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A Statistical Investigation on Pre-Hypertension and Hypertension Association with Siesta among the Students of Rajshahi University

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Abstract

High blood pressure is an important factor in primary care in the 21st century and has become growing worldwide, especially in developing countries. The siesta (midday napping or rest), a typical conventional behavior in populations, may decrease the risk of high blood pressure. This study aims to determine the prevalence of pre-hypertension association with siesta among the students of Rajshahi University, Bangladesh. This study is based on information from 301 students studying at Rajshahi University, 2017. Logistic regression analysis is performed to evaluate the association of prehypertension with various factors along with descriptive analysis. It has been found that among the 301 respondents, 63.12 % are non-hypertensive, 27.52% are pre-hypertensive and 9.3 % are hypertensive. Logistic regression analysis found that siesta practice among respondents lowering 97% risk of having pre-hypertensive or hypertensive (Odds Ratio=0.03, 95% confidence interval=0.01, 0.08). This study revealed that siesta practice had a positive association to lower prehypertension or hypertension among students of Rajshahi University. Therefore, University Authority should take initiative to encourage students to develop siesta practice in order to prevent prehypertension and hypertension.

Keywords: Prehypertension, Hypertension, Students of Rajshahi University, Cross sectional study, BMI (Body Mass Index), Siesta.

AMS Classification: 62J02.

1. Introduction

Hypertension is exceptionally recognizable to us and is one of the unquestionable public health concerns in Bangladesh [1,2]. Research indicates that higher the blood pressure, the higher the risk of getting ischemic heart disease, stroke, heart failure and kidney diseases [3].High blood pressure is one of the major global burdens of disease, and it is higher in the low income countries than in the high income countries. Hypertensive people contributes half of this burden; the rest was among the people with less degrees of high blood pressure [4,5].

More specifically, elevated blood pressure is responsible for approximately 60% of stroke and over 50% of ischemic heart disease [3]. Prehypertension is associated with CVD mortality, especially stroke mortality and stroke morbidity [6]. Pre-hypertension is now recognized as a potential candidate for cardiovascular intervention or risk reduction [7]. Studies found a relationship between pre-hypertension and increased danger of Coronary Artery Disease [8-17]. Prehypertension is also associated with chronic kidney diseases [12 13]. In USA, over 9% of death and roughly 3.5% of hospitalizations are owing to pre-hypertension [16]. Midday napping (siesta) is normal in populaces with low coronary mortality, yet epidemiological investigations have created clashing outcomes [17]. Some investigation had already undertaken dependent on a sizable cohort with a high frequency of napping and data on possibly perplexing factors including detailed comorbidity, physical movement, and diet [18, 19]. Some study thought about BP during the daytime (wakeful period) and evening time (asleep period) from subject journals, however daytime napping (siesta) was not rejected in the investigations [20-25]. Regular siesta had decrease systolic pressure levels and reduced serum adipocyte unsaturated fat restricting protein con-centration's, contrasted and that of non- siesta subjects. Siesta is significantly connected with a reduced prevalence of hypertension [26].

A report published by the Centre for Enterprise and Society (CES) has revealed that 62% of undergraduate students in Bangladesh are under extreme stress. CES Director Sajid Amit published the report for Undergraduate Academic Experience Survey (UAES) 2016-17 at a ceremony. The research findings conclude that undergraduate students are stressed with their student life despite being satisfied with the overall university experience, which causes extreme prehypertension among undergraduate students. Therefore, we motivated to study more on

prehypertension and we are mainly interested to know about the association of siesta with pre-hypertension among students (18–30 years) in Rajshahi University.

2. Sources of data

This study is based on a cross-sectional pilot study where data had been collected from 301 students belonging to the Residential Halls of University of Rajshahi. There are 17 residential hall at RU, where 11 Boy's Hall and 6 Girl's Hall. From which two Boy's Hall and two Girl's Hall were selected using the simple random sampling method. Then, two blocks were chosen within each Hall using the simple random sampling (SRS) method. This was a pilot study of size 301. Study population was residential students of RU. Data collection period was Sep 2017 to Oct 2017.

2.1 Measurements and Methodology

A semi structured pre-tested questionnaire was used to elicit the details on socio-demographic variables, dietary habits, tobacco use, physical activity, family history of hypertension and stress levels, involvement in various non-profit organization, daily habits, etc. Anthropometric measurements and blood pressure were recorded according to standard protocols.

