EVALUATION OF HEALTH RISK PROBLEMS AMONG NIGHT SHIFT WORKERS OF ALIGARH DISTRICT

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Abstract : In developing/developed nations day-night jobs have become the necessity. Those working in late nights or the whole night may pose serious health issues due to a number of reasons. In this context the present study was undertaken to examine the effect of change in life style, particularly sleeping habits and on general overall health, of workers engaged in night jobs. The study was carried out in Aligarh district and the sample collected belongs to this city only.

Index Terms – Night shift work employees, questionnaire, health pattern, Z test.

I. Introduction:

At the turn of century, in the developing and developed countries there seems to be unprecedented growth in the number of night shift workers. [1][2](Gordon et al., 1986; Zaho and Turner, 2008). International Labor office defined shift work as: 'A method of work organization under which groups or crew of workers succeed each other at the same workstations to perform the same operations, each crew working a certain schedule or shift so that the undertaking can operate longer than the stipulated weekly hours for any worker. The term shift work is used when more than one work period is scheduled in a workday or when most of the working hours fall outside the standard workday, such as evening, night or weekend shift (International Labor Office, Conditions of work digest, Geneva, 1986). Today, about one in five workers in Europe are employed in shift work involving night work and over one in 20 work extended hours [3](Harrington, 2001). In UK it is estimated that about 20% of workers work in a shift system as it has become the need and demand of the developed and developing nations (Bureau of Labor Statistics, 2005). India is now becoming an outsourcing destination because of its huge population and cheap labor. A report of NASSCOM suggests that 4.5 million Indians are employed in Business Processing Outsourcing (BPO) industries and are exposed to long working hours, irregular timings and increased workload leading to stress and other health problems. As such, we could not find a database which provides information about the percentage of labor working shift rotations in India [4](Bijavara and Honnamachanahalli, 2012). However, those employees who work at night may be at a risk of serious ill health because it causes a permanent clash with the biological clock of human body [5](Costa, 1996; Harrington, 2001). Biological clock of human's body assist in maintaining complex internal functions throughout the day. Several researcheshave reported that shift work or particularly night shift has a significant negative impact on quantity and quality of sleep [6](Khaleque, 1998). The rhythm of melatonin is an important and extensively researched marker of biological-clock. The rising phase of the melatonin rhythm normally initiated the sleep in human beings. Sleep at unsuitable phases of the circadian cycle, for instance during the declining phase of melatonin will usually result in shorter sleep episodes and more night awakenings [7](Dijk et al., 1999). Asynchrony of circadian rhythms accredit to shift work may lead to various clinical complications. Therefore, disruption of circadian rhythm in shift work affects on physiological, psychological and pathological functions of human body (Costa, 1996Harrington, 2001). Disturbance in the sleep is definitely the most important consequence of night work resulting in performance deficits, including increased ruggedness in performance, slowed physical and mental reaction time, increased errors, decreased alertness, impaired memory, and reduced motivation and laxity. Rotating shift work or complete night shift work disturbs sleep, wakefulness, eating patterns and social life and in the long run, often results in gastrointestinal diseases [8](Costa et al., 1987). Factors like age, lifestyle, working conditions may contribute to the risk of ill-health in night shift workers. Most common health problems found in shift workers are insomnia; gastrointestinal problems which include

abdominal pain, diarrhea, loss of appetite, gastritis, acidity, heart burn etc.; cardiovascular problems (Harrington, 2001). Food intake during night leading to high incidence of obesity and cardiovascular diseases due to less responses of endocrine[9](Holmback et al., 2003). According to a study titled 'Sleep deficiency and quality of life of shift workers' by Khaleque (1998), the quantity and quality of sleep, the health of 60 industrial shift workers in Netherlands were compared and it was concluded that night shift is the most disruptive of all shifts in terms of sleep deficiency and health problems. A study carried out by [10]Ohayon (2002) on 817 staff members of a psychiatric hospital in USA found that night shift workers were having difficulty in initiating sleep compared to day workers. This study suggests that shift work causes sleep difficulties and as a consequence, shift workers were more prone to feel sleepy during work and more likely to avail sick leaves.Several studies have been done on the impact of shift work on daily health. [11]Furnham and Hughes (1999) examined psychological corresponds of nightshift workers and results showed that night workers exhibit lower job satisfaction when compared to day shift workers. The connection between shift work and job stress was analyzed by [12]Harda et al. (2005). Subjects enrolled included 3078 day shift workers and 1884 shift workers. The result of study discloses higher job stress among night shift workers. [13]Mohren et al. (2002) studied the high frequency of common infection among employees working different time schedules in Netherland. This revealed that shift work was associated with higher prevalence of common cold, flu-like illness and gastroenteritis compared to day workers. Shift work was further found to be associated with differences in health behavior, sleep, fatigue etc. In Japan, [14]Sewega et al. (1987) investigates 1657 employees in factories, banks and schools by endoscopy. The presence of gastric ulcers was found to be 2.38% in shift workers as compared with 1.03% in day workers. For duodenal ulcers, prevalence was 1.37% and 0.69% for shift workers and day workers respectively. A survey of 343 US factory workers was done by [15] Caruso et al. (2004) with the goal of examining the link between work schedule and gastrointestinal symptoms, medications and diagnosis. The study reveals that night workers were at a higher risk of gastrointestinal problems.

