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Health problems of workers in bakery cum millet processing units

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Abstract

Millet is recently gaining lot of popularity due to its excellent nutrients that help in combating various deficiency diseases. Various products are manufactured from millets i.e. cakes, biscuits, cookies, flour, rawa, ready mixes, extruded products etc. Many small scale enterprises have been started to make millet products. In this connection, present study has been taken up during the year 2019-20 to understand the health problems faced by workers in bakery cum millet processing units. Descriptive cum qualitative research design was adopted to conduct the present study. Fifteen sample from two units were selected from Rajendranagar mandal, Telangana state. Data was collected by using interview cum observation schedule. Health/ergonomic hazards experienced by the workers were assessed by using work station checklist, low back pain assessment scale and body pain assessment scales. Anthropometric rod and weighing machine were used for measuring height and weight and grip dynamometer was used for assessing grip strength. Findings of the study revealed that most of the workers in bakery and millet processing units were young, educated and underweight. Various problems felt by workers were eye irritation, falls/slips and muscle pain/discomfort, sneezing due to flour mixing/milling; moderate to severe pain in neck, shoulders, upper back, lower back, neck, hips, upper legs, lower legs, ankles and feet. Absence of adjustable equipment as per their height, adequate both natural and artificial light caused discomfort while working.

Keywords: Health risks, hazards, millet, bakery and processing unit

Introduction

India has the highest demand for millet seeds and is the largest global millet producer. Millets are small-seeded cereals that retain excellent nutritional qualities and are important to overcome and manage the rising non-communicable diseases like diabetes and also need to create modern tasty products. There are nearly 6,000 varieties of millet produced all over the world with various colors such as pale yellow, white, gray and red. In terms of nutritional property, they are superior to certain highly consumed cereals such as rice and wheat. Despite their prominent nutritional qualities, people are paying less attention to consume them than the junk foods.

Workers are indulged in roasting the millets, milling, mixing flour, salt, yeasts, spices, sugar, and other ingredients to prepare dough, batter, fillings, etc., which are then made into bread, cakes, rolls, etc., and baked in ovens. A major challenge in bakery industry is the rapid turnover of these workers and use of manual production process except in few cases where the bakeries are automated (Okafor, 2010) ^[18]. Their work environment is an important determinant of health; it can influence health positively or negatively, and for most people, work is essential for economic, social as well as physical wellbeing (Yossif and Elaal, 2012) ^[25]. Injuries from accidents are equally common among millet workers. These could arise from slips and falls on wet or uneven floor surfaces. Cuts from sharp or moving machinery, falls from heights as well as burns and scalds from hot ingredients are also frequent causes of accidents. Other health problems among millet workers include musculoskeletal disorders (muscle pains and arthritis), contact dermatitis from chemicals such as sodium hydroxide and bleach used in cleaning bakeries, chronic obstructive pulmonary disorders (emphysema and bronchial asthma), injuries to the eyes, and irreversible hearing damage among others (Svagr *et al.* 2016) ^[23]. However, studies showed the prevalence of several health hazards among these workers (Aguwas & Arinze, (2014) ^[1], Joshua *et al.* (2017) ^[13]. For further investigation, this present study was conducted to study in detail about occupational health risks and hazards found among millet workers.

Joshua *et al.* (2017) ^[13] assessed a study on the knowledge of occupational hazards and the use of preventive measures among bakery workers in Kaduna North Local Government Area of Kaduna State. The cross-sectional descriptive study was carried out with semi-structured interviewer-administered questionnaires and observational checklist. The results revealed that majority (77%)

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(77%) were within the age bracket of 15–30 years with a mean age of 23 ± 2.1 years, 63 per cent of males and 37 per cent had secondary education with different job descriptions. The workers had poor awareness of occupational hazards such as tightness on the chest, skin reactions/allergy, and falls. The most encountered symptoms/problems by workers were a muscular problem, recurrent catarrh, tightness on the chest, recurrent cough and sneezing. Apron, hand gloves and face masks were the commonly used protective devices by the workers and only 19 per cent of the bakeries had functional first aid boxes (Kalakannavar & Reddy, 2013) [14]. Hence it was concluded that workers had poor to average awareness of some occupational hazards with some encountering some problems as a result of their work.

