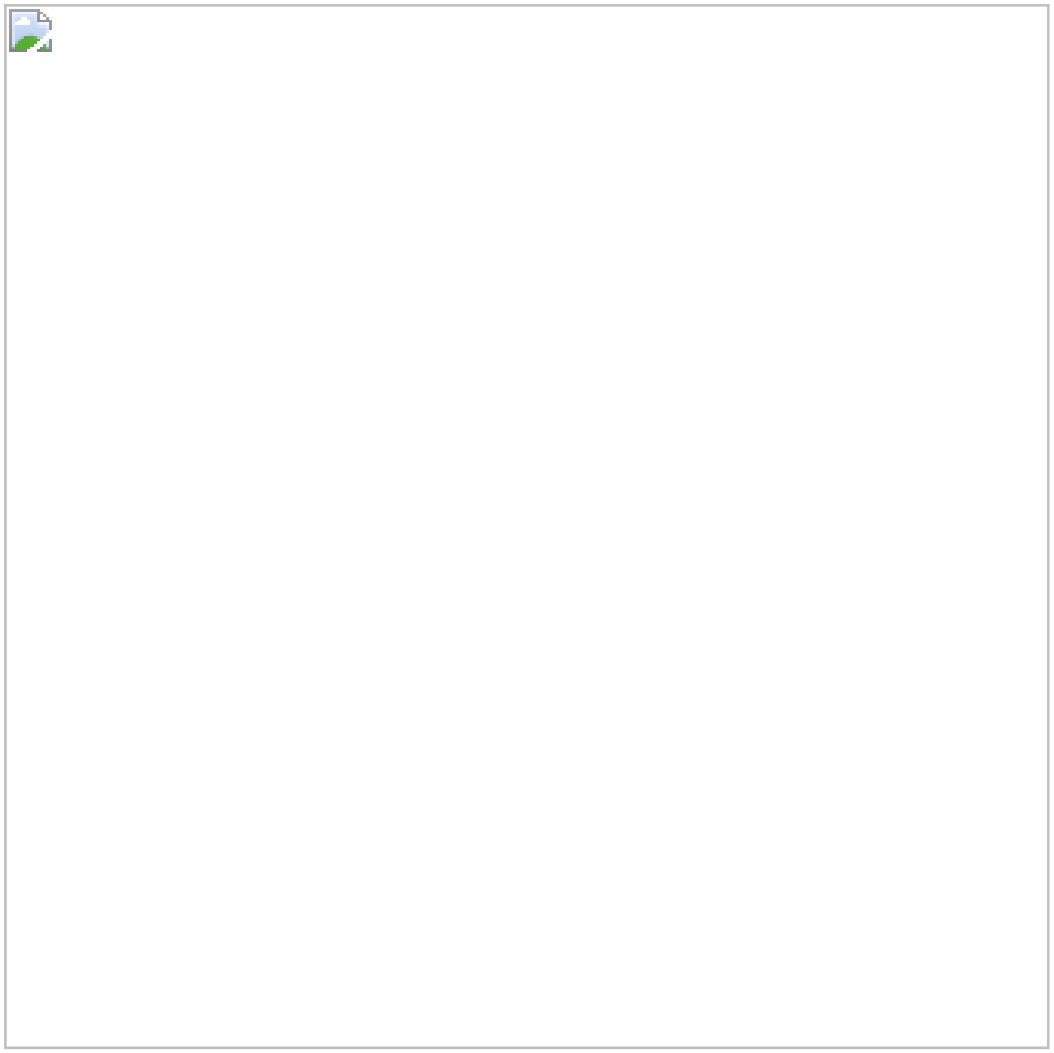

Impact of Rising Summer Temperatures on Government Sector Tertiary Care Emergency Centers: Addressing Heatstroke and Associated Death Rates in Karachi, Pakistan

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Impact of Rising Summer Temperatures on Government Sector Tertiary Care Emergency Centers: Addressing Heatstroke and Associated Death Rates in Karachi, Pakistan

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ABSTRACT: Rising summer temperatures pose significant challenges to healthcare systems, particularly in low-resource settings. This article examines the impact of heatwaves on government sector tertiary care emergency centers in Karachi, Pakistan and addresses the alarming increases in heatstroke cases and associated mortality during extreme heat events. The study signifies the urgent need for adaptive measures to enhance emergency preparedness, public awareness, and heat mitigation strategies. Addressing heat-related illnesses requires collaborative efforts from healthcare providers, policymakers, and community leaders. Effective interventions can mitigate the impact of rising temperatures on vulnerable populations and reduce heat-associated mortality.

