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Original article

Impact of Job Stress on Blood Pressure among Working Women of South 24 Parganas

Pampa Das[1]* and Subir Biswas[2]

ABSTRACT

Aim & Objectives: The present study intends to study effect of occupation on blood pressure in respect of women two occupational groups such as- office staffs and teachers.
Material & Methods: A cross sectional study was conducted among office staffs and teachers (aged 25 – 50 years) in two blocks of South 24 Parganas named Kulpi and Sonarpur. Area was selected by the random sampling method; whereas populations were selected through purposive sampling method. Some stress questionnaire (PSS) and blood pressure were collected through standard techniques.
Results & Discussion: Perceived Stress Scale (PSS) score and Mean Arterial Pressure (MAP) were calculated. If we see the PSS category wise mean blood pressure then we can see that the peoples who belongs in low stress category, their mean blood pressure was lower than those belongs to moderate or any other category.
Blood Pressure level was found higher among office staffs than teachers, the mean SBP and DBP of office staffs are 132.78 and 87.01 mmHg whereas among teachers it is 126.59 and 82.77 mmHg respectively and the difference is statistically significant at $p<0.001$ level.
Key Words: Blood Pressure, MAP, PSS, Occupational health, Office staffs, Teachers.

INTRODUCTION

Blood pressure is a strong, consistent, continuous, independent and etiologically relevant risk factor for cardio vascular diseases (Chobanian, 2003). Many diseases such as stroke, heart attack, damage to the eyes and kidneys are due to the high blood pressure (Ghosh *et al.*1983, Beevers *et al.* 2001, Estela *et al.* 2001, Porth, 2002).

[1] *Research Scholar (RGNF), Dept. of Anthropology, West Bengal State University, (*Corresponding author: pampadas0703@gmail.com)*
[2] *Subir Biswas, Professor, Dept. of Anthropology, West Bengal State University.*

High blood pressure or hypertension is ranked as the third most important risk factor in south Asia (Lim et al. 2010). WHO rates hypertension as an important causes of premature death worldwide (Mackay, 2004). Hypertension exerts a considerable public health burden on cardiovascular health status and healthcare systems in India (Srinath *et al.* 2005). In India 57% of all stroke deaths and 24% of all coronary heart disease (CHD) death take place for hypertension (Gupta, 2004).

Hypertension is a common cardiovascular disease. It is as frequent in developing countries as in developed ones. It is considered as the most significant risk factor in the development of stroke, congestive heart failure, renal insufficiency, arterial lesions in general, coronary heart disease and myocardial infarction (Truett *et al*. 1967). As blood pressure rises, life expectancy goes down. In fact it is currently recognized as an important health problem which has far reaching implications (Fries, 1971).

Blood pressure can varies among different occupational groups due to long occupational exposure, stress and stain as well as physical activity due to specific occupation. Probably the level of occupation may materially affect physical activity and other aspect of life in relation to high blood pressure or hypertension. Various epidemiologic studies have shown an excessive risk on hypertension with occupation (Mariammal, 2012).

Occupation related stress has been considered as an important cardiovascular risk factor (Heydari *et al.* 2010). Higher levels of stress at work, where people spend many of their working hours, were recently identified as a source of life stress with significant impact on blood pressure (Matthews *et al.* 1987). According to Tsutsumi *et al.* (2001) job strain is related to high blood pressure among Japanese male workers. Psychological stress at work, or job strain, has been shown to be moderately associated with an increased risk of coronary heart disease (Belkic *et al.* 2004, Kivimaki *et al*. 2006, Steptoe *et al*. 2012, Kivimaki *et al*. 2012).

MATERIAL AND METHODS

Sampling

A cross sectional study was conducted among the office staffs and teachers of Sonarpur and Kulpi area of South 24 Parganas, West Bengal, India. Area was selected by the random sampling method; whereas populations were selected through purposive sampling method.

Age group considered as 25 to 50 years. Age group selected as per the minimum 5 years experience in current occupation. Total 341 samples were collected, of which 166 were office staffs and 175 teachers belonging to same socio economic condition. At the time of sampling some people were excluded those who are physically challenged, taking high blood pressure medicines and did not able to answer when necessary questions were placed before him. Therefore, only female, who are apparently healthy and able to give proper answer at the time of asking some question in relation to stress, taken into consideration as a study participant.

Data Collection

Data were collected from the participants using a proper schedule. Age, religion, education, occupational activities, blood pressure and perceived stress scale related data were collected.

Blood pressure measurements

Blood pressure (in mmHg) were measured by using a standard error free mercury sphygmomanometer and a stethoscope. Mean Arterial Pressure (MAP) can be reasonably approximated by using the following equation MAP = DBP + {1/3(PP)}, where PP = (SBP - DBP), here PP = Pulse pressure, SBP = Systolic blood pressure, DBP = Diastolic blood pressure (Pocock & Richards, 2009).

