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HEALTH CAMPAIGNS INTERVENTION TO IMPROVE HEAT STROKE RISK BEHAVIORS DURING HAJJ PILGRIMAGE: A PROSPECTIVE COHORT STUDY

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Abstract

The study aims to evaluate the interventions related to health campaigns to address the risks associated with heat stroke during Hajj. A prospective-cohort research design was followed and 1,028 participants were included in the study. Two groups were formulated, namely, cohort and control group. The demographic details, along with their knowledge regarding heat stroke, the symptoms of heat stroke and other factors were also evaluated. The results suggested a positive level of awareness and knowledge regarding heat stroke and heat exhaustion among pilgrims divided in both groups. The control group was found to be inflicted more with heat stroke and exhaustion. Thus, health campaigns can serve as an important approach to disseminate information among pilgrims to control the incidence of such diseases.

Keywords: *Health Campaigns, Hajj Pilgrims, Pilgrimage, Saudi Arabia, Heat Stroke*

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INTRODUCTION:

Annually more than 10 million pilgrims travel to Makah Saudi Arabia (KSA) to perform Hajj pilgrimage, one of the five pillars of Islam [1]. The most common health issues suffered by the pilgrims on their journey are heat stroke and heat exhaustion [2, 3]. Thus, to provide relieve a victim of heatstroke, it is required to remove sufficient amount of heat from its skin. To this end, a large number of scientific methods are under research to facilitate the pilgrims traveling in desert conditions. The ritual of Hajj is performed at Muzdilah, Mina and Arafat in minimal clothes; therefore, the chances of being inflicted to heat stroke are relatively more (3). On the other hand, non-communicable diseases (NCDs) among pilgrims are a very important issue, which is often underestimated; thus, more emphasis is laid usually upon communicable diseases. The risks involved with NCDs are however increasing among hajj pilgrims [4] due to a number of reasons, including; crowded places, pre-existing chronic diseases, elderly people, and inadequate health promotion to perform hajj pilgrimage during these five days. Non-communicable diseases are the most common diseases which accounts for a large number of patient admission in hospitals during Hajj [4].

One of the most important health problems among pilgrims is exposure to extreme heat and sunlight at Mina and Arafat, leading to heat cramps, heat exhaustion and heat stroke [5]. The Kingdom of Saudi Arabia (KSA) Ministry of Health (MOH) recommends several preventive methods to decrease the non-communicable diseases among pilgrims during Hajj. One simple advice that pilgrims can follow is the use of umbrellas when exposed to direct sunlight [6]. Elachola et al [7] showed that hand-held umbrellas can serve as a challenge to the hajj pilgrims due to a large number of people; however, the amount of risk associated with the hajj pilgrims due to inadequate sun protection still remains a challenging issue. In a large crowded setting, such as, Hajj, use of handheld umbrellas may be a challenge to pilgrims. The acceptance of smaller umbrellas that can be worn on the head, without being held by hand, needs to be assessed. Moreover, the use of sun-screen creams can be of helpful in preventing solar radiation, but not dehydration, also, their acceptance remains a topic of concern. Given the absence of other tools, prevention from heat and solar exposure efforts are needed to educate more pilgrims on the use of umbrella and other potential solar protection methods [7].

Due to a large number of studies based on heat stroke and heat exhaustion during hajj, the gap can be identified as a need to raise awareness among pilgrims about preventive methods and risk of heat stroke. To this end, a number of health campaigns were being held for hajj pilgrims to raise awareness among pilgrims regarding several important topics, including; heat stroke, heat exhaustion and assessing the impact of such campaigns by using a relatively unused method; cohort study by re-directional surveys before and after hajj pilgrimage in both cohort and control group.

AIMS AND OBJECTIVES:

The current study aims to assess the efficacy of health campaigns to minimize the incidence rate of heat stroke and heat exhaustion cases among hajj pilgrims. The study also evaluates the efficacy of using umbrella against heat stroke and heat exhaustion at Hajj. Moreover, the study determines the self-reported heat exhaustion and heat stroke at Hajj pilgrimage. A comparison between cohort and control group getting afflicted with heat stroke symptoms, knowledge and hospitalization are also determined. The infected pilgrims according to scoring system of symptoms are divided and a comparison between different variables and demographic data in both groups are assessed. Lastly, the barriers which stop pilgrims from dealing with precautions to prevent infectious diseases are also determined.

