

Prevention of heat related illness health essay

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Rajvir Bhalwar Few of the world's major population centres can afford to ignore the potential dangers of sustained heat wave. Every community should assess its resources and develop a contingency plan. Although heat stroke is amenable to medical treatment, control can best be achieved by applying the principles of public health. Sentinel surveillance, public education, outreach to vulnerable persons and enlistment of the help of the entire community can save lives [1]. A structured approach towards prevention and control of heat illnesses in communities consists of : (a) Public Health measures directed towards communities and large populations groups (b) Specific preventive measures directed towards individuals/small groups identified to be at high risk of heat illnesses due to certain occupational or lifestyle characteristics (c) Early detection and first aid. Public health measures directed towards communities and large populations groups Traditionally heat illness are associated with certain high risk groups, such as military personnel, industrial workers or sports person. A large majority of the world's population lives in hot, humid tropical areas and are also at risk for classical forms of heat illnesses. In tropical countries like India, millions of people among the general population are at risk during the hot/humid months, especially when spells of heat wave strike. In such settings, heat related casualties may occur in large numbers in short duration (2 - 4) creating almost a disaster like situation and hence the need for public education, provision and quick first aid. From the public health point of view, the following aspects need to be addressed (a) Public education on various preventive measures. (b) Provision of basic preventive amenities at vantage points on a large scale basis, during high risk periods. (c) Identification of vulnerable groups in the community, enlistment of

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community support and outreach activities.(d)Issue of warnings as a part of "Heat and Health" wearing system.(e)Public Health surveillance.

(f)Contingency plan for disaster.(g)Provisions of first aid and early evacuation facilities. Public Education on Various Preventive MeasuresCreating public awareness should be high on the list for the public health administrators.

Studies have revealed that subjects who listen to maps media messages through radio or television are less prone to developing heat illness, hence full use of audio-visual and print mass media must be made during the onset of hot weather and also well before the expected heat wave. The messages should include various aspects as shown in Box 2. 5. 1:-: -Box – 1: Key Issues for Public Education

Do not venture out in the sun, especially between 10 am to 4 pm unless the same is necessary

✦ Avoid strenuous physical exertion between 10 am to 4 pm during the hot weather unless the same is necessary for reasons of occupation. ✦ Drink at least 4 to 5 liters of cool water is a day even if not feeling thirsty. If undertaking strenuous physical activities drink a

quarter to half liter of water after every half hour, as long as strenuous activity continues. ✦ Do not wait for 'thirst' to develop. Keep drinking water regularly even if not thirsty. ✦ If exposure to sun is necessary, place a wet

hand towel around your neck. ✦ Put on a wide – brimmed hat of light colour when going out. Simple caps as golf cap may not give enough

protection. ✦ Put on sunglasses when going out in the sun. ✦ Apply a sun screen ointment with a sun – protection-factor (SPF) of at least 15, which should be able protect against both UV – A and B rays , when going out in

the sun,. ✦ Avoid alcohol consumption during hot humid months. If consumption becomes necessary, keep the same within limits of less than 2 small drinks of hard liquor or one bottle of light beer. ✦ Keep children less

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than 5 years and elderly (aged 65 years and above) away from sun as far as possible. † Never leave children (or pets) in a closed, parked car. Try and park your car in cool, shaded place † Use a car - sun visor to be minimize the effect of direct radiant heat produced by the sun, to enter inside the parked car † Dress for hot, humid weather should be " breathable " i. e. Loose fitting, light weight, light colored, preferably of cotton material and in one or two layers only. † Carry a water bottle with cool drinking water whenever you go out in summer months. † If you feel exhausted, confused or running out of memory/consciousness, move to a shaded place, sit/lie down, drink cool water and seek help. Public Education should also seek to inform the community members of certain common myths and to resolve them, as shown in Box-2. 5. 2 Box - 2. 5. 2 : Public Education should also tackle certain myths; as:-Alcohol especially if chilled is good (or harmless) during hot weather. Track suits or windcheaters should be worn while doing sports or physical training. Tough people do not need to drink water. After acclimatization (getting used to) to heat, one can do well with only limited amounts of water. Drink water only when you are thirsty. Sports drinks are better than water. You can get enough cooling with a damp cloth around your neck or head. Salt tablets are good for preventing dehydration. In addition to providing the messages for simple Dos and Dont's, the general public should also be made aware of whom to contact during an emergency (telephone numbers and addresses). Provisions of Basic Preventive Amenities at Vantage Points on a Large Scale Basis, during High Risk Periods There are four basic amenities which all public health managers must strive to provide to the general public during the hot weather or else, if some high risk activity as sports events or religious/social gatherings are likely.

