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IMPACT OF NUTRITIONAL KNOWLEDGE AMONG MALE EMPLOYEES OF ORGANIZED AND UNORGANIZED SECTORS OF CHANDIGARH

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ABSTRACT

Urbanization involves alteration in occupational pattern leading to lifestyle changes. These changes cause 'Nutrition Transition' which is reflected in dietary practices with rising consumption of convenience foods that are energy-dense and nutrient-poor. A self designed pre tested questionnaire was used to compare the demographic profile, nutritional knowledge scores and physical activity levels (Global Physical Activity Questionnaire- version 2) of 450 male employees of organized (225) and unorganized (225) sectors in Chandigarh. All respondents were literate. The nutritional knowledge scores were higher in the organized sector (21.1±3.4) along with overweight and obesity as compared to unorganized sector (20.4±3.0). A direct relation was seen between educational qualifications and nutritional knowledge in organized sector. 67.56% and 66.2% were moderately active in organized and unorganized sector respectively. With reference to sedentary activity, respondents in organized sector had higher nutritional knowledge score (21.3±3.6) as compared to unorganized sector (19.8±2.7). The respondents were seen to be aware of ill effects of incorrect dietary practices, but minor efforts were made to follow a healthier lifestyle. Hence, urbanization, changes in dietary habits and physical activity levels have been found to be associated with increased prevalence of overweight and obesity.

Key words: Nutritional knowledge, Education, Obesity, Sedentary activity, Nutrition Transition.

INTRODUCTION

Urbanization involves changes in occupation patterns, life-styles, family structures and value systems. These changes are reflected in dietary practices and levels of physical activity. Convenience foods and fast foods find increasing acceptance, especially in the context of globalization (Gopalan, 1998). Foreign Direct Investment (FDI) is a key mechanism shaping the market for highly processed foods in developing countries. FDI makes more processed foods available to consumers. It enables lower prices and opens up new purchasing channels. It also has repercussions for the food supply chain. As a consequence, FDI drives sales and consumption of highly processed foods. FDI in food service has stimulated the growth of fast-food restaurants, leading to huge growth in consumption of French fries world-wide. In an inter-related shift, trade in frozen potato products has expanded, with the amount imported associated with the degree of FDI in the fast food sector. Hand-in-hand increased trade with increased FDI in French fries processing plants, which provide fries for the host market and intraregional trade (Howkes, 2004). During the past decade alone, the rural economy is estimated to have grown on average by 7.3% as compared to 5.4% in the urban economy. The latest Central Statistical Organization figures show that the rural economy accounted for 49% of India's GDP in 2000. This is a significant increase from 41% in 1981-82 and 46% in 1993-94 (Gopalan, 1998).

According to United Nations Conference on Trade and Development (UNCTAD) in a report on world investment prospects titled, 'World Investment Prospects Survey 2009-2012', India was ranked second in global foreign direct investments in 2010 and has continued to remain among the top five attractive destinations for international investors during 2010-12 period. (www.fdiindia.in) According to the Indian Fast Food Market Analysis report, India's fast food market is growing fast, at a rate of 30-35% per year. It has been suggested that rapid urbanization, swift economic growth, and increase in average income in India will lead to an increase in consumerism (www.rncos.com). Eating patterns and dietary behavior of people have changed and there is a shift from malnutrition to imbalanced nutrient intake. The imbalanced dietary pattern was thought to be the cause of the increasing prevalence of obesity and metabolic diseases. In order to design an appropriate

nutrition intervention program, it is important to understand the factors associated with personal food choices, such as nutrition knowledge, attitude and behavior (Shariff *et.al.,* 2008). In recent years, there has been a marked increase in the rates of obesity in countries such as India that has been attributed to unhealthy lifestyle practices associated with the introduction of Western-style fast foods that are higher in fat and refined carbohydrates. The prevalence of central obesity in North India increased with the level of urbanization in both men and women by 8.7% and 34.5%, respectively. The growth of the fast-food industry has led to an increased consumption of food prepared away from home that is high in total and saturated fat, as well as sodium, but low in dietary fibre, calcium, and iron (Shariff *et.al.,* 2008). The rising consumption of energy-dense, nutrient-poor foods high in fats, sugars and salt has become a source of global concern. With 'nutrition transition', populations of developing countries are now consuming diets closer to those of developed countries, with more animal products, vegetable oils, sweeteners and processed foods, and fewer whole grains (Howkes, 2004).