A study performed by [16]Kim et al. (2002) to investigate effect of shift work, in denomination of general health, insomnia, stress, psychological health on 850 shift workers and 550 day workers, in several manufacturing plants in Korea. The results showed that shift workers suffered from physical and psychological stress and sleep problems.While the impact of shift work on health has been studied broadly in other countries, but in India very few studies have been done in this area. Furthermore the studies previously done were on shift workers in call centers, BPO's, software companies, etc. Therefore, the present study was undertaken with an aim to investigate the health issues, in general, among the night shift employees working in different MNCs, Hospitals, BPOs. In this work, the following objectives were undertaken:

1. Tostudy and compare the health pattern between day and night shift workers.
2. To study various health parameterssuch as disturbed sleep, obesity and weight gain, overall general health, hypertension, cardiovascular diseases, dementia, insomnia, gastrointestinal disorders, physical workout, eye problems, joints pain etc.

II. Materials and Methods

Study group: The present study was conducted among employees of Day and Night shift employees from Aligarh District.

In this perspective a questionnaire based study was undertaken.A total of 160 subjects, in the age group 20-50 yrs including men and women irrespective of gender were enrolled. The study was carried out within a 2 month of period between December 2016 and January 2017. Ethical clearance was obtained and data was collected after gaining informed consent, by asking the subjects to fill up a questionnaire which had questions regarding the age, sex, physical activity, lifestyle, psychological and physical illness, and physiological problems.

Selection criteria:

a) Inclusion criteria-Permanent day employees and shift employees from different occupational rank were included.

b) Exclusion criteria-Subjects not willing to fill the questionnaire and incompletely filled questionnaires were excluded.

The subjects were divided into two groups of 80 members each, Group A-Day shift employees and Group B-night employees. Day employees are defined as those employees who work only during the daylight hours i.e. within the standard working time of 8 am to 5 pm. Night shift employees refers to those employees who works in night, i.e. work from 10 pm to 6 am.

Questionnaire:

Keeping in mind, the objective of the study, a detailed questionnaire was prepared to obtain the information on various details related to the evaluation of health status of night shift employees. The questionnaire was divided as: I-Physical workout, II-social life, III-Psychological health,IV-Health problems V-Physiological health. A set of self-designed questions was used to evaluate the general health problems of the night shift employees. The responses of workers were evaluated for group A (day employees) and group B (night

Statistical methods: Data collected from the questionnaire was analyzed manually and assistance of Microsoft Excel (2007 version) was used to compute the percentages. Z test for two proportions was used to study the significance of parameters. |Z| value of > 2.58 was considered as significant at 1% level and |Z| > 1.96 was considered highly significant at 5% level.

III. Results

The study included 160 subjects irrespective of gender. Equal numbers of subjects were taken i.e. 80 from day shift and 80 from night shift. Three age groups were taken i.e.20 to 30 years, 30 to 40 years and 40 to 50 years. The following outcomes were carried out by the study. Fig 1 demonstrated that night shift workers had obesity in age group 20 to 30 years and 30 to 40 years i.e. 5.70% and 5.88% respectively while in day shift only one age group was obese i.e. 40 to 50 years i.e. 15%.