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They are :- †Cool drinking water at vantage points. †Covered/shaded areas for taking rest pauses at vantage points. †Facilities for first aid in a way that they are early accessible to all, particularly the high risk groups, and , †Public information system to make all aware about the facilities and the telephone numbers/addresses of persons/first and facilities who may be contacted during need. Identification of High Risk Groups and Enlistment of Community Support Studies have revealed, there are certain high risk groups like agricultural workers, manual labourers, young children, old people those who are unable to care for themselves or do not have a family to care for them, those staying on higher floors of high rise buildings, people staying in " concrete jungles, close of urban areas without much vegetation around, and those using major tranquilizers, anticholinergics, alcohol, cocaine or cannabis, and those who form part of large social or religious gatherings/ festivals, are more vulnerable to the effects of heat. And enlistment of community support as part of voluntary services with outreach efforts towards these high groups can be of much utility in minimizing the public health impact of heat. Public Health Surveillance, Early Warning Systems and Disaster Plan The need to have a good epidemiological surveillance system for heat illnesses as well as various environment conditions that determine those illnesses, need not be over emphasized. This should be established not only for specialized groups like armed forces or industries but also for the general community as well. It is only through ongoing collection of data and monitoring of trends of occurrence of illness and environmental factors, that proper policy decisions on public health aspects of heat illnesses can be taken [5, 6]. An effective heat illness surveillance system must include reporting of all heat illness cases according to diagnostic categories, both for <https://assignbuster.com/prevention-of-heat-related-illness-health-essay/>

indoor and outdoor cases separately. It should have the minimum time and place of exposure, related data as well as basic clinical data, besides including the antecedent/precipitating factors, personal risk factors and the essential meteorological data (WBT, DBT, GT) according to time and for various locations. The data should be analyzed in an ongoing manner and a "Heat and health early warning system" should be developed to issue early warnings and use of public health/preventive measures to the physician as well as to the general community. Simple warning criteria based on WBGT for outdoor exercises as running and cycling, for general public can be as follows (Table 2. 8) [5]:

Table 2. 8 : Simple warning criteria based on wbgt for outdoor exercises

WBGT Index	Action
Above 28°C	Very high risk. Cancel all outdoor exercises.
23 to 28°C	Persons at high risk of heat illness should not expose to outdoor exercise.
Below 23°C	Low risk. In the absence of WBGT values, the oxford (WD) levels can be used as an approximate.

A general guidance for outdoor exercises using WBT readings can be as follows (Table 2. 9):

Table 2. 9 : Guidance for outdoor exercises using wbt readings

WBT reading	Action
Less than 24. 5°C	Event can be held but with appropriate attention to providing drinking water and rest pauses.
24. 5 to 26. 5°C	Curtail or modify the event.
More than 26. 5°C	Cancel the event.

