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The interplay of socio-demographic characteristics and lifestyle choices in hypertension management among women in Bangladesh

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Abstract

Background: Hypertension is a significant public health challenge globally, particularly in low- and middle-income countries like Bangladesh. It contributes extensively to the morbidity and mortality associated with cardiovascular diseases (CVDs). The management of hypertension is influenced by a complex interplay of socio-demographic and lifestyle factors.

Methods: This cross-sectional observational study assessed the prevalence of uncontrolled hypertension and its associated factors among women undergoing treatment in a tertiary medical college and hospital in Dhaka, Bangladesh. The study, spanning six months, involved 371 participants diagnosed with hypertension. Data was collected through semi-structured questionnaires, blood pressure measurements, and physical assessments. Statistical analyses included descriptive statistics, Chi-square tests, T-tests, and multivariable logistic regression.

Results: Most respondents (52.84%) were over 60 years old, with a higher rate of controlled hypertension observed in this age group. Socio-demographic factors such as education and income levels significantly influenced hypertension control, with higher socioeconomic status correlating with better hypertension management. Lifestyle factors, including BMI, smoking status, and physical activity, played a crucial role in hypertension control. The study also highlighted the significant impact of comorbid conditions such as dyslipidemia and diabetes mellitus on hypertension management. Notably, there were marked disparities in hypertension control between urban and rural residents.

Conclusion: The findings of this study underscore the need for targeted public health interventions to address the socio-demographic and lifestyle determinants influencing hypertension management among adult women in Bangladesh. Tailored strategies that consider these factors are essential for improving hypertension control, reducing the burden of CVDs, and enhancing the health and well-being of this vulnerable population. Collaborative efforts from healthcare providers, policymakers, and public health professionals are crucial to developing and implementing effective hypertension management programs.

Keywords: Hypertension Management; Socio-Demographic Factors; Lifestyle Variables; Bangladesh; Cardiovascular Diseases.

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1. Introduction

A major global public health concern, hypertension, also referred to as high blood pressure, contributes significantly to the burden of cardiovascular diseases (CVDs) and associated morbidities (Zhou et al., 2021). Characterized as a continuous increase in blood pressure (BP) above 130/80 mmHg (Ramzy et al., 2019), several fatal diseases, including atrial fibrillation, heart failure, stroke, coronary artery disease, and peripheral vascular disease, are directly linked to the development of hypertension. (Lip et al., 2017). Chronic hypertension that is left untreated can potentially result in cognitive deterioration, dementia, and kidney failure (Ungvari et al., 2021). 13% of deaths worldwide are thought to be caused by hypertension (Mills et al., 2020). Given the 30% predicted increase in the global prevalence of this disorder by 2025 and its critical role in the rising global burden of disease and disability, hypertension has emerged as one of the most pressing global health challenges (Dai et al., 2021; Vadoganathan et al., 2022). Because hypertension is a multifaceted condition including genetic predispositions, sociodemographic factors, lifestyle choices, and environmental influences, managing the condition can be particularly challenging (Masilela, 2021). Research indicates that 75% of people with hypertension worldwide live in low- and middle-income nations (Schutte et al., 2021), and compared to high-income countries (28.5%), the prevalence of hypertension is higher in low- and middle-income countries (31.5%) (Saif-Ur-Rahman et al., 2018). Bangladesh is among the low- and middle-income countries that are witnessing a shift in the epidemiology of diseases from communicable to non-communicable (Biswas et al., 2019). Hypertension prevalence among adults has been rising in Bangladesh, following worldwide trends but being exacerbated by certain socioeconomic and cultural factors (Das et al., 2017). Adult women are a particularly vulnerable group because of physiological, sociological, and economic aspects that influence how diseases are noticed, how easily they may be treated, and how they are managed (Tadesse et al., 2015). Age, income, and education level are sociodemographic factors that have a significant impact on health behaviors and access to care, both of which are essential for managing hypertension effectively (Tan et al., 2019). Diet, exercise, smoking status, and body mass index (BMI) are among the well-established lifestyle factors that influence the risk and management of hypertension (Do et al., 2015). High rates of hypertension and unfavorable management results have been linked to sedentary lifestyles, smoking, and eating habits, particularly in low- and middle-income countries (LMICs) like Bangladesh (Do et al., 2015; Hossain et al., 2022). On the other hand, effective management and control of hypertension lowers the risk of cardiovascular diseases (CVDs) and depends on regular physical activity and adherence to antihypertensive prescription regimens (di Cagno et al., 2023). Despite Bangladesh's achievements in fighting major infectious diseases, the country's healthcare system faces significant challenges because of this changing disease pattern (Chowdhury et al., 2020). Now, Bangladesh lacks a population-based surveillance system to monitor the prevalence of chronic non-communicable diseases like hypertension (Riaz et al., 2020). Furthermore, reliable information on the incidence of illnesses like hypertension is restricted by the lack of central administrative health data or nationwide population-based surveys (Lujic et al., 2017). This study aims to elucidate the complex interplay between socio-demographic factors, lifestyle variables, and the management of hypertension among adult women in Bangladesh. By focusing on this population within the context of a tertiary medical college and hospital in Dhaka, this study seeks to contribute valuable insights to the existing body of knowledge on hypertension management. Understanding these relationships is vital for developing targeted interventions and policies that address the unique needs of this demographic, ultimately contributing to improved healthcare outcomes and quality of life.

