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# Comparative study on the nutritional status of brick industrial worker between male and female, West Bengal

**Sudip Kumar Das[1*], Abhisek Das[2]**
[1] Professor, Department of Nutrition, Mahishadal Girls' College, Vidyasagar University, west Bengal, India
[2] B.Sc. (H), Department Nutrition, Mahishadal Raj College, Vidyasagar University, west Bengal, India

**Abstract**
Brick field industries are one of the largest and oldest industries in India, in which millions of skilled and unskilled workers from all over the country make their livelihood. Brick is one of the most important building materials or unit of construction in India. Fried clay bricks are produced in India and about 42,000 small or cottage scale brick kilns and clamps operate seasonally. As per the latest estimate annual production of bricks in India is 51,000 million from 45,000 small/cottage scale units distributed throughout the country and there are 2.5 million workers employed in the sector. The present study is objected for following factors: To study the Nutritional Status and Health Status of brick industrial worker between male and female in connection to their dietary analysis, to study Height, Weight, B.M.I and W.H.R. of brick industrial worker following anthropometric technique to search out their nutritional status comparing with specific ratio like W.H.R and B.M.I., to compare the health status between male and female brick workers which may be caused due to insufficient intake of nutrient and imbalance between nutrient intake and energy expenditure and to analysis the dietary consumption of brick industrial worker between male and female. Nutritionists have an essential role optimizing the health of all ages and abilities because due to heavy demand of physical activity workers need extra nutritional foods both female and male. There are three basic fuels the relics on while physical activity- carbohydrate, fat, protein needs more calories from these fuels are required to sustain energy levels and maintain lean body mass, particularly, a balance diet that is high in carbohydrate, low in fat and adequate protein with rich in vitamins, minerals and anti-oxident is the recommended for brick worker. Female worker are also deprive the foods because they like to distribute the foods among male worker in their family. So they are also deficit of these nutrients. Workers should be encouraged to eat a wide variety of foods; this does not mean convincing the vegetarian that they need poultry, fish or dairy products in diets. Low cost available local foods should be included in diet. These are papaya, guava etc.

**Keywords:** Brick worker, nutritional status, BMI, MUAC, WHR

## Introduction
Industrialization has been recognized as the main solution to the problem of unemployment in developing countries like India, in recent years. There has been a steady increase in the number of persons employed in various factories, over the past few years. The majority of these employees may be referred to as 'workers' or 'laborers'. The overall production of the factories (and thus national income) depends to a great extent, on the work efficiency of the workers. Brick field industries are one of the largest and oldest industries in India, in which millions of skilled and unskilled workers from all over the country make their livelihood. Brick is one of the most important building materials or unit of construction in India. Fried clay bricks are produced in India and about 42,000 small or cottage scale brick kilns and clamps operate seasonally. As per the latest estimate annual production of bricks in India is 51,000 million from 45,000 small/cottage scale units distributed throughout the country and there are 2.5 million workers employed in the sector. Workers are one of the pillars of each and every industry. Needless to mention that a well-clad, well-fed, satisfied, pleased worker is a plus point to any industry. So the owners of the industries need to pay attention towards the development of the workers engaged in the industries. A large numbers of women workers are affianced in industries. The brick industries are not a special one. Women comprise a huge part of the human population. They take part in a very important role in developing Indian economy. Their involvement to the society cannot be gainsaid. They are the pillars are the families. They clutch the main key in maintaining their families. They give up their expensive time in bringing up their siblings. They are rendering their services in different customs. They are also working in brick kilns for the maintanance of their families. In order to maintain their families, maintainable earnings should be provided. Conducive working environment, healthy industrial relations, welfare facilities etc need to be extended to the workingmen. The non-existence of the above factors may obstruct the resonance industrial relation, demotivate the workers, create job dissatisfaction, and increase labour turnover and absenteeism. No denying the fact that good, favorable socio economic condition of the workers may act as a booster, which in turn may establish congenial industrial relations. In this backdrop, an attempt has been made to find out the socio-economic conditions of the women workers engaged in the selected brickkiln factories