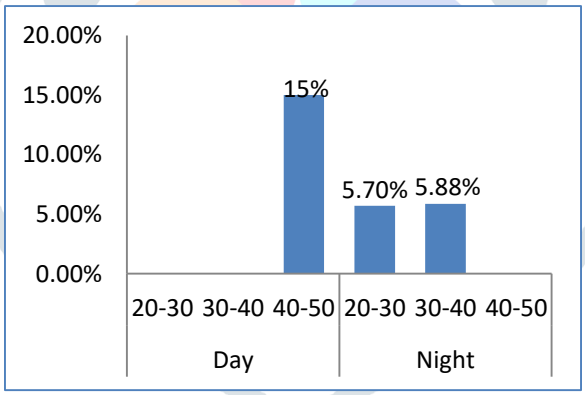

Figure 1 Obesity

Compared to day workers, night shift workers gaining their weight more rapidly in two age groups i.e. 20 to 30 years and 30 to 40 years i.e. 45.70% and 38.20% respectively then day workers i.e. 26.20% and 31.25% respectively. While 40 to 50 years age group of night shift was less prone to gaining their weight as it was not found significant in the study (Fig. 2).

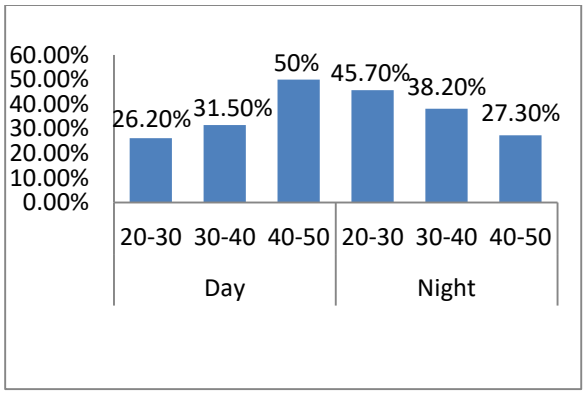

Figure 2 Increase in weight

In night shift, workers are mostly addicted to smoking to avoid the sleep as 29.40%, 73.50% and 54.50% in 20 to 30 years, 30 to 40 years and 40 to 50 years respectively. While in day Shift this data is quite low i.e. 4.50%, 6.70% and 22.20% respectively as depicted in fig 3. Also according to this study environment of night shift also induced the workers to smoke as shown in fig 4.

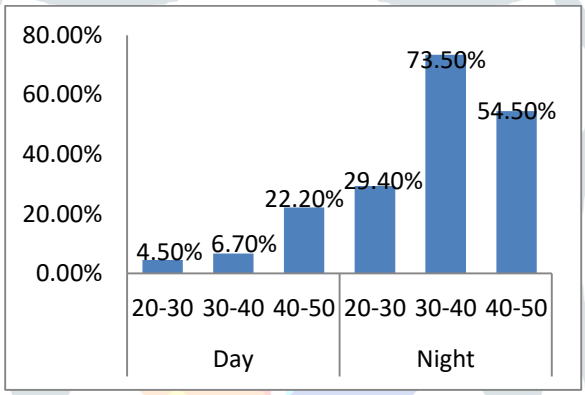

Figure 3 Smoking

No case of obesity was found in the study in the age group of 20 to 30 years and 30 to 40 years of day shit and 40 to 50 years in night shift.

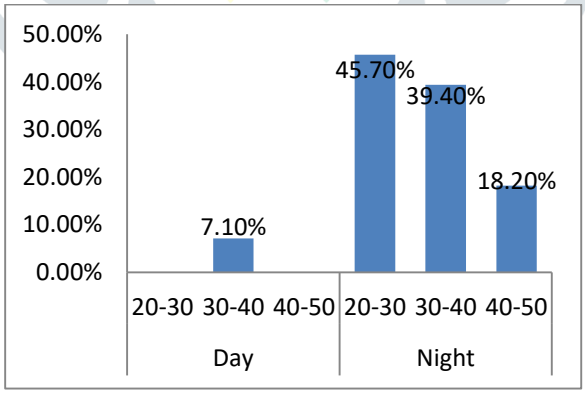

Figure 4 Induced Smoking

In all three age groups of night shift shows significant induced smoking i.e. 45.70%, 39.40% and 18.20% in 20 to 30, 30 to 40 and 40 to 50 years of age group respectively. While no induction of smoking was found in 20 to 30 years and 40 to 50 years of age group but only 7.10% workers were involved in induced smoking in day shift i.e. 30 to 40 years. Eye problems including weakness of sight and blurring of images and watery eyes on concentration was found in the in the night shift workers as 77.10%, 82.40 % and 54.50% in all three age groups respectively comparing to day shift as 30.20%, 26.70% and 36.8% respectively. As depicted in fig 5.

