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Feminine and Nuptial Determinants of Hypertension in Bangladesh: A Case Study in Rajshahi District

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Abstract

Hypertension is an increasingly important medical and public health problem. It is a leading cause of the global burden of disease and a major risk factor for ischemic heart disease, stroke, kidney failure, etc. The core objective of the study is to investigate the impact of some selected feminine and nuptial determinants on hypertension of reproductive married females in Bangladesh. The data of 1177 reproductive married females were collected from the Rajshahi district using stratified multistage sampling with a technique based on the scheduled questionnaire. The percentage distribution, point bi-serial correlation, phi correlation, binary logistic regression, and boot-strapping techniques were used. The study results show that the prevalence of hypertension among the reproductive married females are 28.90%. Among the total respondents, 6.60% are pregnant, 57.90% are contraceptive users, and 25.80% are with menopause. Also, 21.70% of females are involved with miscarriage. Besides, the significant effects of the duration of the couple's life, contraceptive use, menopause, pregnancy, and miscarriage on hypertension have been found positive. Also, the first menstruation age had a negative impact on hypertension. i. e. early menstruation age is a risk factor for occurring hypertension. Therefore, to get a good life, women should not marry earlier, the use of contraceptives should be kept limited, should be careful and take necessary precautions during pregnancy.

Keywords: Hypertension, Feminine, Nuptiality, Reproductive Married Female.

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1. INTRODUCTION

Hypertension is called high blood pressure, and blood pressure is the lateral pressure exerted on the walls of the arteries by blood flowing through the arteries. Hypertension is an important factor in various severe diseases. At present, hypertension is increasing day by day worldwide. So, it is not only a national problem for any country; it is also an international problem. Worldwide prevalence estimates for hypertension may be as much as 1 billion individuals, and approximately 7.10 million deaths per year may be attributable to hypertension (Chobanian et al., 2003).

Hypertension is a most important risk factor of cardiovascular diseases **(**Chobanian, et al. 2003). The World Health Organization (WHO) reports that suboptimal systolic blood pressure (>115 mm Hg) is responsible for 62% of cerebrovascular diseases and 49% of ischemic heart disease, with little variation by sex. In addition, suboptimal blood pressure is the number one attributable risk for death throughout the world (WHO, 2002a). Maternal hypertension is a most important risk factor for low birth weight infants, and the rate of low birth weight of black women is more than twice that of white women (Odell et al., 2006). In Latin America and the Caribbean, hypertensive disorders are the first leading cause of maternal deaths (26.7%), and in Asia and Africa, 9.1% of maternal deaths are caused by hypertensive disorders; also, 16.1% in developed countries (Khan et al., 2006). In the global context, hypertensive disorder of pregnancy was responsible for 6% of the burden of all maternal conditions, and it was estimated that deaths due to hypertensive disorders of pregnancy represented 13% of all maternal deaths (Dolea et al., 2003). Specially, developing countries are likely to face an enormous burden of chronic non-communicable diseases in the near future (World Health Organization, 2001).

In Bangladesh, where non-communicable diseases are on the rise, hypertension stands out as a significant yet insufficiently explored public health issue among women. Identifying the factors that contribute to this condition is essential for designing effective interventions and shaping health policies. Given the growing prevalence and complex effects of hypertension on maternal and child health, this study aims to examine the connection between specific feminine and nuptial determinants and hypertension among reproductive married women in Bangladesh.

2. LITERATURE REVIEW

Hypertension is the most important disease which is the leading cause of morbidity and mortality in the industrial world as well as becoming an increasingly common disease in developing countries (Saha et al., 2006). Bangladesh is a high-mortality developing country (World Health Organization, 2002a). Among the top ten leading causes of death in Bangladesh, Ischemic heart disease is the first leading cause of death, accounting for 12% of total deaths (World Health Organization, 2002b). Also, 10.57% of deaths have occurred by hypertension (where 7.97% is female and 12.51% is male), heart disease, and stroke; the prevalence of morbidity by blood pressure is 6.2% (Bangladesh Bureau of Statistics, 2007; Begum, 1996).

The World Health Organization (WHO) raised the alarm against high blood pressure or hypertension on World Health Day 13 as the disease kills nearly 1.5 million in Southeast Asia and afflicts 12 million in Bangladesh (WHO, 2013). The prevalence of hypertension was 12%, and it was higher among women (14.8%) than among men (8.9%) (Khanam et al., 2011). The pooled estimate for the prevalence of hypertension in Bangladesh was 13.5% (Moniruzzaman et al., 2013). Many researchers (Tosell et al., 2001; Bond et al., 2000; Dehoff et al., 2004, etc.) have studied the in-depth patterns of hypertension in different populations of the world. In Bangladesh, some researchers (Chen et al., 2006; Zaman et al., 2010; Islam and Majumder, 2012, etc.) have studied the fundamental situation of hypertension but to the best of our knowledge, individually in-depth assessment of feminine hypertension is rare in Bangladesh.