Perceived Stress Scale

The 10-item PSS questionnaire is used to assess the appraisal of stress personally experienced in one's life. Perceived Stress Scale is widely used stress screening tools. PSS assesses the subjective evaluation of the stressful environments/situations. PSS-4 is used to make a comparison of the subject's preservative stress. It doesn't provide us any diagnostic information so there is no cut-off in the scoring process. The higher score value could indicate a risk of greater perceived stress or clinical psychiatric disorder. The score i.e. 0 = never, 1 = almost never, 2 =sometimes, 3 = fairly often, 4 = very often is taken for each questions. For the scoring of the items 4, 5, 7, and 8 the reverse order i.e. 0 = 4, 1 = 3, 2 = 2, 3 = 1 and 4 = 0 is considered and then summing across all scale items. The highest scoring value is 40 and the lowest value is 0. If for example, answer to the questions 1 to 10 is 2, 2, 2, 2, 3, 1, 3, 2, 2, 1 then the scoring value will be 2+ 2+ 2+ 2+ 1+ 1+ 1+ 2+ 2+ 1= 16 for this subject. All questions must be answered. If any answer is missing the questionnaire is not valid and cannot be used. The Perceived Stress Scale is not a diagnostic instrument; there are

no score cut-offs. There are only comparisons within our own sample (Cohen & Kessler, 1997).

Statistical analysis

Collected data were analyzed by using Statistical Package for the Social Science (SPSS, version 20.0).

RESULTS AND DISCUSSION

A total no. of 341 research participants data were analyzed, Table 1 of frequency distribution of SBP & DBP in different occupational groups shows the percentage of 'Normal' (< or 120 / < or 80 mmHg), 'Pre Hypertension' (120-139 / 80-89 mmHg), 'Stage 1 hypertension' (140-59 / 90-99 mmHg), 'Stage 2 Hypertension' (> or 160 / > or 100 mmHg).

Table 1: Frequency distribution of SBP and DBP in different occupational groups

Occupation	**Normal (mmHg)**		**Pre Hypertension (mmHg)**		**Stage1 Hypertension (mmHg)**		**Stage2 Hypertension (mmHg)**	
	SBP < or 120	DBP < or 80	SBP 120-139	DBP 80-89	SBP 140-159	DBP 90-99	SBP > or 160	DBP > or 100
Office Staff	22 (13.3%)	39 (23.5%)	103 (62.0%)	62 (37.3%)	40 (24.1%)	54 (32.5%)	1 (.6%)	11 (6.6%)
Teacher	50 (28.6%)	74 (42.3%)	103 (58.9%)	65 (37.1%)	19 (10.9%)	31 (17.7%)	3 (1.7%)	5 (2.9%)

 # Chi-Square value SBP, 2df 16.393(p<0.001) *# Chi-Square value DBP, 2df 9.014(p<0.001)*

In this above table we found that maximum office staffs are distributed in 'Pre-Hypertension' category in case of SBP & DBP. Similarly we found the maximum teachers are distributed in 'Pre-Hypertension' category in case of SBP & in 'Normal' category in case of DBP. The Chi-square value of SBP is 16.393, DBP is 19.014 and both the value is significant at p<0.001 percent level.

Table 2: Blood pressure status of office staffs and teachers

Occupation	**SBP(mmHg)**				**DBP(mmHg)**				**MAP(mmHg)**			
	Min	**Max**	**Mean (±SE)**	**t Test**	**Min**	**Max**	**Mean (±SE)**	**t Test**	**Min**	**Max**	**Mean (±SE)**	**t Test**
Office staffs	103	178	132.78 (±.903)	4.752 ***	61	116	87.01 (±.699)	4.392 ***	77	124	102.27 (±.693)	4.969 ***
Teachers	94	165	126.59 (±.937)		59	113	82.77 (±.668)		75	127	97.38 (±.700)	

*Significant*** p<0.001*

Blood pressure status of office staffs and teachers described in table 2. The mean blood pressure of office staffs is 132.78 mmHg and 87.01 mmHg and the mean blood pressure of teachers is 126.59 mmHg and 82.77 mmHg. So here we can see that office staffs are more hypertensive than teachers. Hence, the "t" test value of SBP, DBP and MAP shows significant values i.e. 4.752, 4.392 and 4.969 respectively and it is significant at p<0.001 percent level.