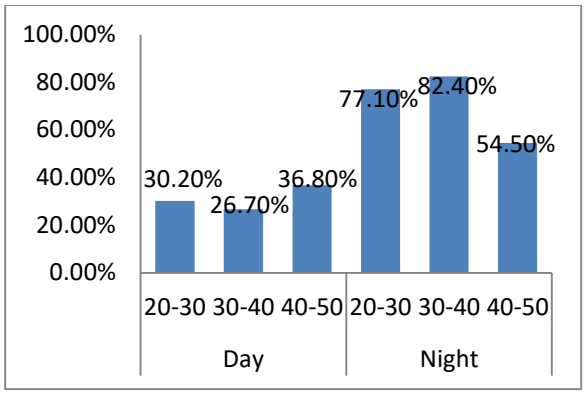

Figure 5 Eye Problems

In fig 6, Compared to day shift, night shift workers were having complain of joints pain in all three age groups as 20%, 44.10% and 45.50% respectively. While in day shift were only 6.80% in 20 to 30 years, 15% in 40 to 50 years and no case of joints pain was found in age group of 30 to 40 years.

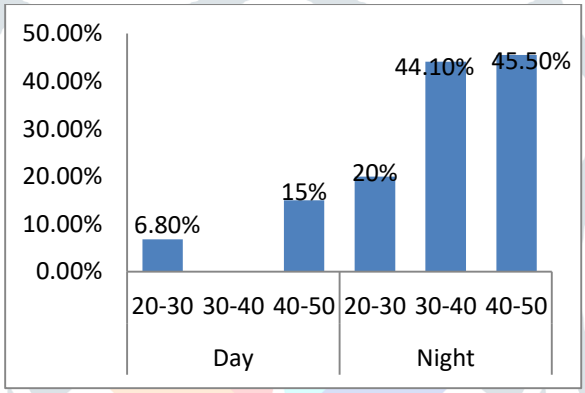

Figure 6 Joints Pain

Psychosocial lives of night shift workers were found significantly disturbed and poor. As depicted in fig 7, 61.80% of 20 to 30 years of age group, 84.40% of 30 to 40 years age group and 63.60% of 40 to 50 years of age group were having severely disturbed social life compared to day shift that was only 39.50%, 18.80% and 27.80% in all three age groups respectively.

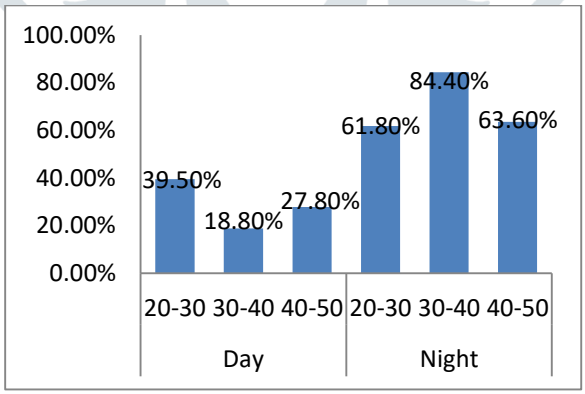

Figure 7 Social Health

Also as per this study, it was found that the psychologically the workers of night shift were more prone to the mental stress as shown in fig 8, stress level of night shift workers was found 54.30%, 81.80% and 63.60% respectively in all three age groups. While this data in day shift were 45.50%, 31.31%, and 20% respectively in all three age groups respectively.

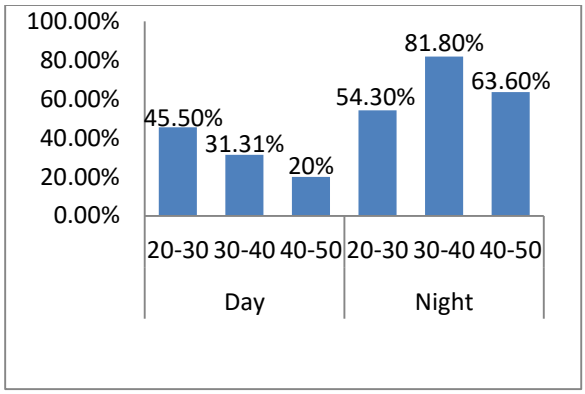

Figure 8 Mental Stress

Analyzing the fig 9, it is concluded that the sleeping pattern of night shift workers was significantly poor compared to day shift workers as there is no case of poor sleep was found in day shift workers but in night shift it was 40%, 50% and 27% respectively in all three age groups respectively.