PLAIN LANGUAGE SUMMARY: Due to increasing global temperatures, the rate of heat stroke has increased, especially in countries already lacking healthcare facilities. This has led to high death rates due to heat stroke whenever temperatures soar high in the summer. It is important to understand and highlight the problems before proposing solutions and this article aims to do so by highlighting the barriers to delivering emergency healthcare to heat stroke patients, the underlying reasons why these problems exist, and proposes solutions to the government and concerned entities to tackle these problems and make sure they are corrected to guarantee a future with fewer deaths due to heat stroke.

KEYWORDS: Environmental health, global warming, climate change, heat waves, heat stroke, tertiary care, emergency care, hyperthermia, heat stroke management, low income country

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Introduction

Pakistan is experiencing increasingly severe heatwaves and there has been a sharp increase in cases of heatstroke in Karachi during the hot summer.[1] According to The World Health Organization, heat stroke is a medical condition that is fatal and characterized by hyperthermia and dysfunction of organs.[2] This paper examines the rising temperatures and their impact on healthcare facilities, depicting the problems resulting from heatstroke and suggesting strategies to decrease mortality rates caused by it. According to the press information department, Pakistan is ranked fifth among the countries to suffer the worst consequences of climate change,[3] with only 4.5% of its land covered by forests, far below the ideal 25%,[4] making Pakistan acutely vulnerable. Mortality burden due to heat waves varies worldwide, but Asia alone accounts for 51.49% of the annual deaths,[5] with Pakistan and India alone reporting more than 3500 deaths in 2015. Moreover, these figures are an underestimation of the total burden caused on the health care system because of the lack of a proper surveillance system and data recording.[6] Karachi alone reports around 1500 cases of heat stroke and several deaths every day as a result of the sharp temperature rise, and 30 to 40 people are taken to the Karachi city mortuary daily, according to the Edhi ambulance service.[7] These extreme conditions are attributed to various factors, including climate change, urbanization, and deforestation. Despite being among the most severe natural disasters, heatwaves rarely get enough attention since the damage and death toll they cause are not usually immediately apparent.[8]

Current Management of Heat Wave at Government Sector Hospitals of Karachi

Guideline recommendations typically include electrolyte stabilization, fluid management or replenishment, and quick cooling.[9] However, significant obstacles and difficulties frequently develop, leading to the partial or total abandoning of such recommendations in the management of heat stroke cases in Karachi. Management of heatstroke in government tertiary care hospitals in foreign countries, like the United States, is achieved by critical care of the patient, starting with immersion in cold water, using evaporation cooling techniques, and administering medication to stop the patient's shivering,[10] while in Pakistan public health care centers lack basic facilities like beds, fans, and first aid medication.[11] The Pakistan Medical Association (PMA) claims that water is unavailable to half of the city. The scarcity of water may prove to be a major contributor to the adversities of extreme heat due to its importance in maintaining

body homeostasis. They also added that the water consumed by those individuals was seriously contaminated, and this may lead to further morbidity from waterborne diseases.[12] The long 12+ hour power cuts all over the city worsen the situation as studies show that power cuts make heat waves even deadlier.[11] A 2015 study mirrors many problems that government hospitals face in handling heat stroke cases and identified that people with heatstroke and dehydration had overwhelmed government-run facilities. In hospitals, a state of emergency was proclaimed, and medical personnel were fighting to treat patients. Every hospital's heatstroke ward was either overcrowded or lacked the resources necessary to care for these patients, thus doctors were forced to admit patients to regular wards without facilities specifically designed to manage heatstroke.[13]

