

Original article

# Prevalence of High Blood Pressure in Pregnant Women in Aljouf, Saudi Arabia

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## ABSTRACT

Raised blood pressure during pregnancy may result in the death of the mother and the fetus. In frontline healthcare settings, there aren't enough studies on its prevalence and associated factors. Our goal was to assess the prevalence of HBP and its risk factors among pregnant women in the Aljouf area. A cross-sectional study conducted in the obstetrics department of Maternity and Children Hospital (MCH) Sakaka, Aljouf, Saudi Arabia, included a pregnant woman with high blood pressure (HBP). A multivariable logistic regression analysis was used to determine the causes of HBP. A bout 451 pregnant women with high blood pressure were included among 3750 other pregnant women. In general, the prevalence of HBP was 12% (95% confidence interval [CI] 0.7-2.3); among women, it was 0.7% (95% CI 0.3-1.1), 1.6% (95% CI 0.8-2.1), and 3% (95% CI 1.2-8.6) in the first, second, and third trimesters, respectively. Trimester of pregnancy, age, income, occupation, and parity, were not linked to HBP during pregnancy in the multivariable analysis. HBP was present in 12% of pregnant women in the Aljouf region, which is considered to be of moderate-high prevalence. High blood pressure during pregnancy can harm both the mother and the fetus. As a result, the prevalence research has the benefit of encouraging medical professionals to conduct early screening, which helps with prevention, treatment, and also decreases the burden of negative pregnancy outcomes.

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## INTRODUCTION

Approximately 295,000 women die around the world due to pregnancy, delivery, and post-delivery, which subsequently leads to a higher maternal mortality rate. [1]. Besides, the previous study reported that each year, about eight hundred pregnant women die because of pregnancy complications [2]. Although pregnancy complications are preventable, a deficiency of recourse causes pregnant women's deaths in the majority of cases [3]. There were several components responsible for the adverse effects of pregnancy, but high blood pressure or hypertension disorder is relevant to high maternal mortality [4,5]. However, high blood pressure (HBP) comprised 2.16% and 0.28% of preeclampsia and eclampsia cases, respectively, while 0.29% of persistent hypertension-affected pregnant women universally [6]. Several

studies conducted in tertiary hospitals revealed the prevalence of high blood pressure during pregnancy [6]. According to the WHO plan, all pregnant women should improve their outcomes through proper management of high blood pressure during pregnancy [7, 8]. However, preconception counseling, regular antenatal visits, immediate delivery, and proper monitoring should all be part of a comprehensive care plan for women with HDP. The woman is advised throughout every stage of her pregnancy, so she is aware of the dangers to both mother and fetus [8,9]. However, the objective of our study was to ascertain the prevalence of HBP in pregnancy in Aljouf, Saudi Arabia.

## METHODS

### *Study design and participants*

A pregnant woman with high blood pressure (HBP) was included in this cross-sectional study, which was carried out in the obstetrics division of Maternity and Children Hospital (MCH) Sakaka, Saudi Arabia, between January 2021 and March 2023. To identify the causes of HBP, multivariable logistic regression analysis was employed.

### *Inclusion and exclusion criteria*

The inclusion criteria included all Pregnant women in either the first, second or third trimester, natural conception, no past history of hypertension, no history of taking any hypertensive drugs. We excluded any chronic diseases.

### *Estimating the Sample Size*

To get the ideal sample size, use the formula  $n = (z / 2) 2 p (1p) / d^2$  for the single population proportion. According to this calculation, the sample size for our experiment was 451.

### *Data collection*

We gathered relevant data from their hospital record files in addition to a face-to-face interview with pre-written questions. Everyone who took part gave their permission verbally. two separate authors with experience with data collection in Arabic. Tables display the results of blood pressure measurements and demographic information. The average of the previous two readings was used to calculate the participant's blood pressure.

