

“Review Study On Heat Exhaustion”

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ABSTRACT

Heat exhaustion is part of a spectrum of heat-related illnesses that can affect all individuals, although children, older adults, and those with chronic disease are particularly vulnerable due to their impaired ability to dissipate heat. If left uninterrupted, there can be progression of symptoms to heatstroke, a life-threatening emergency. Signs and symptoms of heat exhaustion may develop suddenly or over time. Exposure to a hot environment for a prolonged period and performing exercise or work in the heat can overwhelm the body's ability to cool itself, causing heat exhaustion. Heat exhaustion can be worsened by dehydration due to inadequate access to water or insufficient fluid replacement. Heat exhaustion can be managed by the immediate reduction of heat gain by discontinuing exercise and reducing radiative heat source exposure. The individual should be encouraged to drink cool fluids and remove or loosen clothing to facilitate heat loss. In more extreme situations, more aggressive cooling strategies (e.g., cold shower, application of wet towels) to lower core temperature should be employed. Heat-related illnesses such as heat exhaustion can be prevented by increasing public awareness of the risks associated with exposure to high temperatures and prolonged exercise.

Keywords: *Heat Exhaustion, Cooling; Dehydration; Exercise; Heat Illness; Heat Injury; Heat Stress; Heat Wave; Hydration; Vulnerable Populations.*

INTRODUCTION-

Heat exhaustion is a condition that happens when your body overheats. Symptoms may include heavy sweating and a rapid pulse. Heat exhaustion is one of three heat-related illnesses, with heat cramps being the mildest and heatstroke being the most serious. Causes of heat illness include exposure to high temperatures, particularly when there is also high humidity, and strenuous physical activity. Without prompt treatment, heat exhaustion can lead to heatstroke, a life-threatening condition. Fortunately, heat exhaustion is preventable. Heat-related illnesses develop when the pathological effects of heat load are not prevented. Syndromes vary from less severe, such as heat syncope to severe forms as lethal heat stroke.

Symptoms

Symptoms of heat exhaustion may start suddenly or progress over time, especially with prolonged periods of exercise. Possible heat exhaustion symptoms include:

- Cool, moist skin with goose bumps when in the heat.
- Heavy sweating.
- Faintness.
- Dizziness.
- Fatigue.
- Weak, rapid pulse.

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- Low blood pressure upon standing.
- Muscle cramps.
- Nausea.
- Headache.

Activation of autonomic heat-defence effectors affects the regulation of homeostatic systems other than thermoregulation. Increased cutaneous vasodilation and decreased venous tone reduce ventricular filling, which, in an orthostatic position, may lead to low brain perfusion and heat syncope (with unconsciousness). Electrolyte imbalance can develop due to sweating, and promote the occurrence of heat cramps, i.e. short-lived, painful contractions of skeletal muscles during or after prolonged work in the heat.²

In severe hypovolemia, heat exhaustion develops with domination of water- or salt-depletion.³ The former is mainly due to insufficient fluid replacement and consists of thirst, progressive hypovolemia, hyperosmolarity and hyperthermia. Salt-depletion dominates when sweating-induced water loss is replaced, but salt is not (e.g., by soft drinks), leading to hypo osmolarity and its consequences (e.g., cell swelling).

In patients with compensated heart failure, the need for a higher cardiac output during heat exposure may manifest heart failure: high end-diastolic volume/pressure with backward (venous congestion, oedema) and forward (insufficient muscle/renal/intestinal perfusion) failure symptoms. Consequently, the patient collapses because of muscle weakness. Although consciousness is maintained, the developing heat decompensation is more severe than heat syncope. The most severe form of the heat-related illnesses is heat stroke, when body temperature usually exceeds 41°C, neurological dysfunctions, and in some cases anhidrosis are present. Classic heat stroke affects subjects with compromised warmth-defence capabilities (e.g., infants, elderly), while exertional heat stroke occurs in healthy, young adults during high-performance activities in hot environment. In heat stroke, the signs and symptoms of systemic inflammation, distributive/hypovolemic circulatory shock, multiple organ dysfunction, disseminated intravascular coagulopathy, electrolyte, pH, and osmotic imbalance are manifested simultaneously.⁴

