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ASSESSMENTS OF NUTRITIONAL STATUS AND DIETARY HABITS LIFESTYLE PATTERN OF INDIVIDUALS WORKING IN A DAY SHIFT AND NIGHT SHIFT (20-40 YEARS) IN CORPORATE SECTOR.

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ABSTRACT: The purpose of study was to assess the nutritional status and dietary habits of individuals working in a day shift and night shift in corporate sector working in Mumbai. The study group consisted of subjects were between 20-40 years of age. Sample size included 100 individuals working in shift like day, night, and rotational and dawn in different corporate sectors. The data was collected with the help of a well-structured questionnaire designed which covered aspects: Background data, Data related to dietary assessment, food choices, and anthropometric assessment. Data was analyzed and results showed both groups there was no significant difference in the BMI of individuals working in day shift and other shifts. The data collected from 3-day dietary recall when compared with eating habits, a significant difference in protein intake (p value=.018) as the individuals working in day shift had higher intake of protein whereas other shift worker had intake of low protein. The skipping of meal showed a prominent effect on total daily intake. A significant differences were seen in intake of energy, protein and fat intake as samples skipped one meal per day indicated a lesser calorie, protein and fats intake as compared to those who do not skip meal. Frequent health problem faced by the subjects were headache, stress, acidity and tiredness. In conclusion, significant difference were seen when day shift and other shifts were compared on basis of nutritional status and dietary pattern which can be improved a help proper diet counselling and nutritional education programs.

KEYWORDS: Nutritional status, dietary habits, protein intake, shift work.

INTRODUCTION

Shift work is a work practice used to provide service across, all for 24 hours of each day of the week (24/7). The shift work mainly divides the day into shifts times and time during at which different groups of employees perform their duties or work. It can involve evening or night shifts, early morning shifts, and rotating shifts. There are different types of shift work schedules. Shift workers are significantly at high risk for sleepiness, as well as the common health risks associated with insufficient sleep, such as high blood pressure and heart problems. Shift work is challenging as it requires people to wake and sleep in a pattern which is out of sync with the body's biological clock. Individuals working in shift pattern are seen to practicing binge eating in order to keep themselves awake and provide energy in order to carry out activity. Nocturnal eating habits in shift workers showed dietary intakes and nutritional status parameters indicated that those who eat during night shift showed higher levels of serum total cholesterol and LDL and a higher LDL: HDL ratio. Diet plays a diverse role within sleep-cardio metabolic health associations.

Shift work has increased risk factor for inflammation, hypertension, and cardiovascular disease. Shift workers behavioral and environmental cycles are usually disturbed in relation to circadian system. The impact of acute circadian misalignment on cardiovascular disease risk in shift workers independent of differences in work stress, food quality, sleep schedules, physical activity and other factors likely alcohol and smoking habits in both night and day shifts. (Morris et al 2017)

The physiological links between circadian clocks, glucose metabolism and insulin sensitivity, and present current evidence for a relationship between circadian disruption and insulin resistance. (Stenvers et al 2019)

MATERIAL AND METHODOLOGY

- **Sample size:** Sample size included 100 individuals working in day shift, night shift, rotational shift and dawn shift working in different corporate sectors. Thus out of total sample of 100, 50 were working in a day shift, 5 were working in dawn shift, 17 were working in night shift and 28 were working in a rotational shift.
- **Sample selection:** Subjects were selected by using purposive convenience sampling within the Mumbai Metropolitan city. Corporate office which were included in the study were from Indian and foreign based companies based in Mumbai. Oral Consents was taken from the participants before recruiting them as subject.
- **Inclusion Criteria:** Individuals, both men and women who work in corporate sector, working in day shift, night shift, rotational shift and dawn shift within the Mumbai city region, between the age group of 20-40 years were selected in the study group.

TOOLS FOR DATA COLLECTION:

The data was collected with the help of questionnaire designed for this study which covered following aspects:

1. **Background data:** Such as duty hours, working pattern, marital status, preferred mode of travel and data related to medical condition and medication taken to understand life style, nutritional status amongst the study group.
2. **Data related to dietary assessment:** Dietary assessment was carried out with the help of questions related to: meal pattern, meal timings, skipping of meals and no. of meal, food preferences, snaking pattern, food habits, and dietary intake**.** 3-day dietary recall (15% of sampled data pool) 3 day dietary recall was used to understand dietary pattern and food intake. Subject were asked to recall his/her exact food intake of 3 day which included 2 working days and 1 non-working day. The recall included day, date, time, meal, menu, amount, source of food and location of food consumed.
3. **Anthropometric assessment:** height, weight, body mass index was assessed.

