



Prevalence of Malnutrition in Industrial Workers of Bhopal

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ABSTRACT

In the present era of globalization of business, the nature of work of organizations and its environment are changing radically extending noticeable impact on individual's job, safety, health, and well-being. The study was undertaken to assess the malnutrition level of the Industrial workers. Random sampling method was use to collect the data. We have used statically methods like Percentage, Mean, standard deviation, Two Independent Sample't' test and Paired Sample Non-Parametric Test (Wilcoxon signed-rank Paired Sample test) on dietary intake of workers to study the impact of improper diet on their work and health. For the convenience of the presentation of the results which has been analyzed, a graph has been developed and the results are presented accordingly. Interview schedule based survey was carried out among 50 adult Male Industrial workers in Bhopal city. Demographic profile, socio-economic status, anthropometric measurement, body mass index (BMI) calculation and haemoglobin have been checked to assess malnutrition and anaemia level of the Industrial workers. The result showed that poor health status and highest category of anaemic population were found in this study.

KEYWORDS

Industry, Health status, Body Mass Index (BMI), Malnutrition, Anaemia.

INTRODUCTION:

In India, nutrient deficiencies are mainly found in people living below poverty line. Madhya Pradesh is one of the largest states of the Republic of India. The state is marked with a complete social structure, predominantly agrarian economy a different and inaccessible terrain, and scattered settlements over vast area that together pose several formidable problems to health service delivery systems. Bhopal is the capital of Madhya Pradesh states of India. The Bhopal disaster was the world's worst industrial catastrophe. It occurred on the night of December 2-3, 1984 at the UCIL (Union Carbide India Limited), pesticide plant in Bhopal. A leak of methyl isocyanides gas and other chemicals from the plant resulted in the exposure of hundreds of thousands of people. It is observed that workers still suffer from malnutrition, respiratory diseases, acute, and chronic occupational illness, affecting their health and working capacities.

According to FAO, 2002, 799 million people in the developing world were chronically undernourished in 1998-2000. Even more people are debilitated by deficiencies associated with poor nutrition, especially of vitamin A, iron and iodine (ACC/SCN, 2000). It adversely affects an individual's physical and mental development, productivity and the span of productive years. This problem is most prevalent among the vulnerable sectors of the population particularly those residing in socio-economically depressed urban and rural areas. (Dipti, et. al, 2008)

Malnutrition is a nutrient deficiency disease, this occurs due to poor dietary habits related to food choice, lifestyle and environmental factor. This is not only a problem in children but also among adults and old age specifically those who belong to low socio-economic status. There are many other factors that affect the way people eat. What, when and how much people eat is greatly influenced by emotional, social, cultural and economic factors. However, eating too much, too little or none eating some of each type of food can make people unhealthy. Eating habits also affect the risk for immediate health problems.

Nutritional deficiencies have generally been replaced by dietary imbalances or excesses associated with many of the leading causes of death and disability. Malnutrition is the largest single contributor to disease, according to the UN's Standing Committee on Nutrition (SCN). (UNWFP, September 2013).

According to Joshi, (2003) A balanced diet is one which includes all the nutrients in correct proportion or adequate amounts to promote and preserved health.

Dietary intakes of industrial workers are major factors affecting the nutritional status and health of the workers. The present work is related to the study on the nutritional status of industrial workers. The labours do not get healthy food from the construction companies on working site. Majority of companies are not making provision for better food to their labours. Nutritional status is affected by a number of variables. The Industrial workers are not getting enough nutrition which affects their health status.

The occupational group of factory workers, therefore, deserves special attention because they are one of the backbones of the industrial sector. This group likewise has important needs that must be fulfilled in the midst of declining standards of living. Malnutrition is not only a problem among the pre-school children but also among households specifically those whose heads belong to the occupational groups that are nutritionally disadvantaged like the factory workers. Dietary intakes of farm workers households were shown to be deficient in essential nutrients (Villavieja, 1984), 34.6% of these households were below the food thresholds implying the pervasiveness of poverty in this occupational group. It reduces future adult labour productivity due to young child malnutrition, but this large part of population is giving an excellent support to the country's economy. (Dipti, 2008)

Malnutrition is largely a result of dietary inadequacy and unhealthy lifestyles. Other contributing factors are poor purchasing power, faulty feeding habits, large family size, frequent infections, poor health care, inadequate sanitation and low agricultural production. Population living in the backward and drought-prone rural areas and urban slums, and those belonging to the socially backward groups like scheduled castes and tribal communities are highly susceptible to under nutrition. Similarly, landless labourers and destitute are also at a higher risk. (Rao, 2011)

AIM: The main aim of the study is to see the effect of diet counselling on the industrial workers of Bhopal and to see improvement in the malnutrition / anaemia status.

