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# Heat Stress Among Large Kitchen Workers in Hostel

**S. Logeswari* and A. Mrunalini**

Ph.D. scholar, Department of Resource Management and Consumer Sciences,
Professor Jayashankar Telangana State Agricultural University, Telangana, India
Professor and University Head, Department of Resource Management and Consumer Sciences, Professor Jayashankar Telangana State Agricultural University, Telangana, India
*Corresponding Author E-mail: mydadmyfav@gmail.com

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**ABSTRACT**

*Heat-related illness is a problem for many types of workers: metal smelters, outdoor construction and law enforcement workers, plastics manufacturing workers, landscaping and recreation maintenance personnel, staff in warehouses without air conditioning, cooks and kitchen workers, and athletes. There are various problems that are being faced by the chefs while working in the large kitchen. This study explains the heat stress in large kitchens. The present study was carried out among eight mess workers in two hostels of Professor Jayashankar Telangana State Agricultural University, Hyderabad. The area heat stress monitor and personal heat stress monitor were used to record the environmental heat and human core body temperature of the kitchen workers. The results revealed that the WBGT was slightly higher that the permissible limits given by ACGIH in the cooking areas where stove is placed. The body temperature of the workers was more than 39°C.This unorganized sector of people, face more heat related issues. The workers were suggested to drink more water, take breaks in between work and to adopt shift system of work with their co-workers while feeling exhausted by heat.*

***Key words:*** *Kitchen, Heat, Worker, Fatigue, Environment.*

## INTRODUCTION

Heat stress is an important aspect in the lives of people working under exposed conditions for long hours. In the last decade, heat waves have been more prevalent in states like Orissa and Andhra Pradesh on the east coast[2]. The kitchen is primarily a workplace; it is a room in which the cooking chef spends long periods. The cooking area in the mess kitchen were large quantity of food will be cooked emits more heat on the surface and surroundings around the room. The workers involved in cooking process will be directly affected through the heat that is released for the stove. A working person creates heat internally in the body, particularly through muscular work, which adds to the heat stress in hot environments[1]. Human body is always generating heat and passing it into the environment. The harder body works, the more heat it has to lose. When the environment is hot and/or humid or has a source of radiant heat (such as a furnace or the sun), your body must work harder to get rid of heat.

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This condition will lead to heat stress in the human body leading to heat related health problems. This study is an attempt to evident the heat stress experienced in the kitchens of hostels.

**Literature Review**

The National Institute for Occupational Safety and Health[4] has defined that the potential danger from working in hot environments as "The frequency of accidents, in general, appears to be higher in hot environments than in more moderate environmental conditions. One reason is that working in a hot environment lowers the mental alertness and physical performance of an individual. Increased body temperature and physical discomfort promote irritability, anger and other emotional states which sometimes cause workers to overlook safety procedures or to divert attention from hazardous tasks."

Heat gain is a combination of external heat from the environment and internal body heat generated from metabolic processes. There are two types of external heat exposure sources in workplace: weather-related and manmade heat exposure. With predicted increasing frequency and intensity of heat waves, weather-related heat exposure is presently a growing challenge to occupational health and safety[8].

Simmone *et al*[6]., investigated more than 100 commercial kitchens in the United States in both summer and winter. The physical measurements revealed that there is a large range of kitchens environments and confirmed that employees are exposed to a warm-to-hot environment. The measured ranges of activities and temperatures were outside the range recommended by ASHRAE 55 and ISO EN 7730.

Haruyama *et al*[3]., has studied the thermal strain in different types of kitchens. WBGT was assessed in ten kitchens of electric stove type and gas stove kitchens. The mean WBGT in gas kitchens was 29.6 C and the electric kitchens were 25.7 C. Compared with the electric kitchens, the proportion of workers who perceived the room temperature as hot to very hot was significantly higher in gas kitchens. The WBGT were significantly higher in the gas kitchens.

According to The American Conference of Governmental Industrial Hygienists states that workers should not be permitted to work when their core temperature exceeds 39.5 C. The WBGT of the work environment should be not exceeding 29 C for moderate work. Excessive sweating while at work indicates that there is stress on thermoregulatory system of body leading to heat related health issues to the workers[5].

## MATERIEL AND METHODS

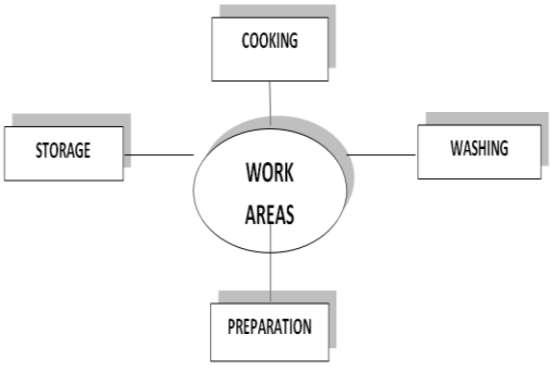
The present study was carried out among kitchen workers in the hostel mess of Professor Jayashankar Telangana State Agricultural University. This study was conducted during February month, 2016.Extent of Heat stress experienced by the mess workers while cooking was calculated by using Area heat stress monitor (QT-34) in two hostel kitchens. The kitchens were divided into cooking area and preparatory area respectively. The environmental heat at the work places was recorded for duration of one hour in each working area. The Personal heat stress monitor (QT-II) was used to observe the core body temperature of the workers while performing work activities in kitchen. All the eight workers employed in the hostel kitchen were selected for the study. The oral temperature of the workers was initially recorded before work using a thermometer. The core body temperature was then recorded for one hour for each worker in the kitchens.