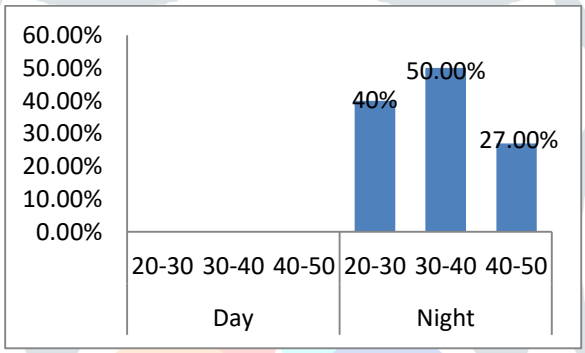

Figure 9 Poor Sleep

Comparing day and night shift workers in terms of dementia, night shift workers were having the dementia as they regularly forgot the small details after joining the night shift work. As it was found 48.60% in 20 to 30 years of age group, 67.60% in 30 to 40 years of age group and 45.50% in 40 to 50 years of age group respectively while it was 16.20%, 42.90% and 23.50% in all three age groups of day shift respectively (Fig 10).

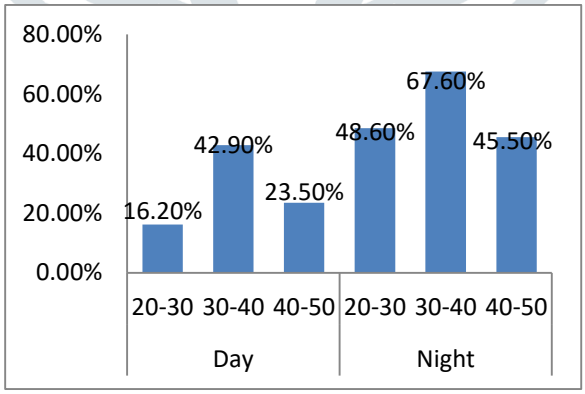

Figure 10 Dementia

Fig 11, shows the anger or mood disorder in the workers due to the night shift work, comparing to the day workers the night shift workers were having more mood disorder or anger as it was found 51%, 78% and 54% respectively in all three age groups against of day shift workers which was 28%, 18% and 16% in all three age groups respectively.

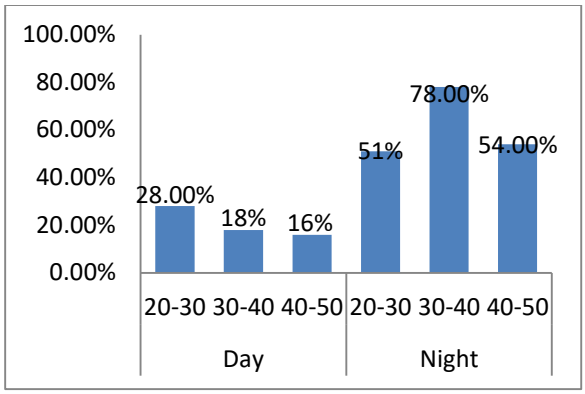

Figure 11 Mood Disorder

Figure 12 and 13 demonstrated the gastrointestinal problems (Gastritis, acidity, heart burn, abdominal pain etc) and disturbed bowel type (constipation and loose motions) in night shift work. According to fig. 12, 20%, 58.80% and 54.50% in all three age groups respectively were having gastrointestinal problem. While this percentage in day shift was 4.50%, 18.80% and 20% in all three age groups respectively.

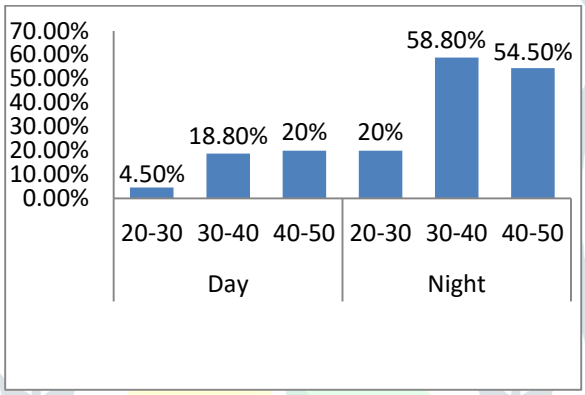

Figure 12 Gastrointestinal Problems

As fig 13, depicts 21.20%, 20.60% and 54.50% in all three age groups respectively of night shift were having severe problem of constipation and loose motions while in day shift it was 10.30%, 16.70% and 15.80% in all three age groups respectively.