OBJECTIVES:

1. To collect demographic profile of the Industrial workers. (IW)
2. To assess the anthropometric measurement (Height, Weight) of IW.
3. To calculate BMI grades of IW and assess malnutrition.
4. To measure the haemoglobin level anaemic to know the anaemic condition of Industrial workers
5. Nutritional counselling of the IW by giving them low cost recipes diet chart.
6. Follow up of diet counselling after one month till six months.

METHODOLOGY: Approximately 50 male IW were selected randomly from the different Industries of ward no. 63, Govindpura (Industrial area) of the Bhopal district. An interview schedule was designed on the basis of the operation carried out in these units to gather maximum and useful information. Sample size which is pre-decided of 50 adult male Industrial workers (10 workers from each industry) were taken under the study. The respondents were from labour class working in different industries. Code number has been decided for each Industry like Iron - IP, Cement - CP, Glass fibre - GF, Plastic - PM, and Wood - WP industry. Interview schedule were prepared to collect the information about demographic profile of the Industrial workers and their present health status

Anthropometric measurements techniques were used on the basis of height and weight of the subject's body mass index was calculated to evaluate the malnutrition grades. Haemoglobin test has been done to know anaemic status of Industrial workers. For assessment of dietary pattern of the industrial workers, 24 hour recall method has been used in the frequency of 3 to 7 days. Diet counselling conducted to improve health status of Industrial workers by giving them low cost recipes diet chart and their feedback has been taken after one month till six month. Collected data was tabulated and statistically analyzed to assess the health status of the Industrial workers. Statistical methods like Percentage, Mean, standard deviation, Two Independent Sample 't' test and Paired Sample Non-Parametric Test (Wilcoxon signed-rank Paired Sample test) have been used on dietary intake of workers to study the impact of improper diet on their work and health.

RESULT: This study deals about the health issues of the workers working in different Industries. The study was planned to observe occurrence of malnutrition in Industrial workers like under weight, overweight and nutritional deficiency anaemic status of Industrial workers. The results of the research work are presented through different bar diagram, pie chart and histogram and graphical representation are used to make presentation easy to understand. The following results were obtained by the statistical calculation. These relations are to be analysed, compared, evaluated and then conclusions are drawn

Table No.-(1)-Average BMI Mean Difference and Percentage of Industrial Workers and Comparison with Standard (N=50)

BMI	No	Average BMI of Workers	%	Mean Difference
<18.5 (Under Wt.)	18	18.3	36.0	-0.2
18.5 - 25 (Normal)	32	19.5	64.0	1
25 - 30 (Over Weight)	Nil	Nil	Nil	Nil
> 30 (Obese) Grade I, II, III	Nil	Nil	Nil	Nil

BMI is a reasonable indicator of the nutritional status of an individual. BMI was calculated from the weight in kilograms and height in meters of an individual. Table (1) shows that underweight category of male worker having mean value - 0.2. These calculations show the poor health status were found in industrial workers. For knowing the health status of workers

BMI and mean difference has been calculated. On average 36.0 percent of Industrial workers found underweight. This indicates that malnourished was almost increasing rate in among Industrial workers and 64.0 percent Industrial workers were found normal according to BMI grades.

Table No.(2)- Average BMI Mean Difference of Male Industrial Workers after Diet Counseling (N=50)

BMI	No.	Average	Mean Difference
<18.5 (Under Wt.)	Before	18.1	-0.4
	After	19.7	1.2
18.5 - 25 (Normal)	Before	18.9	0.4
	After	20.1	1.6
25 - 30 (Over Weight)	Before	Nil	Nil
	After	Nil	Nil
> 30 (Obese) [Grade I, II, III]	Before	Nil	Nil
	After	Nil	Nil

For healthy person standard BMI should be in between the range of 18.5 - 24.5. Table (2) shows that before counselling average mean difference of Industrial workers -0.4 were seen in male Industrial worker. After two month feedback has been taken and weight and height has been measure and calculates mean difference and found that mean difference was 1.2 in male Industrial worker. This indicates that counselling help them to improve their health conditions. BMI of the workers is shown in the figure no. (2) which represents the total Industrial workers malnourished on the basis of BMI category. It was found on an average 42 percent were under weight, this group was nutritionally-at-risk group and 58 percent were normal. This indicates that malnutrition was almost increasing rate in among industrial workers. Findings of the results show that poor nutrition consumption; ultimately affect the health status of the workers.

