



AWARENESS REGARDING HEAT EXHAUSTION; A SURVEY BASED STUDY IN POPULATION OF KARACHI

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ABSTRACT

Background: Extreme variation in temperature (i.e increased heat) has led to large number of deaths in karachi (Pakistan) recently . Our study is based on evaluating the awareness among medical and nonmedical personnel regarding heat exhaustion an initial condition due to increased environmental temperature which if not controlled progresses to heat stroke. **Methodology:** It is a descriptive cross sectional survey based study consisting of N= 300 individuals out of which N=200 belonged to health care profession and N=100 were laymen. They were questioned about heat stroke and exhaustion, symptoms and treatment. The answers were recorded as open-ended. **Results:** our study showed that 82.5% medical professionals were aware about the term heat exhaustion where as only 13% laymen knew about it. 61% Medical where as 19% non-medical people were aware about the symptomatic difference between heat stroke and heat exhaustion.46% medical personnel considered people who work outside are more prone to heat exhaustion whereas 81.5% medical personnel considered heat stroke more complicated than heat exhaustion. **Conclusion:** From our study we came to know that medical personnel are aware about heat exhaustion although there is slight confusion in symptoms but they are aware about treatment of heat exhaustion. Awareness needs to be created in laymen about heat exhaustion, its symptoms, treatment and prevention so steps can be taken by them before hand to avoid dire consequences

KEYWORDS: Heat Exhaustion, Heat stroke, Medical Personnel and Laymen.

INTRODUCTION

Extreme heat is an important weather hazard associated with excess mortality and morbidity found in cities worldwide.^[1] Each year, millions of people are exposed to the dangers of extreme heat. Outdoor laborers compose the largest percentage of patients with heat-related illnesses.^[2] This is a major public health concern for cities now and looking toward the future because the interactions of global climate change, urban heat islands, and air pollution are predicted to place increasing health burdens on cities.^[3]

Heat-related illnesses (HRIs) are a spectrum of conditions ranging from minor to life threatening. Extreme environmental heat can trigger the onset of acute conditions, including heat stroke and dehydration, as well as exacerbate a range of underlying illnesses. Heat stress is a perceived discomfort and physiological strain; heat exhaustion, a mild to moderate illness; and heat stroke, a severe illness characterized by a core body temperature above 40.0°C^[4] Heat-related conditions can lead to severe consequences, sometimes even deaths^[5].Elevation of core body temperature is usually characteristic of heat exhaustion and heat stroke^[4] which seems difficult to distinguish.

Heat exhaustion is defined as mild dehydration with or without sodium abnormalities, which can include hypernatremia or hyponatremia. Heat exhaustion usually occurs after strenuous exercise, excessive sweating, exposure to high environmental temperatures, poor fluid intake, chronic volume depletion and failure to acclimatize with surrounding temperature^[6] In heat exhaustion, core temperatures are between 100.4°F (38°C) and 104°F (40°C).^[7] Human thermal maximum has core body temperature of 42°C (107.6°F) between 45 minutes and 8 hours. Thermal maximum is defined as magnitude and duration of heat that cells can stand before becoming damaged.^[8] At higher temperatures rapid cellular destruction occurs, gastrointestinal permeability increases and inflammatory factors are released too which releases endotoxins into circulation.^[9]

Symptoms of heat exhaustion include intense discomfort, confusion, thirst, nausea, and vomiting. The absence of severe neurologic symptoms frequently is used to differentiate heat exhaustion from heat stroke^[4] heat stroke is defined as a condition in which body temperature is elevated to such a level that it becomes a noxious agent causing body tissue dysfunction and

damage with a characteristic multi-organ clinical and pathological syndrome.

Heat exhaustion is a milder entity than heat-stroke that exists on the same continuum of heat-related illness.^[10] Heatstroke is a much more severe condition than heat exhaustion. The diagnosis of heatstroke rests on two critical factors: hyperthermia and central nervous system dysfunction. Heat-stroke is a medical emergency, and mortality can approach 10%.^[11]

The distinction between heat exhaustion and heat stroke is not always clear cut although heat stroke differs from heat exhaustion in three clinical aspects.^{[12][13]} Firstly, heat stroke usually has a core temperature of greater than 40.6°C and heat exhaustion usually has a core temperature of 40°C or less. Secondly, heat stroke results in central nervous dysfunction as evident by delirium, convulsion and coma. Thirdly heat stroke usually has anhydrosis on the basis of Thermoregulatory failure.^[14]

If a patient is suffering from heat-stroke, rapid diagnosis and effective cooling are crucial, because the condition triggers a series of metabolic events that may progress to irreversible injury or death.^[15] Patients with heat exhaustion lack the profound central nervous system derangement found in those with heatstroke. Their symptoms typically resolve promptly with proper hydration and cooling.^[15]