In case the Dry Bulb (DBT) readings and relative humidity (RH) levels are known, a rough guidance for outdoor physical exercise can be as follows (Table 2. 10) :

Table 2. 10 : Rough guidance for outdoor physical exercise

Dry bulbs temp (DBT)° C	Relative Humidity (RH) levels (%)	Moderate risk	High risk
29. 5°C	100%-32. 2°C	70-99%	35. 0°C
32. 2°C	50-70%	> 80%	37. 8°C
35. 0°C	40-50%	60-80%	40. 6°C
37. 8°C	20-40%	50-60%	43. 3°C
40. 6°C	10-30%	40-50%	46. 1°C
43. 3°C	10-20%	30-40%	48. 9°C
46. 1°C	1-10%	20-30%	

In addition, as a very simple guideline, a ready reference table of <https://assignbuster.com/prevention-of-heat-related-illness-health-essay/>

various levels of heat stress index, alongwith guidelines on its usage has been also given in chapter 2. 1 on " Epidemiology of Heat Illnesses". General Medical Practioners as well as public Health / Occupational Health specialists can effectively use the same in most of their routine settings. It is to be noted that all the above-mentioned meteorological parameters should be recorded as near the place of outdoor exercise as possible. It is also a known fact that large number of cases of heat illness occur in short period of time and in specific localities. Occurrence of a large number of cases over a short period of time can lead to disaster like situation and contingency plans to deal with such situation should be kept in readiness. Specific Preventive Measures Directed Towards Individuals and Small Groups Specific preventive measures directed to individuals or specific high risk groups as industrial workers, military personnel, sports persons etc, are directed to achieve the following objectives :-

(a)To reduce the " heat load" This is achieved by :

✦ Proper protective measures in the industries as isolation of furnaces, air of works areas, and spray of cold aerosols. ✦ Micro climate cooling for certain groups like industrial worker, soldiers firefighters who have to undertake heavy exertion in hot environment and have to put on heavy clothing. Microclimate cooling systems cool down the micro-environment immediately surrounding the person rather than cooling the " macro environment", that is, the general area of work. These systems use circulating cool air or cool liquid in tubes placed next to the skin or ice packed vests. ✦ Seeking shade and wind to the extent possible. ✦ Frequent rest pauses interspersed between phases of physical activity. ✦ Putting on proper clothing of low

insulation, low energy absorption and high permeability. †Reducing the amount of exercise in terms of duration or intensity or both. †Avoiding carrying of load or reducing the load.

(b)Improving and Maintaining the Individual Capacity to Dissipate Heat. This is achieved through , acclimatization to heat and proper hydration.

(c)Avoiding Antecedent factors which increases the risk. These include

†Avoidance of obesity. †Avoidance of alcohol and other habit forming agents as cocaine, cannabis and caffeine. †Avoidance of self medication. †Seeking medical advice if medications have been prescribed by the physician. †Avoiding physical activity and exposure to hot environment during febrile illness, until fully recovered. †Ensuring proper sleep of 7 to 8 hours in the night and cooler parts of early morning. An afternoon rest in a shaded place may be of further protective value. †Avoiding exposure to heat for extremes of age (less than 5 years or more than 65 years) and during pregnancy. †Maintenance of general hygiene and sanitation, regular bath and care of skin, proper immunization and food/water hygiene to avoid GIT infections. †Nutritious and palatable meals with plenty of drinking water. †Treatment of skin conditions as prickly heat, psoriasis, sun burns etc.

Acclimatization to heatAcclimatization to heat is a process of undertaking gradually increasing physical exercises in gradually increasing hot environment with a view to develop physiological changes, so that the individual, so acclimatized, is able to perform physical activities in the hot environment for which he/she has been acclimatized, with much less risk of suffering adverse effects of heat. Acclimatization is achieved under material <https://assignbuster.com/prevention-of-heat-related-illness-health-essay/>

