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### Food habits and nutrient intake among male shift workers of textile industries

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#### Abstract

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. Although malnutrition has been known to be a major public health problem in developing countries, data on nutritional status of factory workers are lacking. Therefore the objective of the present study was to probe through the food habits, food consumption pattern, nutrient intake and health problems of male workers of textile industries in relation to shift work. One hundred and fifty male textile industry workers (aged 20-40 years) with equal numbers working in day and night shift were studied. Results of anthropometric measurements showed that day shift subjects had a comparatively higher body mass index and waist hip ratio than night shift subjects. Food intake revealed that day shift subjects had a higher intake of vegetables and fruits along with fats and oils whereas night shift subjects had a higher consumption of milk and sugars. Results on nutrient intake showed that day shift subjects had a significantly higher intake of fat, energy, folic acid, iron,  $\beta$  – carotene and zinc. Additionally, the food consumption habits of subjects showed that the preference of ghee, meats and fried foods was found to be higher in day shift subjects whereas tea intake was more prevalent in night shift subjects. Alcohol intake was also higher in day workers. Health problems regarding to gastrointestinal tract like constipation, heart burn, flatulence, disturbed appetite etc. were comparatively more prevalent in night shift subjects whereas problems like chest pain, short breath and swollen feet were found more in day shift subjects.

**Keywords:** Textile worker, Shift work, Body Mass Index, Waist Hip Ratio, Gastrointestinal tract

#### Introduction

Textile industry touches the lives of all people in one or the other ways. It occupies a unique place in our country. It accounts for 14% of the total Industrial production, contributing more than 5 per cent of GDP and providing direct employment to 38 million people, primarily the weaker sections; it is the second most important sector only after agriculture (www.cci.in). Shift work is a method of organization of the working time in which workers succeed one another at the work place so that the establishment can operate longer than the hours of work of individual workers. In most cases shift work is synonymous to irregular, odd, flexible, variable, unusual, non-standard working hours (International Labour Organization, 2006) [4]. The US Bureau of Labor Statistics reported that more than 21 million wage and salary workers (17.7%) usually worked alternate shifts that fell at least partially outside the day time shift range. Shift work is considered to be disruptive of normal diurnal biological rhythms and has been associated with many health problems (Centre for Disease Control and Prevention, 2009) [1]. Therefore the present study was conducted to assess, highlight and envisage the impact of shift work on food habits, nutrient intake and health status of the male workers of textile industries.

#### Materials and Methods

One hundred and fifty male workers of textile industries (free from any disease) aged between 20-40 years were studied from Bhilwara city (Rajasthan). Out of this seventy five workers were working in day shift and seventy five in night shift. An interview schedule was used to collect the information on personal particulars, anthropometric measurements and indices (height, weight, waist and hip circumference, desirable body weight, body mass index and waist hip ratio), dietary pattern, nutrient intake and health problems.

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### Anthropometric Measurements

Information on anthropometric measurements and dietary pattern were collected. Anthropometric measurements like height, weight and circumference of hip and waist were taken using standardized procedures (Jeliffe, 1966) [5]. From these measurements Body Mass Index (BMI), Desirable Body Weight (DBW) and Waist Hip Ratio (WHR) were computed.

### Dietary Pattern

This include the information on dietary intake, type of food habits, favorite food items, food preferences in between meals and the intake of tea/coffee and alcohol.

### Statistical Analysis

Mean  $\pm$  SE values were calculated for food and nutrient intake and compared with standard values. Z-test for difference between two means was used to assess the difference between the nutrient intakes of day and night shift subjects.

### Results and Discussion

The results of the present study as well as relevant discussion have been presented under following sub heads:

#### General Information

Table 1 presents data on the general profile of the subjects. Majority of subjects (98.66%) were Hindus and belonged to the age group of 31 to 40 years (53.33%). A large percentage of the subjects (48%) had families with 5-6 family members and had a monthly income ranging between 5,000-10,000 (58.66%). About 85.33 percent of the subjects were literate and 94.67 percent subjects were married.

