An Understanding of Hypertensive Factors: A Study at Charghat Thana of Bangladesh

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Abstract

The core objective of the study was to investigate the impact of influential factors on hypertension in Bangladesh. The non-communicable disease hypertension is emerging as a major health problem in Bangladesh. It is a silent killer causing a lot of mortality and morbidity. Many researchers have studied the in-depth patterns of hypertension in different populations of the world. In Bangladesh, some researchers have studied the fundamental situation of hypertension, but there is no individual, in-depth assessment of it. Considering the above situation, this study was undertaken. Data were collected from 1600 respondents using multistage cluster sampling through an interview schedule. The binary backward logistic regression method has been used to identify risk factors of hypertension. Also, the performance of the fitted model has been examined by using the likelihood ratio test, Wald test, Hosmer–Lemeshow test and Nagelkerke R-squared. The study demonstrated that the percentages of diastolic hypertension (16.20%) was greater than systolic hypertension (12.30%) in the age group below 40 years, while the percentages of diastolic hypertension (39.10%) were less than systolic hypertension (50.90%) in the age group above 60 years. However, both systolic (31%) and diastolic (31.20%) hypertension rates were approximately the same in the age group 40-60 years. The positive significant impact of types of work, working hours per day, social stress, occupational stress, mental stress, diabetes, and hypertension in families, overweight, smoking, and access salt intake have been found on hypertension. Also, educational level and regular exercise have been identified as negative risk factors for hypertension. There should be more careful handling of blood pressure medications in elderly patients. Bangladesh can effectively control hypertension and improve public health by promoting lifestyle changes, a healthy diet, increased physical activity, and a smoking-free society.

Keywords: Hypertension, Binary Backward Logistic Regression, Nagelkerke R-squared

JEL Classification: C1, C2, I1

1.0 Introduction

Hypertension or high blood pressure is when the pressure in blood vessels is too high (140/90 mmHg higher) (WHO, 2023)**.** This hypertension is an important factor for various sever diseases. At present, the rate of hypertension is increasing day by day world-wide. So, it is not a national problem, it is also an international problem.

Specially, developing countries are thus likely to face an enormous burden of chronic non-communicable diseases in the near future, and 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 the developing countries (WHO, 2001; WHO, 1978). World-wide 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). An estimated 1.28 billion adults aged 30–79 years world-wide have hypertension, most (two-thirds) living in low- and middle-income countries. Also, an estimated 46% of adults with hypertension are unaware that they have the condition. In the same report, Less than half of adults (42%) with hypertension are diagnosed and treated, and approximately 1 in 5 adults (21%) with hypertension have it under control (WHO, 2023)**.** 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 occurred by hypertensive disorders; also, 16.1% in developed countries (Khan et al., 2006). Maternal hypertension is the 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 the global context, hypertensive disorders of pregnancy were 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). Hypertension is a most important risk factor for cardiovascular diseases (Chobanian et al. 2003). The World Health Organization 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). Bangladesh is a developing country with high mortality rates (WHO, 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 (WHO, 2002b). Also, 10.57% of deaths have been 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% (BBS, 2007; Begum, 1996). The number of diabetic hypertensive patients is also increasing day by day (Haque et al., 2012). 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 (Syeed et al., 1994; Saha et al., 2006; Ullah, 1976, etc.) have studied the fundamental situation of hypertension, but there is no individually in-depth assessment of hypertension.

Thus, the determinants of hypertension should be properly investigated. The findings of this study may help to understand the effect of these determinants on hypertension. This paper will investigate the impact of some selected hypertensive factors on adult people in Bangladesh.

2.0 Objectives of The Study

The objective of the study was to know the nature of hypertensive prevalence and to acquire an in-depth understanding about hypertensive prevalence. The ultimate purpose of the study was to find the influential factors that influence hypertension in Bangladesh.

3.0 Methodology

The methodological function of this study is performed in the following three steps.

3.1 Sampling Technique

The total data, 1600, was collected by personal interview method from Charghat Thana of Rajshahi district using multistage cluster sampling with a technique based on the scheduled questionnaire.

3.2 Sources and Collection of Data

Both Primary and secondary data were collected from primary and secondary sources. Hypertension based on systolic blood pressure and diastolic blood pressure is a binary outcome variable (Y) where types of work, working hours per day, social stress, occupational stress, mental stress, diabetes, hypertension in family, overweight, smoking, access to salt intake, education, and regular exercise (Xj's) are explanatory variables. The variable hypertension takes the value one if SBP≥140 mmHg or DBP≥90 mmHg and otherwise takes zero value. **Social stress** is stress that stems from one's relationships with others and from the social environment in general. **Occupational stress** is stress involving work. Occupational stress can occur when there is a discrepancy between the demands of the environment/workplace and an individual's ability to carry out and complete these demands. **Mental stress** is one kind of mental condition that may be considered as psychological pressure. **Access salt intake** means respondents take general salt with curry.

3.3 Processing and Analysing Data

Since the outcome variable is binary, we have used the binary backward logistic regression method. Also, this method can tackle the multicollinearity Problem.

Hence, considering the above situation, the method has been adopted to identify the risk factors of hypertension. The performance of the fitted model has been examined by using the likelihood ratio test, Wald test, Hosmer–Lemeshow test, and Nagelkerke R-squared.

