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## Assessment of knowledge level about occupational health hazards, use of safety measures and food consumption among dal mill workers in Kalaburagi district of Karnataka state

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#### Abstract

Kalaburagi district is major pulse producing and processing district of Karnataka and it is well known as Pulse bowl of Karnataka, having 308 registered dal mill units in the district operating at various capacities. Dal mill workers in mills are exposed to dal dust linked with several occupational health hazards. Therefore, the present study was conducted to assess knowledge level about occupational health hazards faced, use of safety measures and food consumption by workers in dal mill industries. “Teacher made test” was used to measure the knowledge level of 30 dal mill workers that is intervention group about use of safety measures and nutrition practice, which consisted of 30 questions related to knowledge level. The results showed that majority of the workers belonged to age group of 25 to 35 years (46.3%), most of them belonged to Hindu religion (93.6%) and 78.7 per cent of the respondents were married and belonged to joint family (56.3%). Half of the mill workers (54.3%) were living in pucca house and majority (81.7%) of the workers income were between 10,002 – 29,972 belonged to upper lower and lower middle class. Pertaining to knowledge level higher percentage of dal mill workers belonged to medium knowledge category 36.67 per cent followed by in low 33.33 per cent and high knowledge category 30.00 per cent. This indicates that some of the workers had medium level of knowledge regarding safety measures, food, nutrition and health before the nutrition education. After the intervention respondents who were in the low-level category increased their knowledge level. Out of 10 respondents 7 moved to higher knowledge category after intervention. It was increased from 30 per cent to 53.30 per cent. This indicates that the nutrition education had a better impact on the mill workers knowledge regarding the use of safety measures and good nutritional knowledge.

**Keywords:** Assessment, dal mill workers, knowledge, nutrition education and safety measures

#### Introduction

In small and large-scale industries, the occupational health hazards are the great burden on workers' health system. Over 20 million people working in various industrial sectors in India are exposed to occupational hazard in one or other way. The diseases of the respiratory system induced by occupational dusts are influenced by the type of dust, dose, duration of exposure. Mengesha and Bekele (2005) [8]. Occupational diseases are caused by pathologic responses of the workers to their working environment. With rapid industrialization of the developing world, food dust induced occupational diseases are poised to become a global health problem (WHO, 2017) [15]. When work is fully fitted to human requirements and variables, the interaction between man and his working environment can lead to greater health, or it can lead to bad health if work stress exceeds human tolerance. Occupational illness and injuries are the result of specific workplace exposures. Workplace exposures may also aggravate some illnesses or play a role in the development of diseases with various etiologies.

Occupational health, as defined by the World Health Organization, is concerned with all elements of health and safety at work, with a strong focus on preventing dangers. Workers' health is influenced by a number of elements, including occupational risk factors that contribute to accidents, malignancies, respiratory diseases, hearing loss, musculoskeletal diseases, circulatory diseases, and stress-related disorders.

Occupational health hazards are well-known as one of the top causes of death worldwide. According to the (World Health Organization, 2017) [15], occupational hazards such as injuries, noise, carcinogenic agents, airborne particles, and ergonomic risks account for significant portion of the burden of chronic diseases.

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Due to extended workplace exposure, industrial employees are at a higher risk of developing chronic lung illnesses. WHO predicts that, COPD would likely become the world's third largest cause of mortality by 2030.

Based on the Global Initiative for Obstructive and Lung Diseases (GOLD) guideline, Tobacco smoking, indoor and outdoor air pollution, occupational exposure, age, gender, and socioeconomic status are all risk factors for COPD. Numerous research studies conducted at the state and district levels support the conclusion that low socioeconomic status, occupational exposure to environmental hazards, tobacco smoke, and exposure to air pollution (both indoor and outdoor) are the major factors significantly associated with COPD. Alvar *et al.*, (2019)<sup>[2]</sup>.

Redgram [*Cajanus cajan* (L.) Millsp.] is an important pulse crop in the semi-arid tropics with a number of distinguishing traits. It plays a significant role in the farming systems of small-scale peasants in many developing countries. Redgram is India's second most significant pulse, after bengalgram. Redgram is a high-protein food that is mostly consumed in the form of split pulses, also known as dal, and is a vital protein supplement for cereal-based diets. It includes about 22% protein, which is about three times the protein found in grains (Narpinder Singh, 2017)<sup>[9]</sup>. As redgram is a protein-rich staple food, it meets a large portion of the protein requirements of the country's vegetarian diet.