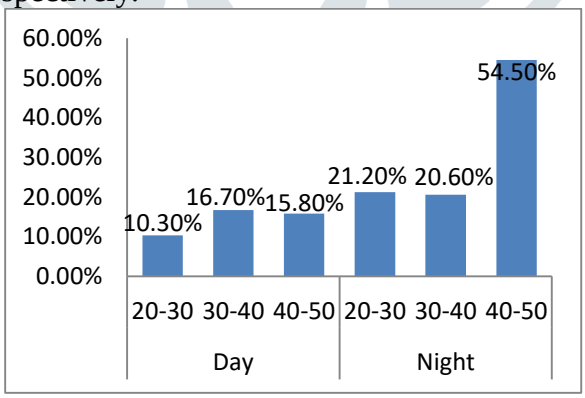

Figure 13 Bowel Type

Fig. 14, depicts 8.80% of 30 to 40 years of age group and 10% of 40 to 50 years of night shift workers reported cardiac diseases while no case of cardiac diseases found in 20 to 30 years of age group. Among day shift workers only 2.30% workers of age group 20 to 30 years reported cardiac diseases wile no cardiac diseases were found in 30 to 40 years and 40 to 50 years of age group.

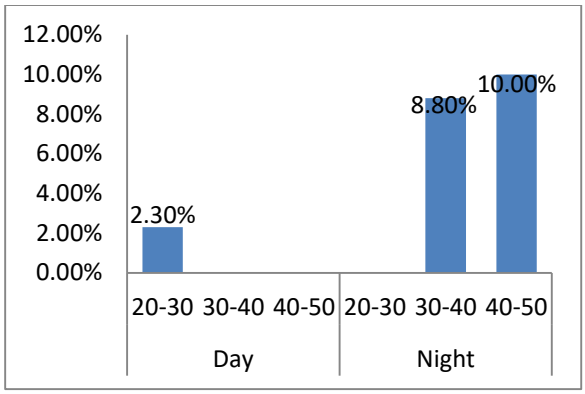

Figure 14 Cardiac Diseases

Additionally, hypertension was found in the night shift workers as 14.25%, 35.25% and 18.20% in all three age groups respectively while in day shift it was 6.80%, 6.30% and 17.50% respectively in all three age groups as depicted in fig 15.

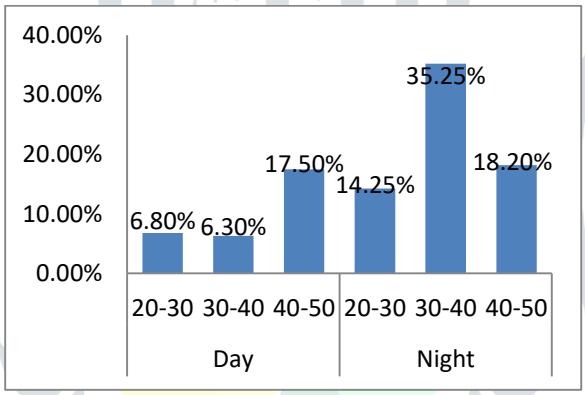

Figure 15 Hypertension

Observing fig 16, it was found that night shift workers were physically inactive and the figure was 57.10%, 73.50% and 45.50% respectively in all three age groups while in day shift this figure was 29.30%, 26.70% and 35% respectively.

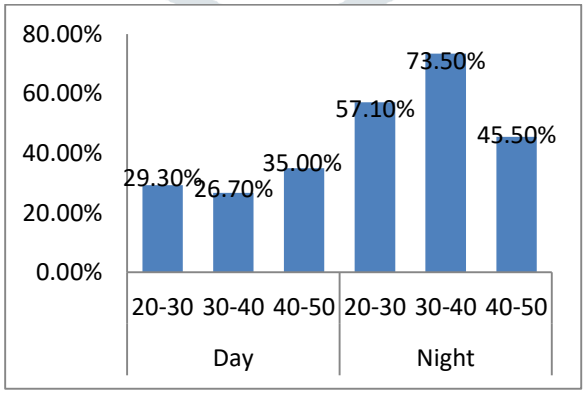

Figure 16 Physical Inactivity

Overall general health of night shift workers was found more affected as 65.70%, 50% and 72.70% respectively in all three age groups while in day shift this data was 11.40%, 25% and 35% respectively (Fig 17).

