ORIGNAL ARTICLE

Assessment of Knowledge of Healthcare Professionals about Heat Waves and Related Conditions

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A B S T R A C T

Objective: The objective of this study was to assess the knowledge of different healthcare professionals about the symptoms, risk factors and management of heat waves and related conditions.

Study Design: Cross-sectional study

Methods: In this study, data was collected from physicians, pharmacist and nurses of private and public hospitals of Karachi from July 2016 to October 2016.In this study data was collected by stratified sampling technique from 100 physicians, 100 pharmacist and 100 nurses about the symptoms, risk factors and management of heat waves and related conditions. Healthcare staffs with at least one year work experience were included for participation. Interns, trainees, volunteers and students were excluded from participation.

Result: The Mean score of Physician, Pharmacist and Nurses was 11.40, 11.43 and 9.77 respectively. The statistical test has indicated that there is difference in the knowledge of physician, pharmacist and nurses about the heat stroke and its management.

Conclusion: Heat stroke is a medical emergency that need prompt attention of patients, their families and all health care staff. The knowledge of all the healthcare staff about heat stroke and its management is necessary so that they can communicate early warning signs and its management to community and can take all precautionary measures against the epidemic of heat stroke

INTRODUCTION

In the past 3-4 decades, an increasing trend in high-humidity heat waves has been noticed [1]. A heat wave is a condition which is characterized by abnormally hot weather> 40OC lasting for three or more consecutive days or weeks [2]. Extreme heat is associated with excess mortality and morbidity worldwide [3]. Extreme heat events are responsible for more deaths annually than hurricanes, floods, earthquakes combined, lightning, and tornadoes [2]. Urban dwellers are at particular risk because of elevated temperatures in cities, known as the "urban heat island effect" due to the magnifying effect of paved surfaces and the lack of tree cover [4].

Human body has an automatic thermoregulatory mechanism, that is responsible for maintaining the inside body temperature by sweating and by radiating heat through skin. This natural cooling system may begin to fail in hot humid weather letting heat in the body to dangerous levels and ultimately can cause heat illness, such as heat cramps, heat exhaustion, or heatstroke [5].

Heat stroke, is a serious, a medical emergency/condition, when the body's temperature rises to >40°C as a result of excessive heat exposure. The body loses its ability to cool itself and overheats [6].The symptoms which are present in patients with heat stroke at the time of clinical admissions are: delirium, seizures, coma, and severe hyperthermia [5]. Infants, the elderly, athletes, and outdoor workers are the groups at greatest risk for heat stroke [7]. However, the factors that predispose to heat stroke collapse include pre-existing illness, cardiovascular disease, drug use, and poor fitness level [8].

In June 2015, worse Heat waves strikes on to the vast geographical areas of Sindh, Southern Punjab and Baluchistan with temperatures as high as 49 °C (120 °F) [9,10] and caused the deaths of about 2,000 people from dehydration and heat stroke, mostly in Sindh province and its capital city, Karachi [11,12]. Majority of the victim of Heat stroke were elderly and poor population and the cause of death among the victims of heat waves were heat stroke, dehydration or other heat-related illnesses [13]. Therefore the Heat-related conditions can lead to severe consequences; sometimes even deaths [14].

It was considered as extreme heat waves that caused more than thousand deaths in June 2015 in the capital city of Sind, Karachi. Karachi is among those cities of Pakistan which was considered as resistant to extreme effects of the environment. From the beginning of 21st century, because of continuous changes of the global environment and weather, the extreme effects of weather have also been seen in Karachi especially the summer are very intense having temperature exceeding 45 degree centigrade or more. The objective of this study was to evaluate awareness among medical professionals regarding different heat waves conditions, their symptomatic differentiation and population at risk, effect on different body parameters, treatment as well as preventive measures that can be done to overcome these conditions.

MATERIALS AND METHODS

This is a descriptive cross sectional study that was conducted indifferent private and public hospitals of Karachi from July 2016 to October 2016. A self-made questionnaire adopted from Centers for Disease Control and Prevention website, under National Institute for Occupational Safety and Health (NIOSH) section. The questionnaires consist of 3 main sections, Demography of the participants, general knowledge of participants about Heat stroke and Medical knowledge about heat stroke management. The knowledge of the healthcare staff was measured by designing 3 points likert scale i.e. agree, don't know and disagree.

In this study, physicians, pharmacist and nurses were targeted because these are the active and have direct contact with patient care in term of diagnosis, management, drug delivery and drug administration. Therefore 3 groups were made on the basis of specialty; namely Physicians, Pharmacist and Nurses. In this way stratified sampling technique was used for the selection of participants. Data was collected from 100 physicians, 100 pharmacist and 100 nurses, who were working in any public and private hospital of Karachi at least from last one year. The healthcare staffs (physician, pharmacist and nurses) worked as intern, trainee and volunteer and have less than one year of experience were excluded. A written permission from the entire healthcare staff involved in providing the data for this research was taken and they were having complete right to withdraw from study without any prior notice.