The distinction between heat stroke and heat exhaustion, therefore, is important only in terms of prognosis but immediate selection of cooling method also plays a role.^{[13][16]} If adequate hydration and cool environment is not provided to heat exhaustion patient it can progress to heat stroke. Monitoring electrolytes is also crucial.^{[17][18]} Heat exhaustion may be a warning sign of impending heat stroke.^[18] Therefore, if there is uncertainty in the differentiation between heat exhaustion and heat stroke, the patient should be treated aggressively and promptly in heat stroke, especially if the patient's mental status is questionable.^[13]

In terms of first aid management, at any cost, there should be no delay in removing the patient from the hot environment.^{[13][17]}

The purpose of the study was to evaluate awareness regarding heat exhaustion in health care professional and medical students as well as in laymen population. Symptoms which occur in heat exhaustion and its treatment and what preventive measures should be adopted to reduce heat exhaustion and prevent its progression to heat stroke and creating awareness among laymen regarding it.

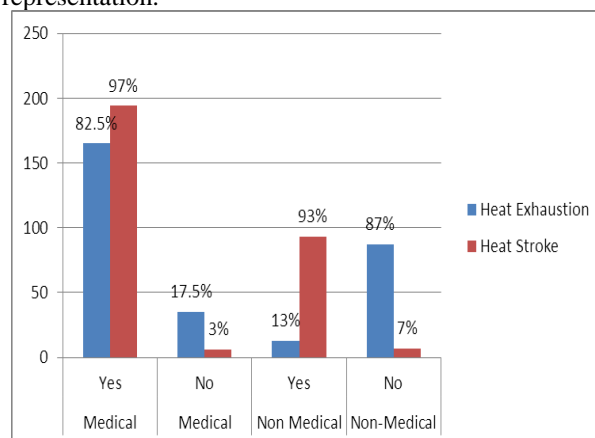
METHODOLOGY

It is a survey based study which consists of N=300 individuals out of which N=200 were (Health care professionals and medical students) and N=100 were

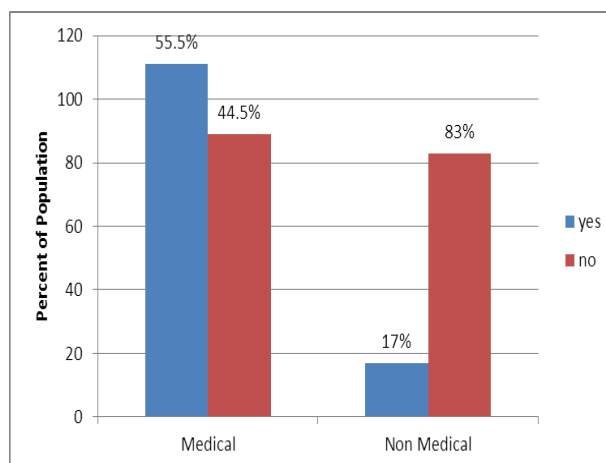
laymen (Students and professionals not belonging to health care field). The study was conducted in different private and public hospitals and universities of Karachi. The answers were recorded as open ended. The duration of study was from June 2015-August2015.

RESULTS

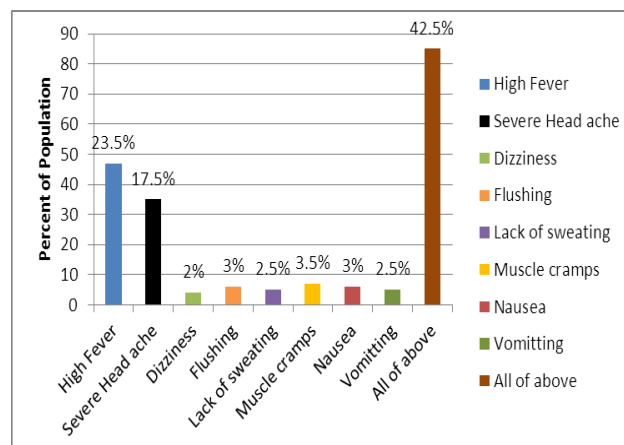
The results have been interpreted by graphical representation.



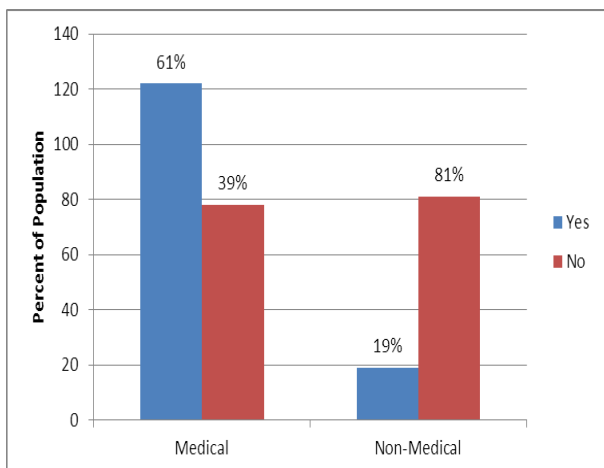
Graph 1: Awareness regarding Heat stroke and Heat exhaustion.