4.0 Analyses and Findings

The percentage distribution was applied to observe the insight view of the data. The percentage distributions of the systolic and diastolic high blood pressure have been constructed with the help of percentile age.

Table 1: Comparison between Systolic and Diastolic Hypertension with Respect to Age

Age According to Percentiles	Percentiles Age (Years)	50th <40	75th 40-60	90th >60
Systolic High Blood Pressure (Percent)		12.30	31.00	50.90
Diastolic High Blood Pressure (Percent)		16.20	31.20	39.10

The percentage (in table-1) of diastolic hypertension (16.20%) was greater than systolic hypertension (12.30%) in the age group below 40 years, while the percentage of diastolic hypertension (39.10%) was less than systolic hypertension (50.90%) in the age group above 60 years. However, both systolic (31%) and diastolic (31.20%) hypertension rates were approximately the same in the age group 40-60 years. Hence, the age group below 40 years was specially more at risk for occurring diastolic hypertension, whereas the age group above 60 years was specially more at risk for occurring systolic hypertension. But age group 40-60 years was an approximately equal risk for occurring both systolic and diastolic hypertension.

To assess the depth insight of the data, the logistic regression model has been applied. Using the binary backward logistic regression model (in table-2), education and regular exercise were found as factors that negatively impacted hypertension. The odds ratio corresponding to education was 0.831, i. e., for a year increase in education, the occurrence of hypertension was approximately three-quarters as likely to occur. In the case of regular exercise, the occurrence of hypertension was 2 of 100 as likely to occur among those who took regular exercise than among those who did not. The rest of the variables (types of work, working hours per day, social stress, occupational stress, mental stress, diabetes, hypertension in family, overweight, smoking, and access salt intake) had a positive significant impact on hypertension. The odds ratio corresponding to types

of work and working hours per day were 3.962 and 4.390, indicating that the respondents who were involved with sedentary works and contribute >8 hours per day had 3.962 and 4.390 times the risk of hypertension than those who did not, respectively.

Table 2 Summary of Logistic Regression Analysis of Hypertension on Selected Factors

Characteristics	Regressor Coefficient (β)	Standard Error of β	Wald	Degree of Freedom	P - Value	Odds Ratio
Education	-0.185	0.021	80.412	1	0.01	0.831
Regular Exercise						
No (r)	-	-	-	-	-	-
Yes	-3.797	0.271	195.643	1	0.01	0.022
Types of Works						
Normal (r)	-	-	-	-	-	-
Sedentary	1.377 3.962	0.192	51.415	1	0.01	
Working Hours Per Day						
$\leq 8\ (r)$	-	-	-	-	-	-
> 8	1.479	0.194	57.934	1	0.01	4.390
Social Stress						
No (r)	-	-	-	-	-	-
Yes	1.577	0.257	37.552	1	0.01	4.838
Occupational Stress						
No (r)	-	-	-	-	-	-
Yes	1.541	0.202	58.331	1	0.01	4.668
Mental Stress						
No (r)	-	-	-	-	-	-
Yes	2.011	0.184	119.789	1	0.01	7.467
Diabetes						
No (r)	-	-	-	-	-	-
Yes	0.744	0.339	4.803	1	0.02	2.104
Hypertension in Family						
No (r)	-	-	-	-	-	-
Yes	1.816	0.202	81.252	1	0.01	6.150
Over Weight						
No (r)	-	-	-	-	-	-
Yes	0.776	0.194	16.000	1	0.01	2.173
Smoking						

No (r)	-	-	-	-	-	-
Yes	0.516	0.211	5.968	1	0.01	1.676
Access Salt Intake						
No (r)	-	-	-	-	-	-
Yes	2.408	0.208	133.419	1	0.01	10

r represents the reference category.

For social stress, occupational stress, mental stress, diabetes, hypertension in the family, overweight, smoking, and access salt intake, the respondents who possessed the presence of corresponding characteristics had 4.838, 4.668, 7.467, 2.104, 6.150, 2.173, 1.676 and 10 times risk to occur hypertension than who did not respectively. These findings are in accordance with the former studies (Saha et al., 2006; Ullah, 1976; Syeed, 1994, etc.) at home and consistent with studies abroad (Chobanian et al., 2003; Burt et al., 1995; Franklin et al., 1997, etc.).

Finally, to assess the fitted model Hosmer-Lemeshow goodness-of-fit statistic has been used. The value of the Hosmer-Lemeshow goodness-of-fit statistic is 9.622 (in Table 3), and the corresponding computed p-value is 0.30 with 8 degrees of freedom.

Table 3: Summary of Assessments of Model Building

	Value	Degree of Freedom (d. f)	P-Value
Hosmer and Lemeshow Test	9.622	8	0.30
Nagelkerke R Square	0.75	-	-

(-2 Log likelihood=915.487)

This indicates that the model seems to fit well. Also, the value of Ngelkerke R^2 is 0.75 (in Table 3), which indicates that the fitted regression equation explains 75% of the variation in Hypertension (Y).

5.0 Conclusion And Recommendations

The study reveals that types of work, working hours per day, social stress, occupational stress, mental stress, diabetes, hypertension in the family, overweight, smoking, and access to salt intake are risk factors for hypertension. Hence, to control and protect against hypertension, knowledge and awareness about the above risk factors might be an alternative way. Every adult's blood pressure should be checked. Also, Primary healthcare centers, community clinics,

and all healthcare facilities should implement this strategy to prevent and control hypertension.

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