Thus, the feminine and nuptial determinants of hypertension should be properly investigated. The findings (obtained by logistic regression) of this study may help to understand the effect of these determinants on hypertension. This paper is meant to investigate the impact of some selected feminine and nuptial determinants on hypertension of married women in Bangladesh.

3. METHODOLOGY

3.1 Data

Using stratified multistage sampling, the data of size 1177 were collected using personal interviews from the population of all reproductive females of Rajshahi district. Hypertension was measured as a binary explained variable (absent or present) where the explanatory variables were first menstruation age, duration of couple life, use of the contraceptive method, pregnancy, menopause, and miscarriage. In the case of qualitative variables (use of the contraceptive method, pregnancy, menopause, and miscarriage), one (01) was indicated for present and zero (0) for the absence of possessed characteristics. Also, the quantitative variables (first menstruation age, duration of couple life) were measured with year.

3.2 Measurement of Hypertension

Blood pressure is measured in millimeters of mercury (mm Hg). Normal blood pressure varies with age, weight, and physical status. Normally, it ranges from 100 to 139 for systolic and from 60 to 89 for diastolic. Thus, blood pressure ≥ (140/90) is considered as hypertension and ≤ (100/60) is as low blood pressure or hypotension (Bernier et al., 1997).

3.3 Methods

Before finding out the explanatory variables (menstruation age, duration of couple life, use of contraceptive method, pregnancy, menopause, and miscarriage) as feminine and nuptial determinants of hypertension, the associations or relationships between hypertension and other explanatory variables mentioned have been studied by phi correlation and point bi-serial correlation. After examining the existence of the general relationship between hypertension and other explanatory variables, the causal relationship has been analyzed using the binary backward stepwise logistic regression model. To test the significance of explanatory variables mentioned in the model likelihood ratio test and Wald test have been used. Also, to assess the goodness of fit of the model, the Hosmer-Lemeshow test statistic and Negelkerke R square and receiver operating characteristic (ROC) curve have been used.

4. RESULTS

Tables 1(a) and 1(b) summarize the feminine and nuptial background characteristics of the study using the percentage distribution and percentile respectively.

Table 1(a): Distribution of Background Characteristics of Respondents

Characteristics	**Percent (%)**	**Characteristics**	**Percent (%)**	**Characteristics**	**Percent (%)**
Use Contraceptive Methods		**Miscarriage**		**Hypertension**	
No	46.10	No	78.60	No	71.10
Yes	53.90	Yes	21.40	Yes	28.90
Total	100	100	100	Total	100
Pregnancy		**Menopause**			
No	94.10	No	85.30		
Yes	5.90	Yes	14.70		
Total		Total	100		

The percentages of selected feminine and nuptial characteristics among the reproductive married female are displayed in Table 1(a). Among total reproductive married females, 53.90% were contraceptive users in the meantime 5.90% were pregnant. In this study, the rate of miscarriage in active married females was 21.40%. Also, the rate of menopause or unproductive females was 14.70%. Finally, the reproductive married female hypertensive patients were 28.90%.

Table 1(b): Percentiles of Age at First Menstruation and Duration of Couple Life.

Percentiles	**5th**	**10th**	**25th**	**50th**	**60th**	**75th**	**90th**	**95th**	**99th**	**100th**
First Menstruation Age (in Year)	11	11	12	13	13	14	15	15	17	17
Duration of Couple Life	3	4	10	18	22	28	38	44	56	72

The percentiles of first menstruation age and duration of the couple's life are displayed in Table 1(b). The first menstruation age (in years) of 25% of females was 12 at the same time the age (in years) was 13 for 60% of females. 95% of females completed 44 years of their total couple life whereas 50% have completed 18 years.

The results of the association between hypertension and other explanatory variables are displayed in Table 2. This table depicts that the negative relationship between hypertension and first menstruation age was significant at a 5% level of significance. Another positive relationship between hypertension and the duration of the couple's life was highly significant at a 1% level of significance.