RESULTS AND DISCUSSION

1. BODY MASS INDEX

Table: 1 – Comparison of Body Mass Index in day and other shift groups.

BMI (kg/m^2)	GRP	N	Mean ± Std. dev.	t	Sig. (2-tailed)
BMI (kg/m^2)	DAY SHIFT	50	18.4± 2.41	.284	.77
	OTHER SHIFT	50	18.5± 2.21		

The data was compared between shift type (i.e day shift and other shifts) and Body mass index, indicated that there was no significant difference at p≤ 0.05(.77) in the BMI of individuals working in day shift and other shifts. A study conducted by Buchvold, et al. (2017) stated that, there was a positive association between work load during night shift and BMI. Another study conducted by Nigatu, et al. (2017) on obesity, overweight and functioning of work a positive correlation in working population as overweight and obesity was highly prevalent and work functioning (WF) scores were low in shift workers, whereas overweight and obesity was not associated with day shift or on call workers.

DIETARY STATUS OF THE STUDY SAMPLE:

1) DIETARY INTAKE AND SHIFT

Table: 2 – 3-day dietary recall and shift type.

DIETARY INTAKE	SHIFT TYPE	N	Mean ± Std. dev.	t-VALUE	p-VALUE
ENERGY	DAY SHIFT	5	1984.8 ± 293.42	1.465	.169
	OTHER SHIFT	10	1795.7 ± 193.16		
CARBOHYDRATES	DAY SHIFT	5	325.7 ± 53.78	.287	.779
	OTHER SHIFT	10	318.6 ± 39.74		
PROTEINS	DAY SHIFT	5	70.6 ± 7.24	2.744	.018*
	OTHER SHIFT	10	57.9 ± 8.84		
FATS	DAY SHIFT	5	36.2 ± 5.34	1.614	.133
	OTHER SHIFT	10	32.7 ± 2.98		

The table 2, depicted the 3 day dietary recall of 15% of pooled sample from total population and was then compared to the shift work. It was noted that 10 out of 15 individuals worked in other shift (rotational shift, night shift and dawn shift) and remaining 5 in day shift. A significant difference was observed in protein intake with p-value= .018 at p≤0.05 as the individuals working in day shift had higher intake of protein whereas other shift worker had low intake of protein. According to WHO guideline, Energy intake (calories) should be in balance

with energy expenditure. To avoid unhealthy weight gain, total fat should not exceed 30% of total energy intake. Intake of saturated fats should be less than 10% of total energy intake, and intake of trans-fats was less than 1% of total energy intake. A study conducted by Margriet in 2008 indicated negative fat-balance and positive protein-balance was shown in the short-term, whereby oxidation of fat was increased. A high protein diet showed a reduced energy efficiency related to the body-composition of the body-weight regained, i.e. favor of fat free mass. A normal protein diet becomes a relatively high protein diet in negative energy balance and at weight maintenance.