Nutrition education is linked to increase the knowledge regarding nutrition, safety measures and practices necessary for developing a healthy lifestyle and to protect the workers' health from contaminated environments in milling area. Nutrition education has the potential to significantly alter the behaviour patterns and thereby lead to improved outlook on nutrition and good hygiene Vivas *et al.* (2010)<sup>[14]</sup>. It has not only been shown to improve nutrition knowledge and skills but also dietary intake and physical activity as well as nutrition and health status Shariff *et al.* (2008)<sup>[11]</sup>. Moreover, practices such as regular use of safety measures in working environments as well as related to foods habits like washing of fruits and vegetables before eating are learned and retained. Nutrition knowledge is most effective if there is a supportive environment and if nutrition education is linked with practical food, nutritional and environmental activities.

Atakora and Stenberg (2020)<sup>[3]</sup> Assessed the workers' knowledge and views of occupational health hazards of gold mining in Obuasi Municipality, Ghana. Results revealed that, most workers about (63.3%) had low knowledge of occupational health and safety regulations. Multivariable logistic regression analysis showed that knowledge about regulations was associated with level of education (OR = 8.5; 95% CI: 7–10.5). The common effects of mining that workers expressed awareness of were land pollution (30%), water pollution (28%), air pollution (18.7%), and noise pollution (16%). The factors influencing exposure to health hazards related to mining were low educational levels (14%), little work experience (30.7%), incorrect handling of equipment or chemicals (26%), poor law enforcement (12.7%), and negligence (16.7%). In general, occupational lung disease (16%), occupational hearing loss (14%), heat illnesses (12%), eye infections (16%), malaria (24%), and skin infections (18%) were the most common health problems study participants mentioned.

Rural people in Kalaburagi district are currently employed in dal mills to meet their daily needs, and they are subjected to a variety of physical, chemical, and environmental health

hazards, such as occupational dust, contaminated air, and noise. Even at mild concentrations, these environmental hazards can impair dal mill workers pulmonary (respiratory) function and trigger allergic reactions, leading to a variety of lung diseases. The primary goal of implementing personal protective equipment (PPEs) for dal mill workers would be to reduce health hazards and dust allergy disorders in the workplace. Apart from dal dust there is substantial evidence that lifestyle factors such as tobacco use, smoking, alcohol consumption and diet and nutrition practice are linked to lung function, also health and nutritional status. With the foregoing facts in mind, the current study was undertaken to assess the of knowledge level about occupational health hazards, use of safety measures and food consumption among dal mill workers in Kalaburagi district.

## Materials and Methods

The research study was conducted in Kalaburagi district of Karnataka state during the year 2019-20. Kalaburagi district was purposively selected because of major pulse producing area, as it is well known as pulse bowl of the state and having majority of dal mills in the district.

**Study area and sample size:** The study was conducted in the Kapnoor Industrial Area, Kalaburagi which is 6 km away from the main city. About 300 dal mill workers who were currently engaged in milling activities were randomly selected for the study.

**Inclusion and exclusion criteria:** All the male workers with age group between 25 to 50 years, who were currently working in the identified dal mills from past one year and workers who expressed their willing to participate in the study were included. Workers below 25 and above 50 years of age, who are ill at the time of data collection and those not willing were excluded from the study.

**Data collection tools:** A pretested structured questionnaire was used to collect the data. The questionnaire consisted of the socio-demographic profile, health and nutritional status, dietary habits and occupational hazards of the workers. The complete detailed information on age, gender, religion and family type was obtained Sudha *et al.* (2014). Education, occupation, income and socio-economic status was assessed by Modified Kuppaswamy's Socioeconomic Status Scale. Saleem, (2020)<sup>[10]</sup>.

## Selection, distribution and adoption of personal protective equipment's (PPEs)

The functional clothing for the dal mill workers was purchased from the All India Coordinated Research Project (AICRP) in Textile and Apparel Designing, College of Community Science, UAS, Dharwad. The cost of the functional clothing kit that is personal protective equipment's (PPEs) was Rs. 236 per kit. The personal protective equipment's were distributed to selected dal mill workers and response was recorded after using PPEs.