The data was analyzed by using statistical software SPSS version 19.0. The demographic features of Physicians, Pharmacist and Nurses were analyzed through descriptive statistics. Responses of physicians, pharmacist and nurses were analyzed by ANOVA and tukey post hoc for

multi group comparison. The p value of 0.05 or less was considered statistically significant.

RESULTS

TABLE 1: Frequencies of Demographic Characteristics of the Participant's(N=300)

Demographic variable	Frequency (f)	Percentage (%)
Hospital Type		
Public	185	61.7 %
Private	115	38.3 %
Occupation		
Physician	100	33.3 %
Pharmacist	100	33.3 %
Nurse	100	33.3 %
Age		
20 to 29 year	167	55.7 %
30 to 39 year	117	39.0 %
40 year or more	16	5.3 %
Sex		43.7 %
Male	131	56.3 %
Female	169	
Work Experience		
1-5 year	148	49.3 %
6-10 year	134	44.7 %
11 year or more	18	6 %

In this study, the data was collected from 300 participants and out of which 43.7% (n=131) were male and 56.3% (n=169) were female. The datacollected from the physicians, pharmacist and nurses who must have at least one year experience, therefore 49.3% (n=148) participants were having work experience range between 1 to 5 year, followed by work experience of 6 to 10 year in 44.7% (n= 134). Similarly 55.7% (n=167) participants fall in age group 20 to 29 year

followed by age group of 30 to 39 year i.e. 39% (n=117)

Table 2: Knowledge test of health professional about heat stroke

Statements	Correct Responses			Correct Answer
	Doctors	Pharmacist	Nurses	
Risk Factors				
Firefighters, bakery workers, farmers, construction workers, miners, boiler room workers, factory workers, and others are not at risk of heat stress	30%	24%	8%	Disagree
People having age more than 65 are at risk of heat stroke	97%	93%	93%	Agree
People who are obese or overweight are more safe to heat shock	27%	39%	43%	Disagree
People with high blood pressure are more prone to develop heat stroke	96%	78%	68%	Agree
Symptoms				
Heat stroke, Heat exhaustion, heat cramps and heat rashes all are analogous term	0%	0%	0%	Disagree
Heat stroke cannot cause permanent disability if emergency treatment is not given.	100%	100%	100%	Disagree
In heat stroke, the body temperature rises to 106 ^{O}F or higher within 10 to 15 minutes	91%	87%	84%	Agree
Hot, dry skin or profuse sweating, Chills, Throbbing headache, High body temperature and Confusion/dizziness are symptoms of heat stroke	100%	85%	66%	Agree
Pale complexions, muscles cramps, weakness, fatigue , fast and shallow sweating are the distinctive feature for Heat Exhaustion	26%	37%	48%	Agree
Factors that may contribute to heat syncope include dehydration and lack of acclimatization.	90%	91%	75%	Agree
Light headedness and fainting are pathogmonic feature of Heat Syncope	38%	41%	38%	Agree
Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.	100%	100%	89%	Agree
In heat cramps patient have muscle pain or spasms usually in the abdomen and thigh region only	0%	13%	25%	Disagree
Heat rash never likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases	84%	77%	64%	Disagree
Protection & Prevention				
The first aid management of heat stroke is to showering the body with chilled water	100%	100%	100%	Agree
Use of Oral Rehydration salt solution , soft drink and alcoholic drinks helps in minimizing the episodes of heat strokes	100%	100%	100%	Disagree
Moving the person affected with Heat stroke in shaded area is not effective at all	81%	89%	74%	Disagree
Protective clothing or personal protective equipment does not have any effect in increasing or reducing the risk of heat stress.	48%	57%	36%	Disagree
Caffeine containing products are not recommended in person at risk of heat stress	36%	52%	15%	Agree
Sugar containing drinks provide energy and protect person from heat stoke	91%	58%	17%	Disagree

Table 3: Analysis of variance of healthcare professionals about heat stroke

Groups	N	Mean	SD	F	p
Physicians	100	11.40	1.89		
Pharmacist	100	11.43	1.74	19.613	<0.001
Nurses	100	9.77	2.68		

The mean score for Physicians, Pharmacist and Nurses regarding the risk factors, symptoms and management of heat stroke was 11.40, 11.43 and 9.77 respectively. On statistical analysis, the p-value of <0.001 is obtain and this indicates that there is statistically significant difference about the knowledge of physicians, pharmacist and nursesregarding heat stroke and its management.