Both blood pressures were recorded three times consecutively on the left hand in a seated position from the subjects after had rest for at least 5 minutes. Then the average of the three measurements for systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded to describe them. A respondent was classified as pre-hypertensive if his/her SBP is between 120 to 139 mmHg and/or DBP between 80 and 89 mmHg, and was classified as hypertensive if the SBP was $\geq$140 mm Hg and/ or the DBP was $\geq$90 mmHg, or if the participant was taking antihypertensive medicine [27]. BMI was calculated using the formula, the weight in kilograms divided by the square of the height in meters (kg/m2). BMI was categorized into four groups as <18.5, 18.5 to 24.9 and 25 to 29.9 kg/m2 [3-8].

Descriptive analysis has been performed first to know the characteristic of the data. Bivariate analysis has been performed to compare the characteristics to confounding variables (for example, age, sex etc). Finally, binary logistic regression has been fitted to find the effect of siesta on hypertension. For that

hypertensive and prehypertensive status has been merged together and coded as 1 and non-hypertensive status is coded as 0. The model was adjusted with sociodemographic and economic covariates, too. The statistical analysis has been carried out using STATA version-14**.**

3. Results

It has been found that (Table 1) among the respondents (52.8% male and 47.2% female) 14.6% were underweight, 68.1% were healthy and 17.3% were overweight. Among the respondents, 5.0 % were from 1st year, 14.6 % were from 2nd year, 26.2 % were from 3rd year, 35.2% were from 4th year and 18.9% masters level. It has been found that among the respondents, 63.12 % were non-hypertensive, 27.52% were pre-hypertensive and 9.3 % were hypertensive. It has been also found that 46.18 % of the respondents took 30 minutes to 2 hours siesta and 22.92% took more than 2 hours siesta.

Siesta along with socio-demographic and economic variables has been compared to hypertensive status (Table 2). It has been found that hypertensive status does significantly differ to respondent's gender (p-value<0.001), BMI (p-value<0.001), family income (p-value<0.001), siesta (p-value<0.01). It has been found that, among the hypertensive respondents 53.57% did not have siesta and among the prehypertensive respondents 67.47% did not have siesta.

Odds Ratio (OR) with 95% confidence interval (CI) obtained from the binary logistic regression to hypertensive status have been reported in Table 3. It has been found that respondents who had siesta were 97% less likely to be hypertensive than their counterpart (OR=0.03, 95% CI=0.01, 0.08). Among other selected socio-demographic and economic variables, it has been found that male respondents are about 9 times more likely to be hypertensive than male respondents (OR=8.87, 95%CI=3.33, 23.63). However, BMI and educational status of father are also found to have significant effect on hypertensive status.

4. Discussion

This study reports the prevalence and associated factors related to pre-hypertension and hypertension among the students of University of Rajshahi based on a pilot study of sample size 301. It has been found that male sex,

underweight and overweight, low educational status of father and no siesta are significantly associated with pre-hypertension and hypertension.

It has been found that male students are more likely to be pre-hypertensive or hypertensive than female students. Among male, frequent smoking consumption may be related with an increased probability of prehypertension, while female have no significant connection between smoking consumption and prehypertension [24,25]. Female students mostly stay inside hall than male students other than class hour which may help to feel them safe. Also the environment for study inside is better in female residential hall than male residential hall which might be another reason to make male respondents more on risk to be pre-hypertensive or hypertensive.

In our studies, underweight and overweight are positively associated with pre-hypertensive and hypertensive students. Relationship of higher BMI with pre-hypertension was also observed in different studies [26, 28, 29]. Increasing BMI and BMI below normal range, is related with pre-hypertension. Evidence exist that overweight and obesity are the most strongest indicator of prehypertension [30,31]. Odds ratio of obese classification is the most elevated among all the significant indicators. There is a clear connection between body weight with pre-hypertension and hypertension in this investigation populace [26]. Further study is expected to look at the part of diet and impact of physical movement on pre-hypertension and hypertension in this populace.