RESEARCH QUESTIONS:

Question 1: How does non-communicable diseases influence the Hajj pilgrims?
Question 2: How are health campaigns beneficial to increase the awareness among Hajj pilgrims?
Question 3: What is the efficacy of using umbrella to overcome heat stroke and heat exhaustion?

MATERIAL AND METHODS:

Research design

A cohort study is conducted to compare the efficacy of health campaigns, including; health promotion and umbrella usage during Hajj season between two groups of pilgrims. Selection randomization to each group will be in a 1:1 ratio and it will be carried out based on the residency of pilgrims in Makah city. The randomization will be stratified by gender and country of residence to ensure a balanced and proportionate recruitment. Ethical approval was obtained from institutional ethical committee of ZMZM volunteering commission ; reference number was HAPO-02-K-012-2017-03- 356.

Sample Size

A total of 1,028 pilgrims were selected who were performing Hajj for the first time, second time, third time or more than third time. The participants consisted of both categories, who were suffering

from chronic illness and those who were not suffering from any chronic illness. The participants included in the study were from the age category of ⩾ 18 years. Lastly, only those participants will be selected for the study who were hajj pilgrims. On the other hand, participants that fall in the age category of > 60 years will be excluded from the study. Those participants who refuse or were unable to give the verbal consent will be excluded. Lastly, those pilgrims who were suffering from chronic diseases will be excluded.

Data Collection

A researcher team was prepared to collect data from the pilgrims by visiting their residence and campaigns. The data was collected in the first interval from 31 of August to 5 September before pilgrims were exposed to health campaigns (umbrella and health information was provided) while the second interval was post-Hajj exposure from 15-17 September. The data collection in both intervals was done by using a data collection form, which contained questions regarding demographics, medical conditions, and influenza vaccination history for the first interval and document for the development of any reported heat stroke or heat exhaustion for the second interval for both groups. The health campaigns were not provided to the second control group (Figure 1).

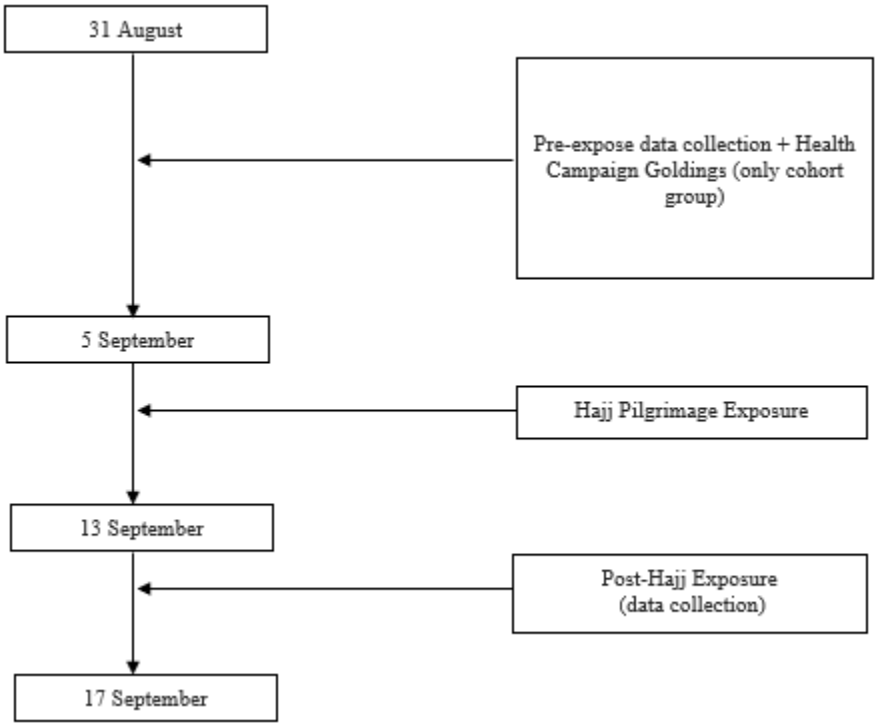

Figure 1: Key Steps

Statistical Analysis

The data collected was analyzed using Statistical Package for the Social science (SPSS). Moreover, descriptive statistics and inferential statistics were used to analyze the data.