## About the workers of brick industry
Brick making is a traditional industry of West Bengal. Brick is

as old as civilization itself. It dates back to ancient Mesopatemia around 500 BC. The archeological ruins of Mahenjo Daro and Harappa which date back over 4000 years indicate that brick making was well developed in India in ancient times. The silted topography of the region (West Bengal) is uniquely suited for making bricks. In the past the riverine delta region of South Bengal provided quality-soil as a cheap source of raw material and the in- land canals functioned as the mode of low-cost and easily accessible local transport. The hinterland of Kolkata – the districts of Howrah, Hooghly, North 24 Parganas and South 24 Parganas – thus became suitable locations for brickfields, as the city grew in size. In west Bengal, around 3500 brick-manufacturing units provide employment (officialy) to more than 0.7 million people from the rural agricultural sector. Brick industry creates 50 jobs against an investment of 0.1 million rupees compared to 7 jobs in other small-scale industries and 2 jobs in large-scale industries. Most of the workers engaged in brick industry are migrants and they are causally engaged. The brickfields in Bengal have been set up for nearly two centuries now. Since the begining of the colonial period in Bengal, the structure of Fort Willams, representing the power and might of the British army and many other structures of significance were erected from bricks. Brick production is a seasonal activity. The seasonal migrant worker living in the brickfields throughout the period of 6 to 8 months of production, returns back to the village after the production season comes to a close. The Brickfields known as the it-khola, are open cast and work continues from 6 a.m. in the morning to 6 p.m. in the evening. The whole process of brick making is split into a number of tasks performed sequentially in different locations within the brickfields spread over 7 to 12 bighas (2.5 to 4 acres) of land. The workers enagged in brickfields in West Bengal are: Pathera (those who moulds bricks), Matikata labour (the earth diggers), Taboya (the bearers of mud-filled baskets), Reja (those who carry bricks to the furnace), Bujhai mistri (the workers who arrange bricks in a particular fashion in the furnace), Mati-phulla (the workers who bring prepared soil to the reja for moulding), Bail hakka (the workers who drive bullocks rounds the mills for grinding soil), Muh-katta (the workers who collect the mixed soil from the open end of the mill).

**Nutritional status of brick field workers**

Nutrition and health are the most important contributory factors for human resource developement in the country. Nutrition is concerned with social, economic, cultural and physiological implications of the food eaten. Under nutrition among adult population is a serious public health problem internationally, especially in developing countries. Malnutrition in adult population puts them at a high risk of a decreased physical developement and increased incidence of infectious disease. Though, anthropometry have some limitations, yet, it's remains the most practical tool for a rapid assessment of nutritional status at individual as well as community level, particularly in resource constrained circumstances in developing countries such as India. Body mass index (BMI) is widely accepted as one of the best indicators of nutritional status in adults. Many studies have shown that BMI is a resonable anthropometric measure of total body fat or storage of energy in the body. Although adult nutritional status can be evaluated in several ways, the BMI is the most widely used because it is simple, inexpensive, safe and suitable for large scale surveys. BMI reflects not only the nutritional status but also the socio-economic condition of a population, especially the adult population in developing countries. A BMI <18.5 $kg/m^2$ is widely used as a practical measure of chronic energy deficiency (CED) i.e a 'steady' state of underweight in which an individual is in an energy balance irrespective of a loss in body weight or body energy stores. Such a 'steady' underweight is likely to be associated with morbidity or other physiological and functional impairments. CED is caused by inadequate intake of energy accompanied by high level of physical activities and infections for a considerably long period of life. It is associated with reduced work capacity, poor work performance and productivity increased morbidity due to supressed immune function and behavioral changes. On the other hand, mid upper arm cicumferance (MUAC) is another anthropometric measure use to evaluate adult nutritional status. It is simpler measure than BMI, requires minimum equipment and may predict morbidity and mortality as accurately as underweight. An extensive study using data from 8 countries (Mali, India, Senegal, Zimbabwe, Somalia, Ethiopia, Papua New Guinea and China) suggested that MUAC could be used as a simple screening tool for assessment of nutritional status. MUAC has been suggested as a substitute for BMI when the rapid screening of an adult population is required as a prelude to targetting the provision of assistance to those who are undernourished.