The World Health Organization (WHO, 2004) has identified foods high in fats, sugars and salt as a risk for chronic diseases and called for concerted action to address the threat in its Global Strategy on Diet, Physical Activity and Health (www.who.int). While a third of India's population still falls below the poverty line, there has been a steady growth of the relatively affluent urban middle class, now estimated to number over 200 million. A good proportion of this middle class is constituted by those who have achieved affluence within a lifetime. This number is expected to increase in the coming decades. (Gopalan, 1998) The average of Urban Population has increased from 21% in 1975 to more than 28% in 2004. It is likely to increase to 36% in 2025. Most high-income Indians prefer to live in urban areas. Over 70% of the affluent Indian consumers live in most populated and cosmopolitan cities in India (www.bis.gov.uk). High income and growing urbanization have also contributed to a shift in the traditional Indian food habits. Chandigarh ranks first in India in the Human Development Index, quality of life and e-readiness. The following table shows the population of Chandigarh and its distribution with respect to urban and rural population (www.censusindia.gov.in):

	2001	**2011**
Population	9,00,635	10,55,450
Urban	8, 08,515 **(89.77%)**	10, 26,459 (**97.25%)**
Rural	92,120 (10.23%)	28,991 (2.74%)

From the above table, it is evident that the level of urbanization has increased and the proportion of rural population has declined. According to the latest census report (2011) and NFHS-3 findings, Chandigarh is the 8th most literate state in India with highest literacy rate the literacy rate in Chandigarh has been 86.43% with male literacy rate of 90.54% and female literacy rate of 81.38 %, as compared with Punjab, Haryana and all India statistics, The Per Capita Income (Rs.) (at current prices) has been noted to be 67370 Rs. /- averagely, which is highest in All India. Gross Domestic Product (GDP) is growing at 16.06% in the year 2004-05 against all India Growth of 8.2 % (www.chandigarh.nic.in). Lifestyle interventions have proven effective in preventing and treating obesity and its health consequences. The prevention and treatment of excess weight is critical for the health of both individuals and society. This is reflected in the changes in dietary habits and reduction in the physical activity owing to urbanization, modernization and westernization. Changes in lifestyle, upgradation in standard of living and rise in overall level of income have greatly contributed to obesity. Stress and tension related over consumption is another major reason for obesity. Increasing stress levels, depression, peer pressures, etc are all gifts of lifestyle changes. A considerable reduction in physical activity which has been observed more in urban areas is a very big culprit leading to conditions of obesity and overweight (Prajapati *et.al.,* 2011). According to National Family Health Survey -3 (2005-2006) findings, Shown in the following table,

Population that was covered under NFHS-3	**Men**		**Women**	
	% Underweight (U) U- % Abnormally Thin	**% Obese (O) O- % Overweight / Obese**	**% Underweight (U) U- % Abnormally Thin**	**% Obese (O) O- % Overweight / Obese**
Urban (%)	27	16	25	24
Rural (%)	38	6	41	7
Total (%)	34	9	36	13

(Table 1.1: Source – National Family Health Survey -3 (2005-2006), by Ministry of Health and Family Welfare Government of India) (12)

The above table shows that, NFHS-3 (National Family Health Survey 2005-2006), coordinated by the International Institute for Population Sciences (IIPS), and collected information on the height and weight of women age 15-49 and men age 15-54. The height and weight measurements provide an estimate of the Body Mass Index (BMI), a measure of nutritional status. The BMI is defined as weight in kilograms divided by height in metres squared (kg/m2). A cut-off point of 18.5 was used to define thinness or acute undernutrition, and a BMI of 25 or above indicates overweight or obesity. More than one-third (36 percent) of women age 15-49 in India have a BMI below 18.5 indicating chronic nutritional deficiency, including 16 percent who are moderately to severely thin.