RESULTS:

Table 1 gives the demographic details of the hajj pilgrims, including; age, sex, nationality, education, and location. The information presented for the control group showed that most of the pilgrims were less than 60 years and a large number of participants were males. The data also showed that most of the pilgrims came for the first time to perform Hajj. The education of hajj pilgrims was found to be between the ranges of 12-18 selected for the study. On the other hand, for the cohort group, most of pilgrims were less than 60 years and a large number of participants were male. The detailed information regarding the demographic details of pilgrims are presented in Table 1.

Table 1: Demographic Details

		Groups						Chi-square	
		Control		Cohort		Total			
		N	%	N	%	N	%	X^2	P-value
Age	<40	146	14.2%	217	15.3%	363	14.8%	3.380	0.337
	40-50	230	22.4%	342	24.1%	572	23.4%		
	50-60	297	28.9%	417	29.4%	714	29.2%		
	>60	355	34.5%	442	31.2%	797	32.6%		
Sex of pilgrims	Male	817	79.5%	1221	86.1%	2038	83.3%	18.863	<0.001*
	Female	211	20.5%	197	13.9%	408	16.7%		
Nationality	Jordanian	17	1.7%	17	1.2%	34	1.4%	60.008	<0.001*
	Egyptian	329	32.0%	297	20.9%	626	25.6%		
	Algerian	335	32.6%	652	46.0%	987	40.4%		
	Tunesian	2	.2%	0	0.0%	2	.1%		
	Sudanese	345	33.6%	452	31.9%	797	32.6%		
Hajj Attendance	first time	872	84.8%	1184	83.5%	2056	84.1%	6.937	0.074
	second time	87	8.5%	158	11.1%	245	10.0%		
	third time	29	2.8%	27	1.9%	56	2.3%		
	more than three	40	3.9%	49	3.5%	89	3.6%		
How many years have you been educated?	No	238	23.2%	253	17.8%	491	20.1%	11.130	0.011
	<12	264	25.7%	369	26.0%	633	25.9%		
	12-18	468	45.5%	704	49.6%	1172	47.9%		
	>18	58	5.6%	92	6.5%	150	6.1%		
Where do you live?	Big City	641	62.4%	935	65.9%	1576	64.4%	4.401	0.221
	Small city	198	19.3%	264	18.6%	462	18.9%		
	Village	163	15.9%	188	13.3%	351	14.3%		
	Rural	26	2.5%	31	2.2%	57	2.3%		

Table 2 presents the information regarding the chronic illness of pilgrims selected for the study. For the control group, the results showed that most of the patients, i.e., 728 suffered from non-chronic illness. However, 84 suffered from diabetes, 102 from HT, 12 from HIV-Hib or other chronic infections, 5 from renal failure, 18 from cardiovascular disease, 4 from CNS disorder, 7 from skin diseases, 11 from immobility, 12 from GIT, and 45 from multiple chronic diseases. On the other hand, data regarding the cohort group showed that 1026 pilgrims suffered from non-chronic illness, 144 from diabetes, 137 from HT, 6 from chronic infectious diseases, 3 from renal failure, 20 from cardiovascular diseases, 4 from CNS disorder, 3 from skin diseases, 8 from immobility, 11 from GIT, and 56 from multiple diseases. The p-value for the following information was found to be 0.113. The detailed information has been provided in Table 2.

Table 2: Information on Chronic Illness

Chronic Diseases	Groups						Chi-square	
	Control		Cohort		Total			
	N	%	N	%	N	%	X^2	P-value
Non-Chronic	728	70.8%	1026	72.4%	1754	71.7%	15.562	0.113
Diabetes	84	8.2%	144	10.2%	228	9.3%		
HT	102	9.9%	137	9.7%	239	9.8%		
Chronic Infectious Diseases (HIV- Hib..)	12	1.2%	6	.4%	18	.7%		
Renal Failure	5	.5%	3	.2%	8	.3%		
Cardiovascular Diseases	18	1.8%	20	1.4%	38	1.6%		
CNS disorder	4	.4%	4	.3%	8	.3%		
Skin diseases	7	.7%	3	.2%	10	.4%		
Immobility	11	1.1%	8	.6%	19	.8%		
GIT diseases	12	1.2%	11	.8%	23	.9%		
Multiple	45	4.4%	56	3.9%	101	4.1%		