**Table 1:** General profile of the subjects

Particulars	Percentage (n=150)
<b>Age:</b> 20 to 30 years	46.66
31 to 40 years	53.34
<b>Religion:</b> Hindu	98.66
Muslim	1.34
<b>Marital status:</b> Married	94.67
Unmarried	5.33
<b>Family members:</b> $\leq$ 4	34
5 to 6	48
>6	18
<b>Monthly Income (Rs):</b> < 5,000	23.33
5,000-10,000	58.67
>10,000	27
<b>Education:</b> Literate	85.33
Illiterate	14.67

### Anthropometric Measurements

Majority of the shift workers had desirable weight for their respective height (Table 2) while a comparative higher percentage of day shift subjects (13.33%) had 20 percent above desirable body weight which shows mild degree of obesity. Maximum percentage of both day and night shift subjects had normal BMI (Body Mass Index) levels whereas a higher percentage of day shift subjects (30.66%) were found to be obese with BMI greater than 25 kg/m<sup>2</sup>. Waist hip ratio was also found to be higher in day shift subjects. Overall a higher percentage of night shift subjects were found to be falling in the normal ranges of all the anthropometric measurements.

**Table 2:** Anthropometric measurements of subjects

Parameters	Percentage (n=150)
<b>Desirable body weight (DBW)</b>	
Correct weight for height	72.66
10% above DBW	19.34
20% above DBW	8
40% above DBW	0
<b>Body mass index (BMI)</b>	
<18	2.66
18 – 25	67.33
>25	30.01
<b>Waist hip ratio (WHR)</b>	
$\leq$ 0.85	74.66
0.86 – 1	25.34
>1	0

### Food Intake

Data on mean daily intake on various food groups by the subjects (Fig. 1) showed that day shift workers had comparatively higher intakes of cereals (295g), pulses (53g), vegetables (especially green leafy vegetables – 75g), fruits (35g) and fats (30.5g). Whereas night shift subjects had high milk (285ml) and sugar (24.4g) intake which could be attributed to their increased tea consumption as a measure to stay awake during night hours. Except fats, oils and sugars, the intake of all the food groups among both types of shift workers was found to be lower than the balanced diet recommendations (Gopalan, 2010) [2].

### Nutrient Intake

Information on daily nutrient intake (Fig. 2) showed that day shift subjects had a significantly higher intake of fat (30.5g), energy (1734.8kcal), iron (13.25mg),  $\beta$  carotene (1988.54  $\mu$ g), folic acid (98.9  $\mu$ g) and zinc (8.56g). The night shift subjects were found to have a higher intake of only calcium (581.36mg) and carbohydrates (313.94g). Overall, the intake of all the nutrients (except fat intake in day shift subjects) especially fiber, iron, B complex vitamins and folic acid was found to be lower than the recommended dietary allowances (ICMR, 2010) [3].