In a study by Bhardwaj, S., Misra, A., and Misra, R., et al. in 2011 the findings suggested that, it is understandable that with high prevalence of abdominal adiposity, co-morbid risk factors, dysglycemia and dyslipidemia would be high. Of specific concern is presence of high prevalence of hypertriglyceridemia (42.7%) in this study, which was higher than that reported

in urban population of Chennai (34.1%), (Mohan *et.al.*, 2008) but was comparable to another study in Chennai (41.1%) (Ramachandran *et.al.*, 2003). Overall high prevalence of the metabolic syndrome (45.3%) in the current study was similar to that seen in urban population of Chandigarh in north India (45.3%) (Ravikiran *et.al.*, 2010). But was higher than that reported in urban Mumbai (35.2%) (9) and Chennai (34.1%) (Bhardwaj et.al, 2011) Brien, GO, and Davis, M., in the year 2007, conducted a study to investigate the relationship between nutrition knowledge and body mass index (BMI). Results demonstrated that there was no significant correlation between levels of nutrition knowledge and BMI; however, a high level of nutrition knowledge was found among the sample. The study concluded that, Nutrition education alone is typically insufficient factor preventing overweight individuals from adopting a healthier diet to facilitate behaviour change because of its failure to specifically address the personal, behavioral and environmental barriers to dietary behaviour change (Brien, 2007). Lin, W., Hang, CM, and Yang, HC, in 2011, surveyed 1706 Taiwanese adults (19 to 64 years) to understand their nutrition knowledge, attitude, and behavior in them, by adding Knowledge questionnaire for analysis and concluded in their study that, a positive correlation among nutrition knowledge in adults was seen. All of the scales were developed by the authors and were similar to those used in NAHSIT Elderly (NAHSIT- Nutrition and Health Survey in Taiwan) (1999-2000) (Lin et.al., 2011). In recent years, there has been a marked increase in the rates of obesity in countries such as India that has been attributed to unhealthy sedentary lifestyle practices associated with the introduction of Western-style fast foods that are higher in fat and refined carbohydrates and less physical activity. Reddy, BN., in 1998 in South Andhra Pradesh, India, revealed that irrespective of age, BMI and Waist Circumference was directly related to, the urbanization and smoking habits and inversely related to the physical activity level. This additionally reported that, urbanization and sedentary life gives rise to obesity (Reddy, 1998). Keeping in view the above parameters, the present study was conducted on working male employees in the age group of 19-60 years in organized and unorganized retail sectors of Chandigarh and to study the impact of nutritional knowledge on the incidence of their obesity with the following

OBJECTIVES

- Evaluation of the nutritional knowledge score of the male employees in retail organized and unorganized sectors of Chandigarh
- Assessment and comparison of the nutritional status of the male using anthropometric measurements- BMI.
- To assess and compare the education level of subjects.
- To assess and compare the physical activity level of the subjects by using GPAQ (Global Physical Activity Questionnaire) WHO recommended version 2.0.

MATERIALS AND METHODS

The present study was conducted on a sample of 450 Male employees. (225 Organized and 225 unorganized) working in the retail stores of Organized and Unorganized sector of Chandigarh. The 225 organized sector employees were working in Café Coffee day, Mc Donald's, Subway, More refresh, Gopal Sweets, Unisex saloons like Matrix, Oleega, and Hair Raiserz. The other 225 employees were working in unorganized local retail shops, departmental stores in different sector markets of Chandigarh city.

