



RESEARCH ARTICLE

Hypertension and its risk factors among pregnant garment workers attending a health centre in Bangladesh

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ABSTRACT

Background: The burden of hypertension among the pregnant garment workers in Bangladesh is not well known. The aim of this study was to determine the prevalence of hypertension and its associated factors among pregnant garment workers attending a health centre in Narayanganj, Bangladesh.

Methods: A cross-sectional study was done among conveniently selected adult pregnant garment workers at ≥ 20 weeks of gestation who visited a health centre of a garment company in Narayanganj, Bangladesh, between July and October 2023. Data on age, education, job nature, family history, clinical, height, weight, and blood pressure were collected. Binary logistic regression was performed to identify factors associated with hypertension.

Results: Of 150 participants the average age was 27.3 years (standard deviation, 3.2) and mean gestational age was 21.7 weeks. The prevalence of hypertension among the participants was 7.3% (95% confidence interval, 4.0% - 12.3%). A family history of pregnancy-related hypertension was found to be associated with hypertension (adjusted odds ratio, 34.7; 95% confidence interval, 2.0 - 619.0).

Conclusion: Approximately one in 14 pregnant garment workers had hypertension, and family history of pregnancy-related hypertension was an associated factor. Healthcare professionals may consider this factor while providing care and counseling to this population.

Keywords: hypertension, risk factors, pregnant garment workers, antenatal care, Bangladesh

INTRODUCTION

Hypertension during pregnancy refers to elevated blood pressure (systolic ≥ 140 mmHg or diastolic ≥ 90 mmHg or both) developed at or after 20 weeks of gestation in women who had normal blood pressure before.¹ It is the second leading cause of maternal mortality worldwide and is a significant contributor to fetal morbidity and mortality.^{2,3} A substantial amount of women die every year from pregnancy-related causes, with around 86% of these deaths occurring in Sub-Saharan Africa and Southern Asia.⁴ Approximately 12.9% and 14.0% of maternal deaths in developed and developing countries,

respectively, are associated with hypertensive disorders in pregnancy.⁵ Therefore, hypertension during pregnancy represents a critical public health concern globally, particularly in developing countries where the prevalence remains high.⁶

Studies indicate that the prevalence of hypertension during pregnancy is approximately 8.8% in urban areas and 5% to 9% in rural regions in Bangladesh.^{7,8,9} Several factors are linked with hypertension during pregnancy, as reported in various studies. The identified factors include nulliparity, several pregnancies, history of chronic hypertension, gestational diabetes, fetal

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HIGHLIGHTS

1. Studies on hypertension among pregnant garment workers are rare in Bangladesh.
2. Hypertension was found in one out of every 14 pregnant garment workers at or after 20 weeks of gestation.
3. Family history of pregnancy-related hypertension was found to

malformations, extreme maternal age (under 20 or over 40 years), chronic diseases (including renal disease, diabetes mellitus, and cardiac disease), a family history of pregnancy-related hypertension, psychological stress, alcohol use, rheumatic arthritis, extreme underweight and overweight, asthma, and low socioeconomic status.^{10, 11, 12}

Bangladesh has made notable progress in maternal and child health as a developing country in recent decades. However, challenges persist for certain segments of the female population, particularly those employed in the garment industry, a significant part of the workforce in Bangladesh. These women often struggle to access healthcare due to their work schedules and limited resources. While the prevalence of hypertension among pregnant women has been studied in various settings, there is limited research on working mothers in low socio-economic conditions. The unique intersection of strenuous work conditions, limited access to healthcare, and financial constraints faced by pregnant garment workers underlines the need for a targeted investigation within this demographic. Therefore, the aim of this study was to determine the prevalence of hypertension and associated factors among pregnant garment workers attending a health centre in Narayanganj, Bangladesh.

METHODS

Design and sample recruitment

A cross-sectional study was done among adult pregnant garment workers (≥ 18 years) who attended a health centre at a garment factory in the Adamjee Export Processing Zone, Narayanganj, for antenatal care between July and October 2023. The physician investigator conveniently identified the pregnant garment workers who were at least 20 weeks into

gestation (as determined from clinician records). After obtaining written consent, interviews and physical measurements were conducted. Patient ID of the center was used to minimise duplicate participation.

Sample size determination

The sample size was determined using the formula for population proportion, employing the prevalence of 8.8% for hypertension as reported by Haque *et al.*,⁷ with a confidence level of 95%. As the prevalence is less than 10% so we considered margin of error is 4.4% (half of the prevalence).¹³ Therefore, the estimated sample size was 160.