2) MEALS PER DAY

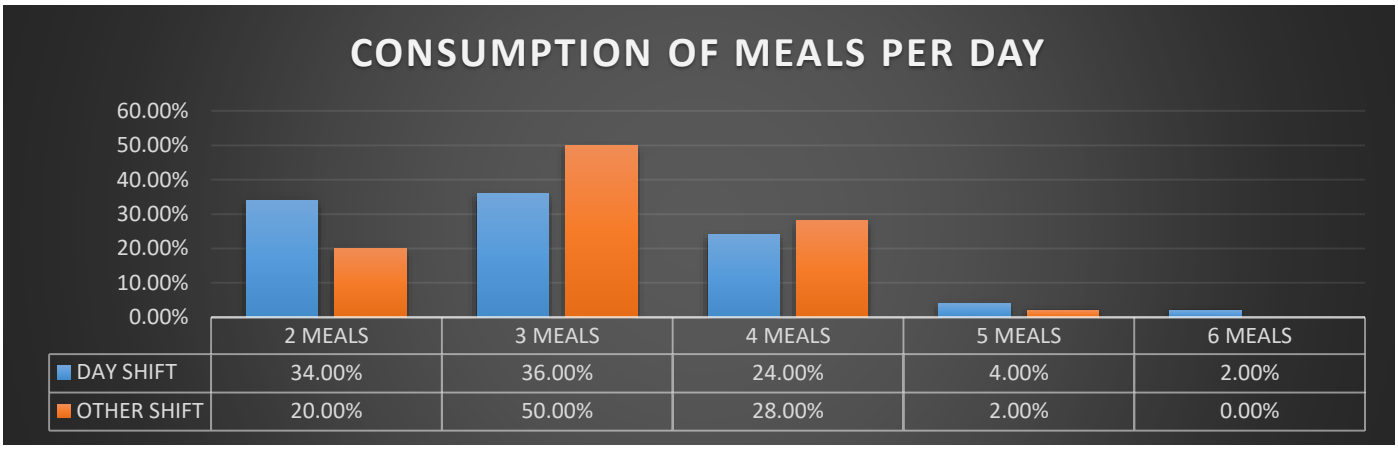

Figure: 2- Consumption of meals per day.

Figure 2, showed that majority of the study sample consumed 3 meals per day from both day shift and other shift i.e 36% and 50% respectively. 34% of day shift and 20% of other shift samples had only 2 meals per day whereas 24% of individuals from day shift and 28% from other shift consumed 4 meals per day. 4% from day shift and 2% from other shift consumed 5 meals per day whereas only 2% of individuals from day shift had 6 meals per day.

Table: 3 – 3-day dietary recall and meals consumed per day.

MEALS PER DAY		No. of sample	Mean ± Std. dev.	f-value	Sig.
ENERGY	2 TIMES	5	1704.9 ± 131.13	2.073	.172
	3 TIMES	6	1859.7 ± 307.38		
	4 TIMES	4	2026.9 ± 93.77		
	Total	15	1863.2 ± 241.45		
CARBOHYDRATES	2 TIMES	5	286.1 ± 37.15	3.082	.087
	3 TIMES	6	324.04 ± 46.11		
	4 TIMES	4	351.9 ± 16.80		
	Total	15	321.1± 43.30		
PROTEINS	2 TIMES	5	59.3 ± 7.16	1.686	.230
	3 TIMES	6	59.5 ± 10.63		
	4 TIMES	4	70.0 ± 10.33		
	Total	15	62.47 ± 10.22		
FATS	2 TIMES	5	33.5 ± 3.33	3.535	.065
	3 TIMES	6	31.7 ± 2.40		
	4 TIMES	4	37.7 ± 5.00		
	Total	15	34 ± 4.16		

The table 3, represented the comparison between 3day dietary recall of 15% of total sample size and meals consumed per day. It was observed that 5 individuals consumed 2 meals per day whereas 6 individuals had 3 meals per day and only 4 individuals consumed 4 meals per day.

