
	Employee	477	44.66
	Unemployed	106	9.93
Educational Level	< diploma	195	18.24
	diploma	161	15.06
	academic	713	66.70
Economic status of the family	Weak	314	29.37
	moderate	621	58.09
	Good	134	12.54

Table 2: Mean and standard deviation of risk perception and its dimensions

row	dimensions	lowest	highest	mean	SD	score status (percent)		
						weak	Moderate	Good
1	cognitive	20	40	31.36	4.12	(0.56%) 6	515 (48.26%)	548 (51.18%)
2	functional	11	20	16.92	1.88			
3	physical	13	30	23.35	3.31			
4	psychological	9	35	25.28	5.15			
5	total score	57	125	96.92	14.47			

Table 3: Mean and standard deviation of risk perception and its dimensions according to demographic variables

Demographic		total score		cognitive		functional		physical		9	
		mean	SD	Mean	SD	mean	SD	mean	SD	mean	SD
Age(year)	<30	96.67	14.36	31.47	4.77	18.10	2.21	23.33	3.58	24.78	5.89
	30-50	97.88	11.84	31.68	3.85	16.93	1.89	23.57	3.18	25.71	4.74
	>50	92.67	12.64	29.76	4.18	16.66	1.32	22.33	3.42	23.92	5.75
p**		0.00		0.00		0.00		0.00		0.00	
Gender	female	102.93	11.96	33.09	4.31	17.50	1.84	24.62	3.37	27.70	4.21
	male	94.87	12.09	30.77	3.88	16.71	1.86	22.91	3.18	24.46	5.18
*p		0.00		0.00		0.00		0.00		0.00	
Marital status	single	101.63	13.24	32.98	4.34	17.76	1.98	24.10	3.67	26.78	4.98
	Married	101.51	11.99	32.88	3.93	17.67	1.78	24.13	3.16	26.84	5.11
*p		0.15		0.13		0.17		0.11		0.12	
Employment status	self-employment	96.21	13.15	31.08	4.03	17.34	2.05	23.24	3.59	25.55	5.46
	student	99.70	12.37	31.38	4.04	17.02	1.64	23.04	3.54	25.27	4.97
	Employee	96.79	12.62	31.49	4.10	17.71	1.96	23.31	3.08	25.28	5.24
	Unemployed	95.04	9.82	31.96	4.15	17.51	1.05	23.73	2.90	25.84	3.49
**p		0.60		0.10		0.11		0.70		0.30	
Educational Level	< diploma	95.21	13.50	30.14	4.51	16.13	1.68	22.79	3.66	24.15	5.74
	diploma	88.93	11.60	31.60	4.10	17.73	2.12	22.56	3.41	24.00	4.43
	academic	90.98	12.34	33.60	3.99	19.91	1.88	24.69	3.14	26.89	5.02
p**		0.00		0.00		0.00		0.00		0.00	
Economic status of the family	Weak	99.48	10.64	30.14	3.74	16.16	1.71	23.63	3.00	24.56	4.18
	moderate	95.92	13.16	30.98	4.20	16.83	1.91	23.29	3.50	24.83	5.43
	Good	95.62	13.02	30.34	4.39	16.78	2.11	23.02	3.10	24.47	5.34
p**		0.12		0.09		0.15		0.16		0.11	

Discussion

Heat waves are an environmental hazard threatening human health, and the degree to which people perceive the associated risks may influence their decision to modify their behavior during heat waves. This study investigated the risk perception of Arbaeen pilgrims regarding heatstroke in 2023.

The mean and standard deviation of pilgrims' total risk perception score regarding heat stroke was 96.92 ± 14.47, and 51.18% of pilgrims were in good condition regarding risk perception. This finding was consistent with the study results of Al Mayahi [15] and Brimblecombe [16]. However, it was not consistent with the results of the study of Van [17] and Frondel [18]. Heat waves are considered a health hazard and are likely to increase in frequency, intensity, and duration due to climate change. If people know the risks and adopt healthy behaviors during heat waves, the effects of heat waves on human health can be reduced. In different countries, according to cultural, economic, political, and social conditions, many factors are effective in people's understanding of the risk, and it is necessary to use appropriate strategies to increase pilgrims' understanding of the risk of heat stroke.