Figure No. - 2



Table No.- (3.a) Changes in Haemoglobin of Industrial Workers (N=50)

Code of Industries	No	Std. Hb 13 - 17 g/dl for Male			
		Before Ave. Hb(g/dl)	Mean Difference	After Ave. Hb(g/dl)	Mean Difference
IP	8	11.5	-1.5	12.4	-0.6
CP	12	10.6	-2.4	11.1	-1.9
GF	13	9.7	-3.3	10.6	-2.4
PM	7	11.1	-1.9	12.8	-0.2
WP	9	9.8	-3.2	11.9	-2.1

The level of haemoglobin in the blood is used to measure anaemic condition. Above table (3.a) shows the result in which it is clearly visible that the before counselling mean difference of highest value is -3.8 and lowest value is -1.1 for male Industrial worker. Apart from this after counselling mean difference of highest value is -2.4 and lowest value is -0.8 for

male Industrial worker. This values show the severity of anaemic condition in Industrial workers.

Table No. - [3 (b)]- Distribution of Industrial Workers according to the grades of Anaemia after Diet Counseling (N=50)

Category of Anaemia	St. Hb Grades(g/dl)	Before		After	
		N	%	N	%
Normal	13 to 17	-	-	1	2
Mild	11 to 12.5	12	24	25	50
Moderate	8.5 to 10.5	15	30	12	24
Severe	< 8	22	44	10	20

Present result of haemoglobin level of Industrial workers shown in table (3, b). It is found that before counselling haemoglobin level of male worker is 24 percent mild anaemic, 30 percent moderate anaemic and 44 percent found severe and no person is found in normal anaemic. After counselling it was found that 2 percent normal, 50 percent mild anaemic, 24 percent moderate anaemic, 20 percent found severe anaemic. Anaemia can be attribute-able to multiple nutritional deficiencies (eg, iron, vitamin B12, folate, vitamin C, and protein), a careful analysis of blood sample is important to check the anaemic condition.

Changes in Dietary Pattern of Industrial Workers after Diet Counselling: The impact of counselling on Industrial workers' dietary pattern was recorded after one month till six month through feedback process. All these data collected are analysed and interpreted using statistical method and all the changes before and after counselling are capture in the result. The quantity and quality of dietary intake are assessed by prospective food records (with weighed or estimated food portions). This is called food frequencies questionnaire in which prospective food record were carried out for 3 to 7 days (including a combination of weekend and weekdays) and provide the most accurate assessment of actual intake. However, food records are used most often in the research setting because they are labour intensive and time consuming. As available, these records are analyzed and compared to the recommended dietary intakes.

Table 4 : Wilcoxon Signed Paired Non Parametric Test for changes in Dietary Intake (calories) of Industrial Workers Descriptive Statistics

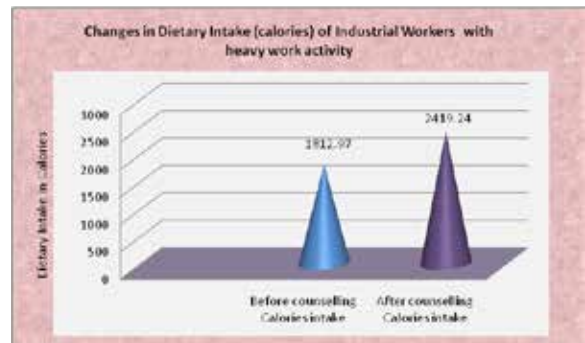
Independent Variables	N	Mean	Standard Deviation	Minimum	Maximum
Before Calories intake	50	1812.97	107.57	1542.60	2123.20
After Calories intake	50	2419.24	276.54	1843.10	2962.60