2. Methodology

A cross-sectional observational study was conducted to assess the prevalence of uncontrolled hypertension and its associated factors in women undergoing treatment. It was conducted at the Medicine Department of a tertiary medical college and hospital in Dhaka, Bangladesh, encompassing both inpatient and outpatient services. Participants included women aged 18 years and above diagnosed with hypertension and receiving treatment during the study period. The investigation spanned six months following protocol approval. The sample size was calculated using the formula ($n = z^2pq/d^2$) where $p = 0.407$ which was an estimated prevalence based on the 2017 ACC/AHA and JNC 7 hypertension guidelines. The sample size was 371 which was calculated with a 95% confidence level and a 5% level of significance. Samples included were women over 18 with uncontrolled hypertension for at least three months. Exclusions were made for severe mental illness, pregnancy, or inability to provide informed consent. Participants were purposively selected based on the inclusion and exclusion criteria. Data were collected through a semi-structured questionnaire, blood pressure measurements (using an ALP K2 Sphygmomanometer and BSMI stethoscope), and physical assessments for height (portable wooden scale) and weight (Nulife digital scale). Data were managed and analyzed under the guidance of a statistician, employing IBM STATA 16. Descriptive statistics, Chi-square tests, T-tests, and multivariable logistic regression were utilized to examine associations and determine statistical significance ($P < 0.05$). Ethical considerations were rigorously maintained, including obtaining informed consent, ensuring participant confidentiality, and minimizing

harm. The study was approved by an institutional Ethical Committee and adhered to the guidelines set by the Institutional Review Board.

3. Results

Table 01 presents the socio-demographic characteristics of 371 respondents. The respondents are categorized into five age groups. The majority, 196 respondents (52.84%), are over 60 years old. The next largest group is those aged 51 to 60 years, comprising 105 respondents (28.31%). Those in the 41 to 50 age group numbered 46 (12.45%), followed by 14 respondents (3.86%) in the 31 to 40 age group, and the smallest group, 9 respondents (2.54%), are aged 18 to 30. The mean age of the respondents is 61.25 years with a standard deviation of 10.24. In the case of highest educational attainment, the highest number of respondents, 131 (35.33%), have completed their Higher Secondary Certificate (HSC). This is followed by 107 graduates (28.93%), and 62 respondents (16.73%) with education above the graduate level. There are 24 respondents (6.54%) who have completed their Secondary School Certificate (SSC), 29 (7.89%) with education below SSC, and 13 (3.46%) with primary education. The least represented are those with no formal education, numbering 4 (1.12%). The income levels are divided into four brackets. The highest bracket, with incomes over BDT 55000, includes 192 respondents (51.78%). This is followed by those earning between BDT 35001 to BDT 55000, accounting for 106 respondents (28.46%). The bracket BDT 15001 to BDT 35000 comprises 49 respondents (13.27%), and the lowest income bracket, under BDT 15000, includes 24 respondents (6.49%). Most of the respondents, 328 (88.41%), are from urban areas, while 43 (11.59%) are from rural areas.

Table 1 Socio-demographic characteristics of the respondents (n=371)

Socio-demographic variables	No. of respondents	Percentage
Age group		
18 to 30 years	9	2.54%
31 to 40 years	14	3.86%
41 to 50 years	46	12.45%
51 to 60 years	105	28.31%
>60 years	196	52.84%
Mean \pm SD	61.25 \pm 10.24	
Level of education		
No formal education	4	1.12%
Primary	13	3.46%
Under Secondary School Certificate (SSC)	29	7.89%
Secondary School Certificate (SSC)	24	6.54%
Higher Secondary Certificate (HSC)	131	35.33%
Graduate	107	28.93%
Above graduate	62	16.73%
Monthly household income		
<BDT 15000	24	6.49%
BDT 15001-BDT 35000	49	13.27%
BDT 35001-BDT 55000	106	28.46%
>BDT 55000	192	51.78%
Residence		
Rural	43	11.59%
Urban	328	88.41%