**Common health disorders of brick field workers**

The common physical hazard in most industries is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and decreased efficiency, increased fatigue and enhanced accident rates. Many industries have local 'hot spots' oven and furnaces which radiate heat. Radiant heat is the main problem in foundry, glass and steel industries while heat stagnation is the principal problem in jute and cotton textile industry. High temperatures are also found in mines for instance in the collar crowd mines of Mysore which is the second deepest mine of the world (11,000feet), temperatures as high as 150 deg are recorded. The workers may be to the exposed to the risk of poor illumination or excessive brightness, the acute affects of poor illumination are eye strain, headache, eye pain, and lachrymator, congestion around the cornea and eye fatigue. Exposure to excessive brightness or glare is associated with discomfort, annoyance and nasal fatigue. Vision, and lead to accidents. Should be sufficient and suitable lighting, natural or artificial, where every person are working There.

1. In brick field industry, the female brick field workers have to perform various types of hard and strenuous work that lead to lower back pain (LBP) in the body. Studies of the epidemiology of LBP have implicated mechanical risk factors, such as manual handling, carrying heavy loads and work related posture. Lower back pain problem is a major public health problem with over 80% of the world

Population reporting LBP at some point in their life. It is a disorder with much possible etiology, occurring in different groups, and is also a common health condition in working populations. Female brick field workers are at a high risk of suffering from occupational-related LBP because of high risk activities involved in different activities in brick production. LBP and its associated disability continue to plague the brick field industry. The prevalence of occupational-related LBP among manual workers in the brick manufacturing companies is believed to be due to high exposure to awkward postures for long hours, heavy manual work and exposure to whole-body vibration in the work environment. LBP is associated with major costs in terms of health resource usage, work disability and absenteeism and loss of quality of life.

2. Dusts are finally divided soil particles with size ranging from 0.1 to 150 microns. They are released into the atmosphere during unloading, grinding, abrading, loading and unloading operation. Dusts are produced in a number of industries-mines, foundry, industries. Dust particles larger than 10 microns settle down from the air rapidly, while the smaller ones remain suspended indefinitely. Particles smaller than 5 microns are directly inhaled into the lungs and are retained there this fraction of the dust is called "respirable dust", and is mainly responsible for phenmo coniosis. Dust has been classified into inorganic and organic dust. The soluble and insoluble dusts. The inorganic dusts are silica, mica, coal, asbestos, dust etc. The organic dusts are cotton, jute and the lick. The soluble dusts dissolve slowly; enter the systemic circulation, and re eventually eliminated by body metabolism. The insoluble dusts remain, more or less, permanently in the lunges. They are mainly the cause of pneumoconiosis. The most common dust diseases in this country are silicosis and anthracnose.
3. Exposure to gases is a common on hazard in industries. Gases are sometime gasified as simple gases (e.g. chloroform, the, tri-chloro ethylene). Carbon monoxide hazard is frequently reported in coal gas manufacturing plants and steel industry.
4. A large number of metals, and their compounds are used throughout. The chief mode of entry of some them is by inhalation as dust or fumes. The industrial physician should be aware of the toxic effect of lead, antimony, arsenic, beryllium, cadmium, cobalt, manganese, marcher, phosphorus, chromium, zinc and others. The ill effects depend upon the duration of exposure. Unlike the pneumoconiosis, most chemical intoxications respond favorably to cessation, exposure and medical treatment.
5. Occupational disease may also result from ingestion of chemical substances such as lead, mercury, arsenic, zinc, chromium, cadmium, phosphorus etc. Usually these substances are swallowed hands, food or small proportion may reach the general blood circulation.
6. The Psychosocial hazards arise from the workers failure to adapt to lion. Lack of job satisfaction in serenity, poor some of the workers. The capacity to adapt to different working environments influenced by many factors such as education, cultural background, family life, social habits and what the worker expects from employment.

