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Research Article

Self Reported Symptoms Due To Heat Stress Among Housekeeping Workers Of A Residential Complex Maintenance Sector

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Abstract: Linkages between thermal loads and its physiological consequences have been studied in organized sector settings of developed countries. Outdoor workplace settings in developing countries are largely influenced by radiation from direct sunlight that may contribute to greater than recommended levels of heat exposure. Consequently a wide range of health implications can cause unsafe conditions and thermal discomfort leading to reduced performance in hot working temperatures. This study is aimed to evaluate the perception of housekeeping workers regarding heat stress and also assess the self reported symptoms due to heat stress. The objective of present study is to assess self –reported health symptoms and perceptions of housekeeping workers of a residential complex maintenance sector in relation to occupational heat stress. Heat stress was assessed through Environmental measurements (WBGT). A standardized questionnaire was administered to 40 workers to assess a range of symptoms due to exposure to heat stress. The questionnaire also recorded productivity loss in terms of missed work hours/days or sickness/absenteeism. WBGT levels in the residential sector ranged from 27.6 to 32.4 ^{o}C. Nearly 80% of the workers reported excessive sweating suggestive of exhaustion and fatigue. 20% reported symptoms of severe exhaustion, while 33% reported skin rashes. Amongst women workers 20% reported urinary tract infections and/or burning sensations. 15% of workers also reported loss of productivity (in terms of not being able to finish assigned work in the given time) that they perceived to be due to heat exposures. The worker perceptions have indicated that occupational heat stress exposure resulting from outdoor work is likely to have implications for health and productivity. Further assessments to refine this relationship warrant quantitative assessments of physiological responses. These studies will help in implementing effective interventions and protective policies.
Keywords: thermal loads, Heat stress, physiological responses, health implications.

INTRODUCTION

The human beings on the earth are facing many challenges due to climate change and globalization which causes increase in global temperature day by day [1]. India being a tropical country by its geographical location and nature of industrial process, the exposure to heat is very common among workers [2]. Increase in temperature due to climate change and exposure to heat at workplaces has adverse effects in human health. The health impacts include heat exhaustion, heat rash, and heat stroke. Linkages between thermal loads and its physiological consequences have been widely studied in organized sector settings of developed countries [3, 4] Outdoor workplace settings in developing countries are largely influenced by radiation from direct sunlight that may contribute to greater than recommended levels of heat exposure. Consequently a wide range of health implications can cause unsafe conditions and thermal discomfort leading to reduced performance in hot working temperatures. In a study, it reported that death due to exposure to excessive heat leading heat stroke occurred at 27 ^{o}C [5] .The outdoor workers are exposed to direct heat radiation from sunlight. Also it is stated that death might occur due to heat stroke when dry bulb temperature is more than 35 ^{o}C with relative humidity less than 40% [6]. Chennai region, coastal city experiences increased ambient temperature and humidity during the summer months resulting in reduced efficiency of evaporative heat loss. Thermal stress may actually be higher in the mornings and late afternoons due to the high relative humidity, often exceeding 80% and the lack of air movement. Workers in severe thermal environments are at risk of a range of heat-related illnesses. In Europe, 70,000 deaths were reported in 2003 due to heat wave [7]. The adjusted odds ratio was estimated to be between 1.5 and 4.8 for emotional problems, between 1.31 and 2.91 for lower energy levels and between 1.10 and 2.49 for reduced life satisfaction associated with increasing frequency of

heat stress in Thailand [8]. The diversity in Indian climate systems necessitates more research [9]. This will help to improve the ability and health condition of the worker. Many people keep working beyond the safe limit for heat exposure in order to complete work tasks in a stipulated period to get paid. This will cause adverse health impacts in workers leading to increase in morbidity and mortality and decreased in productivity [10]. The health impacts reported by the workers include increased sweat, tiredness, fatigue, heat rash, heat syncope etc. There are very few studies in India documenting the perceptions of workers regarding the health impacts of heat stress especially in sectors like the residential complex maintenance sector. This study is aimed to document the perceptions of workers and the health symptoms due to heat stress reported by maintenance workers working in a residential complex of Chennai.

MATERIALS AND METHODS

This study was approved by Institutional ethics committee of Sri Ramachandra University. In this cross sectional study 40 housekeeping workers (age group 20-50 yrs) from residential complex were recruited during the month of May 2013. In this questionnaire based study all workers were included in the study to eliminate the selection bias. Informed consent was obtained from the study participants. This study was conducted using HOTHAPS (High occupational Temperature Health And Productivity Suppression) questionnaire to obtain information about personal history, past history, and occupational heat exposure and also to record the range of symptoms indicative of fatigue and heat exhaustion [11]. The questionnaire also recorded productivity loss in terms of missed work hours/days or sickness/absenteeism. A single trained field investigator administered the questionnaire to study participants in both English and local language which eliminated the interviewer bias. Area heat stress measurements were measured using Quest Temp WBGT monitor [12] (Figure 1). Statistical analysis was done using SPSS software version 11.6.