## Imparting nutrition education and its impact assessment

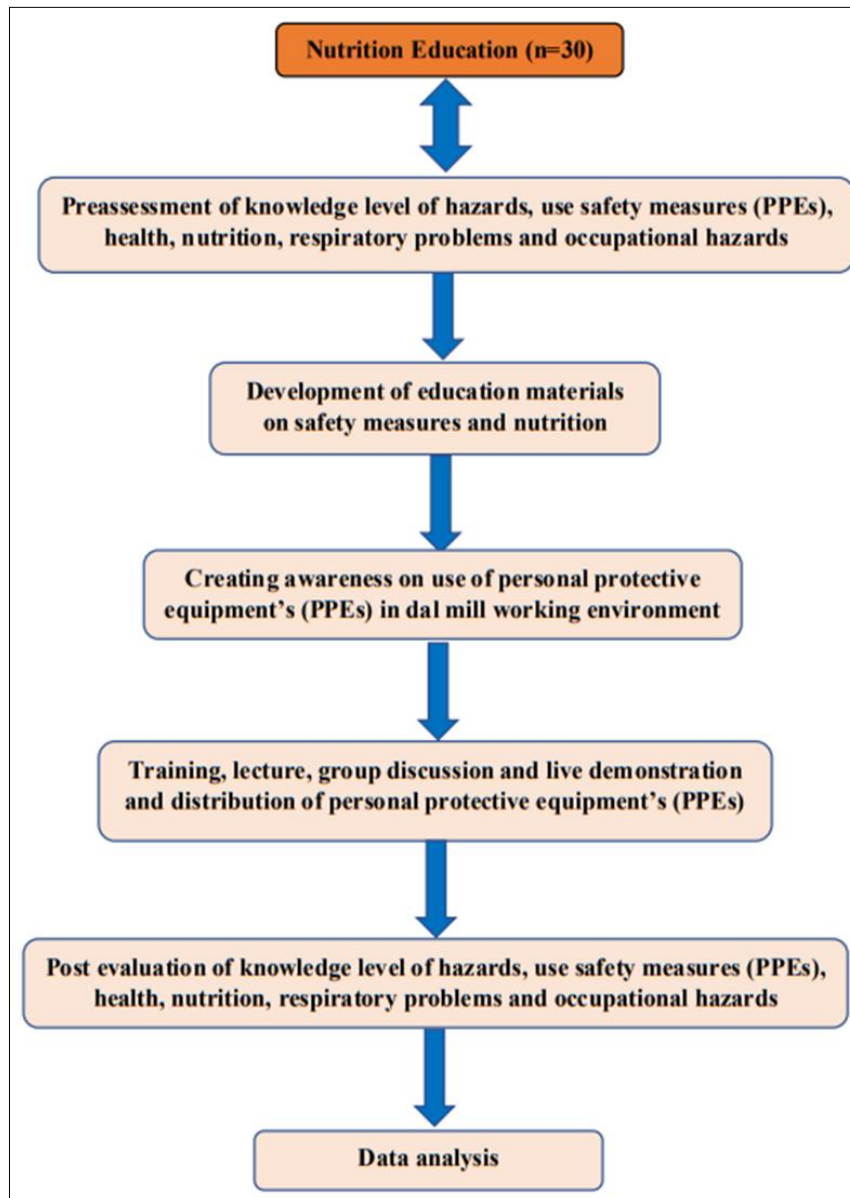
The holistic nutrition education was given in collaboration with ICAR- Krishi Vigyan Kendra, Kalaburagi-I on importance of safety measure in the working environment to minimize the health hazards that is use of personal protective equipment's (PPEs) and also about nutrition and health using

teaching aids such as posters, leaflets, demonstrations followed by impact of training was assessed (Figure. 1). Scoring was done to categorize the knowledge level of dal mill workers. Before and after training programme knowledge is operationalized as the amount of information understood by dal mill workers about safety measures and nutrition practice.

**Assessment of knowledge level:** It refers to an individual’s understanding of nutrition, including the intellectual ability to remember and recall food and nutrition-related information and facts Macias and Glasauer, (2014)<sup>[7]</sup>.

The “Teacher made test” was used to measure the knowledge level of dal mill workers about nutrition practice, which consisted of 30 questions related to knowledge level. The question framed related to health hazards, use safety measures in working environment and importance of food. The answer elicited from the respondent were quantified by assigning one score to correct answer and zero to wrong answer.

A structured questionnaire was framed to assess the knowledge level of the dal mill worker that is intervention group (n=30).



**Fig 1:** Steps in nutrition education intervention

Based on the total scores, the knowledge level of dal mill workers was classified by using mean and standard deviation as measures of check.