The health effects can be classified in two main categories a>Psychological and behavioural changes including hostility, aggressions, anxiety, depression, tardiness, alcoholism, drug abuse, sickness absenteeism. b>Psychosomatic ill health: including fatigue, headache, pain in the shoulders, neck and back, propensity to peptic ulcer, hypertension, heart disease and rapid ageing(33). Reports from various parts of the world indicate that physical factors cheat, noise, poor lighting, also play a major role in adding to or precipitating mental disorder among workers. The increasing stress to or precipitating mental disorder among workers. The increasing stress on automation, electronic operations and nuclear energy may introduce newer psychosocial health problems in industry. Psychosocial hazards are therefore assuming more importance than physical or chemical hazards.

**Aims and objectives**

The present study is objected for following factors:

- To study the Nutritional Status and Health Status of brick industrial worker between male and female in connection to their dietary analysis.
- To study Height, Weight, B.M.I and W.H.R. of brick industrial worker following anthropometric technique to search out their nutritional status comparing with specific ratio like W.H.R and B.M.I.
- To compare the health status between male and female brick workers which may be caused due to insufficient intake of nutrient and imbalance between nutrient intake and energy expenditure.
- To analysis the dietary consumption of brick industrial worker between male and female.

**Materials and methods**

The present study involved Brick industrial workers to find out the nutritional status and health status between male and female, belonging to the age group of 20-30years were selected to complete the project work. I had visited a brick industry in our locality is located in Haldia, Purba Medinipur. The project work covered the total number of 30 male and 30 females.

**Parameters**

To find out the health status following parameters and adopted.

- Height (cm)
- Weight (kg)
- Body mass index (kg/m2)
- Waist circumference(cm)
- Hip circumference(cm)
- MUAC (cm)

**Anthropometric Measurement**

To do this project work I have measured the height, weight, waist circumference, mid upper arm circumference of 20-30 years of break industrial worker between male and female. I used some anthropometric indicate for coquet the information of this project.

**Measurement of height**

Height is measured with a vertical measuring rob. The subject should stand create looking straight on a level surface with heels together and toes apart, without shoes. The moving had pieces of the anthropometry should be lowered to rest flat on the top of the reading should be taken. Height should be take read to the nearest ¼" or 0.5cm. an average of three measurement is taken as the measurement.

**Measurement of body weight**

Subject stands on the platform of the human weighting machine exerting equal pressure on both feet the reading in taken from the scale with an accuracy of 0.5 kg.

Weight is measured with the individual under Basel conditions with minimum clothing and without shoes. The zero error of the weighing scale should be checked before taking the corrected as and when required.

**Measurement of mid upper arm circumference**

This circumference is measured at the midpoint of left upper arm (between the acromial and olecranon) horizontally and biceps lend with the handling felly either by flexible steel tape. The measuring fake is held gently without pressing the soft tissue. The tape must be flexible no stretchable and unaffected by temperature

**Measurement of waist circumference**

This is measured horizontally on the trunk at the level of waist line by using steel tape.

**Measurement of hip circumference**

This is measured horizontally at the level of gluteus. Tape is placed on the gluteus muscle and its edge mid of the lateral sawfly of the things.

**Calculation of index**

Body mass index is measured by the following formula.