The awareness among pilgrims regarding health problems at the time of hajj were evaluated and the results were found to be significant. On the other hand, the results regarding the awareness gained from ZMAM charity health campaign, Hajj Company, airport, TV health campaigns, or multiple resources were found to be insignificant. Moreover, the awareness regarding diseases among pilgrims was also found to be insignificant. Table 3 gives the detailed information.

Table 3: Awareness among Pilgrims

		Groups						Chi-square	
		Control		Cohort		Total			
		N	%	N	%	N	%	X^2	P-value
Did you ever had awareness about hajj health problems before you performed hajj pilgrimage?	Yes	2	.2%	1418	100.0%	1420	58.1%	3298.168	<0.001*
	No	1026	99.8%	0	0.0%	1026	41.9%		
If yes, what was the source of awareness?	Zmam charity health campaigns	0	0.0%	418	29.5%	418	29.4%	4.748	0.691
	Hajj company	2	100.0%	432	30.5%	434	30.6%		
	Airport	0	0.0%	46	3.2%	46	3.2%		

	TV	0	0.0%	190	13.4%	190	13.4%		
	Health campaigns	0	0.0%	223	15.7%	223	15.7%		
	Hospitals	0	0.0%	88	6.2%	88	6.2%		
	Don't know	0	0.0%	15	1.1%	15	1.1%		
	Multiple	0	0.0%	6	.4%	6	.4%		
If yes, what were the topics that you were already aware about?	Hypertension	2	100.0%	94	6.6%	96	6.8%	10.815	0.372
	Diabetes	0	0.0%	44	3.1%	44	3.1%		
	Heat stroke	0	0.0%	138	9.7%	138	9.7%		
	Asthma	0	0.0%	10	.7%	10	.7%		
	Respiratory infectious diseases	0	0.0%	389	27.4%	389	27.4%		
	Food poisoning	0	0.0%	22	1.6%	22	1.5%		
	Vaccination	0	0.0%	36	2.5%	36	2.5%		
	Foot and other Injuries	0	0.0%	93	6.6%	93	6.5%		
	Skin diseases	0	0.0%	5	.4%	5	.4%		
	Don't know	0	0.0%	25	1.8%	25	1.8%		
	multiple	0	0.0%	562	39.6%	562	39.6%		

The results showed significance regarding the use of umbrella among pilgrims, the time of use of umbrella, and the reasons regarding the non-usage of umbrella among pilgrims. The results showed that most of the pilgrims were not aware of heat stroke due to which they did not use umbrella during Hajj. Table 4 gives complete details.

Table 4: Information regarding Umbrella use among Pilgrims

		Groups						**Chi-square**	
		Control		**Cohort**		**Total**			
		N	**%**	**N**	**%**	**N**	**%**	**X^2**	**P-value**
Did you use an umbrella during your hajj pilgrimage (5days from Arafat to mina)?	Yes	620	60.3%	951	67.1%	1571	64.2%	11.797	0.001*
	No	408	39.7%	467	32.9%	875	35.8%		
If yes, how many days did you used it?	1 day	180	29.0%	260	27.3%	440	28.0%	1.551	0.956
	2 days	94	15.2%	141	14.8%	235	15.0%		
	3 days	140	22.6%	220	23.1%	360	22.9%		
	4 days	81	13.1%	134	14.1%	215	13.7%		
	5 days	106	17.1%	159	16.7%	265	16.9%		
	Don't know	15	2.4%	30	3.2%	45	2.9%		
	more than 5 days	4	.6%	7	.7%	11	.7%		
If yes, when was the time of using the Umbrella?	7am -11am	179	28.9%	179	18.8%	358	22.8%	33.216	<0.001*
	11am -3pm	285	46.0%	572	60.1%	857	54.6%		
	3pm -6pm	34	5.5%	42	4.4%	76	4.8%		
	7am -6pm	122	19.7%	158	16.6%	280	17.8%		