MATERIALS AND METHODS-

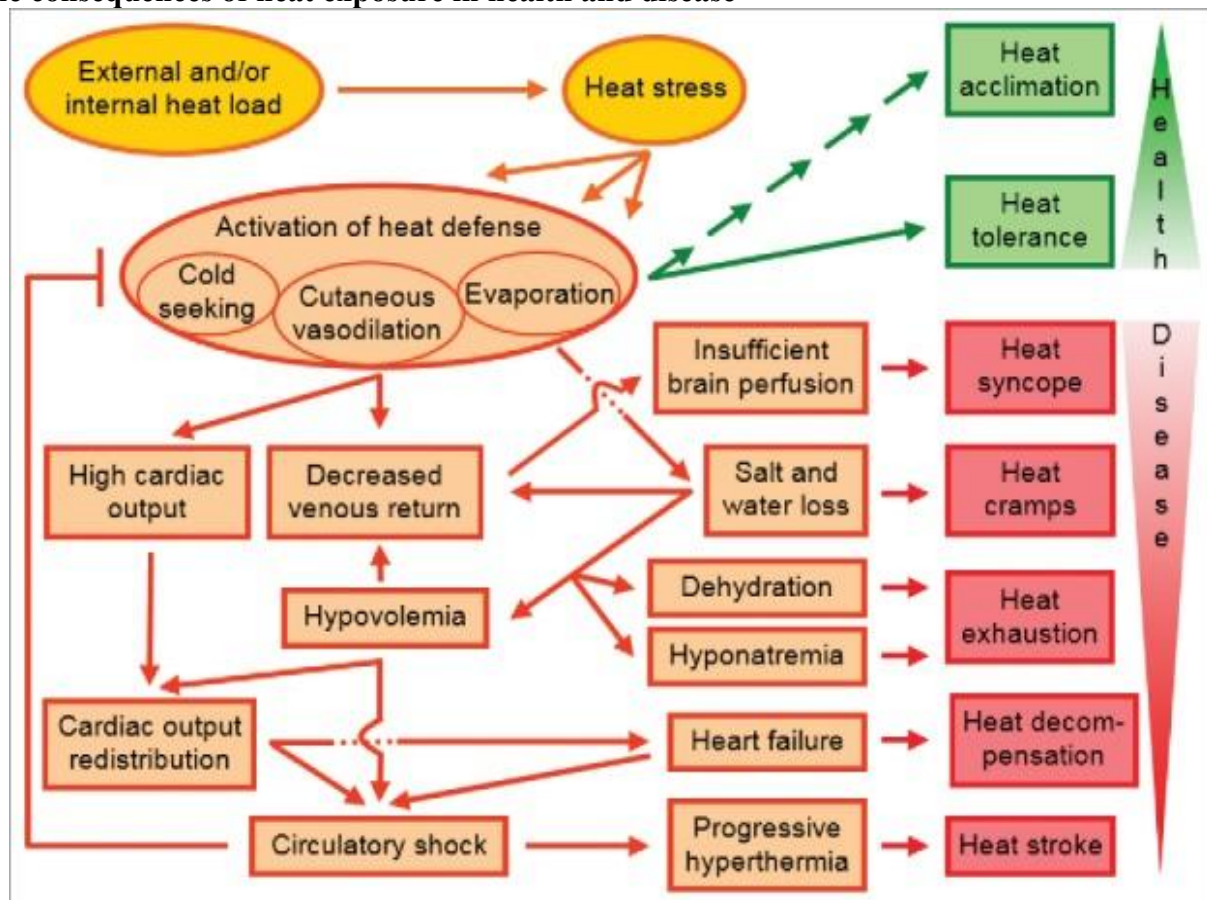
Risk factors

Anyone can get heat illness, but certain factors increase your sensitivity to heat. They include:

- **Young age or old age.** Infants and children younger than 4 and adults older than 65 are at higher risk of heat exhaustion. The body's ability to regulate its temperature isn't fully developed in children. In older adults, illness, medicines or other factors can affect the body's ability to control temperature.
- **Certain drugs.** Some medicines can affect your body's ability to stay hydrated and respond properly to heat. These include some medicines used to treat high blood pressure and heart problems (beta blockers, diuretics), reduce allergy symptoms (antihistamines), calm you (tranquilizers), or reduce psychiatric symptoms such as delusions (antipsychotics). Some illegal drugs, such as cocaine and amphetamines, can increase your core temperature.
- **Obesity.** Carrying excess weight can affect your body's ability to regulate its temperature and cause your body to keep more heat.
- **Sudden temperature changes.** If you're not used to the heat, you're more susceptible to heat-related illnesses, such as heat exhaustion. The body needs time to get used to higher temperatures. Traveling to a warm climate from a cold one or living in an area that experiences an early heat wave can put you at risk of a heat-related illness. The body hasn't had a chance to get used to the higher temperatures.
- **A high heat index.** The heat index is a single temperature value that considers how both the outdoor temperature and humidity make you feel. When the humidity is high, your sweat can't evaporate as easily, and your body has more trouble cooling itself. This makes you more prone to heat exhaustion and heatstroke. When the heat index is 91 F (33 C) or higher, you should take precautions to keep cool.

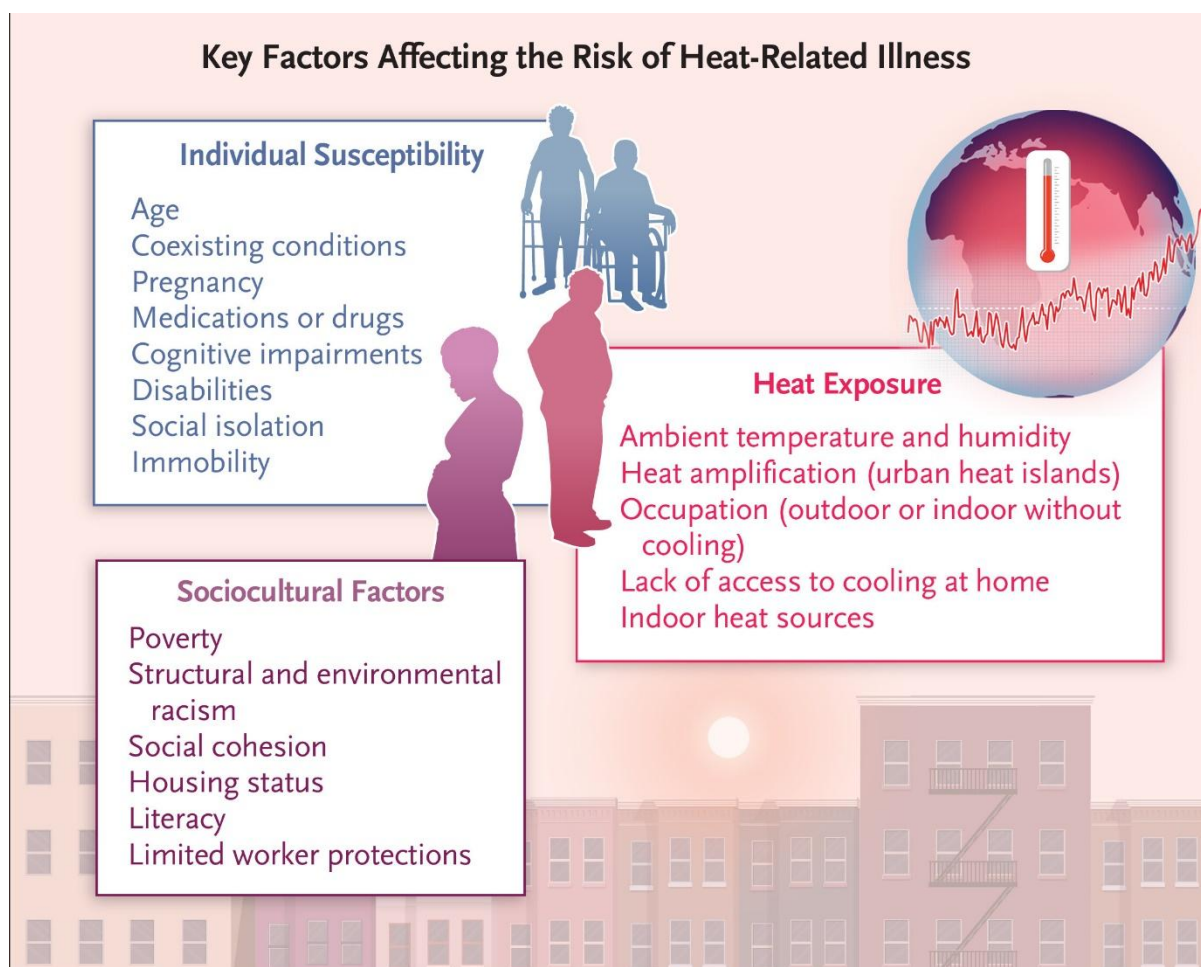
Climate change is causing a global increase in average temperatures and increasing the frequency, duration, and intensity of extreme heat events,¹ resulting in unprecedented levels of heat exposure. The past 7 years have been the hottest on record,¹ and climate change either caused or dramatically worsened² recent extreme heat events in Europe (2022), India (2022), and the Pacific Northwest of the United States (2021). In the past 20 years, there has been a 54% increase in heat-related mortality among persons older than 65 years of age, and more than one third of all global warm-season heat-related deaths are attributable to climate change. On our current global greenhouse gas emissions trajectory, with warming of 2°C over preindustrial temperatures expected by mid-century, most of the world is expected to encounter frequent extreme heat events in the coming decades; formerly once-in-10-years heat waves are projected to occur more than 5 times as frequently and once-in-50-years events almost 14 times as frequently. Elevated global temperatures and heat waves are already increasing the global health burden and causing substantial economic loss⁵.