Category	Score
Low	Less than (Mean - 1/2 SD)
Medium	Between (Mean ± 1/2 SD)
High	More than (Mean +1/2 SD)

After the training programme to the dal mill workers the post test on use of safety measures in dal mills and also about

health and nutrition knowledge level was conducted to same intervention group (n=30) using same questionnaire developed to assess post training knowledge level. Thus, after computing the knowledge scores, the dal mill workers were grouped into high, medium and low categories by taking the mean and standard deviation as a measure of check.

$$\text{Knowledge index} = \frac{\text{Score obtained}}{\text{Maximum score}} \times 100$$

**Data Analysis:** The study data obtained was subjected to statistical analysis with appropriate tools. Descriptive statistics like mean and standard deviation were calculated.

**Results and Discussion**

**Socio economic profile of dal mill workers**

Socio economic status of the dal mill workers is represented in Table 1. Forty-six per cent of the respondents belonged to age group of 25 to 35 years. 42.0 per cent of the respondents were between the age group of 36 to 45 years of age. Only 11.6 per cent belonged to the age group between 46 to 50 years. Majority of the respondents belonged to Hindu religion (93.6%) and only 6.3 per cent were Muslims. The results are in accordance with the study carried out by Alemseged *et al.*, (2020) <sup>[1]</sup> where most 48.9 per cent of the flour mill workers were found between the age group of 26–45 years. In the current study most of the workers belonged to younger age group, this indicates as age increases it is difficult to engage in moderate to heavy work.

In the present study 19.7 per cent of the respondents were illiterate, total 39.3 per cent of mill workers had their education upto school level. Most of the respondents had their education upto intermediate or diploma level (37.3%). Few of the mill workers were graduated about 3.7 per cent. The results are comparable with study conducted by Sudha *et al.*, (2013) <sup>[12,13]</sup> on occupational hazards faced by dal mill workers where most of the workers 33.3 per cent studied upto secondary level.

**Table 1:** Socio demographic characteristics of dal mill workers (n=300)

Characters	No.	%
<b>Age (Years)</b>		
25-35	139	46.3
36-45	126	42.0
46-50	35	11.6
<b>Religion</b>		
Hindu	281	93.6
Muslim	19	6.30
<b>Education</b>		
Illiterate	59	19.7
Primary school	21	7.00
Middle school	30	10.0
High school	67	22.3
Intermediate	112	37.3
Graduate	11	3.70
<b>Marital status</b>		
Married	236	78.7
Unmarried	64	21.3
<b>Family type</b>		
Joint	169	56.3
Nuclear	131	43.7
<b>Occupation</b>		
Industry labour	255	85.0
Industry labour & Agriculture	45	15.0
<b>Family Income</b>		
49962 - 74755	0	0.00
29973 - 49961	39	13.0
10,002 - 29972	245	81.7
≤ 10,001	16	5.3
<b>Housing condition</b>		
Katcha house	137	45.7
Pucca house	163	54.3
<b>Type of food</b>		
Vegetarian	241	80.3
Non-Vegetarian	59	19.6

Similarly, the result is in conformity with the study conducted by Deshpande *et al.* (2019) where 42.06 per cent respondents had education upto school level, few (3.4%) were graduated. In the present study majority of the respondents were married (78.7%).

Fifty per cent of the respondents belonged to joint family that is (56.3%) and majority of the mill workers (85.0%) were dependent on milling work as their main occupation and few of the mill workers had agriculture as their subsidiary occupation (15.0%). The study results are in line with the study conducted by Sudha and Rupali (2013) <sup>[12, 13]</sup> on occupational health hazards faced by the flour mill workers, where 60 per cent of the respondents were working in flour mills. In the present study more than fifty per cent of the workers were living in pucca house that is (54.3%), remaining were in katcha house. Majority of dal mill workers were vegetarian (80.3%).

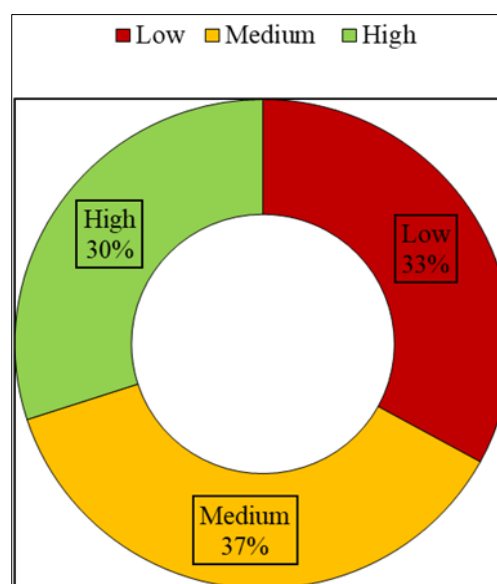
**Table 2:** Overall knowledge level of dal mill workers before nutrition education (n=30)