If not what are the reasons?	Not aware with Heat stroke and heat excursion during hajj pilgrimage	116	28.4%	92	19.7%	208	23.8%	18.230	0.011*
	Believing that they rarely get Heat stroke and heat excursion	38	9.3%	63	13.5%	101	11.5%		
	Too busy to buy the Umbrella	18	4.4%	38	8.1%	56	6.4%		
	Do not like to use the Umbrella	113	27.7%	129	27.6%	242	27.7%		
	Believing that the Umbrella does not protect them from Heat stroke	15	3.7%	29	6.2%	44	5.0%		
	Did not know where it sale	23	5.6%	25	5.4%	48	5.5%		
	Did not have money to buy	13	3.2%	14	3.0%	27	3.1%		
	Don't know	72	17.6%	77	16.5%	149	17.0%		

The information regarding the hospitalization of pilgrims showed insignificant results with p-value 0.377 and 0.728 for the hospitalization and reason for hospitalization, respectively. Table 5 presents the information regarding the hospitalization of pilgrims.

Table 5: Information regarding hospitalization of pilgrims

		Groups						**Chi-square**	
		Control		**Cohort**		**Total**			
		N	**%**	**N**	**%**	**N**	**%**	**X^2**	**P-value**
Did you ever have hospitalization during hajj pilgrimage?	Yes	182	17.7%	252	17.8%	434	17.7%	1.953	0.377
	No	834	81.1%	1157	81.6%	1991	81.4%		
	Don't know	12	1.2%	9	.6%	21	.9%		
If yes, what was the cause?	RTA	56	30.8%	67	26.6%	123	28.3%	4.442	0.728
	Heat stroke	18	9.9%	26	10.3%	44	10.1%		
	Foot injuries	21	11.5%	31	12.3%	52	12.0%		
	Heat excursion	8	4.4%	12	4.8%	20	4.6%		
	Food poisoning	14	7.7%	17	6.7%	31	7.1%		
	Skin diseases	5	2.7%	2	.8%	7	1.6%		
	Don't know	16	8.8%	23	9.1%	39	9.0%		
	RID	44	24.2%	74	29.4%	118	27.2%		

Table 6 shows information regarding the symptoms of heat stroke among pilgrims. Unconsciousness and nausea and vomiting were found to be the most frequent symptoms among pilgrims with p-value 0.001 and 0.01, respectively.

Table 6 shows the information regarding the symptoms of heat stroke among pilgrims.

Table 6: Symptoms of Heat Stroke

	Groups						Chi-square	
	Control		Cohort		Total			
	N	%	N	%	N	%	X^2	P-value
Throbbing Headache	27	2.63%	41	2.89%	68	2.78%	0.156	0.693
Dizziness and Light-headedness	18	1.75%	16	1.13%	34	1.39%		
Nausea and Vomiting	10	0.97%	3	0.21%	13	0.53%	6.597	0.01*
Rapid Heartbeat	17	1.65%	18	1.27%	35	1.43%	0.617	0.432
Behavioral Changes such as Confusion, Disorientation or Staggering	4	0.39%	5	0.35%	9	0.37%	0.022	0.883
Rapid, Shallow Breathing	6	0.58%	13	0.92%	19	0.78%	0.885	0.347
Seizures	179	17.41%	261	18.41%	440	17.99%	0.400	0.527
Unconsciousness	16	1.56%	61	4.30%	77	3.15%	16.021	<0.001*
Headache	23	2.24%	53	3.74%	76	3.11%	4.617	0.032*
Dark-Colored Urine (a sign of dehydration)	237	23.05%	305	21.51%	542	22.16%	0.823	0.364
Fainting	60	5.84%	114	8.04%	174	7.11%	4.462	0.035*
Fatigue	69	6.71%	143	10.08%	212	8.67%	8.781	0.003*
Muscle or Abdominal	128	12.45%	216	15.23%	344	14.06%	3.854	0.050*
Profuse Sweating	46	4.47%	53	3.74%	99	4.05%	0.827	0.363
Fever	78	7.59%	115	8.11%	193	7.89%	0.225	0.636
Chills	132	12.84%	181	12.76%	313	12.80%	0.003	0.956
Diarrhea or Constipation	120	11.67%	155	10.93%	275	11.24%	0.328	0.567
Muscle Aches	37	3.60%	57	4.02%	94	3.84%	0.287	0.592
Thirst	37	3.60%	41	2.89%	78	3.19%	0.958	0.328
general malaise	326	31.71%	487	34.34%	813	33.24%	1.865	0.172
Fever and Chills	6	0.58%	7	0.49%	13	0.53%	0.091	0.763
Cough	1	0.10%	2	0.14%	3	0.12%	0.096	0.757
Cough that lasts longer than 3 weeks	13	1.26%	9	0.63%	22	0.90%	2.608	0.106
Coughing up Blood	46	4.47%	74	5.22%	120	4.91%	0.713	0.398
Weight Loss	13	1.26%	9	0.63%	22	0.90%	2.608	0.106
Chest Pain	46	4.47%	74	5.22%	120	4.91%	0.713	0.398