Purposive sampling technique was conducted on the age group of 19 yrs to 60 yrs. The questionnaires were pretested on a sample of 20 males. This was done in order to check if the questions were properly understood and elicited desirable changes. The questions were framed in such a manner that the male employees could answer them with free mind. Some questions were put to them in different manners so that accurate information could be obtained from them in a polite manner.

The study was carried out using 2 questionnaires.

1. A self-designed questionnaire was framed. The questionnaire covered the following parameters:
   - Demographic information
   - Anthropometric measurements
   - Nutritional Knowledge
2. A WHO approved and validated Global Physical Activity Questionnaire- version 2 (GPAQ to assess their physical activity level).

SELF-DESIGNED QUESTIONNAIRE

The self-designed questionnaire was used to gather information regarding the parameters mentioned above. The questions were kept simple, unambiguous, and free from any kind of religious or cultural bias and suitable to Indian context.

DEMOGRAPHIC INFORMATION

This included questions related to age, address and educational qualification of the employees/respondents.

ANTHROPOMETRIC MEASUREMENTS

The measurements were taken for each subject in two anthropometric variables including height and weight. Three complete sets of measurements were carried out and the mean of the three values were used in the statistical analysis. Weight and height of participants were determined in light clothing and without shoes.

Height was measured with the subjects standing bare foot with heels together, arms on the side, legs straight, shoulders relaxed and head in the Frankfort horizontal plane with heels, buttocks and scapulae lying against a vertical wall.

The total body weight of the subjects was measured with a firm digital portable scale with precision of 0.5 kg with bare minimum light clothes.

As per the standards recommended by World Health Organization in 1987, BMI was calculated as weight (in kilogram)/height^2 (in meters). The cut off value for the normal BMI was found to be 18-23 kg/m$^{2.}$ (Snehalatha *et.al.,* 2003)

NUTRITION KNOWLEDGE SCALE

The Nutrition knowledge scale included: a) 10 items on the relationship between diet and disease; b) 10 items on the comparison of foods in terms of specific nutrient content; c) 6 items on the daily serving requirements of different food groups; and d) 5 items on weight and weight loss. Scoring: The scale was in multiple choice formats with one point awarded for correct answers, and zero otherwise. (Lin *et.al.,* 2011)

GLOBAL PHYSICAL ACTIVITY QUESTIONNAIRE (GPAQ)

The second version of the Global Physical Activity Questionnaire version-2 was used in the survey (WHO, 2008) (http://www.who.int). This questionnaire which has been developed by WHO, comprises of 16 questions regarding physical activity in a typical week and assesses physical activity in three domains, namely, work, transportation, and recreational activities. It also determines the intensity of activity (i.e., vigorous, moderate or sedentary) in each domain as well as the time spent on sedentary behaviors such as watching TV. Sedentary behavior was defined as activities such as sitting at a desk, traveling in car/bus/train, and reading, working with computer, and watching television. In order to measure energy expenditure, the concept of metabolic equivalents (MET) was used. MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly and is equivalent to a caloric consumption of 1 kcal/kilogram/hour. It was estimated that a person's caloric consumption is four times as high when being moderately active, and eight times as high when being vigorously active. Therefore, when calculating a person's overall energy expenditure using the GPAQ data, four METs are assigned to the time spent on moderate activities, and eight METs to the time spent on vigorous activities. The total physical activity score (TPA) was calculated as the sum of all MET × minutes for moderate or vigorous-intensity physical activity performed in work, commuting, and recreation.

Subjects were classified into the following three categories, as defined by the GPAQ analysis framework:

1. High: a person reaching any of the following criteria is classified in this category:
   - Vigorous-intensity activity on at least 3 days a week achieving a minimum of at least 1500 MET-minutes per week, or
   - Seven or more days of any combination of walking and moderate- or vigorous-intensity activities achieving a minimum of at least 3000 MET minutes per week.
2. Moderate: a person not meeting the criteria for the "high" category, but meeting any of the following criteria is classified in this category:
   - Three or more days of vigorous-intensity activity of at least 20 min per day, or
   - Five or more days of moderate-intensity activity or walking of at least 30 min per day.
   - Five or more days of any combination of walking and moderate- or vigorous-intensity activities achieving a minimum of at least 600 MET minutes per week.
3. Low: a person not meeting any of the above mentioned criteria falls in this category.