Ghamari *et al.*, (2009) [9] aimed at determining the prevalence of WMSDs in different body regions, assessing posturing, and detecting ergonomic and individual risk factors causing musculoskeletal disorders, in Araki bakery workers in Arak, Iran. In this cross-sectional study, 233 randomly selected bakery workers in Arak were included. The method used was OWAS and the NMQ Questionnaire. The results revealed that highest prevalence of musculoskeletal disorders were in the knees (62.2%), low back (58.8%), legs (53.9%) and shoulders (44.6%) of the workers. Low back and shoulder injuries in Shaaters (workers in charge of baking the bread) and elbow, thigh and low back disorders in Choongees (workers in charge of dividing and rounding the dough) were more prevalent than in other occupations. There is a positive association between type of occupation and these disorders ($p < 0.05$). According to the OWAS's classification, the distribution of bakery workers' working postures was as follows: 58.5% in the action category 1 (natural posture), 34.7 per cent in the action category 2 (stress posture), 4 per cent in the action category 3 (harmful posture), and 2.5 per cent in the action category 4 (very harmful posture). There was a significant relation between work service record and neck, elbow, shoulder, and knee disorders ($p < 0.05$). It was concluded that the working postures of 42.2 per cent of Araki bakery workers were slightly too very harmful postures in addition; there was a high prevalence of WMSDs in different body regions of the workers. Ergonomic interventions are essential to improve the situation and protect

better the health of the workers.

Mehrizi *et al.* (2014) [17] conducted a survey on prevalence and risk factors associated with upper extremity musculoskeletal disorders by repetitive job activities methods in baker of Iran by using OCRA index method. In this analytic-descriptive and cross-sectional study, four data collection methods were used i.e. observing and interviewing methods, questionnaire and check list. Randomly, 384 samples for Cumulative Trauma Disorder prevalence and 423 samples for OCRA index exposure survey were collected by cluster ratio sampling. In this study, findings indicated that CTD prevalence was high in studied bakery workers and most disorder and pain were reported in back, knees and hand/wrist. Through different tasks, most percentage of neck CTD (7.1%) and shoulder CTD (27.8%) was related to selling and baker tasks respectively, and most percentage of hand/wrist CTD (33/3%) and back CTD (38.1%) was related to bread baker task. There was a significant correlation between shoulder, hand/wrist and back CTD with bakery and task type, and effect of job background on CTD prevalence was improved in the above four zones. Alexopoulos *et al.* (2009) reported that the most important occupational hazards in the bakery industry involve heavy loads, repetitiveness of activities, high temperatures and high rate of work.

Materials and Methods

Descriptive cum qualitative research design was adopted to conduct a study. Fifteen sample from two units were selected from Rajendranagarmandal, Telangana state. As per the willingness of the sample and rapport developed, purposive sampling technique was adopted for the present study. Data was collected by using interview cum observation schedule. Health/ergonomic hazards experienced by the workers were assessed by using work station checklist, low back pain assessment scale and body pain assessment scales. Anthropometric rod and weighing machine were used for measuring height and weight and grip dynamometer was used for assessing grip strength.

Results and Discussion

The results of the present study were presented below

Table 1: Demographic profile of workers in bakery cum millet processing unitN-15

Demographic parameters	Categorization	Percentage (%)
Age in years	1. Below 20 years	40.00
	2. 20-30 years	40.00
	3. Above 30 years	20.00
Gender	1. Male	40.00
	2. Female	60.00
Educational qualification	Middle class	20.00
	Intermediate	80.00
Family size	1. Small (Upto 4 members)	15.00
	2. Medium (5-8 members)	65.00
	3. Large (8 and more members)	20.00
Work experience (years)	1-5 years	100.00
Labour wages per day	Rs. 6500/-	100.00
Working hours per day	9-12 hours	100.00

The workers who are engaged in this industry were 60 per cent of the female workers and 40 per cent were male workers with the age groups ranging from below 20 years (40%), 20-30 years (40%) and above 30 years (20%). These under-aged workers are more likely to have poor knowledge of

occupational hazards and less likely to use personal protective equipment (Clark, 2008). Therefore, they are more likely to suffer from accidents in the workplace. They had 1-5 years of work experience with monthly income of Rs. 6500.