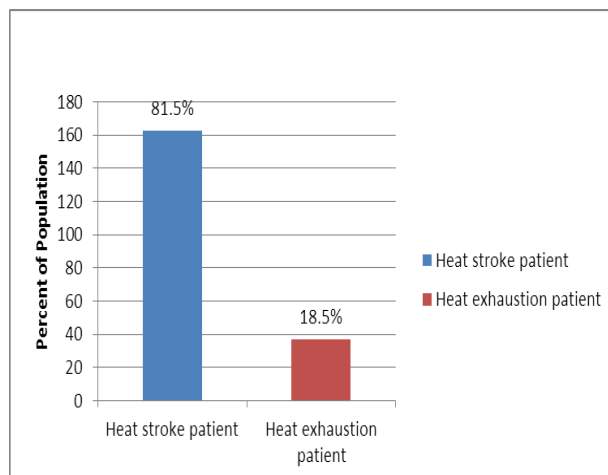
Graph 2: Awareness regarding difference between heat stroke and heat exhaustion:



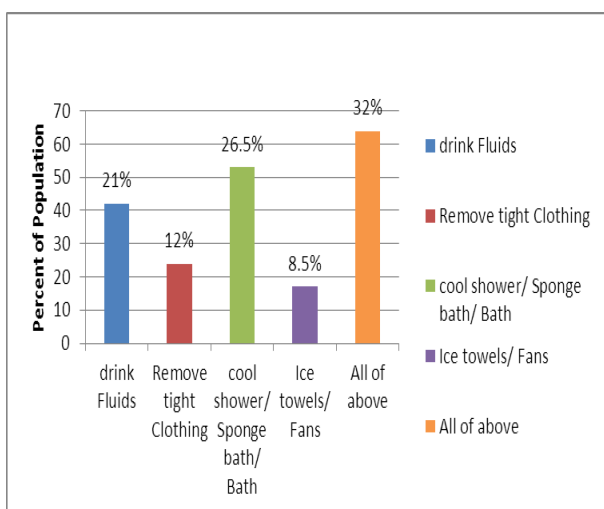
Graph 3: Symptoms of heat exhaustion: (Medical personnel data)



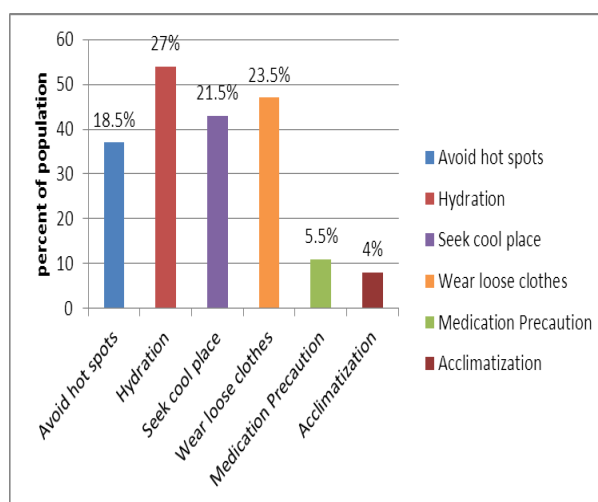
Graph 4: Symptomatic differentiation between heat stroke and exhaustion.



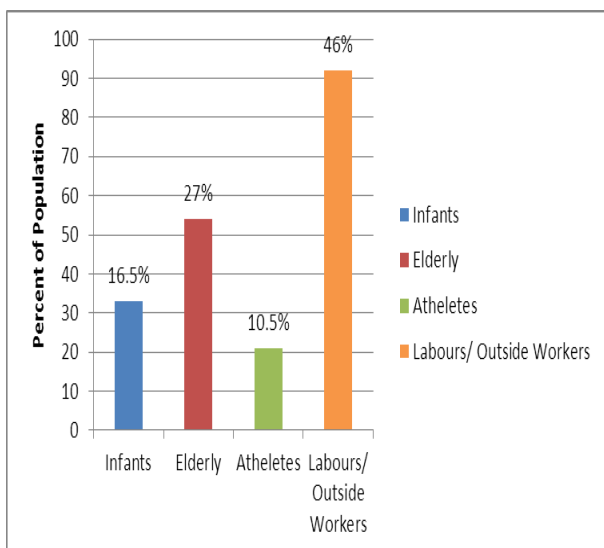
Graph 7: Severity of complications: (Medical personnel only)