Table 2: Association between Hypertension and Other Feminine as well as Nuptial Characteristics

	Hypertension	**Correlation Coefficients**	**P-Value**
Point Bi-serial Correlation (r_{pbc})	First Menstruation Age	$r_{pbc} = -0.06$	0.05
	Duration of Couple Life	$r_{pbc} = 0.34$	0.01
Phi Correlation (r_{φ})	Use of Contraceptive Method	$r_{\phi} = 0.08$	0.10
	Menopause	$r_{\phi} = 0.24$	0.01
	Pregnancy	$r_{\phi} = 0.07$	0.03

	Miscarriage	$r_{\phi} = 0.14$	0.01

Also, the relationships between hypertension and other selected feminine as well as nuptial characteristics such as the use of contraceptive methods, pregnancy, menopause, and miscarriage were significant at 10%, 3%, 1%, and 1% levels of significance.

The results of the causal relation obtained by binary backward stepwise logistic regression analysis are displayed in Table 3.

Table 3: Logistic Regression Analysis of Hypertension on Feminine and Nuptial Determinants

Characteristics	**Regressor Coefficient (β)**	**Standard Error of β**	**Wald Test**	**d. f**	**P -Value**	**Odds Ratio**	**95% Confidence Interval**	
							Lower	**Upper**
First Menstruation Age	-0.089	0.052	2.992	1	0.084	0.914	0.828	1.016
Duration of Couple Life	0.070	0.007	89.738	1	0.000	1.073	1.057	1.089
Use of Contraceptive Method								
No (r)	-	-			-	-		
Yes	2.086	0.245	72.461	1	0.000	8.054	4.863	12.768
Menopause								
No (r)	-	-			-	-		
Yes	1.661	0.279	35.555	1	0.000	5.265	3.008	8.964
Pregnancy								
No (r)	-	-			-	-		
Yes	2.676	0.358	55.991	1	0.000	14.530	7.235	30.335
Miscarriage								
No (r)	-	-				-		
Yes	.576	0.166	12.056	1	0.001	1.779	1.295	2.488
Constant	-3.119	0.716	18.992	1	0.000	0.044		

[Note: r represents the reference category]

To study the causal relationship between hypertension and other feminine and nuptial characteristics, first menstruation age was found as a significant variable. i. e. first menstruation age had a negative significant impact on hypertension and its odds ratio of 0.914 indicated that for every increase of one year in first menstruation age up to 17 years, the risk of occurring hypertension decreased by 0.914 times. Secondly, the duration of the couple's life had a positive significant impact on hypertension, and its odds ratio focused on every increase of one year in the duration of the couple's life, the risk of hypertension increased 1.073 times. Thirdly, the use of the contraceptive method had a positive significant impact on hypertension and the odd ratio indicated that the respondents who used the contraceptive method had 8.054 times the odds or risk of occurring hypertension compared with those who did not use it. Also, menopause, pregnancy, and miscarriage had a positive significant impact on hypertension and the odds ratios indicated that the respondents who possessed the mentioned characteristics had 5.265, 14.530, and 1.779 times risk for hypertension compared with those who did not possess them. After discussing the binary backward stepwise logistic regression it was established that first menstruation age, duration of couple life, use of contraceptive method, menopause, pregnancy, and miscarriage were considered as determinants of hypertension.

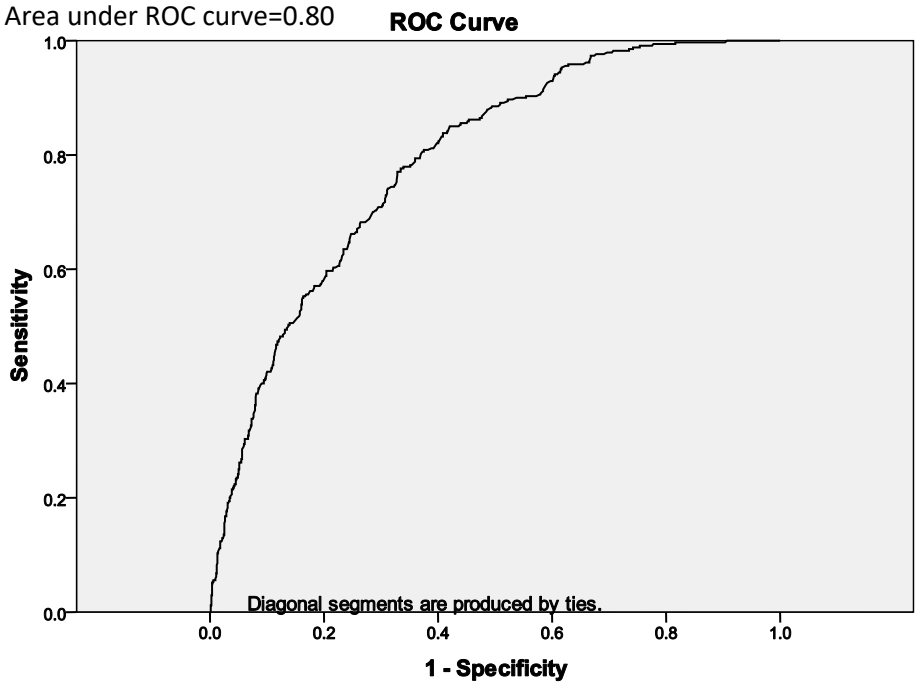
According to the results of the Wald test statistic (in Table 3), the satisfactory level of assessment of the fitted binary backward stepwise logistic regression model was quite well. i.e., the model contained those variables that should have been in the model. Also, other results of the assessment of the fitted binary backward stepwise logistic regression model are displayed in Table 4.