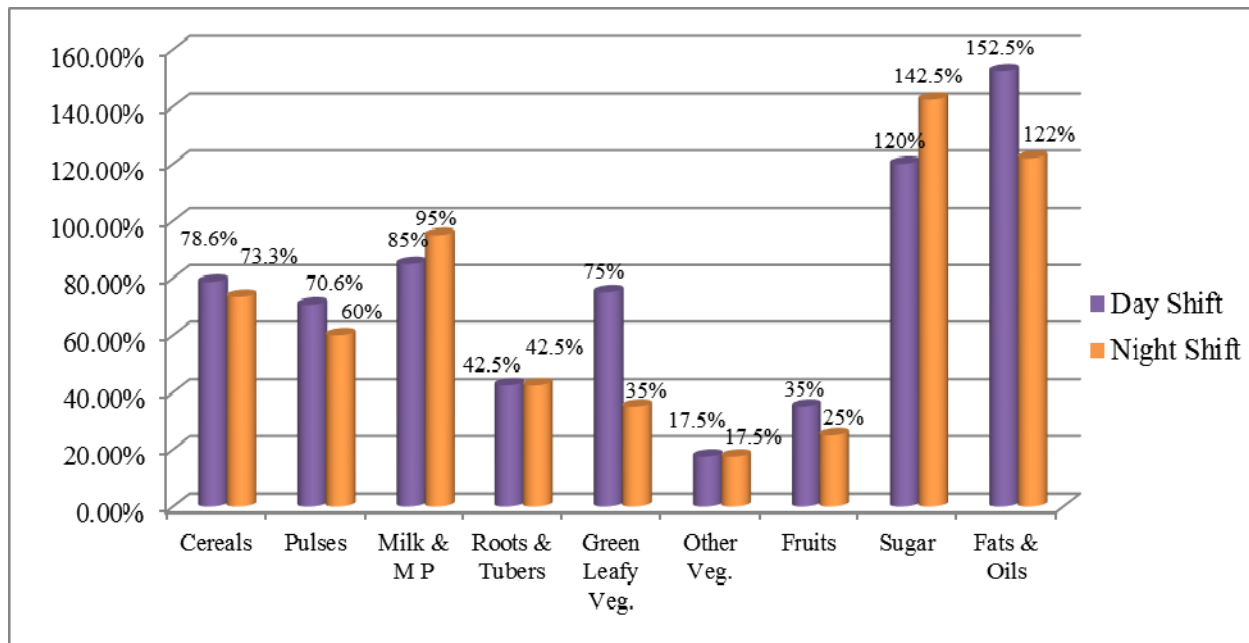


Fig 1: Comparison of Food Intake by Day and Night Shift Subjects in relation to Balanced Diet

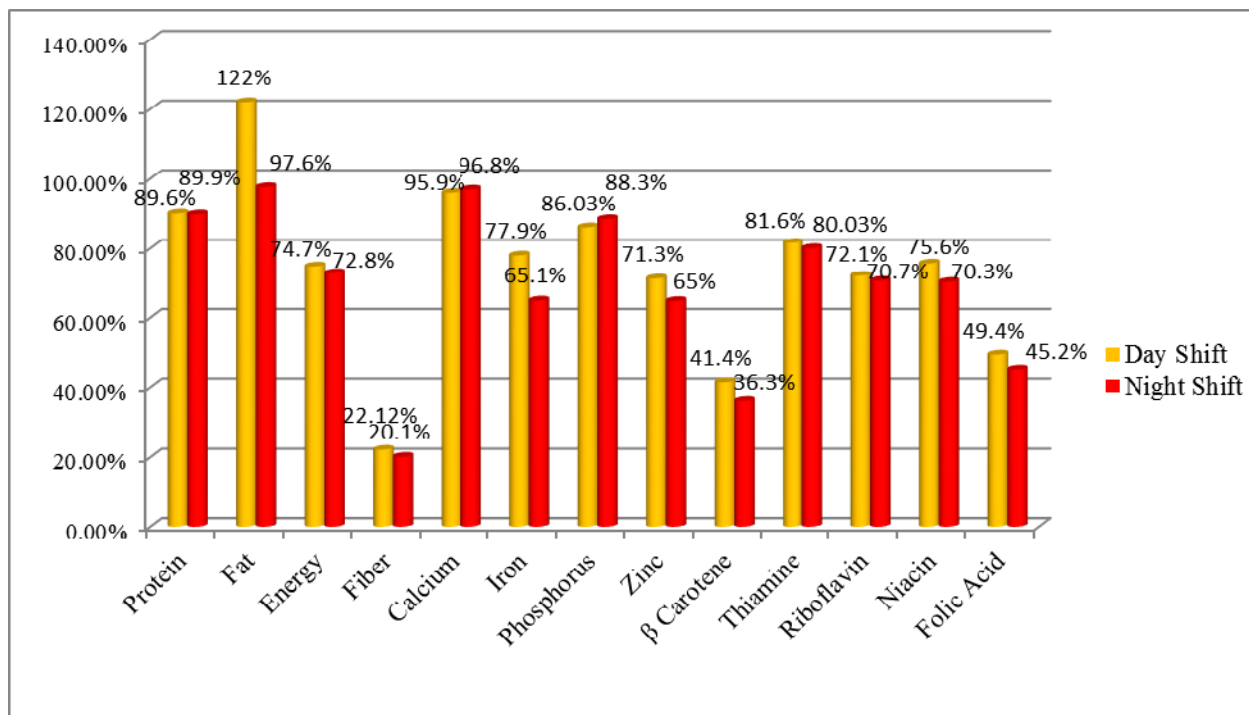


Fig 2: Comparison of Nutrient Intake among Day and Night Shift Subjects in relation to RD