3) SKIPPING OF MEALS

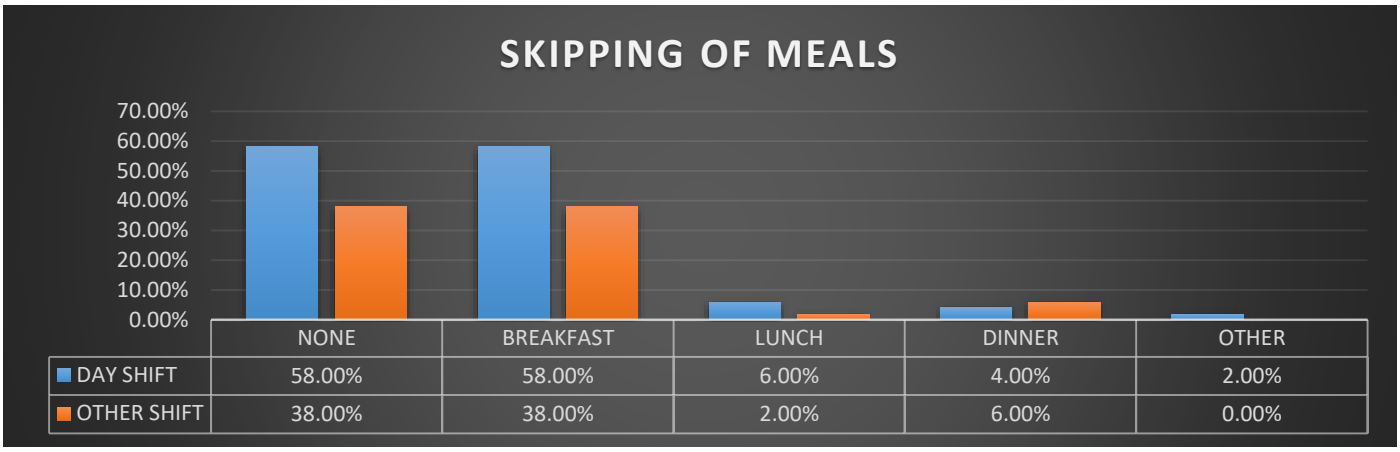

Figure: 3- Skipping of meals per day.

The figure 3, indicated that 58% and 38% of individuals from day shift and other shift did not skip any meal in a day, whereas other 58% and 38% from both day and other shift skipped breakfast. Also 6% from day shift, 2% from other shift skipped lunch and 4% and 6% skipped dinner from day and other shift respectively.

Table: 4– 3-day dietary recall and skipping of meals per day.

SKIPPING OF MEALS		No. of Sample	Mean ± Std. dev.	f-value	Sig.
ENERGY	NO	5	2048.4 ± 236.42	6.511	.025*
	BREAKFAST	10	1760.4 ± 182.93		
	Total	15	1863.2 ± 241.45		
CARBOHYDRATES	NO	5	348.3 ± 30.91	3.707	.078
	BREAKFAST	10	306.0 ± 43.01		
	Total	15	321.17 ± 43.30		
PROTEIN	NO	5	69.41 ± 10.11	4.565	.054*
	BREAKFAST	10	58.6 ± 8.48		
	Total	15	62.47 ± 10.22		
FATS	NO	5	37.04 ± 4.70	5.642	.035*
	BREAKFAST	10	32.30 ± 2.84		
	Total	15	34.0 ± 4.16		

The table 4 represents the 3day dietary recall of 15% of pooled sample from total subjects and skipping of meals per day. 5 out of 15 individuals did not skip any meals whereas remaining 10 skipped breakfast every day. The skipping of meal showed a prominent effect on total daily intake. A significant difference was observed in intake of energy with f value of .025, protein intake with f value of .054 and fat intake with f value of .035 as skipping of one meal per day indicated a lesser calorie, protein and fats intake as compared to those who do not skipped meal. A study conducted by Nas, et al (2017) suggested that data when compared with 3 meals/d, skipping of meal increased energy expenditure. In contrast, higher postprandial insulin concentrations and increased fat oxidation with skipping of breakfast suggested the development of metabolic inflexibility in response to prolonged fasting that might in the long term lead to low-grade inflammation and impaired glucose homeostasis. Another study conducted by Sharma, et al (2018) suggested that Breakfast skipping emerged as stronger risk factor than obesity and sedentary life style in Indians and showed close association with hypertension. Habitual breakfast skippers are at increased risk for development of Coronary Artery Diseases (CAD) and hypertension in Western India.