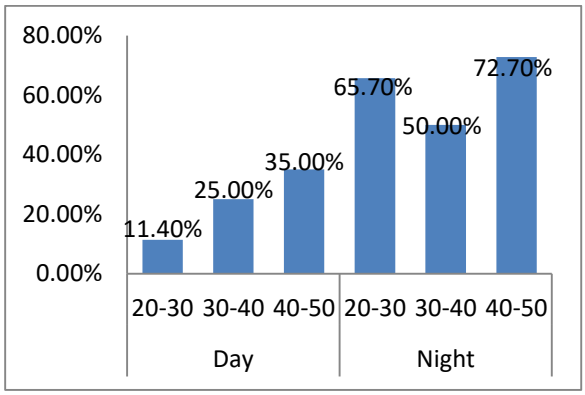

Figure 17 Overall General Health

Summary of result based on statistical analysis:

The Z value that were obtain was analyzed on two percentage level of significance i.e 1% level of significance and 5% level of significance.

Criteria for significance at both level is.

a) $|Z| > 2.58$ for 1% of significance
b) $|Z| > 1.96$ for 5% of significance

Parameters that were significant at 1% level are as follows.

a) Obesity in age group between 40 years to 50 years.
b) Increase in weight in age group 40 years to 50 years.
c) Smoking in all three groups of ages.
d) Induced smoking in all three groups of ages.
e) Joints pain in all three groups of ages.
f) Eye problems in two age groups i.e. 20 years to 30 years and 30 years to 40 years.
g) Disturbed social life in all three groups of ages.
h) Mental stress in two age groups i.e. 30 years to 40 years and 40 years to 50 years.
i) Mood disorder in all three age groups.
j) Dementia in all three age groups.
k) Gastrointestinal problems in all three age groups.
l) Bowel movement in two age groups i.e. 20 years to 30 years and 40 years to 50 years.
m) Cardiac diseases in two age groups i.e. 30 years to 40 years and 40 years to 50 years.
n) Hypertension in two age groups i.e. 20 years to 30 years and 30 years to 40 years.
o) Physical inactivity in one age group i.e. 40 years to 50 years.
p) Poor overall general health in all three age groups

Parameters that were significant at 5% level are as follows.

At 5% level of significance it is found that all the parameters were significant except.

a) Increase in weight in age group 30 years to 40 years
b) Mental stress in age group 20 years to 30 years.
c) Bowel movement in age group 30 years to 40 years.
d) Cardiovascular disease in age group 20 years to 30 years.
e) Hypertension in age group 40 years to 50 years.
f) Physical inactivity in age group 30 to 40 years.