A significant majority of the respondents, 277 (74.78%), have a family history of hypertension. In contrast, 94 respondents (25.22%) do not have such a history. The mean systolic blood pressure among the respondents is 131.79 mmHg with a standard deviation of 16.11, while the mean diastolic pressure is 74.88 mmHg with a standard deviation of 10.14. The respondents are categorized into four BMI groups. The majority, 219 respondents (59.15%), have a BMI of less than 25. There are 117 respondents (31.43%) with a BMI between 25 and 29.99, 30 respondents (8.16%) with a BMI between 30 and 34.99, and a small group, 5 respondents (1.26%), with a BMI of 35 or more. A vast majority, 351 respondents (94.58%), have never smoked. There are 14 ex-smokers (3.83%) and 6 current smokers (1.59%) among the participants. The respondents have various comorbidities. Dyslipidemia is reported in 203 respondents (54.68%), diabetes mellitus in 72 (19.43%), and gout in 38 (10.23%). Regarding the usage of antihypertensive medications, 5 respondents (1.23%) are not taking any such medications, 129 (34.82%) are on one medication, 170 (45.69%) are on two, and 68 (18.26%) are taking three or more medications regularly. A large portion of the respondents, 294 (79.34%), engage in regular physical activity, while 77 (20.66%) have irregular physical activity habits (Table 02).

Table 2 Health and lifestyle-related information of the respondents (n=371)

Health and lifestyle-related variables	No. of respondents	Percentage
Family history of hypertension		
Had a family history of hypertension	277	74.78%
Had no family history of hypertension	94	25.22%
Blood pressure		
Systolic blood pressure (Mean \pm SD)	131.79 \pm 16.11	
Diastolic blood pressure (Mean \pm SD)	74.88 \pm 10.14	
Body Mass Index (BMI)		
<25	219	59.15%
25-29.99	117	31.43%
30-34.99	30	8.16%
35 or more	5	1.26%
Smoking behavior		
Never smoked	351	94.58%
Ex-smoker	14	3.83%
Current smoker	6	1.59%
Comorbidities		
Dyslipidemia	203	54.68%
Diabetes mellitus	72	19.43%
Gout	38	10.23%
Number of antihypertensive medications taken regularly		
0	5	1.23%
1	129	34.82%
2	170	45.69%
3 or more	68	18.26%
Physical activity status		
Regular	294	79.34%
Irregular	77	20.66%

According to Figure 01, a significant majority, 287 individuals (77.41%), have their hypertension under control, indicating effective management through medication or lifestyle adjustments. In contrast, a notable segment of the population, 84 respondents (22.59%), are classified as having uncontrolled hypertension, suggesting areas where additional medical intervention or health education might be necessary.

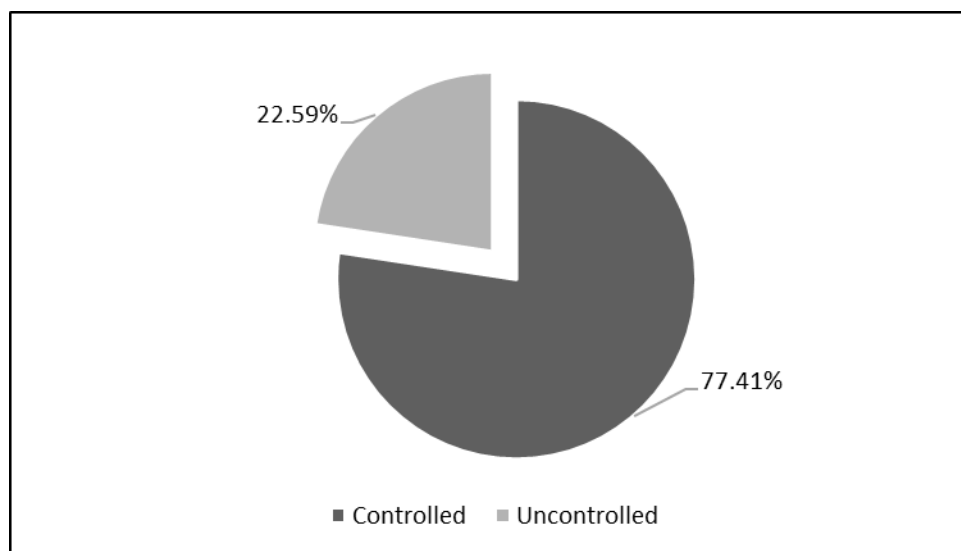


Figure 1 Distribution of the respondents according to their hypertension status (n=371)