4) SOURCE OF MEAL

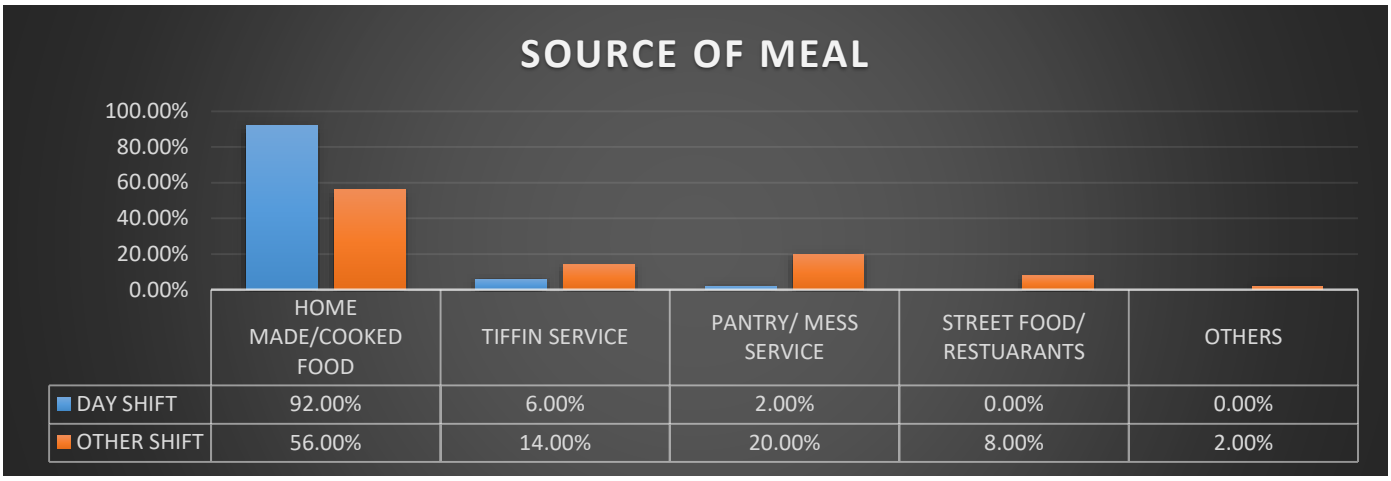

Figure: 4- Source of meal.

The Figure 4 showed majority of individuals from both day and other shift consumed homemade or home cooked food i.e 92% and 56% respectively, followed by 6% and 14% of individual's source of meal was tiffin service whereas 2% and 20% rely on pantry or mess service as source of their meal from day and other shift respectively. Remaining 8% and 2% from other shift consume street food/ restaurants and other sources for their meal. A significant difference with p value of .001 at $p \leq 0.05$ was observed as prominent majority of individuals from day shift have home cooked food. Hence, a significant difference was noted in the study.

Table: 5 – 3-day dietary recall and source of meal.

SOURCE OF MEAL		N	Mean ± Std. Dev.	f-value	Sig.
ENERGY	HOME MADE/ COOKED	10	1853.3 ± 254.25	1.106	.365
	TIFFIN SERVICE	2	1687.8 ± 266.10		
	PANTRY / MESS SERVICE	3	2009.8 ± 146.66		
	Total	15	1863.2 ± 241.45		
CARBOHYDRATES	HOME MADE/ COOKED	10	316.3 ± 46.52	.989	.403
	TIFFIN SERVICE	2	299.3 ± 52.16		
	PANTRY / MESS SERVICE	3	350.3 ± 17.63		
	Total	15	321.17 ± 43.30		
PROTEINS	HOME MADE/ COOKED	10	61.2 ± 8.79	2.560	.122
	TIFFIN SERVICE	2	53.91 ± 5.53		
	PANTRY / MESS SERVICE	3	71.98 ± 11.77		
	Total	15	62.4 ± 10.22		
FATS	HOME MADE/ COOKED	10	33.9 ± 2.40	1.027	.390
	TIFFIN SERVICE	2	30.8 ± 3.59		
	PANTRY / MESS SERVICE	3	36.2 ± 8.90		
	Total	15	34 ± 4.16		

The table 5, showed comparison between 3 day recall of 15% of total pooled sample and source of meal. The data indicated that 10 out of 15 consumed home cooked/ homemade food, 2 of them consumed food provided by tiffin service and remaining 3 had food from pantry/ mess service.