Table 3: Perceived stress scale category wise mean blood pressure of respondents

PSS Categories	**n** (%)	**SBP (mmHg)** Mean(±SE)	**ANOVA**	**DBP (mmHg)** Mean(±SE)	**ANOVA**	**MAP (mmHg)** Mean(±SE)	**ANOVA**
Low Stress	63 (18.5%)	123.84 (±1.404)	9.343***	81.19 (±1.047)	9.161***	95.41 (±1.040)	11.022***
Moderate Stress	112 (32.8%)	128.24 (±1.164)		83.37 (±.889)		98.32 (±.888)	
High Stress	131 (38.4%)	132.28 (±1.067)		86.73 (±.736)		101.92 (±.784)	
Very High Stress	35 (10.3%)	134.31 (±1.914)		88.97 (±1.597)		104.09 (±1.566)	

*Significant*** p<0.001*

Table 3 portraits the PSS category wise mean blood pressure of two occupational groups. In every stage of PSS categories the mean blood pressure of SBP, DBP & MAP is increasing. Here majority of the women are standing at 'High Stress' category. Their mean SBP is 132.28 mmHg, DBP is 86.73 mmHg and MAP is 101.92 mmHg. The ANOVA value of SBP, DBP and MAP is 9.343, 9.161, 11.022 respectively and it is significant at p< 0.001 percent level.

Table 4: Perceived stress scale category wise mean blood pressure of office staffs

PSS Categories	**n** (%)	**Office Staffs**					
		SBP(mmHg) Mean (±SE)	**ANOVA**	**DBP(mmHg)** Mean (±SE)	**ANOVA**	**MAP(mmHg)** Mean (±SE)	**ANOVA**
Low Stress	25 (15.1%)	125.24 (±2.377)	7.848***	81.52 (±1.719)	8.403***	96.09 (±1.676)	10.348***
Moderate Stress	52 (31.3)	131.54 (±1.625)		85.44 (±1.422)		100.81 (±1.309)	
High Stress	79 (47.6%)	134.68 (±1.147)		88.73 (±.822)		104.05 (±.846)	
Very High Stress	10 (6.0%)	143.00 (±3.310)		95.30 (±1.777)		111.20 (±2.064)	

*Significant*** p<0.001*

Table 4 shows the PSS category wise mean blood pressure of office staffs, Out of 166 office staffs, the maximum number of women belongs to 'Moderate stress' and 'High stress' category. SBP, DBP & MAP of 'Moderate stress' category is 131.54 mmHg, 85.44 mmHg, 100.81 mmHg respectively; and SBP, DBP, MAP of 'High Stress' category is 134.68 mmHg, 88.73 mmHg, and 104.05 mmHg respectively. The ANOVA result shows a significant SBP, DBP and MAP value, i.e. 7.848, 8.403 and 10.348 respectively. It is significant at $p<0.05$ percent level.

Table 5: Perceived stress scale category wise mean blood pressure of teachers

PSS Categories	**n** (%)	**Teachers**					
		SBP(mmHg) Mean (±SE)	**ANOVA**	**DBP(mmHg)** Mean (±SE)	**ANOVA**	**MAP(mmHg)** Mean (±SE)	**ANOVA**
Low Stress	38 (21.7%)	122.92 (±1.733)	4.280**	80.97 (±1.334)	3.350*	94.96 (±1.340)	4.333**
Moderate Stress	60 (34.3%)	125.38 (±1.577)		81.57 (±1.067)		96.17 (±1.147)	
High Stress	52 (29.7%)	128.63 (±1.954)		83.69 (±1.267)		98.67 (±1.391)	
Very High Stress	25 (14.3%)	130.84 (±1.966)		86.44 (±1.911)		101.24 (±1.745)	

*Significant** $p<0.01$, ** $p<0.05$*

Table 5 shows the PSS category wise mean blood pressure of teachers. Out of 175 teachers, the maximum number of women belongs to 'Moderate stress' and 'High stress' category. SBP, DBP & MAP of 'Moderate stress' category is 125.38 mmHg, 81.57 mmHg, 96.17 mmHg respectively; and SP, DBP, MAP of 'High Stress' category is 128.63mmHg, 83.69 mmHg and 98.67 mmHg respectively. The ANOVA result of SBP is 4.280 and MAP is 4.333. These two values are significant at $p< 0.01$ percent level. The ANOVA result of DBP is 3.350 and it is significant at $p<0.05$ percent level.

Table 6: Mean blood pressure status of low stress category

Occupation	**n** (%)	**Low Stress**					
		SBP(mmHg) Mean (±SE)	**ANOVA**	**DBP(mmHg)** Mean (±SE)	**ANOVA**	**MAP(mmHg)** Mean (±SE)	**ANOVA**
Office Staffs	25 (39.7%)	125.24 (±2.377)	0.650	81.52 (±1.719)	0.064	96.09 (±1.676)	0.283
Teachers	38 (60.3%)	122.92 (±1.733)		80.97 (±1.334)		94.96 (±1.339)	

Table 6 descries the mean blood pressure status of 'Low Stress' category. In 'Low Stress' category the frequency of office staffs is 25 & the frequency of teachers is 38. In this category we have found the mean SBP, DBP & MAP of office staffs is 125.24 mmHg, 81.52 mmHg and 96.09 mmHg respectively. Similarly in 'Low Stress' category we have also found the mean SBP, DBP & MAP of teachers is 122.92 mmHg, 80.97 mmHg, 94.96 mmHg respectively. The ANOVA result of this category shows a non significant value, i.e. 0.650, 0.064, 0.283 respectively.