Twenty per cent of workers have studied up to middle class

and 80 per cent studied up to intermediate. Since the study area is nearer to the state capital, workers had better education. They were working for 9-12 hours per day. These results are in line with the results of the Hatzakis *et al.* (2005) [10] who reported that the majority of workers had education

up to first or secondary level. Young people who have less education have entered into the field of baking food. These young people shift from this job to another one as soon as they get the better job. This shifting of job was mainly due to inconvenient work environment and work activities.

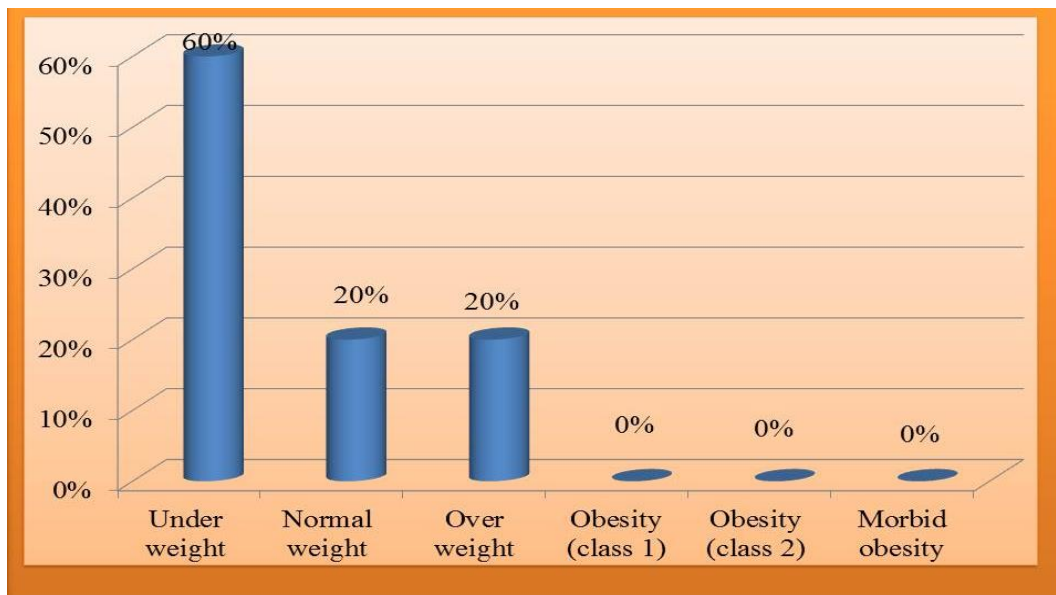


Fig 1: BMI of workers

When body mass index was calculated, most of the workers were found with underweight (60%) followed by 20 per cent each with normal weight and overweight. The mean of the respondents was 20.32 with S.D of 5.5.

Table 2: Physical fitness of bakery cum millet processing unit workers (N=5)

	Mean	S.D
Weight (Kgs)	49.40	12.2
Height (cm)	156.2	7.0
Body Mass Index (kg/m ²)	20.32	5.5

The mean weight of the workers was 49.40kg with a standard deviation of 12.2 and height with 156.2+7.0 cm.