Categories	No	%
Low (Mean + SD)	10	33.33
Medium (Mean ± SD)	11	36.67
High (Mean - SD)	9	30.00

(Mean: 13.76, SD:2.26)

**Knowledge level of dal mill workers before the nutrition education**

The data in the Table. 2 and Figure 2. reveals knowledge regarding safety measures, food, nutrition and health before the nutrition education. The data indicates that, higher percentage of dal mill workers belonged to medium knowledge category 36.67 per cent followed by in low 33.33 per cent and high knowledge category 30.00 per cent. This indicates that some of the workers had medium level of knowledge regarding safety measures, food, nutrition and health.



**Fig 2:** Knowledge level of dal mill workers before the intervention

**Knowledge level of dal mill workers after the nutrition education**

The data regarding knowledge level of the mill workers after the nutrition education is depicted in Table. 3. The results revealed that after the intervention respondents who were in

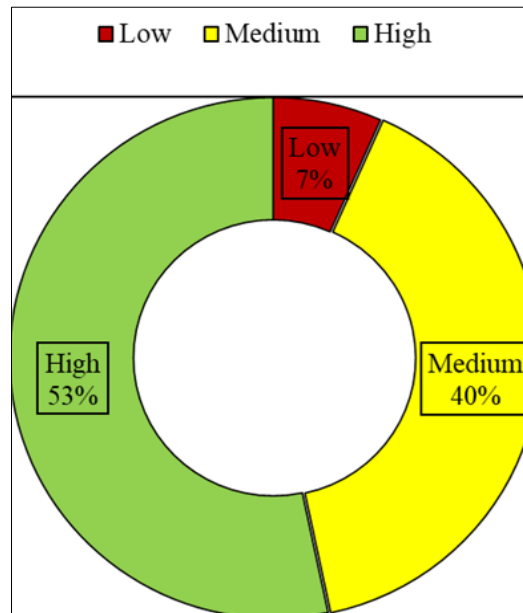


the low-level category increased their knowledge level. Out of 10 respondents 7 moved to higher knowledge category after intervention. it was increased from 30 per cent to 53.30 per cent. This indicates that the nutrition education had a better impact on the mill workers knowledge regarding the use of safety measures and good nutritional knowledge as shown Figure 3.

**Table 3:** Overall knowledge level of dal mill workers after nutrition education (n=30)

Categories	No	%
Low (Mean + SD)	2	6.70
Medium (Mean ± SD)	12	40.00
High (Mean - SD)	16	53.30

(Mean: 23.41, SD:1.45)



**Fig 3:** Knowledge level of dal mill workers after the intervention

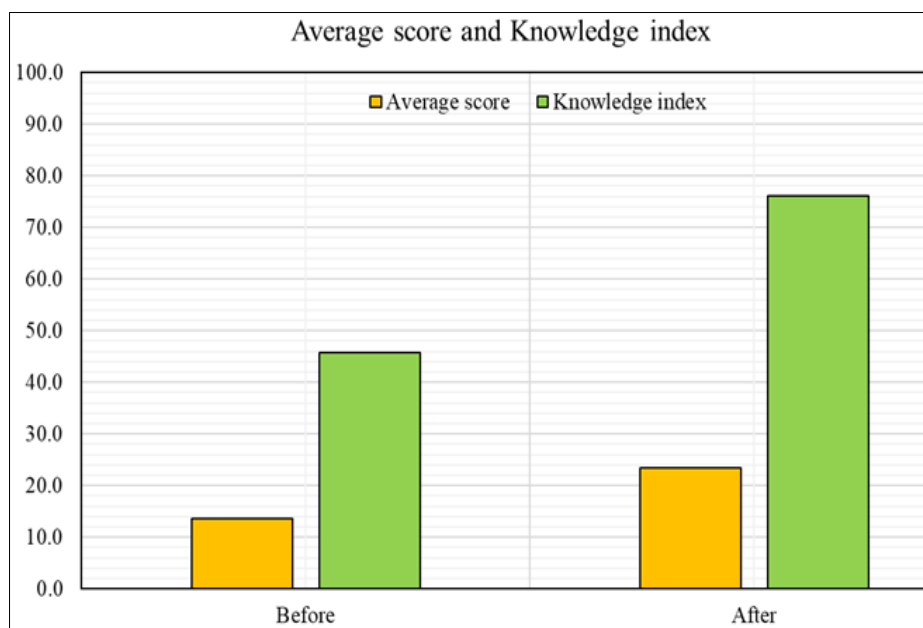
**Table 4:** Average knowledge score and knowledge index of the health hazards, safety measure and nutritional practices

Categories	Before	After
Average score	13.75±2.63	23.41±1.45
Knowledge index	45.86±7.54	76.10±4.85

**Average knowledge score and knowledge index of the health hazards, safety measure and nutritional practice**

The result of impact of training programme on knowledge score and knowledge index of health hazards, safety measures and nutrition practice are depicted in Table. 4. and Figure 4.