Good sleep is fundamental for ideal health and can influence hormone levels, state of mind and weight. The drop in blood pressure during the night sleeping hours is all known. Less is thought about the drop in blood pressure during daytime rest, which has been shown to be positively associated with the frequency of siesta (just as different spells of daytime rest or short-term sleep) [32,33]. In Greece, the individuals who are more physically active were also more likely to have a siesta. Short prophylactic naps can expand alertness and counteract the impacts of sleep deprivation [34] Thus, to take a short siesta may neutrally affect danger of coronary illness, and this habit could be beneficial because of positive effects on daily work performance [34,35]. There have been no previous huge epidemiological studies on the impacts of siesta on intense coronary disease. Upwards of 250 000 passings for every year in the US are attributable to an absence of customary physical activity [36, 37]. Ethnic minority populaces in the US are less active than Caucasians[38, 39] and are more likely to originate from

nations that are part of the 'siesta culture'[40]. Our outcomes like other study recommend substituting daily siesta more physically active leisure time activities might be beneficial, especially among societies were siesta is a socially acceptable behavior [17].

5. Limitation

This paper is based on the pilot study of sample size 301 only. Therefore, large scale data should be analyzed to confirm all these outcomes. All information (other than anthropometric measurements and blood pressure) was self-reported. If the true information is different than the provided information, the analytical results may be altered.

6. Conclusion

We have found that siesta of apparently healthy individuals, is inversely associated with pre-hypertension and hypertension. This is an important finding because the siesta habit is common in many parts of the world. Based on our findings, if someone has to take a nap during the day, it may also have benefits for high blood pressure. Napping can be easily adopted and typically doesn't cost anything. We obviously don't want to encourage people to sleep for hours on end during the day, but on the other hand, they shouldn't feel guilty if they can take a short nap, given the potential health benefits. Therefore, University authority should encourage students to have siesta practice in order to protect pre-hypertension and hypertension.

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Table 1: Characteristics of the study subjects

Characteristics	**N=301, Frequency (%)**
Gender of Respondent	
Male	159 (52.8)
Female	142 (47.2)
Age of Respondent	
18-20 yrs	35(11.63)
21-25 yrs	260(86.38)
26-30 yrs	6(1.99)
BMI * of Respondent	
Under weight (less than 18.5)	44 (14.6)
Healthy (from 18.5 to 24.9)	205 (68.1)
Over weight (from 25 to 29.9)	52(17.3)
Academic Year of Respondent	
1st year	15 (5.0)
2nd year	44 (14.6)

3rd year	79 (26.2)
4th year	106 (35.2)
Masters	57 (18.9)
Educational Qualification of Respondent's Father	
Primary	63 (20.9)
Secondary	65 (21.6)
higher secondary	46 (15.3)
Honours	94 (31.2)
Others	32 (10.6)
Educational Qualification of Respondent's Mother	
Primary	104 (34.7)
Secondary	98 (31.7)
higher secondary	49 (16.3)
Honours	24 (8.0)
Others	25 (8.3)
Type of Family	
Nuclear family	248 (82.4)
Joint family	53 (17.6)
Family Bonding	
Normal	91 (30.2)
Strong	210 (69.8)
Family Income (in thousand taka)	
Low (2-15)	95(33.57)
Middle (16-30)	106(37.46)
High (> 30)	82(28.98)
Respondent Suffering From Acute Disease	
Yes	21(7.0)
No	280 (93.0)
Siesta in Respondent	
No Sleep	93(30.9)
30 min – 2 hours	139(46.18)
2+ hours	69(22.92)
Hypertensive Status of Respondent**	
Non-Hypertensive	190(63.12)
Pre-Hypertensive	83(27.57)
Hypertensive	28(9.3)

*BMI=$\left[\frac{weight\ (\ in\ kg)}{height(\ in\ m)^2}\right]$, **Non-hypertensive <120/80 mmHg, Pre-hypertensive 120-139 or 80-89 mmHg, Hypertensive ≥140 or ≥ 90 mmHg or taking antihypertensive medicine