BMI (Body Mass Index)

$BMI = Weight\ (kg)/Height\ (m)^2$

**Waist to the Hip ratio**

The predominant distribution of fat in an obese person, whether in the upper part or the lower part of the body, may determine the disease pattern. This was estimated by dividing the waist circumference. The limit of WHR was>0.85for wamen and >1.00 for men.

**Questionnaire methods for measuring food intake**

Health status measurement of nutritional status of brick industrial worker questonnarie method a diet survey may also includes data collection to dietary habits and practices. The data that is collected to have translated into.

Mean intake (grams of food in terms of cereals, pulses, vegetables, fruits, milk, meat, fish and AGGS). The mean intake of nutrients per individual consumption unit this diet survey provides information a dietary intake patterns, specific foods consumed and estimated intakes.The caloriefic and nutritive values of different food stuffs consumed by the workers were estimated using the tables of nutritive value of Indian food and compared with the quantity of the Recommended Dietary Allowance (RDA) for the Indians by ICMR 2010. The survey was carried out during a period of 7 days.

**Analysis of data**

The data of each anthropometric parameter and food intake of workers were used for calculating the mean and standard deviation. The standard error of means are also calculated. These mean values were compared with the standard data published by ICMR and NCHS.

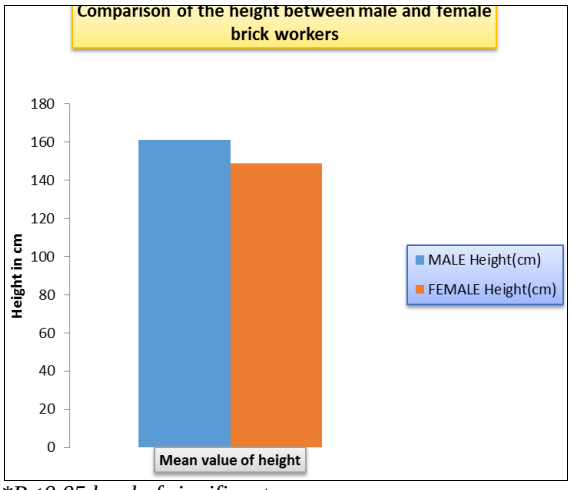
**Statistical Analysis**

For determination of statistical significant difference of different parameters, student 't' test were performed. $P<0.05$ was considered as significant.

**Result**

**Table 1:** A Value shows: Mean ± SE

| Category | Mean Height(cm) ±SE |
|---|---|
| Male(n=30) | 160.91 ±0.73 |
| Female(n=30) | 148.81 ±0.59 |

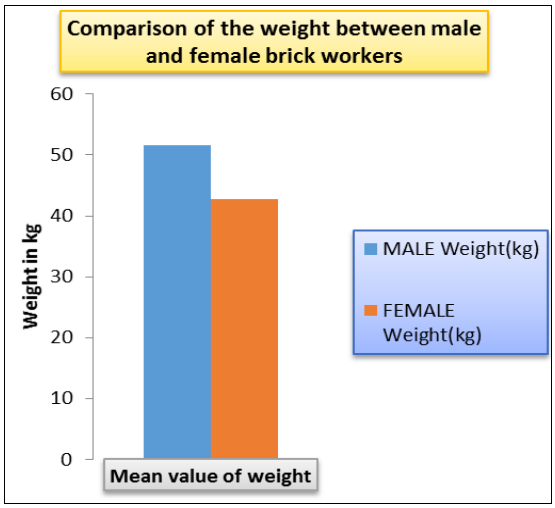



**P<0.05 level of significant*

**Fig 1:** Column diagram represent height of male and female brick workers (20-30 years).Data represents mean±SE followed by two tail 't' test.