Data collection process

Data were collected through face-to-face interviews and paper-based questionnaires. Information on socio-demographics, clinical characteristics, and family history of chronic diseases were collected first. Blood pressure (BP), body weight and height were measured later. BP was measured on the left arm in a sitting position using an aneroid sphygmomanometer (Model: ALPK2, model 500V) with a standard adult cuff size. Two readings were taken five minutes apart, and the average was calculated. Height was recorded in centimetres using a measuring tape, with participants standing upright without shoes. Weight was measured in kilograms using a calibrated digital scale (Tanita, model HA-680), with participants barefoot and without additional items.

Ethical considerations

The study adhered to the principles outlined in the Declaration of Helsinki. The collected information was treated with utmost confidentiality and exclusively utilised for this study. Each participant got their regular services and was not provided any incentives for participation.

Statistical analysis

The collected data were analysed using Jamovi, a free and open-source statistical software built on the R language (version 2.3). Categorical variables such as education, job nature, family type, gravidity, contraception use, and family history of chronic

diseases were summarised as numbers and percent. For quantitative data like age, gestational age, body mass index (BMI), systolic blood pressure (SBP) and diastolic blood pressure (DBP) summarised by mean and standard deviation. Hypertension was determined as elevated blood pressure (SBP \geq 140 mmHg, or DBP \geq 90 mmHg, or both) or currently on antihypertensive medication. Binary logistic regression was performed to identify factors associated with hypertension (dependent variable: yes=1, no=0). The odds ratios (ORs) were estimated by including each predictor individually in the model. Adjusted odds ratios (aORs) were calculated using a backward stepwise regression approach. Age was included in the model as an obligatory variable. Statistical significance was set at a $P < 0.05$.

RESULTS

During the data collection period, 161 pregnant garment workers aged 18 or older attended the centre for antenatal care. Of these, 150 who were at least 20 weeks into gestation and provided consent were included in the final analysis.

TABLE 1 Socio-demographic and clinical characteristics of the pregnant garment workers attending a health centre in Bangladesh (n=150)

Socio-demographic and clinical characteristics	Number	Percent
Age groups in years		
18 to 25	47	31.3
26 to 35	103	68.7
Educational status		
Any primary (1 to 5 class)	57	38.0
Any secondary or higher	93	62.0
Nature of job		
Light labour job ^a	48	32.0
Hard labour jobs ^b	102	68.0
Family type		
Nuclear family	80	53.3
Joint or extended family	70	46.7
Mean age (in years) at first pregnancy	21.7	3.2
Mean gestational age in weeks	23.7	4.5
Mean systolic blood pressure in mmHg	110.8	13.1
Mean diastolic blood pressure in mmHg	69.4	8.8
Mean body mass index in Kilogram/meter ²	27.0	5.3
Gravidity		
Primigravida	141	94.0
Multigravida	9	6.0
Ever taken contraception	107	71.3
Family history of hypertension	19	12.7
Family history of pregnancy-related hypertension	3	2.0
Family history of diabetes	15	10.0

^aWork involved in Kansai sewing machines, Overlock sewing machines, Bartacking machine

^bWork involved in Lockstitch sewing machine (APW machine), Quality check, Ironing

Socio-demographic and clinical characteristics

The participants had a mean (standard deviation) age of 27.3 (3.2) years. A little over two-thirds of the participants (68.7%) were aged between 26 and 35, and 62% had secondary or higher level of education. The mean (standard deviation) age at first pregnancy, gestational age, SBP, DBP, and BMI were 21.7 (3.2) years, 23.7 (4.5) weeks, 110.8 (13.1) mmHg, 69.4 (8.8) mmHg, and 27.0 (5.3) Kilogram/meter² respectively. Regarding family history, 12.7% had a history of hypertension, 2% had a history of pregnancy-related hypertension, and 10% had a history of diabetes (TABLE 1).

TABLE 2 Hypertension and the risk factors among pregnant garment workers attending a health centre in Bangladesh (n=150)

Factors	Hypertension		OR (95% confidence interval)
	Yes Number (%)	No Number (%)	
Overall	11 (7.3)	139 (92.7)	-
Age in years (Continuous)	9 (8.7)	94 (91.3)	1.2 (1.0 – 1.4)
Any secondary or higher education (Ref. Any primary)	6 (8.2)	67 (91.8)	1.7 (0.4 – 6.7)
Hard labour job (Ref. Lite labour job)	8 (7.8)	94 (92.2)	1.3 (0.3 – 5.0)
Gestational age 32-39 weeks (Ref. 20 to 31 weeks)	7 (22.6)	24 (77.4)	1.6 (0.2 – 14.4)
Ever taken contraception (Ref. No)	10 (9.3)	97 (90.7)	4.3 (0.5 – 34.9)
Family history of hypertension (Ref. No)	4 (21.1)	15 (78.9)	4.7 (1.2 – 18.0) ^a
Family history of pregnancy-related hypertension (Ref. No)	2 (66.7)	1 (33.3)	30.7 (2.5 – 371.1) ^a
Family history of diabetes (Ref. No)	2 (13.3)	13 (86.7)	2.2 (0.4 – 11.1)