conditions, a similar word "acclimation" refers to the same process when it is achieved under experimental conditions (6). The individuals to be acclimatized are subjected to a maximum of one and a half to two hours (average 100 minutes) of physical exercise in a hot environment in which they are ultimately required to work. The schedule should be in a graded manner, dealing with lesser intensity of physical exercise, for lesser duration of about an hour and in less hot environment, and gradually increasing the intensity, duration (to about 90 to 120 minutes), to the required hot environment, by the 6th or 7th day and continuing thereafter for another 7 days. It takes about 10 to 14 days for status of acclimatization to be achieved. The performance following 10 to 14 days of heat acclimatization definitely increases and such persons can conveniently undertake such exercise schedules in hot environment, which would have been quite difficult prior to acclimatization. During the process of acclimatization, individuals should be encouraged to drink plenty of water/oral fluids and additional salt may be given with meals (not as salt tablets). The dictum should be to replace water loss hour by hour and salt loss day by day. The physiological changes consequent to acclimatization, are increased amount of sweating in response to exercise, lowering the threshold for exercise induced sweating, lesser rise in heart rate and lesser use of skin and rectal temperature in response to exercise. In addition the amount of salt excreted in sweat decreases there is increased ability to sustain sweat production during prolonged exercise and redistribution of sweating from truncal region to the extremities. Since increase in sweating is one of the major pathways through which acclimatization acts, it is apparent that use of heavy or impervious clothing will negate the advantage achieved by acclimatization. Similarly, it

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is logical to ensure proper hydration to compensate for the water loss which occurs due to increased sweating in an acclimatized person. Thus, the general feeling that persons after acclimatization can do with reduced amount of water is absolutely unfounded, in fact an acclimatized person will sweat more and hence will need to drink more water thus, proper clothing and proper hydration are equally important even after an individual has been properly acclimatized. Secondly, it must be noted that acclimatized people are rendered so, only for the particular level of hot environment for which they have been acclimatized; sudden requirement to work in a harsher environment will need further acclimatization. Physical exercise programme of 2 months, undertaken in temperate environment may lead to improvement in exercise heat tolerance, but, for achieving the ideal state of exercise heat tolerance, acclimatization should ideally be undertaken in hot environment [7]. It is reported that while acclimatization in a hot and dry (desert like) environment also provides adequate protection in hot and humid (jungle like) environment the reverse may not be completely true, since acclimatization in humid heat produces physiological changes which are more specific for hot and humid condition [8, 9]. The tolerance which results from acclimatization may be reversed by use of alcohol, dehydration, sleep deprivation, infections and salt depletion [10 - 12]. Without ongoing heat exposure, nearly all the beneficial changes of acclimatization may be lost in about two-and-a-half to three weeks time, although partial losses due to non-exposure for few days, can be made up by the body on re-exposure to hot environment. Physically fit subjects are likely to retain the beneficial effects of acclimatization for a longer time [8, 9, 13, 14]. Supplemental salt for a fully acclimatized person may not be required. With acclimatization, the <https://assignbuster.com/prevention-of-heat-related-illness-health-essay/>

secretion of sodium in the sweat is greatly reduced so that healthy, acclimatized person can secrete up to 9 liters of sweat in a day and live in perfectly well salt balance, with 5 to 6 grams of dietary salt per day. However subjects who are not acclimatized or are in the process of acclimatization in unusually hot environment or else are not consuming normal diet, an additional 10 grams salt may be given in the diet (not as salt tablets) till they are fully acclimatized taking care that adequate hydration is maintained. As said, any extra salt should be given as a part of meals and not as supplemental salt tablets. Corticoids (Aldosterone, deoxycorticosterone) administered during on before the process of acclimatization do not seem to be having any role. The role of heat shock proteins (HSPs) which are released as a result of exposure to heat, in assisting during acclimatization is still under investigation [15]. Maintenance of Hydration During the process of acclimatization and also after acclimatization it is imperative that adequate hydration be maintained, otherwise the entire process of acclimatization will be negated. In certain settings particularly in military and industries, there is a general feeling that once fully acclimatized; persons can do with greatly reduced amount of water (the so called water rationing or hard-scale of water or water discipline). This feeling is scientifically unfounded and can, in fact, lead to disastrous results. There is no substitute to adequate hydration even after full acclimatization, since acclimatization itself works on the principle of increasing the sweating. One can acclimatize to physical work in heat but there is nothing like acclimatization to dehydration. Persons should be encouraged (even, at times, forced or ordered) to keep drinking water regularly while working in hot environment, even when not thirsty. It must be explained clearly that <https://assignbuster.com/prevention-of-heat-related-illness-health-essay/>