Table 2: Comparison of Characteristics to hypertensive status

Variable	Non-hypertensive	Pre-hypertensive	Hypertensive	p-value*
Age of Respondent				
18-20 yrs	23(12.11)	10(12.05)	2(7.14)	0.507
21-25 yrs	164(86.32)	72(86.75)	24(85.71)	
26-30 yrs	3(1.58)	1(1.2)	2(7.14)	
Sex of Respondent				
Female	125(65.79)	15(18.07)	2(7.14)	<0.001
Male	65(34.21)	68(81.93)	26(92.86)	
BMI of Respondent				
Under Weight	44(23.16)	0(0)	0(0)	<0.001
Healthy	127(66.84)	59(71.08)	19(67.86)	
Over Weight	19(10.0)	24(28.92)	9(32.14)	
Academic Year of Respondent				
1st year	11(5.79)	3(3.61)	1(3.57)	0.132
2nd year	26(13.68)	17(20.48)	1(3.57)	
3rd year	56(29.47)	19(22.89)	4(14.29)	
4th year	65(34.21)	28(33.73)	13(46.43)	
Masters	32(16.84)	16(19.28)	9(32.14)	
Educational Qualification of Respondent's Father				
Primary	31(16.4)	23(27.71)	9(32.14)	0.113
Secondary	37(19.58)	24(28.92)	4(14.29)	
Higher Secondary	33(17.46)	9(10.84)	4(14.29)	
Honours	65(34.39)	21(25.3)	8(28.57)	
Others	23(12.17)	6(7.23)	3(10.71)	
Educational Qualification of Respondent's Mother				
Primary	59(31.22)	33(39.76)	12(42.86)	0.568
Secondary	60(31.75)	30(36.14)	8(28.57)	
Higher Secondary	36(19.05)	9(10.84)	4(14.29)	
Honour's	18(9.52)	4(4.82)	2(7.14)	
Other's	16(8.47)	7(8.43)	2(7.14)	
Type of Family of Respondent				
Nuclear family	153(80.53)	71(85.54)	24(85.71)	0.531
Joint family	37(19.47)	12(14.46)	4(14.29)	
Family Bonding				
Normal	59(31.05)	26(31.33)	6(21.43)	0.547
Strong	131(68.95)	57(68.67)	22(78.57)	
Respondent Suffering from Acute Disease				
No	176(92.63	78(93.98)	26(92.86)	0.92
Yes	14(7.37	5(6.02)	2(7.14)	

Family Income				
Low (2000-15000)	44(25.14)	38(46.91)	13(48.15)	<0.001
Middle (16000-30000)	65(37.14)	31(38.27)	10(37.04)	
High (< 30000)	66(37.71)	12(14.81)	4(14.81)	
Siesta in Respondent				
No sleep	22(11.58)	56(67.47)	15(53.57)	<0.001
30 min-1 hour	101(53.16)	27(32.53)	11(39.29)	
2+ hour	67(35.26)	0(0)	2(7.14)	

Table 3: OR of socio-demographic, economic factors obtained from logistic regression to pre-hypertension and hypertension vs non-hypertension.

Variable	**OR (95% CI)**
Sex of Respondent	
Female	1
Male	8.87(3.33,23.63)
BMI of Respondent	
Under Weight	--
Healthy	0.18(0.06,0.49)
Over Weight	1
P-value for trend	<0.001
Academic Year of Respondent	
1st year	1
2nd year	0.26(0.03,2.34)
3rd year	0.46(0.07,3.04)
4th year	0.44(0.07,2.82)
Masters	0.43(0.06,2.9)
P-value for trend	0.792
Educational Qualification of Respondent's Father	
Primary	1
Secondary	0.73(0.19,2.75)
Higher Secondary	0.12(0.02,0.59)
Honor's	0.11(0.02,0.51)
Other's	0.12(0.02,0.69)
P-value for trend	0.004
Educational Qualification of Respondent's Mother	
Primary	1

Secondary	1.59(0.52,4.88)
Higher Secondary	3.7(0.77,17.15)
Honor's	7.60(1.26,45.82)
Others	0.89(0.20,3.80)
P-value for trend	0.464
Type of Family	
Nuclear family	1
Joint family	0.57(0.20,1.64)
Family Bonding	
Normal	1
Strong	1.47(0.61,3.49)
Respondent Suffering from Acute Disease	
No	1
Yes	0.49(0.10,2.28)
Family Income	
Low (2000-15000)	1
Medium (16000-30000)	0.80(0.31,2.05)
High (< 30000)	0.38(0.12,1.22)
P-value for trend	0.14
Siesta in Respondent	
No	1
Yes	0.029(0.01,0.08)
ROC* analysis: AUC**=0.903	

*Receiver Operating Curve, **Area Under the ROC Curve