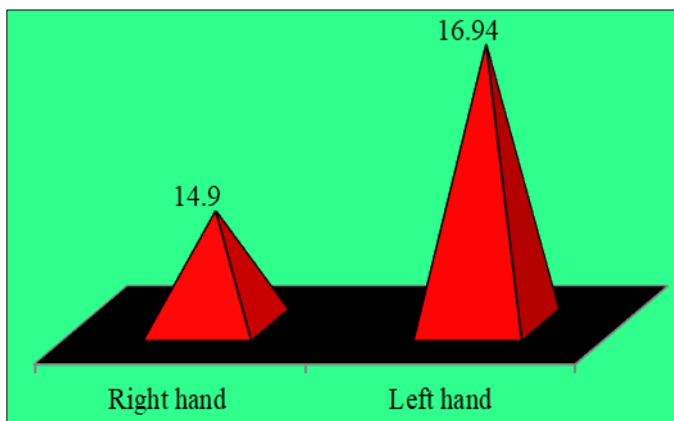


Fig 2: Mean values of grip strength

When mean grip strength was compared (Fig 2), it was found that left hand (16.94) has greater grip than that of right hand (14.9) which implies that both the hands have weak grip strength may be because majority of them are underweight workers.

Table 3: Assessment of work station of bakery cum millet processing units by workers' perception (N=15)

S. No.	Work station checklist	Average score
1	Full range of movement is possible in work space	-1.4
2	Mechanical equipments and aids are available	-1.8
3	Adjustable Height of the workstation	-0.8
4	Workstation does not eliminate bending or twisting of the wrist, full extension of the arms and reaching above the shoulder	-0.6
10	Posture can be changed by workers while working	+0.5
11	Tilted or angled work surface is possible	+0.4
12	Sharp edges on work surfaces are away from hands and arms reach	-0.8
13	Provision of arm rest in required places	+1.6
14	Footrest is present	+0.86
15	Floor surface is free of obstacles	-1.6
16	Cushioned floor mats are provided to stand for long time while working	+1.6
17	Adjustable chairs or stools are there	+1.8
18	One can view all task elements from comfortable positions	-0.3
19	All equipment are regularly serviced/maintained	-1.6
20	Enough natural light is there to perform the task	-1.6
21	Day time operations are possible in the presence of artificial light	-1.6
22	Temperature of workplace is comfortable	+0.6
23	It is a noise free workplace	-1.0

When workstation was analyzed from workers' perspective, Table 3 revealed that workers experienced discomfort due to the design features of work station that have ultimately affected the worker's health. The musculoskeletal disorders arise from manual handling and moving of heavy loads for example while loading or off-loading from the vehicles. Other causes of musculoskeletal disorders include work requiring repetitive movements and poor work posture. Most of these are due to poor consideration of ergonomic factors in the

workplace (Commission for Occupational Safety and Health, 2015) [7]. Work station checklist has 23 items on which workers had responded on a 5 point continuum as strongly disagree, disagree, neutral, agree and strongly agree for which scores assigned were -2,-1,0, +1,+2. Number of responses on each continuum were multiplied with the respective scores, mean score was calculated on each item by dividing the total score obtained by total number of respondents. Out of 23 statements only on 7 items, workers reacted positively which implies that workstation is not comfortable.

The study revealed that majority of the workers felt that their

work station was not comfortable to move in any direction or to have access which (-1.6) may be due to improper mechanical aids and equipment (-1.8), irregular maintenance of mechanical aids, tools, and other equipment (-1.6%) and disagreed that work place was noise free. Similar results were cited by Huq et al, (2013) [19] where the conditions of the machine room, packaging, sealing room and surrounding of selected baking factories were also not at satisfactory level. However adjustable stools or chairs (+1.8) and cushioned floor mats were provided for employees to stand for long periods (+1.6).

Table 4: Assessment of low back pain felt by workers in bakery cum millet processing units (N=15)