## RESULT AND DISCUSSION

### *1. General profile of the kitchen workers*

The age of the workers was in range from 27 years to 49 years with a mean age of 38 years. Majority of the workers in the mess were female (75%) and male (25%).Ninety percent of the workers were married.

Kitchen work areas:




### *2. Environmental temperature while at work*

The kitchen environment which was taken for the study had two cooking areas and one preparatory area. The area heat stress monitor was placed at the work area of the cooking process and at the preparatory areas. Thus, the WBGT was recorded for one hour in all different areas in the kitchen as tabulated below.

**Table 1: Environmental heat stress in kitchen**

| S. No | Kitchen | Kitchen work area | WBGT in °F |
|---|---|---|---|
| 1. | Mess 1 | Cooking area-1 | 82.976 |
| | | Cooking area -2 | 83.93 |
| | | Preparatory area | 81.5 |
| 2. | Mess 2 | Cooking area-1 | 84.272 |
| | | Cooking area -2 | 80.258 |
| | | Preparatory area | 79.718 |

Table 1 represents the actual temperature in the different work areas where the workers may be exposed to heat in kitchen. The permissible limit of WBGT in according to ACGIH and OSHA is considered to be 80°F for moderate work. This when analyzed with the cooking areas of the kitchen. There is a slight increase in the cooking areas in both the mess. This proved that the workers involved in cooking at the hostel kitchens are affected by heat stress due to environmental heat at their work.

### *3. Worker's body temperature while working in kitchens*

**Table 2: Body temperature of the kitchen workers**

| Respondent | Age | (Before work) Oral temperature °C | Ear temperature°C | | | Mold temperature °C | | |
|---|---|---|---|---|---|---|---|---|
| | | | Average | Max | Min | Average | Max | Min |
| 1 | 49 | 37 | 40.53514 | 41 | 36.1 | 32.15543 | 33.5 | 27.7 |
| 2 | 37 | 36.5 | 39.44582 | 40.7 | 35.9 | 32.76364 | 34.5 | 30.7 |
| 3 | 45 | 37.4 | 39.49972 | 41.6 | 35.3 | 33.80997 | 38.4 | 30.7 |
| 4 | 30 | 37 | 37.61783 | 38.1 | 36.8 | 36.80913 | 39.2 | 34.9 |
| 5 | 37 | 38.2 | 40.05185 | 40.9 | 36.9 | 33.18519 | 35 | 31.2 |
| 6 | 42 | 37.5 | 40.29768 | 42 | 35.9 | 32.09794 | 33.5 | 27.7 |
| 7 | 27 | 38.6 | 39.54563 | 42 | 36.1 | 33.80345 | 38.3 | 30.9 |
| 8 | 33 | 37.2 | 40.29784 | 41.8 | 36.9 | 37.74563 | 38.7 | 30.4 |
| Average | 38 | 37.425 | 39.91143875 | 41.3875 | 36.2375 | 34.0462975 | 36.3875 | 30.525 |

The core body temperature of the workers was analyzed using the personal heat stress monitor. The oral temperature of the workers was recorded initially using thermometer. The mean oral temperature of the workers in the kitchen was 37.42 °C. The ear temperature recorded for one hour using personal heat stress monitor. The mean ear temperature was 39.9 °C, which is slightly higher that the permissible limit (39°C) given by WHO[7]. The mold temperature that was inserted in the ears of the workers was lower than the actual body temperature of the workers. This might be due to the sweating of skin while doing work. Thus, the kitchen workers are experiencing heat stress while cooking and preparing food at the mess of the hostels.

### *4. Suggestive interventions for kitchen workers at hot environment*

- Train the workers to recognize heat stress.
- Wherever possible providing an exhaust at the source of heat and or humidity may dissipate heat.
- Light clothing will help prevent heat stress compared to working barely covered wearing light coloured, loose fitting clothing would be appropriate, when working at the open kilns.

- Encourage workers to drink adequate replacement fluids. A person should drink 5 litres of water per day.
- Take breaks in between works.
- Someone who develops symptoms of heat exhaustion or heat stroke should be removed to a cool area, provided fluids and be medically evaluated.
- Get help from co –workers while feeling hot and tired at work.

## CONCLUSION

The kitchen workers are the large quantified people in every area. There are numerous numbers of these unorganized sector workers who cook food in hostels of schools, colleges, government and private hostel, function halls etc. The chefs in the large kitchen cooking works had been facing more heat related problems which have not been recognized by the society. This study elicits that the environmental heat and the heat emitted through work have effect on the working population. The area heat and the body temperature were above the actual permissible limits that were suggested by ACGIH and WHO[7]. Thus, there is need to reduce the heat problem in the large kitchen setup at various places.

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