Table 4: Results of Assessment of Fitted Logistic Regression Model

-2 Log likelihood	**Cox & Snell R Square**	**Nagelkerke R Square**
1143.401	0.21	0.30
Hosmer and Lemeshow Statistic	**df**	**P - Value**
6.354	8	0.61
Classification Table	**Predicted Hypertension**	**%**

		No	Yes	
Observed Hypertension	**No**	769	68	92 (specificity)
	Yes	210	130	40 (sensitivity)
	Overall			77
Area Under ROC Curve = 0.80				

The value of Negelkerke R square was 0.30 i.e., all selected variables of the logistic regression model explained 30% of the outcome variable. Also, the value of the Hosmer-Lemeshow goodness-of-fit statistic was 6.354 and the corresponding p-value was 0.61 with 8 degrees of freedom which indicated that the fit of the model was quite well. The results of classifying the observations of hypertension using the fitted logistic regression model are presented in Table 4. The overall rate of correct classification was 77% with 92% of the hypertension-free group (specificity) and only 40% of the hypertensive group (sensitivity). A more complete description of classification accuracy was given by the area under the ROC curve which provided a measure of the model's ability to discriminate between those subjects who experienced the outcome of interest versus those who did not. The area under the ROC curve in the present study for feminine and nuptial aspects was 0.80 which indicated that the model's ability was better to discriminate between those respondents who had hypertension than those who did not have.



5. DISCUSSION

According to the present study, the prevalence of hypertension in reproductive married females in Bangladesh was 28.90%, which was higher than the 13.50% prevalence reported by Moniruzzaman et al. (2013) in a meta-analysis from 1995 to 2009. This meta-analysis included studies conducted mainly among the rural community. Also, the prevalence rate (28.90%) of the present study was higher than the prevalence of 11.30% was found in another meta-analysis conducted on the studies from 1976 to 1994 by Zaman and Rouf (1999). The meta-analysis conducted by Zamana and Rouf (1999) included studies conducted in Dhaka only and mostly in urban areas.

The prevalence of hypertension of reproductive married females in this was 28.90%. These findings were in accordance with the former studies (Saha et al., 2006; Ullah, 1976; Syeed, 1994, etc.) at home and consistent with study abroad (Chobanian et al., 2003). Hypertension was significantly associated with the duration of the couple's life, oral contraceptive use, menopause, pregnancy, and miscarriage. The determinants of duration of the couple's life, oral contraceptive use, menopause, pregnancy, and miscarriage had a positively significant impact on hypertension whereas the age at first menstruation had a negatively significant impact on hypertension. Finally, the study revealed that the presence of oral contraceptive uses, menopause, pregnancy, and miscarriage increased the risk of hypertension. Also, the duration of the couple's life had a positive significant impact on hypertension whereas age at first menstruation had a negative significant impact on hypertension. Hence, early menstruation is not expected.

6. CONCLUSION

This study primarily aims to explore the effects of selected feminine and nuptial factors on hypertension among married women in Bangladesh. A sample of 1,177 reproductive married women from the Rajshahi district was collected using a stratified multistage sampling approach and a structured questionnaire. The analysis revealed that the duration of married life, oral contraceptive use, menopause, pregnancy, and miscarriage were significantly associated with an increased risk of hypertension, whereas a higher age at first menstruation was significantly associated with reduced risk. There are no alternatives to menopause and pregnancy. Hence, women are advised to maintain their daily life smoothly. To avoid a bad impact on the duration of the couple's life, men and women should not marry earlier. Also, more reliable and secure contraceptive methods should be invented than existing ones. To

control the early menstruation, teenage girls should avoid the offensive entertainment. To reduce the practice of miscarriage, moral lessons should be implemented nationwide. So, knowledge and awareness are the best ways to protect and control hypertension. This study is limited by its focus on the Rajshahi district, which may constrain the generalizability of the findings to other regions of Bangladesh. Its cross-sectional design restricts the ability to determine causal relationships, and reliance on self-reported data introduces the potential for recall bias. Additionally, key factors such as diet, physical activity, genetic predisposition, and stress were not included, which might have impacted the results.

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