Table 03 meticulously highlights the impact of socio-demographic variables on hypertension control, underscored by P-values for statistical significance. The age group >60 years, representing the largest segment (52.84% of respondents), shows a notable 80.11% rate of controlled hypertension (P-value: 0.037), indicating a statistically significant correlation. In education, graduates (28.93% of total) exhibit a high rate of controlled hypertension (80.43%) with a P-value of 0.061, suggesting a trend towards significance. Income levels reveal a similar pattern, with the highest earners (>BDT 55000, 51.78% of respondents) having a 79.70% control rate, accompanied by a P-value of 0.053. Residence type also plays a role, with urban dwellers (88.41% of the sample) showing a higher control rate (78.35%) compared to rural residents, supported by a P-value of 0.042.

Table 3 Correlation between socio-demographic factors and hypertension status of the respondents

Socio-demographic variables	No. of respondents (371)		Hypertension status				P-value
	Freq.	Perc.	Controlled (287)		Uncontrolled (84)		
			Freq.	Perc.	Freq.	Perc.	
Age group							
18 to 30 years	9	2.54%	7	78.78%	2	21.22%	0.037
31 to 40 years	14	3.86%	10	72.07%	4	27.93%	
41 to 50 years	46	12.45%	31	67.53%	15	32.47%	
51 to 60 years	105	28.31%	81	77.15%	24	22.85%	
>60 years	196	52.84%	157	80.11%	39	19.89%	
Level of education							
No formal education	4	1.12%	2	51.87%	2	48.13%	0.061
Primary	13	3.46%	9	68.84%	4	31.16%	

Under Secondary School Certificate (SSC)	29	7.89%	19	65.84%	10	34.16%	
Secondary School Certificate (SSC)	24	6.54%	17	71.15%	7	28.85%	
Higher Secondary Certificate (HSC)	131	35.33%	105	80.16%	26	19.84%	
Graduate	107	28.93%	86	80.43%	21	19.57%	
Above graduate	62	16.73%	48	77.44%	14	22.56%	
Monthly household income							
<BDT 15000	24	6.49%	17	70.93%	7	29.07%	0.053
BDT 15001-BDT 35000	49	13.27%	33	67.50%	16	32.50%	
BDT 35001-BDT 55000	106	28.46%	84	79.16%	22	20.84%	
>BDT 55000	192	51.78%	153	79.70%	39	20.30%	
Residence							
Rural	43	11.59%	30	69.77%	13	30.23%	0.042
Urban	328	88.41%	257	78.35%	71	21.65%	

Table 04 focuses on the relationship between health and lifestyle variables and their hypertension status, substantiated by P-values for statistical significance. Notably, 74.78% of respondents with a family history of hypertension (277 individuals) have a higher rate of controlled hypertension (80.18%) compared to those without such a history (69.01% controlled among 94 respondents), with a significant P-value of 0.024. In BMI categorization, the largest group (<25 BMI, 59.15% of respondents) shows a controlled hypertension rate of 77.22%, with the group's correlation to hypertension status being statistically significant (P-value: 0.016). Smoking behavior also correlates with hypertension control; notably, 78.06% of the 351 respondents who never smoked have controlled hypertension, supported by a P-value of 0.048. Comorbidities like dyslipidemia (54.68% of respondents) also show a significant correlation (P-value: 0.033) with 75.85% having controlled hypertension. The number of antihypertensive medications taken presents another notable correlation; for instance, 84.52% of those taking one medication (34.82% of respondents) have controlled hypertension, with a P-value of 0.027. Lastly, physical activity status is significant (P-value: 0.039), with 83.01% of regular exercisers (79.34% of respondents) having controlled hypertension, contrasting with a 55.64% control rate among irregular exercisers.

Table 4 Correlation between health and lifestyle factors and hypertension status of the respondents

Health and lifestyle-related variables	No. of respondents (371)		Hypertension status				P-value
	Freq.	Perc.	Controlled (287)		Uncontrolled (84)		
			Freq.	Perc.	Freq.	Perc.	
Family history of hypertension							
Had a family history of hypertension	277	74.78%	222	80.18%	55	19.82%	0.024
Had no family history of hypertension	94	25.22%	65	69.01%	29	30.99%	
Body Mass Index (BMI)							
<25	219	59.15%	169	77.22%	50	22.78%	0.016
25-29.99	117	31.43%	92	78.56%	25	21.44%	
30-34.99	30	8.16%	23	76.88%	7	23.12%	
35 or more	5	1.26%	3	57.22%	2	42.78%	
Smoking behavior							