^a $P < 0.05$

Hypertension and risk factors

The overall prevalence of hypertension was 7.3% (95% confidence interval 4.0% to 12.3%). This prevalence increased with age, from 4.3% in the 18-25 age group to 8.7% in the 26-35 age group. Hypertension was significantly higher among those with an family history of hypertension (21.1%) and a family history of pregnancy-related hypertension (66.7%) (TABLE 2).

In the regression analysis, the chance of developing hypertension was significantly higher in an family history of hypertension (OR 4.7; 95% CI: 1.2 - 18.0) and a family history of pregnancy-related hypertension (OR

30.7; 95% CI: 2.5 - 371.1) (TABLE 2). After employing a backward stepwise approach and keeping age as an obligatory variable in the model, family history of pregnancy-related hypertension (aOR 34.7; 95% CI: 2.0 - 619.0) was found to be associated with hypertension (TABLE 3).

TABLE 3 Adjusted odds ratio (OR) of the risk factors of hypertension among pregnant garment workers attending a health centre in Bangladesh (n=150)

Factors	Adjusted OR ^a (95% confidence interval)
Age in years (Continuous)	1.1 (0.9 - 1.4)
Ever taken contraception (Ref. No)	5.9 (0.6 - 62.9)
Family history of pregnancy-related hypertension (Ref. No)	34.7 (2.0 - 619.0) ^b

^aAdjusted using stepwise backward elimination was used to select the model variables. Age was considered as a obligatory variable.

^bP<0.05

DISCUSSION

We observed that 7.3% of the pregnant garment workers were hypertensive, and a family history of pregnancy-related hypertension was an associated factor. In general, our finding is little lower than pregnant women attended at medical college hospitals in Bangladesh reported by with Haque *et al.*⁷ (8.8%) and Ahmed *et al.*⁸ (7.5%) in a similar age group. Moreover, hypertension among female garment workers (aged ≥ 15 years) was (8.7%) more than ours.¹⁴ The national prevalence of hypertension among men and women aged 18-39 years was 12%.¹⁵ Overall, our observation was lower than pregnant women and even general garment workers.

In Ethiopia, as a low-income country, the findings were almost similar,¹⁶ but much lower than the study reported from Bengaluru (14%),¹⁷ and Karnataka (11%)¹⁸ of India. Despite being lower than other studies findings, this study underscores a substantial burden of hypertension among working pregnant women in Bangladesh.

We also identified that family history of pregnancy-related hypertension thirty-five times chance of developing hypertension. Although this is consistent with an African studies,¹⁶ our confidence interval was much wider, indicating substantial variability in the estimate, which might be due to a relatively small

sample size. Consequently, the true magnitude of the relationship may vary. Overall, we can highlight the genetic predisposition's role in hypertension during pregnancy. Mothers with an family history of pregnancy-related hypertension may require closer monitoring and personalised care. Additionally, healthcare professionals must focus on regular monitoring of blood pressure, especially for those having an family history of hypertension and pregnancy-related hypertension. Programmes are needed to educate mothers about the risks associated with hypertension.

To our knowledge, this is the first study to report on the status of hypertension among pregnant garment workers. However, several limitations should be addressed in future research. First, previous history of hypertension should be meticulously excluded. Second, the study should have adequate power. Third, sample should be selected using random sampling. Fourth, the family history of chronic disease might introduce recall bias, suggesting that the reported data may underestimate the actual scenario.

Conclusion

Approximately one in 14 pregnant garment workers had hypertension, and family history of pregnancy-related hypertension was associated with hypertension. Healthcare professionals may consider this factor while providing care and counseling to this population.

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Author contributions

Conception and design: TK, ZA, RB. *Acquisition, analysis, and interpretation of data:* TK, MKK, RB. *Manuscript drafting and revising it critically:* TK, AA, MKK, ZA RB. *Approval of the final version of the manuscript:* TK, AA, MKK, ZA, RB. *Guarantor of accuracy and integrity of the work:* RB.

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Conflict of interest

We do not have any conflict of interest.

Ethical approval

This study received ethical approval from the Institutional Review Board of the Institute of Child and Mother Hospital (Memo no—ICMH/IRB-28DEC2021/01). Additionally, formal permission was obtained from the management of the garment authority.

Data availability statement

The authors confirm that the data supporting the findings of this study are openly available in Zenodo repository at <https://doi.org/10.5281/zenodo.13368914>

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