Table 4: Post hoc tukey analysis for the mean difference between three groups

Profession (I)	Comparison Group(J)	Mean Difference (I-J)	SE	P –value
Doctor	Pharmacist	- 0.30	0.303	0.995
	Nurse	1.630*	0.303	<0.001*
Pharmacist	Doctor	0.30	0.303	0.995
	Nurse	1.660*	0.303	<0.001*
Nurse	Doctor	-1.630*	0.303	<0.001*
	Pharmacist	-1.660*	0.303	<0.001*

The Asterik (*) sign in table show that results are significant. It means there is difference in the knowledge of healthcare professional regarding heat stroke.

The post-hoc tukey analysis has shown p-value of 0.995 between pharmacist and physicians, and this indicates that there is no difference in the knowledge of physicians and pharmacist. However the p-value of <0.001 is obtained, when post-hoc tukey analysis of nurses was done with physicians and with pharmacist and this reflects that there is difference in the mean score and knowledge of nurses with that of physicians and pharmacist.

DISCUSSION

The exposure to heat waves and the related illnesses is a significant issue of public health and is considered as a major cause of death in United States [15]. An effective healthcare system is not entirely run by physicians; but often it need supports of other health care professionals like clinical pharmacist and nurses case managers [16] and because of this reasons the data has been collected from Physicians, Pharmacist and

Nurses who were working in any public and private hospitals of Karachi.

More than 90% healthcare providers from each group responded correctly that people having age 65 year or more are at risk for developing heat stroke. The study conducted in Tokyo about Temperature and Air Pollution as Risk factor for Heat Stroke, also reflect that people aged 65 year or more are at higher risk for heat stroke [17]. Only 36% Physicians and 15% Nurses had responded correctly that the use of caffeine and related products put person at risk for developing heat stroke, because the caffeine and caffeine containing products increases the urinary excretion and also causes electrolyte imbalance [23].The results of this study indicate thatthe knowledge of different groups of respondents about high risk occupations and other risk factors like obesity, blood pressure,etc is either scarce or inconsistent.

All the physicians, pharmacists and nurses who had participated in this research were not able to differentiate about various conditions associated with heat waves, like Heat stroke, Heat exhaustion, heat cramps and heat rashes. This may be because of similar type diagnostic characteristics, i.e. elevated body temperature,

which causes difficulty to healthcare professional to properly differentiateabout heat stroke and heat exhaustion [18].The distinction between heat stroke and heat exhaustion is not always clear, but heat stroke differs from heat exhaustion in 3 clinical aspects like core temperature exceeds to 40.6oC, thermoregulatory failure and central nervous dysfunctioning in case of heat stroke20. Therefore, the absence of severe neurologic symptoms is frequently used to differentiate heat exhaustion from heat stroke [19]. Moreover, all the physicians, pharmacist and nurses responded that for the management of heat stroke showering the body with chilled water is an effective first aid measure. Different literatures had also supported this view, that immediate provision of cooling therapy would be effective for the prompt management and for the prevention of complications of heat strokes [20]. More than 70% physicians, pharmacists and nurses also believed that protecting an individual from the warm climate offers prevention against heat waves attack. Various literatures also support that provision of air conditioning to vulnerable populationis among effective measures for the prevention of heat stroke [21].

The results of our study reveal that Physicians, Pharmacists and Nurses have more knowledge about the prevention and management of Heat stroke than does the knowledge about the risk factors and symptoms identification, because in majority of the low-middle income countries the written guidelines about the dissemination of information is ineffective [22-23]. Therefore education concerning risk factors of heat related conditions is essential [24] for the prompt diagnosis of heat stroke and other associated heat related conditions.

The knowledge of Physicians and Pharmacist about the Heat Stroke, its symptoms and risk factors is almost similar and they score more score as compared to nurses, statistical analysis by ANOVA and post hoc Tukey analysis also had shown difference in the knowledge of nurses

with that of physicians and pharmacists. A comparative study conducted in New Hampshire about the knowledge and attitude of healthcare providers reveal that physicians possess more knowledge than does other healthcare providers like pharmacist and nurses about disease management [25].

CONCLUSION

Heat wave is a major issue of public health concern that is characterized by intense hot temperature that last for 3 or more consecutive days. It is the heat waves that need prompt intervention, otherwise it may lead to various heat related illness like heat stress, heat exhaustion, heat cramps and heat stroke. The heat related illnesses can be prevented and controlled at primary level by providing health education to the community and by taking proper protective measures against the spread of heat related illnesses. All the Healthcare professionals must have adequate knowledge about the early warning signs of heat waves, differential diagnosis of the different heat waves illnesses and also its prevention, control and management so that the healthcare professionals can disseminate the correct information at right time to the community. This will aid not only in reducing the incidence of heat related illness and but also reduces the burden of healthcare professionals at tertiary healthcare center.

LIMITATIONS

In this study that data has been collected from only 300 physicians, pharmacist and nurses who are working in any public and private hospitals of Karachi. The data in our study was collected from few private and public hospitals of Karachi and this data is not actual representation of the true population. There is tremendous need to scale up this research from community level to tertiary health care centers of Karachi.

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