STATISTICAL ANALYSIS

The data taken from every person was recorded on a pre designed proforma as well as on the validated questionnaires. Before entering the data on an excel spread sheet, the proforma and the validated questionnaires were reviewed for any incomplete information. After filling the entries on the excel sheet, the data was checked again for any possible keyboard error. The statistical analysis was carried out using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 15.0 for Windows). All quantitative variables were estimated using measures of central location (mean, median) and measures of dispersion (standard deviation and standard error). Qualitative or categorical variables were described as frequencies and proportions. Proportions were compared using Chi square test. All statistical tests were two-sided and performed at a significance level of α=.05.

RESULTS AND DISCUSSIONS

Table 1 - Mean Scores of Nutritional Knowledge

GROUP	MEAN SCORES	Nutritional Knowledge total score
Organized sector (N=225)	Mean ± SD	21.1±3.4
	N	225
Unorganized sector (N=225)	Mean ± SD	20.4±3.0
	N	225
Total	Mean ± SD	20.75±3.2
	N	450

Table 1 out looked the distribution of the respondents on the basis of their mean scores of nutritional knowledge attitude and behavior. The mean scores of nutritional knowledge, attitude and behavior were higher in the respondents of organized sector as compared to unorganized sector. It highlighted the higher mean scores of nutritional behavior in the respondents, followed by mean scores of nutritional attitude and knowledge of both the organized and unorganized sectors. The difference of mean scores of nutritional knowledge, attitude and behavior was highly significant statistically in both the sectors.

NUTRITIONAL KNOWLEDGE ACCORDING TO AGE

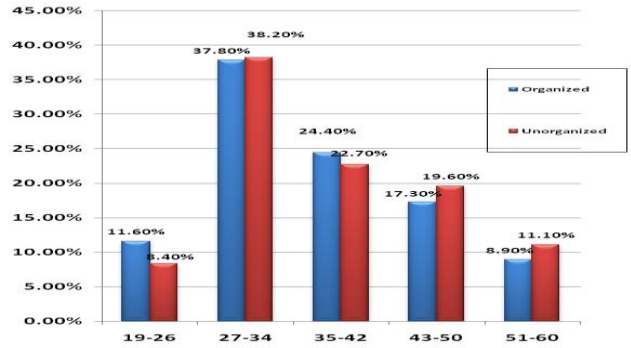

Figure 1.1: Distribution of the Respondents Knowledge According to their Age

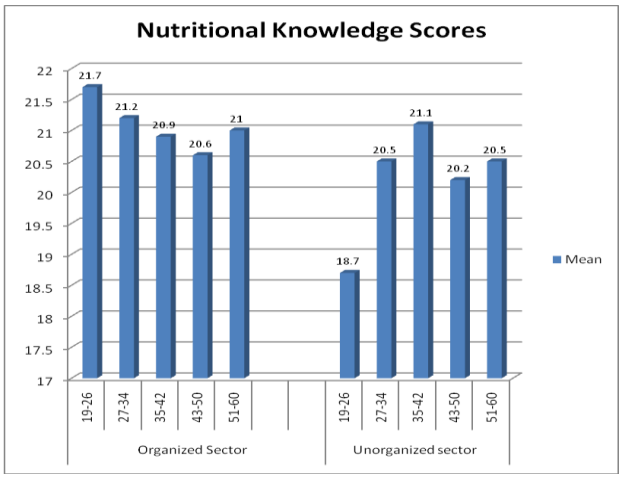

Figure 1.2: Distribution of the on the Basis of their Age Respondents on the Basis of Nutritional