thirst is quite a poor Index of dehydration and should not be relied upon (16 - 18). Drinking only when thirsty will result into an inadequate replacement of water losses and result in to dehydration of more than 2% of body weight, which may be dangerous. The best fluid for drinking is cool, hygienic water. There is no scientific rationale for the so called " Sports Beverages" which contains large amounts of electrolytes and glucose. The only advantage of sports beverages seems to be their greater palatability, so that subjects drink more as compared to plain water [19 - 22]. Glucose and electrolytes in such drinks do not increase the intestinal absorption of water, as often claimed, compared to plain water [21]. There is no place for supplemental salt tablets as has already been emphasized earlier. There is, however, some evidence that providing carbohydrates, in the forms of oral 5% or 10% glucose or sucrose solutions or oral glucose polymer solutions" (available commercially) can improve the exercise performance and can be used in sustained sports activities (soccer, hockey and tennis) or sustained military operations [23, 24]. It is recommended to drink half a litre of water, about an hour before starting physical activities in hot weather, as a " Prehydration" method and to correct any preexisting water deficit [25]. Thereafter every person should drink 300 to 350 ml water (equal to the usual steel tumbler) every half hourly, during the exercise, without waiting for sensation of thirst. In-fact, more frequent intakes of smaller amounts (250 ml i. e, one ordinary size glass tumbler every 20 minutes) may be even better. At the same time care should be taken not to drink so much that it leads to abdominal distension [26, 27]. A safe upper limit can be 500 to 600 ml at a sitting. There is no harm in drinking cold water under the perception that it causes cramps. In-fact, cold water increases the motility of gastric smooth muscle

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leading to rapid emptying and hence faster absorption of water from proximal intestine [28].

FIRST AID

Early Detection

It is important to recognize the early warning signals so that prompt first aid can be rendered. This will assist in saving many lives and in avoiding serious morbidity. Certain warning signs are :-

- (a) Feeling of extreme weakness.
- (b) Cramps, especially in limbs and abdominal muscles.
- (c) Confusion or irrational behaviour, even of a very mild nature.

(a) The colour of urine can be taken as a rough guide to the status of hydration during the course of exertion in hot environment. If the urine is clear or at maximum, having a light lemon hue, the person is well hydrated. If the urine is of orange colour or even deeper shades, as mustard oil colour, it is an indication that the person is dehydrated and must immediately drink water, for which coercion or even force may be necessary because the person may not be feeling thirsty. If the colour of urine is of shades between light lemon and orange, it indicates borderline dehydration and such person should also be encouraged to drink fluids [29, 30]. Persons identified to be at high risk, should be allowed to participate in strenuous activities in hot environment only after they have been evaluated and cleared by specialists. Such medical conditions which indicate high risk can be of two types:-

Transient condition : Sleep deprivation, alcohol consumption, lack of acclimatization, febrile illness including effects of immunization, skin conditions as extensive prickly heat/sunburns/pyoderma .

Chronic condition :- Age more than 50 years obesity, poor physical fitness on physical efficiency test, previous history of heat illness, pregnancy, medications for chronic diseases, presence of cardiovascular or metabolic diseases. Finally, besides the above mentioned methods of early detection, another very crude but quite effective sign which can be used by all programme managers is to

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be careful of the "stragglers" during any strenuous physical event in hot weather since these stragglers are very likely to finally end up as cases of heat illness. First Aid : Efficient first aid in suspected heat illness is an extremely important step for preventing mortality and serious morbidity. All medical and paramedical persons likely to deal with heat casualties must keep themselves well familiarized with the protocol of first aid.