**Table 2:** B Data are represent as Mean ± SE, n=30. Data of each group compared by two Tai

| Category | Mean Weight(kg) ±SE |
|---|---|
| Male(n=30) | 51.52 ±0.67 |
| Female(n=30) | 42.7 ±0.39 |

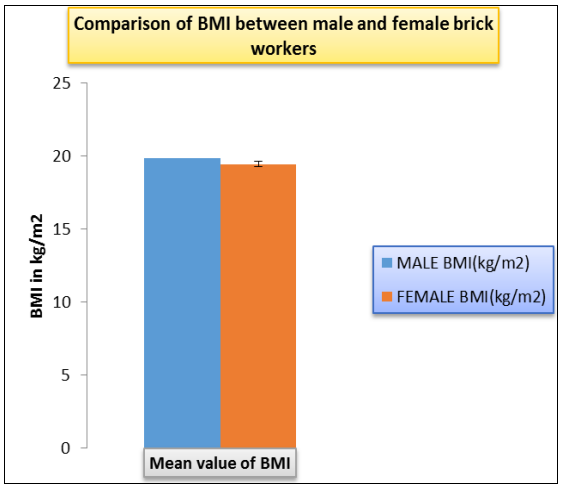



**P<0.05 level of significant*

**Fig 2:** Column diagram represent weight of male and female brick workers (20-30 years).Data represents mean ± SE followed by two tail 't' test.

**Table 3:** C Value shows:Mean±SE

| Category | Mean BMI(kg/m2) ±SE |
|---|---|
| Male(n=30) | 19.84 ±0.22 |
| Female(n=30) | 19.46 ±0.18 |

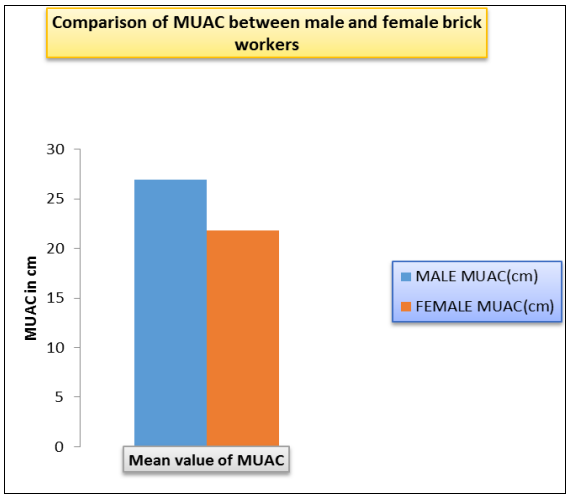



**P>0.05 level is not significant*

**Fig 3:** Column diagram represent BMI of male and female brick workers (20-30 years).Data represents mean ± SE followed by two tail 't' test.

**Table 4:** D Value shows: Mean± SE

| Category | Mean MUAC(cm) ±SE |
|---|---|
| Male(n=30) | 26.96 ±0.08 |
| Female(n=30) | 21.85 ±0.02 |

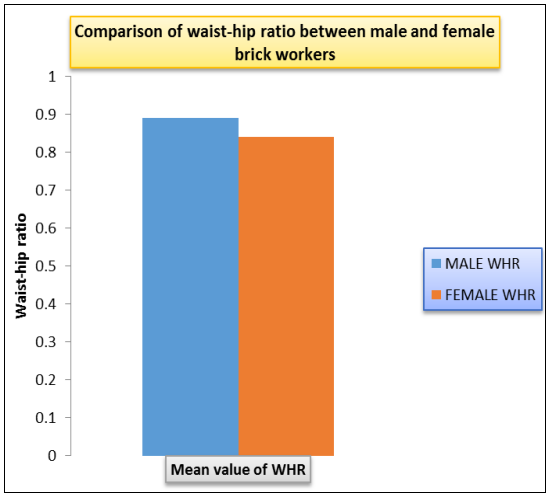



**P>0.05 level is not significant*

**Fig 4:** Column diagram represent MUAC of male and female brick workers (20-30 years).Data represents mean±SE followed by two tail 't' test.