Never smoked	351	94.58%	274	78.06%	77	21.94%	0.048
Ex-smoker	14	3.83%	9	64.29%	5	35.71%	
Current smoker	6	1.59%	4	66.67%	2	33.33%	
Comorbidities							
Dyslipidemia	203	54.68%	154	75.85%	49	24.15%	0.033
Diabetes mellitus	72	19.43%	49	68.09%	23	31.91%	
Gout	38	10.23%	26	68.38%	12	31.62%	
Number of antihypertensive medications taken regularly							
0	5	1.23%	4	78.09%	1	21.91%	0.027
1	129	34.82%	109	84.52%	20	15.48%	
2	170	45.69%	132	77.58%	38	22.42%	
3 or more	68	18.26%	43	63.10%	25	36.90%	
Physical activity status							
Regular	294	79.34%	244	83.01%	50	16.99%	0.039
Irregular	77	20.66%	43	55.64%	34	44.36%	

4. Discussion

This study found that most respondents (52.84%) were over 60 years old, with this group showing a higher rate of controlled hypertension (80.11%). This is consistent with findings by Forman et al. (2009) who reported that older age groups tend to have better hypertension control, possibly due to more regular healthcare access and treatment adherence. However, this contrasts with Vasani et al. (2002), who suggested that hypertension control decreases with age due to increased comorbidities. The level of education and income were significant predictors of hypertension control in our study. Those with higher education and income levels exhibited better hypertension control, which is in line with the research by Muntner et al. (2004), highlighting that higher socio-economic status is associated with better access to healthcare and health-related information. Nevertheless, this finding contrasts with studies in some low-income settings where lower awareness and treatment of hypertension were observed irrespective of socio-economic status (Addo et al., 2007). A significant majority of our respondents (88.41%) were from urban areas and had a higher hypertension control rate compared to rural residents. This finding echoes the work by Chow et al. (2013) who found urban dwellers in South Asia to have better hypertension awareness and control. This disparity could be attributed to better healthcare facilities in urban areas, as suggested by Kearney et al. (2005). The study highlighted a significant association between family history and hypertension control, with those having a family history showing better control. This finding is supported by the study by Kunes and Zicha (2009), emphasizing the role of genetic predisposition in hypertension management. This suggests that individuals with a family history might be more aware and proactive in managing their condition. Lifestyle factors, including BMI, smoking status, and physical activity, played a significant role in hypertension management in our study. Those with a BMI of less than 25 and non-smokers had better hypertension control, which aligns with the findings by Gaziano et al. (2008), who reported the beneficial effects of healthy lifestyle choices on hypertension management. The importance of regular physical activity was also highlighted, supporting the research by Pescatello. (2004) on the positive impact of exercise on blood pressure control. The presence of comorbidities like dyslipidemia and diabetes mellitus was associated with hypertension control in our study, underscoring the complex interplay between various health conditions. This agrees with the findings by Mancia et al. (2014), who noted that comorbid conditions often complicate hypertension management, requiring a multifaceted treatment approach.

5. Conclusion

The epidemiological study on hypertension management among adult women in Bangladesh sheds light on the intricate relationship between socio-demographic elements, lifestyle factors, and hypertension control. Key findings reveal that age, education, income, and residence significantly influence hypertension outcomes, with older individuals showing better control, likely due to more accessible healthcare and greater treatment adherence. Socio-economic disparities

necessitate public health interventions tailored to bridge gaps in healthcare access and literacy. Lifestyle behaviors, such as maintaining a healthy BMI, abstaining from smoking, and engaging in regular physical activity, are crucial for effective hypertension management. The positive association between family history and hypertension control underscores the importance of targeted screenings and interventions for at-risk groups. Additionally, comorbidities like dyslipidemia and diabetes complicate management, highlighting the need for integrated treatment strategies. The study also points out the urban-rural divide in hypertension care, urging initiatives to address this disparity and improve overall health outcomes for women in Bangladesh. In conclusion, this study contributes valuable evidence to the growing body of knowledge on hypertension management in low- and middle-income countries, particularly among adult women in Bangladesh. The insights gathered from this research underscore the critical need for targeted, multifaceted public health interventions that consider the unique socio-demographic and lifestyle factors influencing hypertension management. Addressing these determinants is essential for improving hypertension control, reducing the burden of cardiovascular diseases, and enhancing the overall health and well-being of women in Bangladesh. To this end, our study calls for concerted efforts from healthcare providers, policymakers, and public health professionals to develop and implement effective strategies that cater to the specific needs of this vulnerable population, ultimately contributing to the global fight against hypertension and its associated morbidities.

Compliance with ethical standards

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Consent for publication

Each author has given their consent for this article to be published.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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