### *Statistic evaluation*

HBP was defined as having a systolic blood pressure of 140 mmHg or higher and/or a diastolic blood pressure of 90 mmHg [19]. To identify the variables influencing the occurrence of HBP, we performed a multivariable logistic regression. Using SPSS 22.00, all statistical calculations were performed.

## RESULTS

A total of 451 pregnant patients at ANC participated in our study with verbal consent. All pregnant women had an average age of  $26.7 \pm 5.0$  years, and among 24.1%, 62.5% and 13.3% of them were over 30, between 20 and 29, and under 20 years old, respectively. The majority of first pregnancies among pregnant women occur before the age of 20 compared to other age groups ( $p=0.00$ ). About 63.4% of women were without any education, compared to 12.1% and 24.3% of women with either primary, secondary, or higher education ( $p=0.00$ ). Low 32.5%, middle 33%, and high 34.3% were the economic conditions, and there was no substantial difference between them.

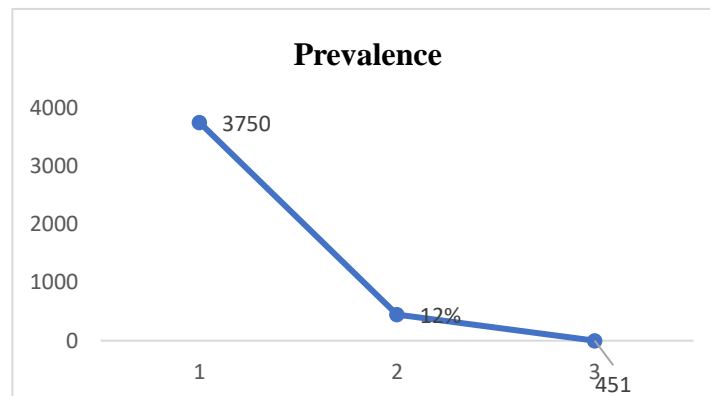
According to our findings, 33.4% of pregnant women were employed and 66.5% were not. In our study, we identified the first trimester at 42.3%, the second trimester at 44.5%, and the third trimester at 13%. All demographic features are present, as shown in table 1.

*Table 1. Participants in the study's demographics criteria*

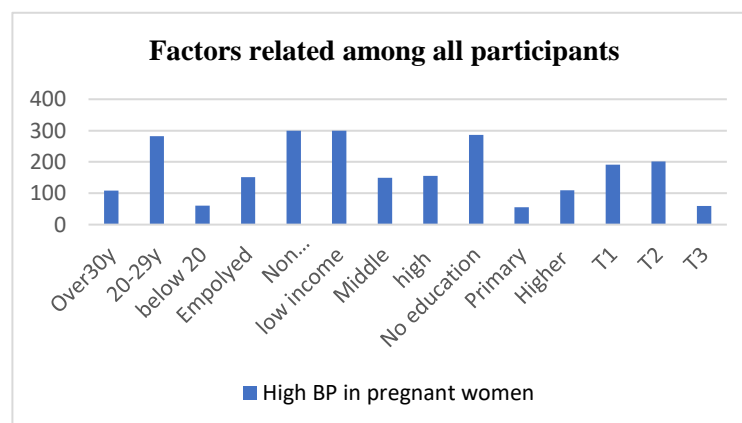
Factors	Total number (n=451) %	P value
Mean (SD) of age	26.7±5.0	
<b>Age of pregnant women (in years)</b>		
Over 30	109 (24.1)	
20-29	282 (62.5)	0.00
Below 20	60 (13.3)	
<b>Education level</b>		
No formal education	286 (63.4)	
Primary	55 (12.1)	0.00

<b>Secondary or higher</b>	110 (24.3)	
<b>Income</b>		
<b>Low</b>	147 (32.5)	
<b>Middle</b>	149 (33)	-
<b>High</b>	155 (34.3)	
<b>Occupation</b>		
<b>Employed</b>	151 (33.4)	
<b>Non-employed</b>	300 (66.5)	0.001
<b>Period of Pregnancy (Trimester)</b>		
<b>T1</b>	191 (42.3)	
<b>T2</b>	201 (44.5)	0.02
<b>T3</b>	59 (13)	
<b>Parity</b>		
<b>over one</b>	235 (52.1)	
<b>One</b>	216 (47.8)	0.001
<b>First pregnancy's age (in years)</b>		
<b>16–19</b>	321 (71.1)	0.00
<b>20–36</b>	130 (28.8)	