S. No	Statements	Response	Freq. (%)
1	Number of days suffered pain in the back or leg (s) in the past 2 weeks	Not a single day	20.00
		1 and 5 days	20.0
		6 and 10 days	60.0
		More than 10 days	--
2	Number of pain killers taken on the worst day during the past 2 weeks	None at all	80.0
		Less than 4 tablets	--
		4 and 8 tablets	20.0
		9 and 12 tablets	--
3	State symptoms of the worse pain	12 tablets and above	--
		Coughing	20.0
		Sneezing	60.0
		Difficulty in Sitting	20.0
4	State the movements that eased the pain	Difficulty in Standing	--
		Difficulty in Bending	--
		Difficulty in Walking	--
		Lying down for some time	60.0
5	Is there any pain in any part of right leg	Sitting down at regular intervals	40.0
		Standing in between the work	--
		Taking short walks	--
		Buttock	--
6	Is there any pain in any part of left leg	Thigh	40.0
		Shin or calf	--
		Foot or ankle	60.0
		Buttock	--
7	State any loss of feeling in legs	Thigh	40.0
		Shin or calf	--
		Foot or ankle	60.0
		No loss of feeling	20.0
8	Which part of right leg has pain or weakness?	Loss of feeling in one leg	80.0
		Loss of feeling in both legs	--
		Hip	60.0
		Knee	20.0
9	Which part of left leg has pain or weakness?	Ankle	20.0
		Foot	--
		Hip	60.0
		Knee	40.0
10	How far could you bend due to pain?	Ankle	--
		Foot	--
		Could touch the floor	40.0
		Could touch ankles with the tips of fingers	20.0
11	During the last 2 weeks was your sleep disturbed due to pain	Could touch mid thighs with the tips of fingers	--
		Could not bend forward at all	40.0
		Not affected at all	--
		I didn't lose any sleep but needed tablets	60.0
12	During the last 2 weeks could you sit due to pain	It prevented me from sleeping	20.0
		I only had 2-4 hours of sleep	20.0
		I had less than 2 hours of sleep	--
		Was able to sit in any chair as long as I liked	60.0
		Could only sit in chair as long as I liked	20.0
		Could not sit for more than an hour	20.0
		Could not sit for more than 30 minutes	--
		Could not sit for more than 15 minutes	--

		Unable to sit due to pain	--
13	During the last 2weeks could you stand due to pain	Could stand as long as I wanted without pain	80.0
		Could stand as long as I wanted but it gave me pain	20.0
		Could not stand for more than an hour	--
		Could not stand for more than 30 minutes	--
		Could not stand for more than 15 minutes	--
		Could not stand at all	--
14	During the last 2weeks how pain interfered with your ability to walk	Pain did not prevent me walking any distance	60.0
		Could not walk for more than an hour	20.0
		Could not walk for more than 30 minutes hour	20.0
		Could not walk for walking more than 15 minutes	--
		Not able to walk at all	--
15	Affect of pain on housework in the last 2 weeks	Not at all	60.0
		Could continue work with little suffering	20.0
		One day work was suffered	20.0
		Work suffered for 2-6 days	--
		Work suffered for more than 7 days	--
16	Number of days stayed in bed due to pain	Not at all	100
		1 and 5 days	--
		6 and 10 days	--
		More than 10 days	--
17	Affect on leisure activities in the last 2weeks due to pain	Not affected	20.0
		Mildly affected	20.0
		Moderately affected	60.0
		Severely affected	--

From the distribution of Table 4, the results revealed that the workers were suffering with back and leg pain for 6-10 days and they were facing with sneezing problem due to continuously working with flourmixing. Respiratory problem was mainly due to the inhalation of the flour dust and improper ventilation. Many studies have shown that flour dust exposure causes respiratory symptoms and is associated with impairment of lung function (Bena & Mirabeli, 1999, Rushton, 2007, Fishwick *et al*, 2011 and Arrandale, *et al*,

2013) [5, 21, 8, 4]. This was in agreement with Ahmed *et al*. (2009) [2] and Ige & Awoyemi, (2002) [12] who reported that bakers have complained with respiratory symptoms which were due to excess heat and exposure to dust. Sixty per cent of the workers expressed that they have pain in foot, ankle, hip and knee and also expressed that they didn't lose any sleep but they need tablets to reduce their pain. Majority (60%) of the workers felt that they were affected moderately by the pain while 20 per cent were affected mildly.