Industrial workers dietary intake in calories was taken and was compared with the standards by the RDA for these types of workers. The result of table (4) showed the descriptive statistics for variables in the analysis. These statistics offer descriptions of the centre, variability, and shape of the distributions of the variables. Total 50 industrial workers with heavy activity level were identified and Wilcoxon Signed Paired non parametric test was used to analyze the data for change in dietary intake after giving counselling to these industrial workers because dietary intake of industrial workers was identified very low before counselling. The means for before dietary intake (in k. calories) and after counselling dietary intake (in k. calories) was compared and was found that before counselling the dietary intake of the industrial worker, with heavy level of work was very poor (M=1812.97 & SD=107.57) and after providing counselling to them regarding the necessary required dietary intake, a slight improvement was observed as per the mean values (M=2419.24 & 276.54) of after dietary intake (in

calories).

The mean values of after diet intake is significantly different from the mean value of pre diet intake (difference mean =606.27 & SD= 168.97). Before counselling the minimum calories intake by a heavy level activity industrial work was found 1542.60 and maximum calories intake was 2123.20. However, after counselling minimum calories intake by a heavy level activity industrial work was found 1843.10 and maximum calories intake was 2962.20. A change in minimum calories intake before-after was 300.50 and maximum calories intake was 839. On the basis of descriptive statistics it can be said that counselling worked and changed the dietary pattern of the heavy level worker of the industries.

Figure No. - 3



The dietary history is an essential component of the nutritional screening. The dietary history provides information not only on the amount and quality of food consumed, but also on the eating patterns and behaviours of the family. This part of the nutritional screening also provides information on the number of meals, snacks, and beverages consumed by the industrial worker.

In the study during the interaction with workers it was observe that most of the Industrial workers are doing heavy activities. They are consuming food basically to fulfil their hunger and they are not having any knowledge about nutritionally adequate diet. It was found that intake of protein in their diet is very low. The most important aspect of this research is to educate the industrial workers to take diet which are richer in protein, vitamins and minerals so that they can have nutritionally adequate and balanced diet.

Through observation it was found that some Industrial workers are not getting adequate food. For this it is necessary to educate them how to get proper nutritional food with same cost which is rich in protein, vitamin and minerals. After counselling the dietary intake has increased. Post counselling no change or calorie wise dietary intake has become lower than the before calories intake than only we would have got a positive's' value. Hence, it can be said that a significant change has been found the calories wise dietary intake of the heavy level activity workers of the industries. Therefore, we can reject the hypothesis because counselling works to change the perception and action of the Industrial works regarding their dietary intake.

On the basis of descriptive statistics it can be said that counselling worked and changed the dietary pattern of the heavy level worker of the industries. The industrial workers' health research not only generates knowledge, but also it should lead to action. In particular, research outcomes must guide the policy and program development, as well as the delivery of health services. Healthcare interventions should be evidence-based in solid research. Better health can make workers more productive, either through fewer days off or through increased output while working. Improved health of family members will have a similar impact through reducing time lost to caring for dependants. Statistical result shows the impact

of diet counselling on the health of Industrial worker. For their health improvement purpose well nourished diet (meal) plan and recipes were prescribed to the industrial workers. Meal plan was prepared considering the food availability and dietary pattern of the Industrial workers.

Overall result reveals that maximum numbers of Industrial workers are low income group while they are doing heavy work with poor nutritional status. A high percentage of anaemia found in Industrial workers. This indicates that malnutrition and anaemia was increasing in among industrial workers. Findings of the results show that poor nutrition consumption; ultimately affect the health status of the Industrial workers.

CONCLUSION:

Industrial diseases nowadays become a major health problem because of poor life style. Low socio-economic status is the main cause of poor health of the workers. A wide range of malnutrition category of Industrial workers was found in this study, It shows due to their low monthly income they cannot afford nutritious food. Poor nutritional status shows the high anaemia level in industrial workers. Findings from this study revealed that a high prevalence of malnutrition exists among the industrial workers. Workers of the studied group have deprived socio-economic status. Poor socio-economic status is a key contributing factor for poor dietary intake, eating patterns and food behaviours that also contribute to dietary intake and ultimately affects nutritional and health status of the Industrial workers. Emerging occupational and epidemiological health problems are major priorities that need to be tackled along with existing malnutrition.

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