The consequences of heat exposure in health and disease^{6,7}



TREATMENT AND PREVENTION OF HEAT-RELATED ILLNESS⁸

- Climate change is causing increasingly frequent and severe heat waves, resulting in increases in the incidence of heat-related illness and exacerbations of heat-sensitive conditions.
- The risk of heat-related illness is driven by heat exposure (ambient and internally generated heat from exertion), individual susceptibility (influenced by age, pregnancy status, and coexisting conditions), and sociocultural factors (including environmental racism, poverty, lack of social cohesion, lack of access to health care, and limited worker protections).
- Heat-related illnesses range from mild to life-threatening, and heat exposure exacerbates many common health conditions, including cardiac, respiratory, and kidney diseases.
- Without prompt recognition and treatment, heat stroke has high associated mortality. Treatment includes rapid cooling, rehydration, and management of potential end-organ damage.
- Heat-related illness is preventable. Clinicians have a role in identifying patients at risk, providing counselling regarding signs and symptoms, and recommending strategies for reducing risk.



Description ²	Treatment
Heat exhaustion	<p>Profound fatigue, weakness, nausea, headache, or dizziness (or a combination of these symptoms) resulting from a decrease in body water content or blood volume due to water or salt depletion from heat exposure; mild elevation ($<40^{\circ}\text{C}$) in body temperature may be present, but no altered mental status</p> <p>Remove patient from heat; treat with rest in supine position, evaporative cooling, and intravenous or oral rehydration; monitor mental status. Delayed response to treatment warrants further evaluation.</p>

Complications

If heat exhaustion isn't treated, it can lead to heatstroke. Heatstroke is a life-threatening condition. It happens when your core body temperature reaches 104 F (40 C) or higher. Heatstroke needs immediate medical attention to prevent permanent damage to your brain and other vital organs that can result in death.

CONCLUSION-

Risk factors include his living alone on the top floor of a building without air conditioning and his use of medications that can compromise thermoregulation. Treatment should involve rapid cooling followed by diagnostic evaluation and management of complications such as aspiration pneumonia, as well as monitoring in an intensive care unit. Subsequent preventive strategies are needed, and, if instituted earlier, might have averted the current illness. These strategies should include clinical screening before the warm season, tailored recommendations that take into

account the patient’s coexisting conditions and medications, and involvement of a multidisciplinary team to aid in improving the safety of his home environment. In addition to broad-based public health measures aimed at reducing risks, rapid action to reduce greenhouse gas emissions is needed to prevent further increases in morbidity and mortality due to heat exposure.

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