INTRODUCTION

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. 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%. [10]

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 anhidrosis 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-August 2015.

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)
DISCUSSION
Heat from high environmental temperatures is a natural hazard that can adversely affect human health. 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. 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.

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 whereas 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 and malaise, anorexia nausea, vomiting, anxiety and confusion. 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. Evaporative cooling may be initiated by wetting the skin. Oral rehydration solutions containing sodium may be used in the field to treat most cases of mild dehydration. 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. Literature studies have frequently highlighted only infants and elderly as being most vulnerable while athletes and recreational sports enthusiasts are also at risk. Children may be more vulnerable due to lack of proper care and adaptation behavior 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. 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. However, with the increase in frequency and magnitude of temperature, extreme heat exhaustion may ultimately disrupt and affect all populations.

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, but ignoring heat exhaustion can lead to heat stroke which is a medical emergency, and its mortality can approach 10%. Hence unless the factors leading to heat exhaustion are corrected swiftly, affected patients can progress to heatstroke where risk to life is higher.

Graph 8 shows that majority of medical personnel (27%) consider hydration as best preventive measure for heat exhaustion, while 23.5% suggested wearing lose 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. The best prevention is to avoid hot environments. Use of air conditioner, air-coolers or fans increase intake of cool, nonalcoholic beverages i.e increase fluid intake, regardless of activity level.

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.

REFERENCES


