Abstract

Ergonomics is the science of fitting workplace conditions and job demands to the capabilities of the working population. Effective and successful "fits" assure high productivity, avoidance of illness and injury risks, and increased satisfaction among the workforce. Although the scope of ergonomics is much broader, the term here refers to assessing those work-related factors that may pose a risk of musculoskeletal disorders and recommendations to alleviate them. Common examples of ergonomic risk factors are found in jobs requiring repetitive, forceful, or prolonged exertions of the hands; frequent or heavy lifting, pushing, pulling, or carrying of heavy objects; and prolonged awkward postures. Vibration and cold may add risk to these work conditions. Jobs or working conditions presenting multiple risk factors will have a higher probability of causing a musculoskeletal problem. The level of risk depends on the intensity, frequency, and duration of the exposure to these conditions and the individuals' capacity to meet the force of other job demands that might be involved.

Food unit is one of the labor intensive units in India. In India, food unit works are running parallel rural and traditional in unorganized sectors than in organized sector. Most of the equipment are handled manually by the food unit laborers working in unorganized sectors. Hence most of the food unit tasks performed in unorganized sectors by the laborers is ergonomically hazardous. In unorganized sectors, the labor contractors recruit the laborers as casual or on temporary basis. The workers do not get any training before recruitment and they do not have any awareness about ergonomic risks related to present work which they are engaged. The labor contractors do not maintain any data about their health hazards and do not pay any compensation for health problems. In India, the cost of manpower is low and therefore manual material handling (MMH) is the cheapest and easiest solution. The manual handling tasks have been studied extensively in developed countries. In India, huge numbers of food unit workers are working in unorganized sectors but very few ergonomic studies have been made on these work force. These workers are mainly coming from poor economic background. There are always high job demands on these work forces even if the workers for in 10 hours of activities on an average working day. In unorganized sectors, the food unit workers have to manually handle a variety of materials and hence it is one of the most physically demanding jobs. These manual material handling tasks require lifting, loading, caring, pushing, and pulling unloading and delivering activities. Most of the time the manual material handling and different equipment handling jobs performed by the workers requires
bending, twisting and other stressful. Postural activities. The awkward working postures for prolonged period of time can cause musculoskeletal disorders. The ergonomic risk factors in this job are directly proportional with the performance of heavy, repetitive, postural stressful works without getting adequate rest break opportunities. Therefore the food unit workers have to face various ergonomic health problems and injuries. The ergonomic health problems include feeling of pain and strain in different body parts which might be a sign of work related musculoskeletal disordered in low back, neck, arms elbows, wrist, legs, and knees. WMSD is one of the most significant work related health problems and most important factor leading to decreased work capacity among food unit workers. The study aims to assess ergonomically the selected activities carried out in food units and suggest ways to improve health and safety. **Specific Objectives:** To study the different activities carried out by workers in selected food units. 1) To assess the work environment of the workers. 2) To study the postures adopted by the workers in selected food units. 3) To assess the feelings of fatigue (using Borg scale) experienced by the workers in selected activities. 4) To study the effect of age, height, weight and work experience of the workers and the feeling of fatigue in performing selected activities. 5) To suggest remedies to increase safety at work place. In order to achieve the objectives of the study both the descriptive and experimental design was planned to find out the nature of work carried out by the unorganised food unit workers. The experimental study was designed to analyse the posture adopted by the workers while carrying out the work through ergo master software. **Development of the tool: Observation sheet for preliminary information**- Observation technique was used to collect the information of the subjects regarding working pattern, postures adopted and work environment. **Interview schedule for general survey**- The close end questionnaire was formulated. It was divided into different parts: **Part-A - Personal Detail:** Name, age, gender, education, height, weight, working hours etc. **Part-B - General Health** - this part included information regarding the status of health of respondents. It covered the details about the habits, feeling of fatigue through body map and universal pain assessment tool. Low back pain, neck and/ or shoulder pain. **Part-C- Work Environment Assessment**- it includes ambient temperature, noise level, illumination level, types of safety apparel worn, housekeeping of food unit etc. **Signs and symptoms interview schedule for experimental study**- **Section -A-Personal Detail:** Age, gender, height, weight, working hours etc. **Section -B - General Health** - It covered the feeling of fatigue, severity of pain, area of pain through body map and universal pain assessment tool **Section-C- Work Environment Assessment**- it included ambient temperature, noise level, illumination level, types of safety apparel worn,