**Table 5:** E Value shows: Mean ±SE

| Category | Mean Waist Hip ratio ±SE |
|---|---|
| Male(n=30) | 0.89 ±0.28 |
| Female(n=30) | 0.84 ±0.30 |

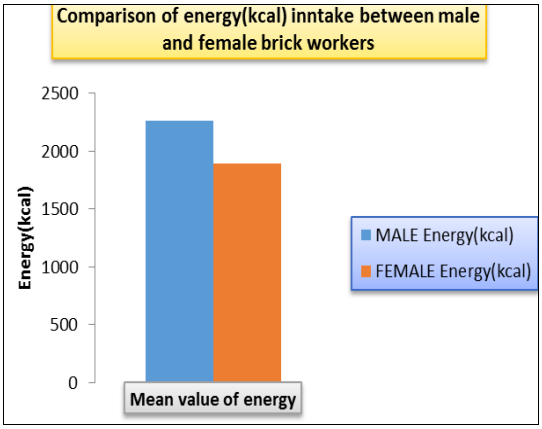



**P>0.05 level is not significant*

**Fig 5:** Column diagram represent WHR of male and female brick workers (20-30 years).Data represents mean±SE followed by two tail 't' test.

**Table 6:** F Value shows: Mean± SE

| Category | Mean Energy(kcal) ±SE |
|---|---|
| Male(n=30) | 2260.33 ±18.68 |
| Female(n=30) | 1894.43 ±14.29 |

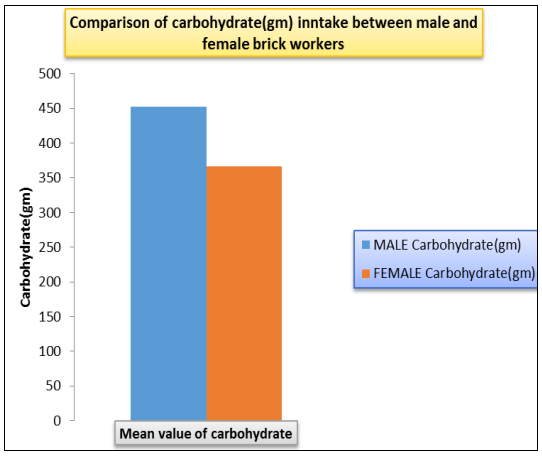



*P<0.05 level of significant*

**Fig 6:** Column diagram represent energy intake of male and female brick workers (20-30 years).Data represents mean ± SE followed by two tail't' test.

**Table 7:** G Value shows: Mean ±SE

| Category | Mean Carbohydrate(gm) ±SE |
|---|---|
| Male(n=30) | 452.3 ±3.70 |
| Female(n=30) | 367 ±2.72 |

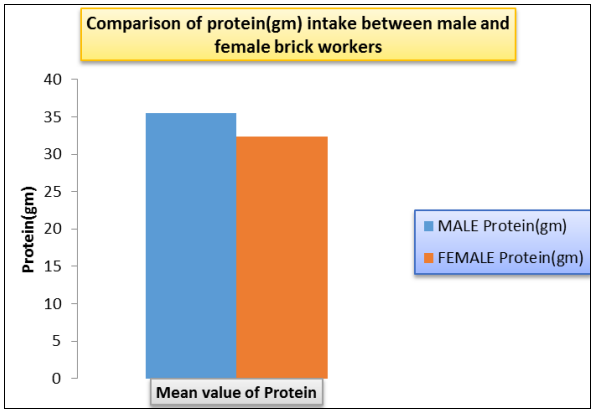



*P>0.05 level is not significant*

**Fig 7:** Column diagram represent carbohydrate intake of male and female brick workers (20-30 years).Data represents mean ±SE followed by two tail't' test.