5) FREQUENCY OF EATING OUTSIDE

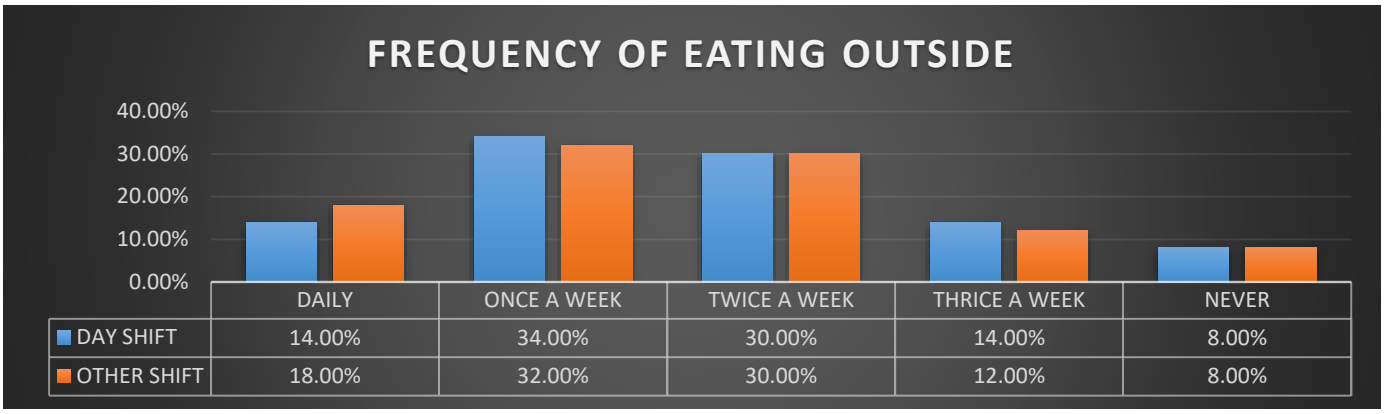

Figure: 5- Frequency of eating outside.

The figure 5, indicated 30% of individuals from both day and other shift, twice a week consumed outside food which included eating places like street food, junk food, restaurants, cafes, stalls, etc. 14% and 18% of individual from day and other shift regularly consumed outside food. 34% and 32% consumed outside food once a week, whereas 14% and 12% consumed outside food thrice a week from day shift and other shift respectively. 8% from both day and other shift never consumed outside food.

Table: 6 – 3-day dietary recall and frequency of eating outside.

FREQUENCY OF EATING OUTSIDE		No. of samples	Mean ± Std. dev.	f-value	Sig.
ENERGY	DAILY	1	1658.3 ± 0.00	1.712	.227
	ONCE A WEEK	5	1991.5 ± 239.26		
	TWICE A WEEK	8	1852.8 ± 212.79		
	THRICE A WEEK	1	1499.6 ± 0.00		
	Total	15	1863.2 ± 241.45		
CARBOHYDRATES	DAILY	1	258.3 ± 0.00	2.474	.122
	ONCE A WEEK	5	345.6 ± 29.75		
	TWICE A WEEK	8	321.0 ± 41.73		
	THRICE A WEEK	1	262.4 ± 0.00		
	Total	15	321.1 ± 43.30		
PROTEINS	DAILY	1	67.5 ± 0.00	.545	.663
	ONCE A WEEK	5	62.3 ± 5.91		
	TWICE A WEEK	8	63.6 ± 13.09		
	THRICE A WEEK	1	49.9 ± 0.00		
	Total	15	62.4 ± 10.22		
FATS	DAILY	1	34.4 ± 0.00	.609	.625
	ONCE A WEEK	5	34.4 ± 1.91		
	TWICE A WEEK	8	34.4367 ± 5.42		
	THRICE A WEEK	1	28.3 ± 0.00		
	Total	15	34.0 ± 4.16		

The table 6, depicts the 3day dietary recall of 15% of total sample pool and frequency of eating outside. It indicated that 8 out of 15 individuals consumed outside food twice a week, 5 consumed it once a week whereas 1 individual consumed it daily and remaining 1 consumed it thrice a week.