Reasons for Ineffective Management of Heatstroke

In Pakistan's tertiary care hospitals, there are major issues regarding the prevention and treatment of heatstroke, these problems stem to a great extent from a deficit in infrastructural facilities as well as systemic deficiencies. One of the reasons for this is the limited budget allocated to the healthcare sector in Pakistan, only 2.91% of the Gross Domestic Product (GDP) compared to 16.75% in developed countries like the United States.[14] Tertiary care especially in emergencies becomes difficult because of the unavailability of physicians specializing in emergency medicine, especially in rural areas,[15] as well as due to the unavailability of essential supplies at the health facilities, including ORS, fluid, icepacks, and emergency life-saving medicine. High patient influx in hospitals makes it difficult to monitor and provide follow-up care for most patients leading to the possibility of poor recovery from heatstroke. Treatment delays also result from the majority of people's inability to identify the early signs of heat-related illnesses, the necessity of seeking medical attention, and because people in the community continue to treat patients at home in the early stages. Hospitalization is only decided upon in extreme circumstances, and most therapy is done using home remedies.[16] These factors—publicized hospital care, a shortage of trained physicians, inadequate infrastructure, and emergency care facilities all pose significant challenges to the prompt and efficient handling of heatstroke cases in Pakistan's tertiary hospitals, reinforcing the need for healthcare reform.

The Way Ahead

Early warning systems (EWS) must be implemented nationally, which may be utilized by Healthcare workers to notify for emergency readiness and that the population may be updated with weather forecasts. Information sharing between school-age children and teachers might lessen the intensity by encouraging children to adopt body cooling practices such as drinking plenty of water, and schools should have well-ventilated rooms as students are a high-risk group.[1] Public Health Awareness Campaigns help convey the dangers of heat stroke. The National Disaster Management Authority (NDMA) has conducted public health campaigns to raise awareness about heat-related illnesses and their preventive measures in the past.[17] Health sector workers should be prepared and equipped to deal with heat stroke, starting from early detection, appraisal, and management. According to healthcare workers, government hospitals should provide enough water because heat strokes frequently result in dehydration. Hospitals should be equipped with everything needed for crash carts, including IV cannulas, oxygen masks, medications, and intubation equipment for sicker patients. Air-conditioned spaces are very necessary so that patients can cool down as soon as they arrive and maintain a low body temperature. They should be given fluids at the same time to keep their electrolytes balanced. They also recommend that this be done as a collaborative multi-specialty effort rather than just the job of the emergency department. Sepsis can occur when a patient gets extremely ill, and to handle such individuals, specialists in infectious diseases should be on board.[16] The government should take immediate action for the addition of private and public sector emergency care centers,[18] assuring the provision of basic medications at the primary level, and increasing the number of beds at public health care centers to maintain supply and demand. Studies suggest drug addicts are at a higher risk for heat-related mortality,[19] therefore purpose-built rehabilitation centers may not only improve the situation of drug addicts but also lessen the number of heatstroke patients. Improvement of the overall greenery index of the city and planting of such trees that grow in a short period and are medically beneficial may prove to provide benefits in the long term.[20] Improving the surveillance system through adaptive management and making proper strategies regarding climate adversities would help in necessary anticipatory policy management to avoid future havoc.[21,22]

Conclusion

In summary, rising summer temperatures coupled with an increase in the associated illnesses and deaths are concerning for our overburdened healthcare system necessitating immediate and long-term intervention. The government's efforts till now have been insufficient to cater to the population. The number of heat-related deaths and the strain on the few operational tertiary care systems could be reduced by increasing the number of emergency rooms, hiring and training more staff, improving basic infrastructure, primary healthcare services, educating the public about preventive measures regarding what to do in the event of an emergency and enhancing the climate surveillance system for accurate and timely heat wave forecasting. Long-term measures include boosting awareness in the community, plantation investments, and establishment of a robust guideline-conforming health care system. Proactive management of heat strokes rather than as an emergency issue may reduce the burden on the tertiary healthcare system and will improve mortality rates. Immediate

action is warranted to evade the consequences of increasing burden on the healthcare system which may limit any ability to cater to heat stroke patients in emergency care centers as temperatures rise.

Author Contribution

Muddassir Syed Saleem: Drafting of the work, final approval and agreeing to the accuracy of the work, also reviewed and revised the manuscript. Syeda Zehra Fatima: Drafting of the work, final approval and agreeing to the accuracy of the work. Hamza Kamran: Bringing up the concept of the study, drafting of the work, final approval and agreeing to the accuracy of the work. Ayesha Nouman: Drafting of the work, final approval and agreeing to the accuracy of the work. Khadija Bibi: Drafting of the work, final approval and agreeing to the accuracy of the work.

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