RESULTS

Area heat stress measurements ranged from 27.6 to 32.4 ^{o}C during the period of May 2013. Nearly 80% of the workers reported excessive sweating. 20% reported symptoms of severe exhaustion, while 33% reported skin rashes. Amongst women workers 20% reported urinary tract infections and/or burning sensations. Some of the workers also gave history of heat cramps and tiredness due to increase heat exposure. 15% of workers also reported loss of productivity (in terms of not being able to finish assigned work in the given time) that they perceived to be due to heat exposures. Because of this health issues the workers also faced many social impacts (Table 1). Among 40 workers, 19 (48%) workers were working in high WBGT area as per ACGIH classification while 10 workers in moderate and 11 workers work in low WBGT. Among 19 workers working in high WBGT, 100 % of the workers working in high ambient temperature reported excessive sweating. 68% reported symptoms of severe exhaustion, while 35% reported skin rashes. Some of the workers also gave history of heat cramps and tiredness due to increase heat exposure. 42% of workers also reported productivity losses (in terms of not being able to finish assigned work in the given time) that they perceived to be due to heat exposures. 42 % of workers gave history of interpersonal issues.47% of workers take more time to complete the task Because of this health issues 58 % the workers also faced many social impacts (Table 2 & figure 1) . The subjective perceptions were less in workers working in mild & moderate WBGT areas.

Table-1: Self reported health symptoms reported by the residential complex maintenance workers

Perceptions reported by the workers	Percentage (%)
Excessive sweating	80
Heat Exhaustion	20
Skin rashes	33
Urinary tract infections	20
Productivity loss	15

Table -2: Perceptions reported by the workers based on heat stress parameter (WBGT)

	Low WBGT (n=11) %	Moderate WBGT (n=10)%	High WBGT (n=19) %
Excessive Sweating	85	90	100
Severe Exhaustion	22	35	68
Skin rashes	4	10	35
Productivity loss	11	26	42
Interpersonal issues	4	16	42
Social impacts	7	29	58

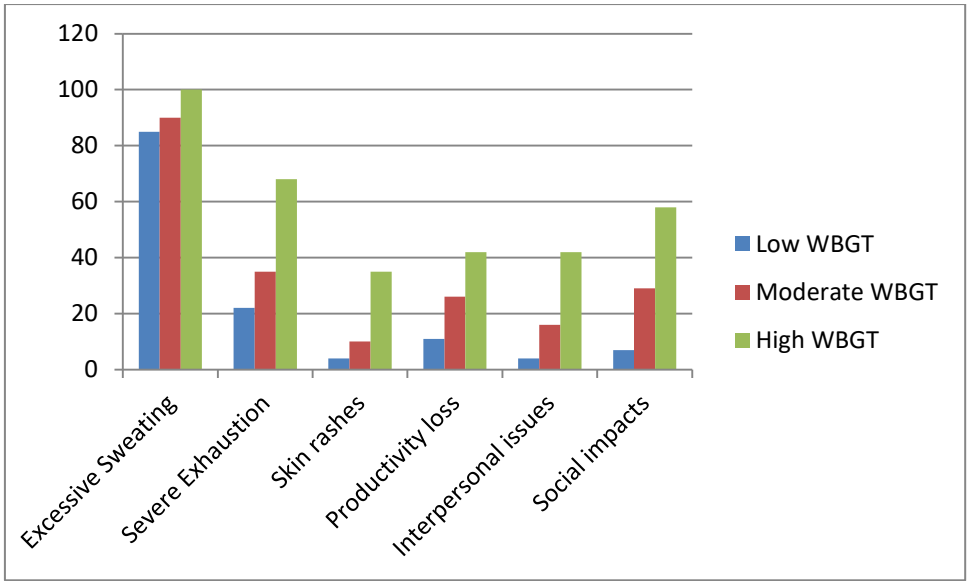

Fig-1: Perceptions reported by the workers based on heat stress parameter (WBGT)

Legend 1: shows the workers health perceptions on exposure to excessive ambient temperature at work place based on WBGT

DISCUSSION

The pilot assessment of worker perceptions has highlighted health impacts due to excessive heat exposure. This study has also indicated that occupational heat stress exposure resulting from outdoor work is likely to have implications for health and productivity. Further assessments are needed to refine this relationship between quantitative assessments of exposure and physiological responses. Impacts of occupational heat stress related to ambient temperatures require urgent studies for implementing effective interventions and protective policies to improve the quality of workers health and life. The health impacts reported by the workers necessitate more studies to be done in workers to improve the health standard. The results of this pilot study to understand the health impacts associated with heat stress and to frame further quantitative and interventional studies in future.

CONCLUSION

The worker perceptions have indicated that occupational heat stress exposure resulting from outdoor work is likely to have implications for health and productivity. Every human being faces own challenge to successfully interact with human environmental variables. Apart from the exposure to environmental temperature which is rising globally, the workers are exposed to excessive heat at their work places. This may lead to several health impacts to workers. There exists a thermal balance between heat gain and heat loss from the body to maintain the normal core body temperature around 37 ^{o}C. If there is any alteration in this thermal balance it leads to adverse health impacts like heat stroke which is very fatal [13]. Occupational heat stress is a major health issue in the current scenario [14]. If these changes allowed continuing it may lead to some health complication like hypertension, heart failure, etc [15]. Occupational heat stress is a major health issue with several potential negative health and well-being outcomes [16]. Impacts on workers health due to heat exposure will decrease their productivity and the economy indirectly. Proper steps have to be taken to reduce the health impacts of the workers due to heat stress such as providing drinking water, following work rest cycle properly etc.

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