Videography for experimental study- Videography was used for collecting technical data and collecting data pertaining to the posture adopted by the workers while working. The sample selected that is the unorganized food units workers were of Anand, Nadiad, Dakor and Vanakbori. Snowball sampling method was used for the present study. The unorganised food units producing farsan (sev, chavanu, tam tam, fafda, gathia,samosa, batatavada, papdi etc), Bakery(cakes, khari, pastry, buns, sweet khari, puff, pizza rotla) and sweets (jalebi, kajukatri, lado, peda, halwasan etc.) In unorganized food units numbers of activities were carried out. The preparation of various types of snacks, sweets, bakery items and relevant food items carried out in food units were selected for the study. All the workers those who were working in selected food units were included as sample for general survey (n = 240 workers) from farsan units -120 workers, bakery units-60 workers and sweets units -60 workers and for experimental work 90 workers were selected from Farsan units - 30, Bakery units -30 and sweets units -30 each. The data was coded according to code numbers assigned. It was further analysed employing descriptive as well as relational statistics. frequency, percentage, mean, standard deviations, coefficient of correlation, one way ANOVA test was used for analysis of data and testing of hypothesis. The results and discussions is the heart of the technical report. The purpose of this section is to present well organized, objective oriented results so that the interpretation is useful and result findings are utility oriented. Research can better be appreciated only through interpretations. It could be concluded that different types of activities were carried out in these unorganized food units that is in Farsan unit activities like dough making, dough flattening, cutting and frying were carried out, in Bakeries activities like dough making, rolling, cutting, stuff filling, greasing, tray stacking, cream making, applying cream and baking were carried out and Sweets unit activities like preparation of barfi mixture from mava, tray filling, cutting. Dough making, making sugar syrup, pouring in mould / cloth, frying, dipping in sugar syrup and batter making were carried out. It was found that Body temperature of the workers were 38°C, mean ambient temperature was more than 30°C in farsan unit, mean illumination level was more (218 lux) in all units, Noise level in the food units was under the limit of 90 dB. Using ergo master software posture assessment was carried out and it was observed that in Farsan units nearly half of the respondent were in the score category of 5 and 6 which means investigate further and changes are required soon changes were required to overcome the problems associated with working conditions, in bakeries majority (93.3%) of the respondents were in the score categories of 5 and 6 which means investigate further and changes are required soon whereas in Sweets unit more than
half of the respondent were in the score category of 5 and 6 which means investigate further and changes are required soon.

Feelings of fatigue (using Borg scale) experienced by the workers in selected activities. For General survey: More than half of the respondents (56.25 %) suffered from upper back pain were the severity of the pain ranged from mild to severe.

For Experimental survey: More than half (62.68%) of the respondents suffer from lower back pain, 61 percentages of the respondents had shoulder pain whereas nearly half of the respondents had wrist pain.

From the correlation test among bakery workers it was observed that as the age of the worker increases experience also increases but feeling of fatigue does not increase with the age of the worker. Among Sweet unit workers it revealed that as the age increase BMI of the respondents also get affected, age and fatigue as well as age and work experience had correlation whereas in farsan workers as the age increases, the experience increases and with increasing age and experience, the workers got used to the work and did not feel tired. Even BMI of the workers was increasing with increasing age.

From one-way ANOVA test it was observed that there is highly significant relationship between fatigue and age farsan and bakery unit workers whereas in sweets unit there is no relationship between fatigue and age of the selected workers whereas in farsan, bakery and sweets unit there is no relationship between fatigue and BMI of the selected workers. It was observed that in farsan, bakery and sweets unit there is significant relationship between fatigue and work experience of the selected workers.