It was found that the mean scores of mean scores of nutritional knowledge were almost similar in all age groups. A direct relation was seen between educational qualifications and nutritional knowledge in organized sector. The score was seen to be maximum in the age group of 19-26 years in the organized sector as compared to the scores in the unorganized sector which were observed to be higher in the age group of 35-42 years. Mean total scores of nutritional knowledge of the respondents were higher in organized sector as compared to the respondents of unorganized sector. There was no statistical significance found in the subjects on the basis of their mean scores of nutritional knowledge. Lin, W., Hang, CM, and Yang, HC, in 2011, surveyed 1706 Taiwanese adults (19 to 64 years) to understand their nutrition knowledge, attitude, and behavior in them, concluded in their study that, a positive correlation among nutrition knowledge in adults was seen. (Lin et.al., 2011)

NUTRITIONAL KNOWLEDGE ACCORDING TO EDUCATIONAL QUALIFICATION

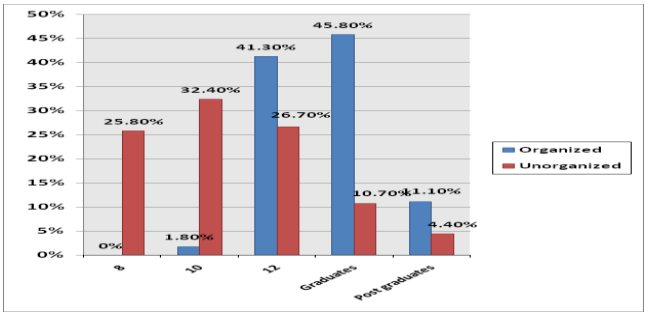

Figure 2.1: Distribution of the Respondents on the Basis of Educational Qualification

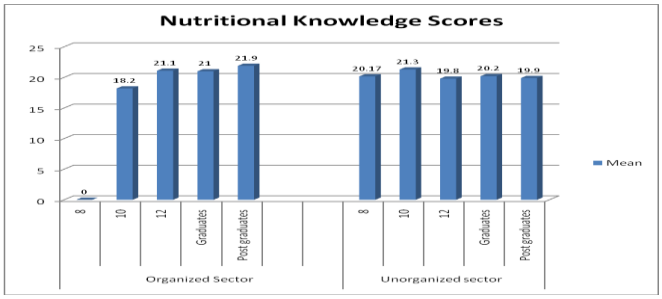

Figure 2.2: Distribution of the Respondents on the Basis of Educational Qualification and its Relation to their Nutritional Knowledge

It was unfolded the distribution of the respondents on the basis of their educational qualification of the respondents and it's relation to their mean scores of nutritional knowledge attitude and behavior.

It was revealed that the mean scores of nutritional knowledge in the organized sector were higher in respondents who were qualified up to post graduation. Thus as increase in the mean scores of Nutritional knowledge was observed as the educational qualification of the respondents increased. Whereas, in unorganized sector the nutritional knowledge scores were higher in the respondents qualified up to 10th standard though it was statistically insignificant.