**Food Habits**

Information regarding food habits, food preferences and avoidances (Table-3) reveals that comparatively larger percentage of day shift subjects (82.66%) preferred to end a feast with sweets than night shift subjects (72%). The percentage of day shift workers (76%) preferring fried foods was also found to be higher than night shift subjects (73.33%) whereas the preference of fruits in between meals was found to be very low in both the groups. Majority of the subjects were vegetarian involving a comparatively higher percentage of night shift subjects (82.66%). Among non – vegetarian food, egg and chicken were preferred more by day shift subjects. The habit of tea/coffee intake was more prevalent in night shift subjects. About 96 percent night shift workers drank more than

3 cups tea/day. Majority of the day shift workers (46.66%) took more than 2 pegs of alcohol per day as compared to night workers (25.33%). About 40 percent of night workers were non-users of alcohol whereas only 34.66 percent of the day workers were non-users.

It is evident from the above data that prevalence of alcoholism and affinity towards fatty and high calorie foods is found comparatively more in day shift subjects whereas the intake of tea is seen more in night workers.

**Table 3:** Food habits of shift workers

Food Habits	Percentage	
	Day Shift (n = 75)	Night Shift (n = 75)
<b>Ending a good feast with</b>		
Ice cream	5.34	24
Fruits	12	4
Sweet	82.66	72
<b>Food preference in between meals</b>		
Fruits	24	26.67
Cakes/ Pastries/ Fried items	76	73.33
<b>Preferable second helping at a feast</b>		
Desserts	64	50.66
Papads/pakodas	22.66	25.34
Vegetables	9.34	12
Sprouted pulses	4	12
<b>Amount of ghee used at table</b>		
½ tsp	53.33	52
>1 tsp	20	9.34
Not at all	26.67	38.66
<b>Vegetarians:</b>	54.66	82.66
<b>Non-vegetarians</b>	45.33	17.33
Egg	55.88	53.86
Chicken	23.52	23.07
Meat	14.7	23.07
Fish	5.88	0
<b>Favorite food item</b>		
Idli / Dosa	33.34	40
Poori / Parantha	66.66	60
<b>Coffee / Tea intake</b>		
1 cup / day	0	0
1-3 cup / day	9.34	4
>3 cup / day	88	96
Non user	2.66	0
<b>Alcoholism</b>		
1-2 pegs/day	18.67	34.66
>2 pegs/day	46.67	25.34
Non user	34.66	40

### Health Problems

Day shift was scheduled from 7 AM to 7 PM whereas night shift was scheduled from 7 PM to 7 AM. The most prominent health problems (Table- 4) of day shift subjects was short breath (57.61%) and swollen feet (54.23%) followed by heart burn (40.74%) and constipation (48%). About 37.5 percent day shift subjects complained of chest pain while 34.66 percent and 27 percent had disturbed appetite and reduced work performance respectively. The subjects in night shift group mostly experienced problems like flatulence (58.06%), disturbed appetite (65.33%), and difficulty in falling asleep (65.43%). Around 63.33 percent subjects avoided meals to prevent stomach upsets whereas 67.27 percent subjects took alcohol to sleep.

**Table 4:** Percentage distribution of shift workers according to their health problems

Health Problems	Percentage	
	Day shift (n=75)	Night Shift (n=75)
Difficulty in falling asleep	34.56	65.43
Alcohol to sleep	32.72	67.27
Disturbed appetite	34.66	65.33
Avoid meals to prevent stomach upset	5.33	63.63
Heart burn/stomach ache	40.74	59.25
Flatulence	41.93	58.06
Constipation	48	52
Short breath	57.61	42.39
Chest pain	58.42	41.58
Swollen feet	54.23	45.77
Inadequate sleep	29	45
Reduced work performance	27	24

### Conclusion

It can be concluded from the present study that the food habits, consumption pattern, food preferences and avoidances of day shift workers were more inclined towards fried, high calorie foods which lead to problems like short breath, chest pain, swollen feet etc. whereas the night shift workers had lesser access to meals at regular intervals during work hours and thus faced problems regarding gastrointestinal tract like disturbed appetite, flatulence, constipation etc.

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