**Table 8:** H Value shows: Mean± SE; n=30

| Category | Mean Protein(gm) ±SE |
|---|---|
| Male(n=30) | 35.53 ±0.59 |
| Female(n=30) | 32.33 ±0.51 |

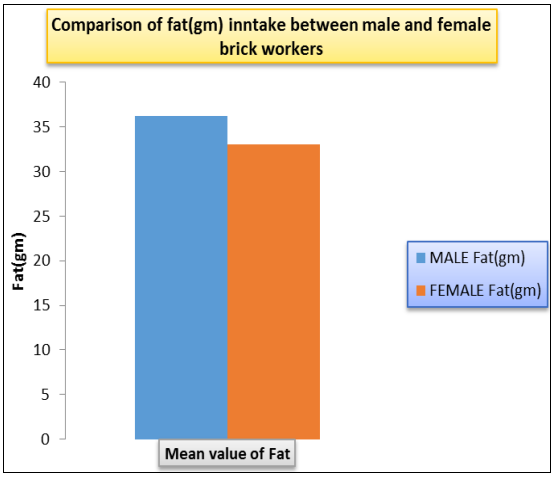



*P<0.05 level of significant*

**Fig 8:** Column diagram represent protein intake of male and female brick workers (20-30 years).Data represents mean± SE followed by two tail 't' test.

**Table 9:** I Value shows: Mean± SE

| Category | Mean Fat(gm) ±SE |
|---|---|
| Male(n=30) | 36.23 ±0.57 |
| Female(n=30) | 33 ±0.56 |




*P<0.05 level of significant*

**Fig 9:** Column diagram represent fat intake of male and female brick workers (20-30 years).Data represents mean± SE followed by two tail 't' test.

## Discussion

Work output is influenced by nutritional status. Underweight with body mass index less than 18 has been found to be associated with lower work output according to some studies (43). Marginal malnutrition including subclinical vitamins and

minerals deficiencies can affect some vital functions such as physical work capacity (PWC), Immunological competence, cognitive functions and behavior. In a group of severelymalnourished individuals PWC and other indices could be partially corrected by a supplement of good quality meat in controlled hospital environment (44).The low body mass index of more than half of the subjewcts of the present study suggest that the workers were not meeting their energy requirements. According to the subcommitee of International Dietary Energy Consultative Group (IDECG), body mass index values between 20 and 25 are normal and between 18.5 and 20.0 are low weight normal, where as values below 18.5 correspond to chronic energy deficiency and those above 25.0 correspond to obesity(45).It has been proposed by several scientists the body mass index values below 18.5 may further be classified into three grades of chronic energy deficiency (CED), That is 17.-18.4 CED grade I, 16.0-17.0 CED grade II and below 16.0 CED grade III. A body mass index of below 17 is taken as too low and as constituting a substantial risk to health (46). The health of the workers directly linked to their status in the society. Generally household level, socioeconomic factors and cultural norms and practices determine the extent of health and nutritional status(47).Brick field workers are generaly suffer form the musculoskeletal pain because of their continous standing at work place, forword bending for weight lifting long working hour.They had to work throughout in the sun, in the rain and in the cold for their job(48).The dust partical and smoke of the brick field generally enter through the respiratory tract and cause bronchial asthma, chronic cough etc(49).In our present studyit was also observed.

**Conclusion**

Nutritionists have an essential role optimizing the health of all ages and abilities because due to heavy demand of physical activity workers need extra nutritional foods both female and male. There are three basic fuels the relics on while physical activity- carbohydrate, fat, protein needs more calories from these fuels are required to sustain energy levels and maintain lean body mass, particularly, a balance diet that is high in carbohydrate, low in fat and adequate protein with rich in vitamins, minerals and anti-oxident is the recommended for brick worker. Female worker are also deprive the foods because they like to distribute the foods among male worker in their family. So they are also deficit of these nutrients.

Workers should be encouraged to eat a wide variety of foods, this does not mean convincing the vegetarian that they need poultry, fish or dairy products in diets. Low cost available local foods should be included in diet. These are papaya, guava etc.

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