ABSTRACT

Background: Global climatic change is expected to make hot regions further hotter as per predictions. The negative impacts of increased temperature may progressively increase in developing countries especially in tropical countries like India. Failure of the temperature regulating mechanisms can alter the thermal balance which may lead to heat disorders like heat rash, heat exhaustion, heat stroke etc. Workers who are working in various industries where heat production is more are at increased risk of heat related illnesses. They experience an additional heat load on the body from their work environment apart from the external environmental temperature. Significant sources of heat can be found in workplaces such as foundries, smelters chemical plants, bakeries and commercial kitchens. There is a dearth of studies on occupational heat stress and its health impacts in India especially in southern India. Hence the present study focuses on examining the health impacts of occupational heat stress of selected occupational groups in Tamil Nadu, South India.

OBJECTIVES: To profile the heat stress using environmental heat stress measurements in various occupational sectors; To assess the perceptions about heat stress among workers in various occupational sector; To assess the impacts of heat stress on health of the workers using select physiological variables.

Materials and Methods: This study was conducted in six occupational sectors from Tamil Nadu which included 3 formal and 3 informal sectors. 750 workers were recruited from the six occupational sectors during summer and winter. Initially after taking the required
permissions, a walk through survey was conducted in all the industries to identify the potential high heat exposure areas. This study included environmental heat assessment with the help of WBGT monitor, questionnaire administration for assessment of perception of workers regarding the occupational heat stress and health assessment which included core body temperature, heart rate, perfusion index, sweat rate and urine specific gravity. Comparison test of significance used was Paired t test, independent t test and Chi square test. Association between the study variables was found out using odds ratio.

**Results:** Around 70% of the work locations had WBGT values more than the prescribed limits. The measured WBGT ranged between 26.9°C to 41.7°C with an average of 31.5°C during summer. In winter WBGT ranged between 22.9 °C to 40 °C with an average of 26.9°C. This study has demonstrated statistically significant increase in core body temperature, heart rate, sweat rate, perfusion index and urinary specific gravity after work in excessive heat stress conditions during summer and winter. The odds of developing health impacts (heat strain) among workers working in locations with WBGT values more than 29 °C is 1.5 (OR 1.5; 95% CI 1.4-2.9) times higher when compared to workers working in locations having WBGT values less than 29°C. The odds of developing health impacts (heat strain) among workers with heavy work load category is 1.2 (OR 1.2; 95% CI 1.1-2.5) times higher when compared to workers with light work load. The odds of developing health impacts (heat strain) among workers during summer is 1.3(OR 1.3; 95% CI 1.2-3.7) times higher when compared to winter.
Conclusion: Exposure to occupational heat stress is a major environmental concern with several potential negative health outcomes necessitating early implementation of interventions. The health impacts were more in summer than winter and more in workers working near high heat exposure areas. This study from south India has highlighted the physiological responses to occupational heat stress in several occupational sectors and has provided recommendations to reduce heat stress which can aid in reduction of health impacts and improve productivity.