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Effect of Shift Work on Blood Pressure!

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Abstract: ***Introduction: Controversies exist in publications about the association between shift work and hypertension. This study aimed to explore the relationship between shift work and the level of systolic and diastolic blood pressure . Potential mechanisms of these health effects have been associated with disturbed circadian rhythms, sleep and lifestyle problems, increased stress and biochemical changes. Most nurses undertake shift work at some time in their career, and health services could not operate without a shift working nursing workforce. Efficient health screening and support to control unhealthy lifestyle factors would be of considerable benefit for maintaining the health of shift workers. Materials and methods: 100 individuals working in Father Muller Medical college hospital (including staff nurses, nursing aids , attenders and clerks), were divided into 50 day time workers and 50 day & night shift workers. Blood pressure will be recorded for all these individuals every week at least four times in a month according to their duty roster and BMI will be calculated. Results: Compared to day workers, 48% shift workers is having abnormal systolic BP recordings and 38% is having high diastolic BP recordings after joining work which is statistically significant.(P value <0.05). There is no statistically significant association between shift work and BMI. (p value 0.07). Conclusion: Our findings confirmed that there is significant association between shift working and the level of blood pressure.***

Keywords: Shift Work, Systolic, Diastolic, hypertension, BMI

1. Introduction

Shift work refers to work patterns that extend beyond the typical daily working hours (7AM TO 4PM OR 8AM to 5 PM)[(1)]. Shift works can potentially disrupt worker's normal biological and social rhythms. Rotatory night shifts are disruptive for sleep, eating patterns and social activities, leading to reduced job performance and higher levels of stress. [(2)]

Studies done in the western world has shown that shift work increases blood pressure, decreases heart rate variability and increased risk of cardiovascular diseases. [(3)]

Evidences indicates that incidence of hypertension is increasing because of increase in risk factors such as smoking, alcoholism, obesity, and lack of exercise[(5)], but little is known about the magnitude and determinants of hypertension in relation to shift work.

Compared to Western World, no much studies are available regarding the effect of shift work on blood pressure variability from India hence the need for this study.

2. Review of Literature

1) A study conducted by a General hospital in Ulsan, South Korea among workers at a petrochemical plant showed that shift workers had significantly higher BMI, systolic as well as diastolic blood pressure than those of day workers.[(4)]
2) A study conducted in Wonji Shoa sugar factory, Ethiopia, 65% of shift works were diagnosed to have hypertension and significantly more among males.[(5)]
3) In a cross sectional study conducted in a rubber manufacturing company in Tehran, it was found out that hypertension was significantly more in shift workers than day workers. [(6)]

Aim of the Study

1) To study the effect of shift work on Blood Pressur
2) To study the effect of shift work on Body Mass Index.

3. Material and Methods

Staff nurses, nursing aids, ward Clerks and hospital attenders who works only during day time and those who works a minimum of 2 night shifts per month on a average for 6 months in Father Muller Medical College are considered.

Study Design – Longitudinal Descriptive Study.

Study Period – 3 months

Study Population – 100 (Total)

$$N = \frac{2(Z\alpha+Z\beta)^2\sigma^2}{(X1-X2)^2} \qquad n= 100$$

Selection Criteria

A minimum of 100 individuals in total who are working in our hospital, were divided into day time workers and day & night shift workers. Blood pressure will be recorded for all these individuals every week at least four times in a month according to their duty roster during their work in wards randomly. BMI also will be calculated for all the subjects.

1) Hypertension is determined according to new guidelines of AHA.[(7)] Normal BP is defined as <120/<80 mm Hg; elevated BP 120-129/<80 mm Hg; hypertension stage 1 is systolic 130-139 or diastolic 80-89 mm Hg, and hypertension stage 2 is systolic ≥140 or diastolic ≥90 mm Hg.
2) BMI has to be calculated for all the individuals according to Asian guidelines. (normal 18.5 to 23 kg/m2). All blood pressure recordings has to be carried out with the same sphygmomanometer.

Inclusion criteria

1) Individuals above 18 years of age of both sexes doing shift work in hospital.

Exclusion criteria

1) Individuals with known co-morbidities such as hypertension, Coronary artery disease, Chronic kidney disease, hyperthyroidism
2) Individuals who are on antihypertensives before joining work.
3) Smoking and Alcoholism

Data analysis

Data collected will be analysed using unpaired T test and Chi square test, and effect of shift work on blood pressure and BMI can be assessed.

4. Results

A Total of 100 people in the age group of 20 to 49 years were studied , out of which 50 are shift workers and 50 are doing only day time work . The maximum are in the age group of 30 to 39 years of age.

Table 1: Frequency distribution based on age

Age	Group		Total	Chi square/ P value
	Day	Shift		
20-29	14	8	22	0.001
30-39	34	26	60	
40-49	2	16	18	
Total	50	50	100	

Table 2: Frequency distribution based on gender

Sex	Group		Total	Chi square/ P value
	Day	Shift		
Female	25	35	60	0.041
Male	25	15	40	
Total	50	50	100	

60% of the study subjects were females out of which 58.3 % were shift workers.