The total prevalence of HBP in our analysis was 12% that displayed in figure 1. Our results found that the prevalence rates such as 20-29 age (1.5%; 95% CI 0.6-2.5), in those with no educational background (1.6%; 95% CI 0.8-3.0), lower incomes (1.6%; 95% CI 0.7-4.8), in those who were unemployed (1.5%; 95% CI 0.7-2.4), third trimester (3.0%; 95% CI 1.2-8.6), and primipara (1.7%; 95% CI 0.7-2.1) that shown into table 2 and figure 2, these variations were not statistically significant.



**Figure 1.** The prevalence rate among study.



**Figure 2.** The factors related among all participants.

**Table 2. High blood pressure of prevalence in the study.**

Factors	Total number (n=451)	Prevalence (%)	95%CL <sup>a</sup>
<i>Age of pregnant women (years)</i>			
Over 30	109	1.2	0.3–2.7
20-29	282	1.5	0.6–2.5
Below 20	60	1.2	0.3–4.2
<i>Educational background</i>			
No education	286	1.6	0.8–3.0
Primary	55	0.0	
Secondary or higher	110	1.2	0.3–2.8
<i>Income</i>			
Low	147	1.6	0.7–4.8
Middle	149	1.4	0.5–4.6
High	155	0.8	0.2–3.8
<i>Occupation</i>			
Employed	151	1.1	0.3–2.0
Non-employed	300	1.5	0.7–2.4
<i>Period of pregnancy (Trimester)</i>			
T1	191	0.6	0.3–1.1
T2	201	1.6	0.8–2.1
T3	59	3.0	1.2–8.6
<i>Parity</i>			
over one	235	1.1	0.4–1.5
One	216	1.7	0.7–2.1
<i>First pregnancy's age (in years)</i>			
16–19	321	1.5	0.7–2.8
20–36	130	1.0	0.2–3.1

Age, income, occupation, parity, and the trimester of pregnancy were not associated with HBP in the analyses utilizing multivariable logistic regression that represented in table 3.

**Table 3. High blood pressure and associated variables were found in pregnant women using multivariable logistic regression.**

Factors	Total number (n=451)	Crude		Adjusted	
		cOR*	95% CI	cOR*	95% CI
<i>Age of pregnant women (years)</i>					
20-29	282	1		1	
Below 20	60	0.94	0.27–3.25	1.13	0.30–4.30
above 30	109	1.12	0.27–4.57	0.82	0.18–3.66
<i>Education level</i>					
No formal education	286	1			
Primary	55	0.33	0.15–4.43		
Secondary or higher	110	0.92	0.22–3.58		
<i>Income</i>					
Low	147	1		1	
Middle	149	0.93	0.29–3.52	0.81	0.27–2.63
High	155	0.44	0.16–1.86	0.62	0.16–1.84
<i>Occupation</i>					
Employed	151	1		1	
Non-employed	300	0.78	0.36–2.39	0.87	0.32–4.22
<i>Pregnancy trimester</i>					
Second trimester	201	1		1	
First trimester	191	0.36	0.18–1.82	0.53	0.14–1.62
Third trimester	59	2.12	0.77–5.46	3.12	0.72–6.38
<i>Parity</i>					
More than one	235	1		1	
One	216	1.55	0.61–3.06	1.81	0.46–7.11