The mean and standard deviation of the total risk perception score and its dimensions according to the age variable had a statistically significant difference. The results showed that younger people have a higher risk perception. In the Sabrina study in Germany, young people had a higher risk perception of heat waves [19]. In the Conti study in Italy, risk perception was lower among young workers [20]. In Mo's study in China, the age of patients suffering from heat stroke was significantly higher than that of young people [21]. In general, age is an important factor in vulnerability to heat waves, as children and older people are at risk during heat waves

[22]. Preventive, social, and sanitary measures should be taken for children, the elderly, and the weak to avoid excessive deaths during heat waves. Older adults 50 years and older are considered a high-risk group in Arbaeen. They are more likely to suffer from heatstroke due to their inability to manage risk.

The mean and standard deviation of the total risk perception score and its dimensions had statistically significant differences according to the gender variable. Women had a higher risk perception than men. This finding was consistent with the results of Foster [23] and Lee [24]. However, it needed to be more consistent with the findings of Sun's study [25]. Women and girls, who currently face significant gender inequalities around the world, are among the vulnerable groups against climate change. Several studies have shown that men and women have differences in understanding environmental risk and weather conditions. Compared to men, women pay more attention to the dangers of increasing environmental temperature, and in understanding the danger of heat, women rely more on feelings and emotions. Men, on the other hand, rely more on data and facts. Women are more concerned about the risk of heat waves for their own and others' health and well-being, while men are more concerned about the economy and their jobs. These differences are due to cultural, social, and biological differences between men and women. Therefore, men and women should work together to understand the risk of heatstroke better.

The mean and standard deviation of the total risk perception score and its dimensions according to the education variable had a significant statistical difference. This finding was consistent with the results of the study of Al Mayahi [15], Sun [25], and Kim [26]. However, it needed to be consistent with the results of Kang's study [27]. It is worth noting that these findings are based on studies conducted in different countries and populations, and the results may only be generalizable to some populations. However, they suggest that the awareness of climate issues and heat waves is an important factor in the formation of the perception of the risks of heat stroke, and increasing the awareness of health and health issues caused by environmental heat may be an effective way to reduce the risk of heat stroke and to improve the protection of people from heat waves.

One of the strengths of the present study is the large sample size. Also, the method of completing the questionnaires in person on the walking path by four trained questioners was another strength of the study. One of the limitations of the present study is the descriptive nature of the study, which cannot find causes. The instrument of this study was a self-report questionnaire that may be far from reality. This study cannot be generalized to all pilgrims. In future studies, other groups in society should be investigated. Also, interventional studies should be conducted to investigate the effect of education and training on pilgrims' understanding of the risk of heatstroke.

Conclusion

According to the study results, the studied pilgrims had a high-risk perception of heatstroke. However, there is room for improvement. Research has shown that climate and weather knowledge interventions can effectively improve people's understanding of climate risks and, as a result, create positive changes in attitudes and practices. Public training on climate risk reduction management should be promoted regularly and widely implemented in the various units and departments visited by pilgrims. The use of the virtual platform, which occupies an important part of people's lives today, should be considered. The findings of this study will help the Ministry of Health, the Red Crescent, and other institutions involved in the health management of the Arbaeen pilgrimage to develop and implement practical preparation courses, reduce the risk of heatstroke, and guide policymakers in evaluating pilgrims' emergency preparedness policies.

Recommendations for stakeholders involved in the Arbaeen ceremony to reduce the risks of heatstroke.

1. Try not to travel during peak heat hours.
2. Be sure to use the cold and fogging tunnel.
3. Necessary recommendations should be made regarding increasing people's awareness about heat stroke.
4. Installation of awnings in crowded and crowded places

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Conflict of Interest Disclosures

The authors declare that they have no competing interests.

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Declaration of Generative AI and AI-assisted technologies

The authors declare they have not used General AI and AI-assisted technologies.

Authors' Contributions

P.H.K conceived the idea presented. A.M and M.T.B drafted the manuscript. S.H.M and H.S collected follow-up data, and A.M performed the data analysis. M.T.B contributed to the critical revision of the manuscript. All authors read and approved the final version.

Ethical Statement

This study has been registered with the Ethics Committee of the Red Crescent Society of the Islamic Republic of Iran with registration number IR.RCS.REC.1402.022. We collected data privately and pilgrims completed informed consent forms before enrolling in the study.

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