Administrators must provide adequate first aid facilities not only near the military, industrial or sports settings but even for general community in developing tropical countries, at primary health centers/sub centers, Dispensaries and Hospitals. A suitable protocol for first aid [31] is as follows:-

(a)In the Field :-

(i)Remove clothing of the suspected heat casualty, leaving only the undergarments(ii)Cover the subject with a sheet dipped in ordinary (tap) water (or cold water if available) and start "fanning" with electric or manual fan.(iii)Massage the skin to increase cutaneous blood flow.(iv)Shift the casualty to the heat stroke clinic on a stretcher. Keep the sheet covering the subject duly wetted while evacuating.(v)Pack ice around the groin and axilla if ice is available.

(b)On arrival in the Clinic :-

(i)Pack ice around the groin and axillae.(ii)Place the stretcher on top of an iced bath tub, above the level of iced water, with the carrying handles sticking out at both ends(iii)Measure rectal temperature, assess mental status and vital signs.(iv)Establish IV line. Draw blood for laboratory investigations.(v)Administer one litre of normal saline as a " Bolus".

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(vi) Maintain/secure airway. Administer Oxygen. (vii) If conscious, administer IV Diazepam. (viii) Dip sheets in the icy water of bath tub and cover (rather, drench) the patient. Add ice to the top of the sheet to cool still further. (ix) Direct a fan towards the patient. (x) Concurrently, irrigate the head with icy water. (xi) Keep massaging the skin. (xii) If rectal temperature is not lowered sufficiently with above measures, immerse the patient directly into the bath tub containing icy water. With this procedure, the rectal temperature usually falls to 39.5°C in 15 to 20 minutes. Remove the patient from the ice bath and proceed with the definitive treatment. The quick rate of cooling is very important since death/ complications are directly related to the duration of raised core temperature. Iced water either by wetting the sheets or direct immersion, as described above provides the best method of rapid cooling. However, the use of cold water (instead of iced water) for cooling appears to be equally efficient and is not as uncomfortable to the patient as immersion in iced water [32 - 34]. The apprehension, that vasoconstrictions, with paradoxical rise of body temperature, or else induction of severe shivering, may occur after ice bath immersion, has not been substantiated in scientific studies. If problematic shivering occurs (though rare), it can be managed with IV Chlorpromazine [34 - 36].

Clothing for Prevention of Heat Stress. Clothing has an important role in prevention of heat illnesses. There are three major reasons as to why human beings put on clothes. Firstly, it is a social requirement to cover oneself, with the extent of coverage of the body depending on the societal norms and customs. Secondly, to look decent and presentable or even attractive. Thirdly, to insulate our body from the external environment. It is the third reason which is physiologically important for prevention of adverse effects of

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environmental temperatures. In hot environment, we need to insulate as less as possible while the reverse holds true for cold environment. From technical point of view, the "insulatory power" of clothing is measured in terms of "Clo". One Clo is equal to 5.55 kilocalories / square meter /hour of heat exchange by radiation and convection for each degree Celsius difference in temperature between the skin and the adjusted dry bulb temperature.. The Clo values for ordinary summer light weight clothing is around 0.6; for cotton coveralls it is 1.0, while for winter working clothing it is 1.4 [37]. In general, the clothing for hot environment should be light weight, light coloured, loose and "breathable" (i. e., provides adequate scope for movement of air through the pores for evaporation of sweat on skin surface. Ideal is light cotton material, used in just one or two layers (as a light porous vest and a cotton shirt or T-shirt. If physical activity is to be undertaken, the clothing should cover as minimum area of the body as possible, e. g., half pants and a light vest / T-shirt of a light-coloured material. One must avoid multiple layers of clothing, "non-breathable" material as polyesters or nylon, and track suits. Another aspect of clothing which is increasingly being realized as quite important is the work-place clothing as used in various industries and by various military and police persons. Such protective clothing, which is often used for reasons of providing a "protection" from various other environmental hazards, tends to increase the Clo value and may be a contributory factor in precipitating heat stress among such persons (38). It is therefore important that administrators in these industries should be careful and strike a balance between the protection required in such industries and the risk of heat stress.