## DISCUSSION

We were concerned that the Aljouf region had no prior information on the prevalence of elevated blood pressure during pregnancy. We estimate the prevalence of high blood pressure in pregnancy in the current study. The prevalence of high blood pressure during pregnancy was found to be 12% in the current study; other studies revealed that it was almost as low as ours [10,11]. Other research indicated a prevalence of 0.3% among women of reproductive age [12]. The prevalence that our study found is moderately high. However, significant variations in the incidence of HBP have been noted [10,13]. A thorough analysis of 258,602 pregnant women revealed that the prevalence of HBP varied from 8.4% to 46.4% [14]. The participant's age may help to explain these disparities. The prevalence of HBP was found to be 12.7% in pregnant women over the age of 40 in China, compared to 4.3% in pregnant women between the ages of 25 and 29 [15]. Different methodologies may partially account for the variations in prevalence since HBP measurement techniques have not been published in all research [14]. Additionally, variations in maternal risk factors caused by societal and natural variables, as well as variations in access to antenatal care, could account for variances [2]. Our investigation was carried out in a well-run hospital. Despite a significant prevalence of women, more than 62.5% of participants in our sample were between the ages of 20 and 29. Prevalence rates vary depending on the stage of pregnancy at which blood pressure measurements are made in the literature because uncomplicated pregnancies experience a mid-pregnancy blood pressure fall and different nations have varying levels of pre-pregnancy screening [16,17]. In our study, we found no correlation between HBP during pregnancy and maternal age, income, occupation, or parity. A relationship between sociodemographic factors has been found in several studies [11,14].

## CONCLUSION

Pregnant women in the Aljouf region had a 12% prevalence of HBP, which is thought to be of moderate-high prevalence. Pregnancy-related high blood pressure can have negative effects on the mother and the fetus. Therefore, the prevalence study has the advantage of enticing medical professionals to early screening, which aids in prevention, treatment, and also lessens the burden of unfavorable pregnancy outcomes.

### *Conflict of Interest*

There are no financial, personal, or professional conflicts of interest to declare.

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## انتشار ارتفاع ضغط الدم لدى النساء الحوامل في الجوف، المملكة العربية السعودية

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### المستخلص

ارتفاع ضغط الدم أثناء الحمل قد يؤدي إلى وفاة الأم والجنين. في إعدادات الرعاية الصحية في الخطوط الأمامية، لا توجد دراسات كافية حول مدى انتشاره والعوامل المرتبطة به. كان هدفنا هو تقييم مدى انتشار مرض HBP وعوامل الخطر المرتبطة به بين النساء الحوامل في منطقة الجوف. شملت دراسة مقطعية أجريت في قسم التوليد بمستشفى الولادة والأطفال (MCH) سكاكا، الجوف، المملكة العربية السعودية، امرأة حامل تعاني من ارتفاع ضغط الدم (HBP). تم استخدام تحليل الانحدار اللوجستي متعدد المتغيرات لتحديد أسباب HB. تم تضمين حوالي 451 امرأة حامل تعاني من ارتفاع ضغط الدم من بين 3750 امرأة حامل أخرى. بشكل عام، كان معدل انتشار (HBP) 12% فاصل الثقة 95% (CI 0.7-2.3)؛ بين النساء، كان 0.7% (95% CI 0.3-1.1)، 1.6% (95% CI 0.8-2.1)، و 3% (95% CI 1.2-2.3) في الأشهر الثلاثة الأولى والثانية والثالثة، على التوالي. لم يتم ربط الأشهر الثلاثة من الحمل والعمر والدخل والمهنة والتكافؤ بـ HBP أثناء الحمل في التحليل متعدد المتغيرات. كان مرض HBP موجوداً في 12% من النساء الحوامل في منطقة الجوف، وهو ما يعتبر ذو انتشار متوسط إلى مرتفع. ارتفاع ضغط الدم أثناء الحمل يمكن أن يضر الأم والجنين. ونتيجة لذلك، فإن أبحاث الانتشار لها فائدة تتمثل في تشجيع المهنيين الطبيين على إجراء الفحص المبكر، مما يساعد في الوقاية والعلاج، ويقال أيضاً من عبء نتائج الحمل السلبية.

**الكلمات الدالة.** ارتفاع ضغط الدم، الحمل، الانتشار.