6) HEALTH CONDITION

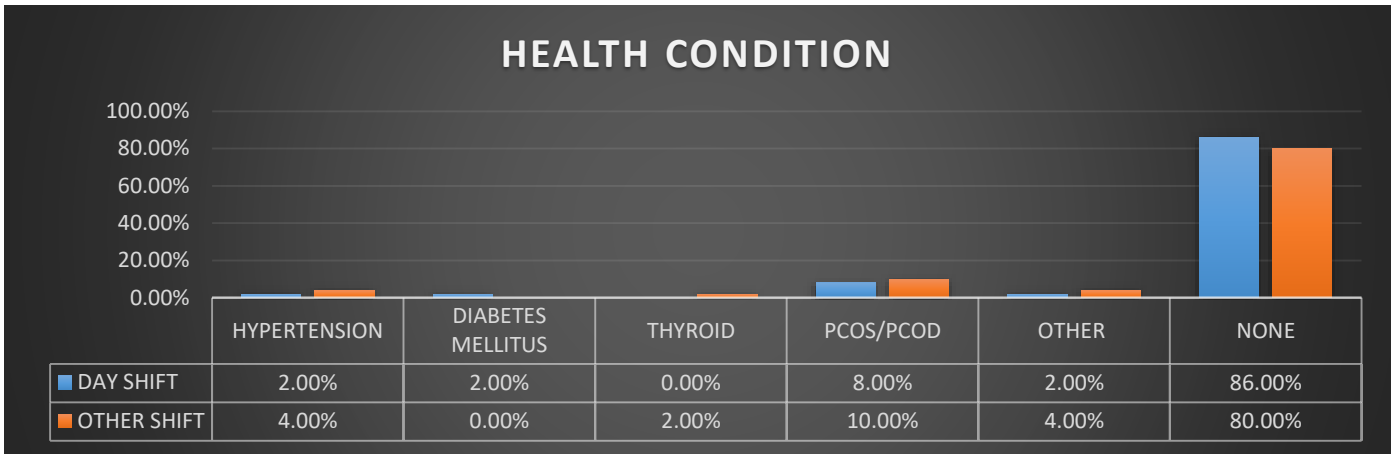

Figure: 6 –Health conditions.

The Figure 6 indicated health condition suffered by the sample.86% from day shift and 80% from other shift did not suffer any health condition. 8% and 10% women from day and other shift had PCOS/PCOD problems respectively. Only 2% of individuals from other shift suffered from thyroid, whereas 2% from day shift had diabetes mellitus type 2. 2% from day shift and 4 %from other shift had hypertension problem. A study conducted by Kecklund et al (2016) reviewed health consequences of shift work and insufficient sleep, evidence showed that the effect of shift work on sleep mainly concerns acute sleep loss in connection with night shifts and early morning shifts a link also existed between shift work and accidents, type 2 diabetes (relative risk range 1.09-1.40), weight gain, coronary heart disease (relative risk 1.23), stroke (relative risk 1.05), and cancer (relative risk range 1.01-1.32). The relationship between shift work and cardio metabolic diseases and accidents mimic those with insufficient sleep. Laboratory studies indicated that cardio metabolic stress and cognitive impairments was increased by shift work, as well as by sleep loss. In 2016 research was conducted by Bannai et al to study the risk of developing diabetes in association with long working hours differs by shift work schedules, shift workers working for ≥45 hours per week had a significantly increased risk of diabetes (HR 2.43; 95% CI, 1.21–5.10) compared to those working for 35–44 hours per week. The risk of diabetes was found to be associated with long working hours differed by shift work schedules.

SUMMARY AND CONCLUSION

The study was conducted on individuals working in shift patterns in Mumbai city belonging to corporate sector. The study group consisted of 50 subjects from day shift and 50 from other shift (night shift, rotational shift, dawn shift) aged between 20-40 years and 66% were males and 34% were females.

It was observed that in both study groups there was no significant difference in the BMI of individuals working in day shift and other shifts (pvalue=0.77). Majority of subject's had non – vegetarian diet type and their major source of meal was home cooked/ homemade food. Maximum number of subjects skipped breakfast on regular basis and consumed 3 meals per day. 33% and 30% of subject from both shifts consumed outside food or junk food once a week and twice a week respectively. The data collected from 3-day dietary recall when compared with eating habits, it was observed that there was a significant difference in protein intake with p value of .018 as the individuals working in day shift had higher intake of protein whereas other shift worker had intake of low protein. The skipping of meal showed a prominent effect on total daily intake. A significant difference was observed in intake of energy with f value of .025, protein intake with f value of .054 and fat intake with f value of .035 as skipping of one meal per day indicated a lesser calorie, protein and fats intake as compared to those who do not skip meal. A highly significant difference with p value of .001 was observed as prominent majority of individuals from day shift have home cooked food.

A significant difference was observed with pvalue was 0.44 in the working hours and shift type as other shift worked for more hours than day shift working individuals. Majority of subjects did not suffer any health condition. Frequent health problem faced by the subjects were headache, stress, acidity and tiredness.

In conclusion, significant difference were observed when day shift and other shifts were compared on nutritional status and dietary pattern. Dietary pattern, meal consumption, snacking option and food choices can be improved a help proper diet counselling and nutritional education programs. Sleep pattern and disorders and can be improved by meditation and time management. Majority of subjects had sedentary lifestyle which was associated to health conditions and frequent faced health problem. Thus, there is a need to give proper nutritional education programs and create awareness regarding importance of a healthy lifestyle among all the subjects.

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