NUTRITIONAL KNOWLEDGE ON BASIS OF BMI

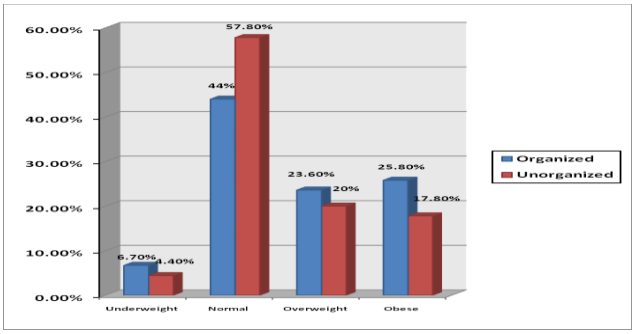

Figure 3.1: Distribution of the BMI

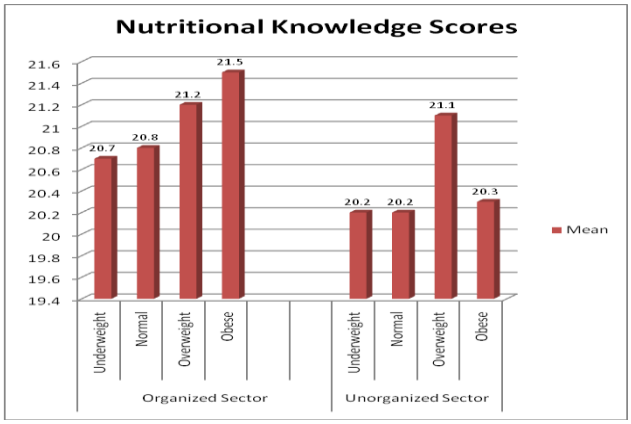

Figure 3.2: Distribution of the Respondents on the Basis of Respondents on the Basis of their BMI and its Relation to their Mean Scores of Nutritional Knowledge

It was seen that nutritional knowledge scores of respondents of organized sector were higher in all, underweight, normal, overweight and obese respondents as compared to the unorganized sector. The mean scores of nutritional knowledge of organized sector respondents were higher among those who were overweight and obese as compared to the respondents in the unorganized sector. Brien, GO, and Davis, M., in the year 2007, in their study on 500 individuals, to investigate the relationship between nutrition knowledge and body mass index (BMI) concluded that, there was no significant correlation between levels of nutrition knowledge and BMI; however, a high level of nutrition knowledge was found among the sample. Nutrition education alone is typically insufficient factor preventing overweight individuals from adopting a healthier diet to facilitate behaviour change because of its failure to specifically address the personal, behavioral and environmental barriers to dietary behaviour change (Brien, 2007).

NUTRITIONAL KNOWLEDGE ON THE BASIS OF PHYSICAL ACTIVITY

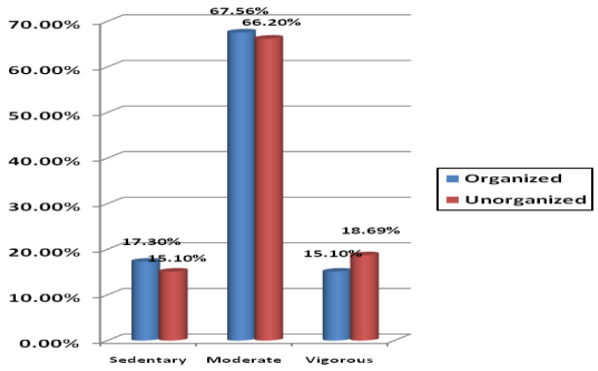

Figure 4.1: Distribution of the Respondents on the Basis of their Physical Activity Level

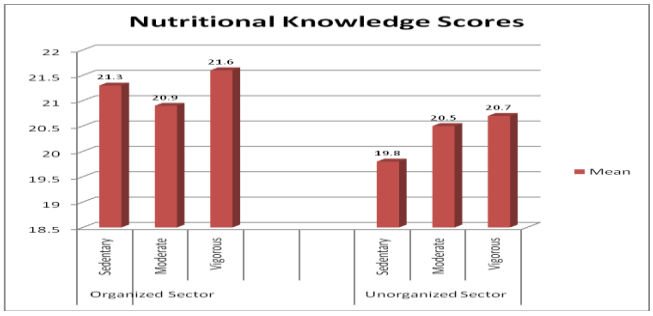

Figure 4.2: Distribution of the Respondents on the Basis of their Physical Activity Level and its Relation to their Mean Scores of Nutritional Knowledge

It was observed that mean scores of knowledge were higher in the respondents of organized sector who were sedentary, moderate and vigorously active as compared with the respondents of the unorganized sector respectively. It was observed that, with reference to sedentary activity, respondents in organized sector had higher nutritional knowledge score as compared to unorganized sector showing that the employees in the organized sector had more knowledge but still followed a sedentary lifestyle. No statistical significance found in the mean nutritional and physical activity level of the respondents of both organized and unorganized sector.