IV. Discussion:

This study enrolled 160 individuals working in day and night shift working in different offices in Aligarh. After a questionnaire survey, the health pattern was studied. Night shift were found more obese and having more in increasing in the weight. The results depict that 5.70% of 20 to 30 years, 5.88% of 30 to 40 years and no case of obesity in 40 to 50 years were found while in day shift no case of obesity was found in the 20 to 30 years and 30 to 40 years but in 40 to 50 years this data was found 15% (Fig 1). Night shift workers also gain weight more rapidly as it was concluded by the study of BMI. According to fig 2, this can be observe that 50%, 38.20% and 27.30% of all three age groups respectively of night shift workers were gaining weight rapidly while in day shift this data was 26.20%, 31.50% and 50% in all three groups of ages respectively. Similar study related with the obesity and increasing weight was done earlier by [16]Sun M, et al. (2017) he concluded that permanent night workers demonstrated a 29% higher risk than rotating shift workers. The increased consumption of cigarettes as a stimulant among night employees may be explained as a mechanism to stay alert during night hours and also night shifts may cause induction of smoking in employees. This can be depicting by the fig 3 and 4. According to fig 3, 29.40%, 73.50% and 54.50% in all three age groups respectively of night shift workers were smokers and also 45.70%, 39.40% and 18.20% of workers from all three age groups respectively were induced smokers (job environment leads them to smoke) as shown in fig 4. this is comparable with the previous study by [17]Ludovic G. P. M. van Amelsvoort, Nicole W. H. Jansen &IJmert Kant (2006) smoking among shift workers. According to fig 5, eye problems in night shift workers were quite high as 77.10%, 82.40% and 54.50% in all three age groups respectively. This is comparable with a study conducted by [18]Makateb, Ali, and HamedTorabifard (2017).Joints pain was found in the night shift workers was very high as 20%, 44.10% and 45.50% in all three age groups respectively as depicts in fig 6. This study is in line with the study conducted by [19]Hedström AK, Åkerstedt T, Klareskog L, et al. Relationship between shift work and the onset of rheumatoid arthritis. Social health of night shift workers were quite disturbed as 61.80%, 84.40% and 63.60% in all three age groups respectively while in day shift it was 39.50%, 18.80% and 27.80% in all three age groups respectively fig 7.this can be judiciously supported by the study of Costa et al.,1987. About 54.30% of 20 to 30 years age group, 81.80% of 30 to 40 years of age group and 63.60% of 40 to 50 years of age group of night shift workers reported being mentally stressed whereas it was 45.50%, 31.30% and 20% of all three age groups respectively fig 8. This can be explained by the study of [20]RenateCervinka (1993) night shift dose and stress at work.According to fig 9, sleep of night shift workers was poorer as 40%, 50% and 27% in all three age groups respectively while no case of poor sleep was found in the day shift workers. This study is supported by the study conducted by Khaleque (1998) who revealed that the quantity and quality of sleep was better in day workers compared to night shift workers. Feeling angry or mood disorder was found in the study among night shift workers as 51%, 71% and 54% in all three age groups while in day shift it was 28%, 18% and 16% respectively fig 10. This can be compared with the study of effects of night shifts in bipolar disorders and extreme morningness by [21]Meyrer R, et al. Bipolar discord. 2009. According to fig 11, it can be concluded that a significant numbers of night shift workers had dementia as they fill the questionnaire that they usually forget the small details after joining the night shift. Fig 11, shows 48.60%, 67.60% and 45.50% of all three age groups respectively was having dementia while in day shift this data was 16.20%, 42.90% and 23.50% of all three groups of ages respectively. This study is comparable to the study conducted by [22]KathleenBokenberger, et al. Night shift employees reported experiencing health problems like gastrointestinal problems (Acidity, heart burn, abdominal pain, gastritis, constipation and loose motions.) and the data was found 20%, 58.80% and 54.50% respectively in all three age groups. While in day shift it was only 450%, 18.80% and 20% in all three age groups respectively. In addition, 21.20%, 20.60% and 54.50% of all three age groups respectively of night shift workers were had disturbed bowel type (constipation and loose motions). While in day shift it was 10.30%, 16.70% and 15.80% in all three age groups respectively as depicted in fig 12 and fig 13 respectively. This is comparable with study of Costa et al., 1987 and Harrington,2001. Cardiac diseases and hypertension was found in the study among night shift workers. According to fig 14, 8.80% of 30 to 40 years of age group and 10% of 40 to 50 years of age group had cardiac disease while no case of cardiac diseases was found in the 20 to 30 years of age groups. While in day shift no case of cardiac diseases was found in the 30 to years of age group and 40 to 50 years of age group, while only 2.30% of cardiac disease

was found in the age group 20 to 30 years. As fig 15 shown 14.25%, 35.25% and 18.20% of all three age groups of night shift workers were having hypertension while 6.80%, 6.30% and 17.50% of all three age groups of day shift was having hypertension. Both cardiac diseases and hypertension found in this study is comparable to the study conducted by the Holmback, et al. , 2003 and [23]Jeong Han Yeom, et al. under the title effect of shift work on hypertension: cross sectional study respectively. Among night shift workers 57.10%, 73.50% and 45.50% of all three age groups respectively were physically inactive while in day shift it was 29.30%, 26.70% and 35% of workers were physically inactive as shown in fig 16. This study is can be defended by the study of [24]Lasfargues et al. (1996) who pointed out that very few subjects were doing physical activity in shift workers (50.2%) in comparison with day workers (59.9%). As shown in fig 17, the overall general health of night shift workers was found poorer as 65.70%, 50% and 72.10% of all three age groups were having overall poor health while in day shift it was 11.40%, 25% and 35% of all three age groups respectively were having overall poor health. This study is compared with the study conducted by Kim et al. (2002) performed a study to investigate effect of shift work, in terms of general health.

V. Acknowledgement:

I sincerely extend my gratitude to the employees of day and night shift employees of various offices in Aligarh district for their support and responding the questionnaire properly. I would like to extend my special thanks to Dr Riaz Ahmad (Associate Professor, Dept of Zoology, AMU) for his immense supervision for my work.

VI. References:

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