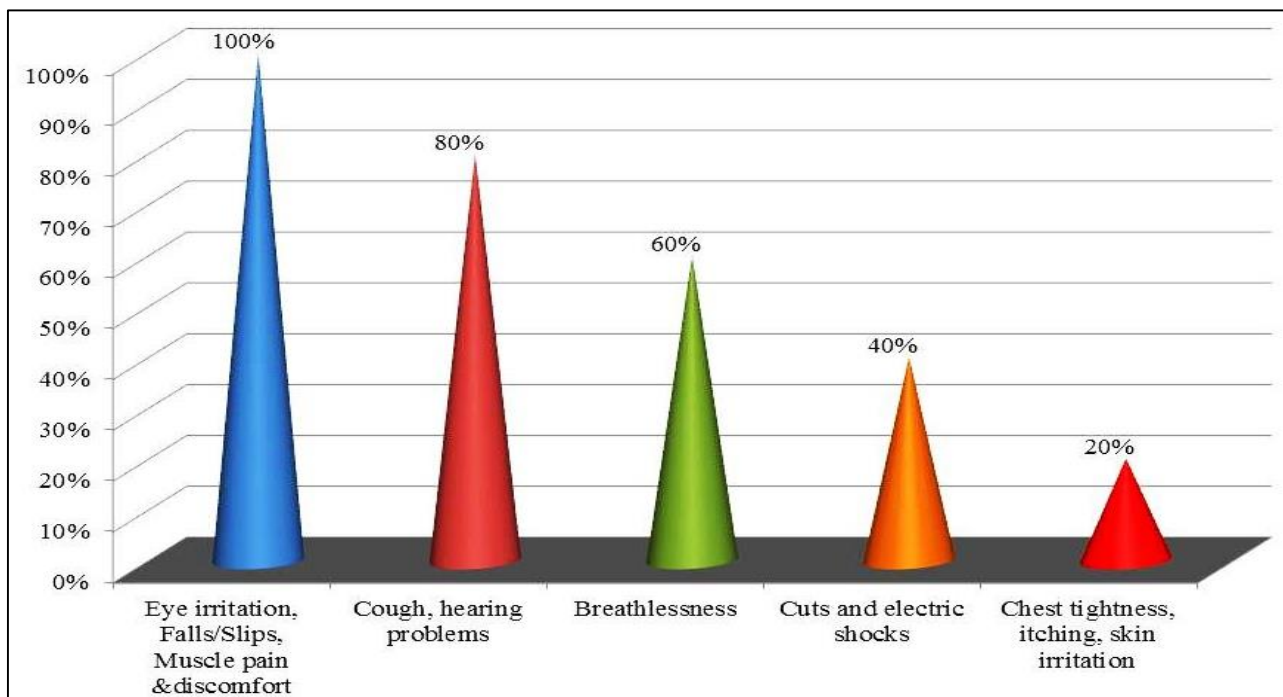


Fig 3: Symptoms health hazards

From Fig 2., the results of the study revealed that cent per cent of workers were facing eye irritation, falls/slips and muscle pain/discomfort due to continuously mixing of flour and exposing to machineries followed by cough and hearing

problems (80%), cuts and electric shocks (40%), chest tightness, itching, skin irritation (20%) and breathlessness (60%). Cuts from sharp or moving machinery, falls from heights as well as burns and scalds from hot ingredients are

also frequent causes of accidents. (Health and Safety Executive, 2011) ^[11]. Irreversible hearing damage was also found in a study conducted by McCullagh (2011) ^[16] on prevalence of hearing loss and accuracy of self-report among factory workers.

It was also observed that in both the units workers were using personal protective equipment i.e., Apron, gloves, shoes/boots, face mask and hat whereas 60 per cent of the workers were using ear plugs when they were working with

machines. These results are in coherence with the findings of Patouchas *et al.* (2009) ^[20] who reported that protective clothing and equipment are a must to protect the bakers from the occupational health problems.

In bakery cum millet processing units, environmental control and pest control methods were not adopted. Recycling, open dumping and burning system were used for waste disposal. According to Joshua *et al.* (2017) ^[13] burning was the most common method of solid waste disposal.