Table 3: Frequency distribution based on BMI

BMI	Group		Total	Chi square/ P value
	Day	Shift		
Normal	16	21	37	0.07
Over weight	25	14	39	
Obese	9	15	24	
Total	50	50	100	

39% of them were overweight and 24% of them were obese. 35% of the overweight individuals were shift workers which is not statistically significant.

Table 4: Before joining work

Systolic BP	Group		Total	Fisher exact
	Day	Shift		
Normal(<120)	48	49	97	0.5
Stage I (130-139)	2	1	3	
Total	50	50	100	

Out of shift workers, 98% were having normal systolic BP before joining work.

Table 5: Before joining work

Diastolic	Group		Total	Fisher exact
	Day	Shift		
Elevated <80	1	6	7	.056
Normal (80)	49	44	93	
Total	50	50	100	

93% of them were having normal diastolic BP before joining work. Out of shift workers, 88% were having normal diastolic BP before joining work.

Table 6: After joining work

Systolic BP	Group		Total	Chi Square p value
	Day	Shift		
Normal(<120)	46	26	72	0.0001
Elevated BP (120-129)	2	14	16	
Stage I (130-139)	2	10	12	
Total	50	50	100	

After joining work, only 72 % are having normal systolic BP. Among shift workers, 48 % is having abnormal systolic BP recordings after joining work which is statistically significant. (p value <0.05)

Table 7: After joining work

Diastolic BP	Group		Total	Fisher exact test
	Day	Shift		
Elevated (<80)	1	4	5	.0001
Normal (80)	49	27	76	
Stage 1 (80-90)	0	17	17	
Stage 2(>90)	0	2	2	
Total	50	50	100	

After joining work, 76% are having normal Diastolic BP.

Among shift workers, 38% is having high diastolic BP recordings which is statistically significant.(P value <0.05)

Table 8

Day work only		Mean	Std. Deviation	P value (Paired t test)
Systolic BP	before joining	116.80	5.869	.046
	MEAN BP	115.62	5.931	
Diastolic BP	before joining	79.80	1.414	.322
	Mean Bp	79.90	.707	

The difference between systolic and diastolic BP before and after joining work in day time workers are not statistically significant.

Table 9

Shift Workers		Mean	Std. Deviation	P value (Paired t test)
Systolic BP	BP before joining	115.80	5.746	.0001
	MEAN BP	122.04	7.211	
Diastolic BP	BP before joining	78.60	4.046	.0001
	Mean Bp	81.94	3.347	

There is much difference between systolic and diastolic BP before and after joining work among shift workers which is statistically significant (p value 0.0001)

5. Discussion

This study compared the prevalence rate of hypertension between day workers and shift workers in Father Muller medical college hospital. Comparison of the two groups of shift working and day working individuals showed that the two groups were properly matched based on age, gender and BMI. This confirms that the results of risk calculation for suffering from hypertension due to shift working obtained in this study are accurate.

Past studies have suggested that compared to day workers, shift workers are more vulnerable to metabolic disorders, such as diabetes and metabolic syndrome[8], and cardiovascular disorders, such as hypertension [9], due to a disruption of circadian rhythm caused by irregular working schedules. Such diverse health effects are induced by a common mechanism via circadian rhythm disruption.

In a study conducted by a General hospital in Ulsan, South Korea among workers at a petrochemical plant showed that shift workers had significantly higher BMI which is not found in our study.[4]

In the study done by Asfaw et al among factory workers in Ethiopia found out that the prevalence of hypertension was significantly higher among shift workers compared to daytime workers (42.9% versus 30.0%; which is in consistent with our present study.[5]

In a study done by Golabadi et al among workers in rubber manufacturing company in Tehran, Iran found out that the mean values of SBP and DBP and prevalence of pre-hypertension and hypertension was significantly more in shift workers than day workers which is in consistent with our study.[6]

In conclusion, we observed that the risk for hypertension was higher in shift workers than in day workers and this finding is consistent with the previous studies. However, no study has identified the specific working period for shift workers after which the risk for hypertension clearly increases. but our results still indicate that shift workers should pay closer attention to blood pressure control by regularly checking their blood pressure, adjusting lifestyle habits, and striving to reduce the length of shift work.

6. Conclusion

This study analyzed the health effects of shift work and found that shift workers had heightened risks for hypertension compared to the day workers.

Working shifts for nurses is a reality that comes with the profession. While there is a significant body of research on shift work, little of this has been specifically applied to nursing, and the implications for individual nurses needing to care for their own health have not been drawn.

Hence, establishing national and social measures to protect the health of shift workers and provide a safer and improved working environment for them will contribute to enhance the quality of their life , ultimately curtailing social and financial costs.

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