Graph 5: Treatment of heat exhaustion: (Medical personnel only)



Graph 8: Prevention from Heat exhaustion: (Medical Personnel only)



Graph 6: Age group prone to heat exhaustion. (Medical Personnel only)

DISCUSSION

Heat from high environmental temperatures is a natural hazard that can adversely affect human health. [19-21] Heat illness is caused by an inability to maintain normal body temperature because of excess heat production or decreased heat transfer to the environment. Heat exhaustion and heatstroke are part of heat-related illness. [22] Heat exhaustion, a mild to moderate illness can precede to heatstroke i.e. a life-threatening illness characterized by a core body temperature above 40.0°C in minutes. [23]

Graph 1 shows highly significant results regarding awareness about heat stroke (97%) among medical staff and students and 82.5% were aware about heat exhaustion too. Only 13% of laymen were aware about heat exhaustion where as 93% were aware of heat stroke while majority (87%) of laymen population was not aware of heat exhaustion.

Graph 2 shows 55.5% of medical personnel knew the difference between heat stroke and heat exhaustion while majority of laymen population (83%) was not aware

about difference between heat stroke and heat exhaustion.

Graph 3 shows that 23.5% medical personnel thought high fever as main symptom of heat exhaustion where as 17.5% consider severe head ache as main symptom of heat exhaustion. Majority of population (42.5%) consider all of these (dizziness, flushing, high fever, nausea, vomiting, severe headache and lack of sweating) as symptoms of heat exhaustions. Literature studies have shown that symptoms of heat exhaustion include fatigue^[23] and malaise,^[24] anorexia^[22] nausea, vomiting, anxiety and confusion^[25] Potentially dangerous clinical manifestations include circulatory collapse and excessive temperature

Graph 4 shows data regarding awareness of symptomatic differences between heat stroke and exhaustion. 61% medical staff were aware about the difference where as only 19% laymen had idea about the differences. Graph 5 shows data from medical personnel about treatment of heat exhaustion. 26% suggested having cold shower or bath, 21% suggested to drink fluid, where as 32% suggested above treatment along with ice towels, use of fans and removal of tight clothing. Literature studies have believed that the initial treatment of patients with heat exhaustion involves stabilization in a cool area.^[26] Evaporative cooling may be initiated by wetting the skin^[27] Oral rehydration solutions containing sodium may be used in the field to treat most cases of mild dehydration^[28] Effective treatment requires immediate removal from the heat source, cessation of exercise, and hydration.

Graph 6 shows that majority of medical staff and students (46%) believed that labours and outside workers are most prone to heat exhaustion. Exertional heat-related injuries are a risk to all physically active individuals in warm or hot environments.^[29] Literature studies have frequently highlighted only infants and elderly as being most vulnerable^[30] while athletes and recreational sports enthusiasts are also at risk. Children may be more vulnerable due to lack of proper care and adaptation behavior^[31], whereas older patients may be more at risk due to a less developed thermoregulation or their low immunity, which may be compounded by health co-morbidities^[32]. People with fatalities most commonly reported in the fields of construction, agriculture, forestry, fishing, and manufacturing. Studies also showed that males are at a higher risk of getting heat exhaustion.^[33] However, with the increase in frequency and magnitude of temperature, extreme heat exhaustion may ultimately disrupt and affect all populations^[34]

Graph 7 shows majority of medical personnel(81.5%) believed heat stroke to be more severe than heat exhaustion. Literature studies have shown that the severity of heat exhaustion appears related to the duration of hyperthermia and to the height of the temperature, those who survive moderate-to-severe heat

stroke have a good chance of making an intact recovery,^[35] but ignoring heat exhaustion can lead to heat stroke which is a medical emergency, and its mortality can approach 10%.^[33] Hence unless the factors leading to heat exhaustion are corrected swiftly, affected patients can progress to heatstroke where risk to life is higher.^[36]

Graph 8 shows that majority of medical personnel(27%) consider hydration as best preventive measure for heat exhaustion, while 23.5% suggested wearing loose clothes, 21.5% suggested seeking cool place and only 18.5% suggested avoiding hot places as preventions from heat exhaustion. Literature studies believed that targeted protective measures can assist to reduce impacts of heat exhaustion.^[37] The best prevention is to avoid hot environments. Use of an air conditioner, air-coolers or fans^[35] increase intake of cool, nonalcoholic beverages i.e increase fluid intake, regardless of activity level.^[37]

CONCLUSION

From our study we came to know that majority of medical professionals are aware about heat exhaustion, its symptoms and treatment however there is lack of awareness in laymen about it. Laymen should be educated about heat exhaustion in order to protect them from heat stroke.

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