Table 5: Musculoskeletal Disorders perceived by workers in bakery cum millet processing units N-15

Body Parts	Presence of specific pain symptoms		Tolerance to the symptom/s					
	Yes		Ignorable		Bearable		Unbearable	
	n	%	n	%	n	%	n	%
Neck	12	80.0	-	-	7	46.6	5	33.3
Shoulder	15	100.0	-	-	9	60.0	6	40.0
Upper arm	15	100.0	-	-	10	66.6	5	33.3
Elbow	15	100.0	-	-	11	73.3	4	26.6
Lower arm	9	60.0	-	-	9	60.0	-	-
Wrist	10	66.6	-	-	10	66.6	-	-
Palm	5	33.3	-	-	5	33.3	-	-
Fingers	6	40.0	-	-	6	40.0	-	-
Upper back	13	86.6	-	-	9	60.0	4	26.6
Lower back	13	86.6	12	80.0	1	6.6	-	-
Hips	11	73.3	11	73.3	-	-	-	-
Upper legs	12	80.0	12	80.0	-	-	-	-
Lower legs	12	80.0	5	33.3	7	46.6	-	-
Ankles	12	80.0	-	-	8	53.3	4	26.6
Feet	12	80.0	-	-	8	53.3	4	26.6

Table 6 revealed that all the workers experienced pain in shoulder, upper arm and elbow whereas 40 per cent of the workers experienced pain in fingers followed by 86 to 80 per cent of the workers experienced pain in upper back, lower back, neck, hips, upper legs, lower legs, ankles and feet. These findings confirmed the results of earlier studies in regards to the association between awkward working postures of bakery workers and musculoskeletal pain, especially in the neck, shoulders, wrist, and elbow (Sahu *et al.*, 2013) ^[24]. While 66 and 60 per cent of the workers had experienced pain in wrist and lower arm respectively. It implies that as they need to stand for a long time to supervise the tasks like milling,

mixing, baking and packing, more pain is perceived in upper and lower body parts. Mostly standing and bending postures are adopted while performing the activities.

Further analysis revealed that pain was unbearable in shoulder (40%), neck and upper arm (33.3%), where as pain was ignorable in lower body parts like lower back, hips and upper legs. In rest of the body parts they reported that pain was bearable. These findings confirmed the results of earlier study by Rima (2019) ^[22] conducted on Bakery workers in Lebanon to know about their musculoskeletal pain. Though majority are underweight, since they are young, perhaps they could bear the pain.

Table 6: Level of body pain experienced by bakery cum millet processing unit workers

Body parts	Average score	Rank
Neck	2.6	4
Shoulder	2.0	7
Upper arm	3.2	1
Elbow	3.2	1
Lower arm	3.0	2
Wrist	2.2	6
Palm	3.0	2
Fingers	3.0	2
Upper back	2.6	4
Lower back	2.8	3
Hips	2.8	3
Upper legs	2.4	5
Lower legs	2.4	5
Ankles	3.2	1
Feet	3.2	1

Further probing was done to find out the level of pain felt by the workers in various body parts. They were asked to respond on four point continuum by assigning scores as 4 for severe pain, 3 for moderate pain, 2 for mild pain and 1 for no pain. Based on the average score obtained on each body part, ranking was done. Results revealed that severe pain was experienced in ankles, feet, upper arm and elbow (1st rank) followed by lower arm, fingers, palm (2nd rank). Moderate to mild pain was felt in other body parts. This implies to make changes in their working postures to have pain relief. A study conducted by Lang *et al* (2012) ^[15] revealed that musculoskeletal pain is not only linked to physical hazards and the heavy physical workload; it can also be associated with other significant psychological factors that contribute to the increase in the incidence of musculoskeletal pain among bakery workers.

Conclusion

It can be concluded from the findings that various problems felt by workers were eye irritation, slips and discomfort, sneezing, pain in neck, shoulders, upper back, lower back, neck, hips, upper legs, lower legs, ankles and feet. Thus, the findings imply that lighting conditions need to be improved to reduce their strain. Employer should provide PPE like masks, ear muffs and hand gloves to reduce their health problems. Body postures need to be changed and altered for every one hour.

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