DISTRIBUTION OF THE RESPONDENTS ON THE BASIS OF BMI AND ITS RELATION TO THEIR PHYSICAL ACTIVITY LEVEL

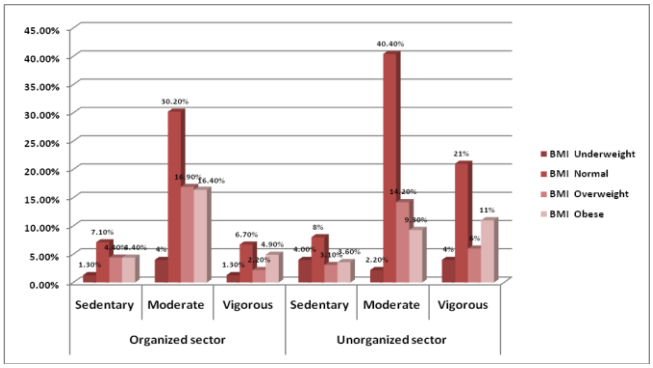

Figure 5: Distribution of the Respondents on the Basis of their BMI and its Relation to their Physical Activity Level

It was observed that, 30.2% of the respondents in the organized sector and 44% of the respondents in unorganized sector were moderately active and had a normal BMI i.e. 18.5-22.9 kg/m². Further, it was seen that, 16.9% of the respondents in the organized sector and 14.2% of the respondents in unorganized sector were in the overweight category with BMI 23-24.9 kg/m². Higher percentage of respondents of the unorganized sector, irrespective of the physical activity levels had normal BMI level when compared to respondents of the organized sector. Overall, the BMI in all categories of all respondents

increased gradually as the level of physical activity was increased from sedentary to moderate and then followed a decline in respondents undergoing vigorous physical activity, in both the sectors. In recent years, there has been a marked increase in the rates of obesity in countries such as India that has been attributed to unhealthy sedentary lifestyle practices associated with the introduction of Western-style fast foods that are higher in fat and refined carbohydrates and less physical activity (Wikipedia). Additionally, urbanization and sedentary life gives rise to obesity (Reddy, 1998).

CONCLUSION

The study revealed that, the mean scores of nutritional knowledge were higher in the organized sector as compared to the unorganized sector. All the respondents were literate. The result corroborated the latest census report of 2011 and NFHS-3 findings that Chandigarh is the 8th most literate state in India with highest literacy rate the literacy rate. Chandigarh literacy rate is 86.43% with male literacy rate of 90.54% and female literacy rate of 81.38 %. A direct relation between nutritional knowledge and education was seen as the mean scores of nutritional knowledge increased as the educational qualification increased in the organized sector. Maximum respondents in both the organized and unorganized sectors had BMI within normal range, however the nutritional knowledge scores among overweight and obese respondents from organized sector were higher than those from the unorganized sector. Thus, just as Brien, GO, and Davis, M's study, nutrition education alone is typically insufficient factor preventing overweight individuals from adopting a healthier diet to facilitate behaviour change because of its failure to specifically address the personal, behavioral and environmental barriers to dietary behaviour change.

The respondents of organized sector following a sedentary lifestyle had a higher nutritional knowledge score than the respondents of the unorganized sector. Higher percentage of respondents of the unorganized sector, irrespective of the physical activity levels had normal BMI level when compared to respondents of the organized sector. It was thus evident that the respondents were aware of the basics of nutrition, yet they were following incorrect dietary practices further paving way for obesity. Despite knowing the side-effects, less effort were made by them to follow a healthier lifestyle. Thus, urbanization, which has caved in changes in occupational patterns, family structures and value system has also led to changes in dietary habits as well as physical activity levels. These alterations in eating habits and lifestyle had thus been found to be associated with increased prevalence of overweight and obesity.

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