The Average knowledge score was 13.75 before the intervention programme. After the nutrition education through training and various method demonstration regarding use of PPEs in the milling work their average knowledge score has been increased to 23.41 which shows a positive and significant impact of training. With regards to knowledge index, the mill workers had knowledge index of 45.86 which was increased to 76.10 after providing education through training and method demonstration. This shows a positive and significant impact of training on the mill workers.



**Fig 4:** Average knowledge score and knowledge index health hazards, safety measure and nutritional practice

**Table 5:** Knowledge level of dal mill workers before and after nutrition education (n=30)

Categories	Before		After		Chi-square Value
	No.	%	No.	%	
Low (Mean + SD)	10	33.33	2	6.70	7.336*
Medium (Mean ± SD)	11	36.67	12	40.00	
High (Mean - SD)	9	30.00	16	53.30	

\*Significant @ the 5 per cent level.

### Knowledge level of dal mill workers before and after nutrition education

Data pertaining to the knowledge level before and after the nutrition education shown in Table. 5. The dal mill workers were categorized into low, medium and high-level knowledge regarding health hazards, safety measures and nutrition practice based on the scores obtained by them (Table 4). It was observed that before the nutrition education higher per cent of the workers belonged to medium and low knowledge level 36.67 per cent, 33.33 per cent respectively. Whereas few of the workers belonged to high knowledge level category (30.00%). After giving nutrition education, the trends of mill workers were being in low category were decreased 6.70 per cent and subsequently the percentage of mill workers in medium and high knowledge category was increased (40.0% and 53.33%). The chi-square test results showed a significant difference at five per cent level after the nutrition education.

The probable reason might be due to fact that overall, more than thirty per cent of the mill workers were educated up to PUC, high school and middle school level, which might have prompted these mill workers to acquire knowledge and also use of pictures and posters and live demonstration related to use of safety measures and importance of it in milling area and about nutrition practices helped them to understand better related to use of PPEs and importance of food and nutrition. Accordingly, this helped the mill workers to acquire more knowledge regarding use of safety measures, its importance and about nutrition practices.

The results showed that nutrition education can impart favourable changes in life style and use of protective measures (PPEs) which were distributed during the training programme and also information regarding health hazards and precautionary measures to be used during working as well as about the importance of nutrition through short-term nutrition education on importance of safety measures (PPEs) and importance of balanced diet. But adoption of gained knowledge needs longer duration on behavioural changes compared to use of PPEs because the results are immediate when compared to nutrition benefits and behavioural changes. The study suggests that emphasizing experiential learning activities using a holistic approach to increase knowledge regarding use of safety measures in milling area can result in favourable changes in mill workers in a relatively short time frame. Nutrition education does not influence changes in dietary habits, but also health behaviours and encouraging focus on lengthy intervention periods to impart successful behavioural outcomes. Brug, (2008) [5] and Ball *et al.*, (2006) [4].

The study showed that acquisition of knowledge on safety measures and health benefits of all food groups promotes subsequent dietary, behavioural and lifestyle changes among the mill workers.

Nutrition education may be a reliable method to generate knowledge of dietary and behaviour modification in mill workers. In post intervention, mill workers showed

significantly increased knowledge level regarding the importance of safety measures and also about importance of balanced diet.

### Conclusion

Industrial workers are at high risk of developing occupational health hazards due to hazardous working environment and poor consumption of micronutrients. Nutrition education plays a very important role in improving knowledge level of dal mill workers that indirectly helps dal mill workers to protect their health from health hazards in the mill area. Study also showed that most of the workers were not aware of personal protective equipments (PPEs) and knowledge regarding protective foods. Nutrition education also brought a positive change in the knowledge regarding use of safety measures (PPEs), nutritional practice of the focused group for dietary intakes and use the safety measures in working area. This positive trend indicates that the training has created the awareness and importance of protective measures in mill workers and owners and also about food habits.

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