DISCUSSION:

The following study was conducted to evaluate the intervention of health campaigns for the improvement of heat stroke risk behaviors during Hajj pilgrimage. The results of the study showed the level of awareness regarding heat stroke and heat exhaustion among the control group. The results also showed the level of knowledge and satisfaction among control group. Lastly, the level of awareness and knowledge was also evaluated in the cohort group. The results of the study showed significant results regarding awareness of health concerns among pilgrims in both groups. Moreover, significant results were found regarding the use of umbrella among pilgrims.

The results of the study were supported by the study conducted by Al-Masuud et al [8]. The results predicted that almost 62.5% of pilgrims suffered from non-communicable or chronic disease. On the other hand, 37.5% of the pilgrims suffered from infectious or communicable diseases. Respiratory disease was found to be the most common disease

among pilgrims which led to hospital admission. Cardiovascular diseases were found to be the most common cause of death among pilgrims. To this end, the study concluded that huge expertise is required to address the medical challenges being faced by pilgrims during pilgrimage.

Another study conducted by Shafi et al [9] reported that non-communicable diseases are the major cause of inflicting a large number of pilgrims during Hajj season. The strenuous Hajj conditions can further exacerbate the condition of patients suffering from non-communicable diseases, such as, kidney, diabetes, epilepsy, liver, and hypertension disease. There is a fair chance of losing track of one's medication during spiritual activities, which leads to worsening the condition of such patients. Moreover, heat exhaustion and heat stroke were reported as one of the factors other than cardiovascular diseases that leads to death of pilgrims. Thus, Hajj can prove to be an important gathering to conduct research. Moreover, the research can also prove to be beneficial for Saudi government to take extra measures to ensure the health care of pilgrims.

Abdelmoety et al [10] conducted a study to evaluate the characteristics of heat illness during hajj. The results of the study showed that 29% of pilgrims were subjected to heat stroke and 67.75% of pilgrims suffered from heat exhaustion. The study also reported diabetes as one of the factors leading to both heat stroke and heat exhaustion. A large number of patients were found to be affected by electrolyte imbalance and hyperthermia. The treatment of these diseases was carried out through the guidelines presented on heat illness. Such that, it can be concluded that most of the patients were found to be suffering from hyperthermia, the mortality rate was comparatively high from heatstroke, plus the creatinine levels varied among patients.

Heat stroke and heat exhaustion appears to be the most common cause of mortality among pilgrims. Such that, a little amount of literature is present on the required topic. To this end, the study was aimed at assessing health campaign interventions to improve the heat stroke behaviors during Hajj pilgrimage. The following approach holds significance due to the level of awareness provided to pilgrims. The health campaigns disseminate significant information to the pilgrims, which can help them during their pilgrimage. Thus, the study provides significant information regarding the main factors that majorly promote the occurrence of non-communicable diseases among pilgrims. The study will also enrich the present literature by further evaluating the topic of research. Despite of the significance of the study, there are various limitations in the current study. Considering a huge crowd being gathered for Hajj, the study included a small number of participants. Moreover, the number of studies has only evaluated the case of Hajj, other mass gathering must also be evaluated and their results should be compared depending on the conditions of both cases. Thus, the future researches are advised to address these limitations to produce more generalized results.

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