Table 7: Mean blood pressure status of moderate stress category

Occupation	**n** (%)	**Moderate Stress**					
		SBP(mmHg) Mean (±SE)	**ANOVA**	**DBP(mmHg)** Mean (±SE)	**ANOVA**	**MAP(mmHg)** Mean (±SE)	**ANOVA**
Office Staff	52 (46.4%)	131.54 (±1.625)	7.347**	85.44 (±1.422)	4.898*	100.79 (±1.308)	7.041**
Teachers	60 (53.6%)	125.38 (±1.577)		81.57 (±1.067)		96.20 (±1.143)	

*Significant** p<0.01, * p<0.05*

This table describes the mean blood pressure status of 'Moderate stress' category. In 'Moderate Stress' category the frequency of office staffs is 52 & the frequency of teachers is 60. In this category we have found the mean SBP, DBP & MAP of office staffs is 131.54 mmHg, 85.44 mmHg and 100.79 mmHg respectively. Similarly in 'Moderate Stress' category we found the mean SBP, DBP & MAP of teachers is 125.38 mmHg, 81.57 mmHg, 96.20 mmHg respectively. The ANOVA result of SBP is 7.347, DBP is 4.898 & MAP is 7.041. The values are significant at p< 0.01 & p< 0.05 percent level.

Table 8: Mean blood pressure status of high stress category

Occupation	**n** (%)	**High Stress**					
		SBP(mmHg) Mean (±SE)	**ANOVA**	**DBP(mmHg)** Mean (±SE)	**ANOVA**	**MAP(mmHg)** Mean (±SE)	**ANOVA**
Office Staff	79 (60.3%)	134.68 (±1.147)	8.120**	88.73 (±.822)	12.204***	104.05 (±.846)	12.249***
Teachers	52 (39.7%)	128.63 (±1.954)		83.69 (±1.267)		98.67 (±1.392)	

*Significant*** p<0.001, ** p<0.01*

Table 9: Mean blood pressure status of very high stress category

Occupation	n (%)	Very High Stress					
		SBP(mmHg) Mean (±SE)	**ANOVA**	**DBP(mmHg)** Mean (±SE)	**ANOVA**	**MAP(mmHg)** Mean (±SE)	**ANOVA**
Office Staff	10 (28.6%)	143.00 (±3.310)	10.545**	95.30 (±1.777)	7.478*	111.20 (±2.054)	10.417**
Teachers	25 (71.4%)	130.84 (±1.966)		86.44 (±1.911)		101.28 (±1.755)	

*Significant** $p<0.01$, * $p<0.05$*

Table 8 and Table 9 describe the mean blood pressure status of high and very high stress category. A no. of 79 office staffs are standing at "High Stress" category and 10 no. of office staffs are standing at "Very High stress" category. Their mean blood pressure (SBP, DBP and MAP) is 134.68 mmHg, 88.73 mmHg, 104.05 mmHg & 143.00 mmHg, 95.30 mmHg, 111.20 mmHg respectively. In the same way 52 teachers are standing at "High Stress" category and 25 teachers are standing at "Very High stress" category. The mean blood pressure of teachers in "High Stress" category and "Very High stress" category is 128.63, 83.69, 98.67 & 130.84, 86.44, 101.28 respectively. The values are significant at $p< 0.001$, $p< 0.01$ & $p< 0.05$ percent level.

CONCLUSION

Regarding blood pressure (both SBP and DBP), teachers having good shape with 28.6% normal in respect of SBP and 42.3% normal in respect of DBP. On the other hand, women in office staff having more hypertension than other groups.

In respect of mean blood pressure again office staff having more SBP, DBP and MAP followed by teacher.

When the study conducted ANOVA among mean SBP, DBP and MAP in normal, moderate, high and very high stress category, it is found that again office staffs having more BP than teachers. It was also found that in every stage of stress category the mean blood pressure is increasing.

Mariammal, 2012 studied on 'Work influenced occupational stress and cardiovascular risk among teachers and office workers'. The result of his study concluded that the working environment affected the teachers to a greater extent resulted in increased blood pressure,

pulse rate and pulse pressure while the working environment of office workers affected their health to a lesser extent than the teachers.

In the present study it was found that job strain is related to hypertension in south 24 Parganas working women as, both the respondents mean blood pressure are standing at pre-hypertension stage and their mean blood pressure is increasing at every level of stress category. Office staffs may be more vulnerable to the hypertensive effects of job strain.

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