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FREQUENCY AND RISK FACTORS OF PRE-ECLAMPSIA AMONG PREGNANT WOMEN PRESENTING TO THE OBSTETRICS AND GYNECOLOGY DEPARTMENT OF KHALIFA GULNAWAZ TEACHING HOSPITAL, BANNU

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Abstract

Pre-eclampsia represents a dangerous hypertensive pregnancy condition which leads to major health problems for mothers and their newborns, especially in developing nations. The research design of this study was cross-sectional to determine pre-eclampsia occurrence rates and risk factors among pregnant women visiting the Obstetrics and Gynecology Department at Khalifa Gulnawaz Teaching Hospital in Bannu. The research found pre-eclampsia occurred in 4.1% of the 506 pregnant women who underwent investigations. The study established that chronic hypertension, together with obesity, severe anemia, and nulliparity, presented as major risk factors for pre-eclampsia. The study emphasizes the need for early identification and management of these risk factors to stop unfavourable fetal and maternal outcomes.

INTRODUCTION

Pre-eclampsia is a multifactorial, multisystem disorder that occurs with new-onset hypertension and proteinuria after 20 weeks of gestation [1]. It is still an important factor of maternal and perinatal morbidity and mortality on the global scale and especially in low- and middle-income countries like Pakistan [2]. In the world, the number of affected pregnancies by pre-eclampsia ranges between 2-8% and contributes up to 15% of maternal deaths [3]. The condition leads to serious complications such as eclampsia, premature detachment of the placenta, preterm birth, fetal growth restriction, and perinatal death [4].

In Pakistan, the incidence of such pre-eclampsia is quite variable geographically, with reports indicating frequency ranging from 2.4% to even that more as 14% [5,6]. In this regard, for instance, a study in a tertiary hospital of Karachi reported a prevalence 14.4%, whereas other regional studies also showed prevalence from 1.8% to 16.7% [7]. Variability of maternal and nutritional indices in early gestation is affected by the socio-demographic, access to antenatal care, nutritional status, genetic predisposition and environmental factors. Known risk factors include chronic high blood pressure, obesity, anemia, nulliparity, age of advanced pregnancy, low socioeconomic status and inadequate antenatal supervision [8,9,10].

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Although pre-eclampsia causes a heavy burden, locally available data from Bannu and surrounding areas are scarce and limit epidemiology and risk profile of this condition in this population [11,12]. Because Pakistan's rural areas are susceptible to circumstances such as poor quality of antenatal care and inadequate nutritional status, it is important to evaluate the incidence and determinants of pre-eclampsia to guide effective intervention in maternal health [13]. Bannu and other rural parts of Pakistan frequently deal with issues including low prenatal care coverage and poor nutritional status, which are known to contribute to the onset and severity of pre-eclampsia [14,15]

This study is done to fill this knowledge gap by assessing the prevalence of pre-eclampsia and what factors are associated with it in pregnant women attending the Obstetrics and Gynecology Department in Khalifa Gulnawaz Teaching Hospital, Bannu. The findings will offer evidence-based insights to enable healthcare providers and policymakers to formulate targeted preventive interventions that will improve maternal and neonatal outcomes in this region.

Methodology

Study design

The study used a cross-sectional observational design in which the data collection and analysis were conducted from a population at a given time. That approach will permit simultaneous measurement of outcomes and exposures, and thus, it will be convenient for estimates of the prevalence of conditions, for example, for pre-eclampsia, and exploration of associated risk factors, without demanding long-term follow-up.Research was done at the Obstetrics and Gynecology Department of Khalifa Gulnawaz Teaching Hospital where Bannu is a tertiary care hospital for a varied population. This context offered access to a representative sample of pregnant women who presented to antenatal care and delivery services, which allowed investigation of pre-eclampsia in this geographical context.

Sample Collection

Data collection was done over six months, between January 2023 and June 2023. This period allowed for at least the enrolment of a reasonable number of subjects to make statistical validity plausible and observe seasonal changes that may affect the outcome of maternal health.A total of 506 pregnant women who were eligible for the study were brought on board. To select participants, we predetermined criteria so that homogeneity and relevance were achieved; thus, we provided for an accurate estimation of the incidence of pre-eclampsia and established the most significant risk factors that operate in the given population.

Inclusion and Exclusion Criteria:

A criterion for inclusion in this study was pregnant women ranging between 18 and 40 years so as to consider the normal reproductive age bracket at risk for pre-eclampsia. The participants needed to have a gestational age of 20 weeks or more, pre-eclampsia is diagnosed based on new-onset hypertension and proteinuria after this period of pregnancy. Also, women in singleton pregnancy had been selected to minimize confounding factors relating to the presence of multiple gestations who have known to present with different risks relating to hypertensive disorders of pregnancy.

The exclusion criteria were set in order to increase homogeneity of group of study population and to prevent confounding factors that can affect the development of pre-eclampsia. Women pregnant multiple times were excluded due to increased baseline risk of pre-eclampsia in multifetal gestations known to carry higher risks of complications. Individuals with diabetes mellitus or cardiovascular disease were also disqualified since these chronic diseases alone increase the risk of the patient developing hypertension and negative pregnancy outcomes, thereby possibly acting as a confounder in the results. Also, participants who have had a recent surgery or an infection were excluded to prevent any acute physiological stressors that can alter blood pressure and proteinuria readings.

Data Collection:

Interviews were conducted with the participants by use of a structured questionnaire to obtain socio-demographic and obstetric history data as well as clinical information. Anthropometric measurements (height, weight) were obtained in order to calculate BMI. Blood pressure was taken using a calibrated sphygmomanometer. Laboratory tests involved hemoglobin levels and protein in urine. According to

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the criteria of the American College of Obstetricians and Gynecologists (ACOG), pre-eclampsia was diagnosed: systolic blood pressure ≥140 mmHg, or diastolic blood pressure ≥90 mmHg on two occasions 4 hours apart after 20 weeks of gestation, proteinuria ≥300 mg/24 hour or protein/creatinine index (ratio) ≥0.3.

Statistical Analysis:

Data analysis was performed within SPSS version 26. Demographic and clinical characteristics were described as a result of descriptive statistics. Chi - square tests and independent t-tests were used to compare categorical and continuous variables, respectively. Logistic regression was done to define independent risk factors for pre-eclampsia. The p-value = 0.05 was considered statistically significant.

Results

1. Frequency of Pre-Eclampsia

Table 1.Socio-Demographic and Clinical Characteristics

Risk Factor	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Variable	**Pre-eclampsia (n=21)**	**No Pre-eclampsia (n=485)**	**p-value**
Mean Age (years)	28.7 ± 4.2	27.9 ± 3.8	0.35
Nulliparity (%)	66.7	38.1	0.01*
BMI ≥30 kg/m² (%)	47.6	18.6	<0.001*
Chronic Hypertension (%)	71.4	12.2	<0.001*
Severe Anemia (Hb <7 g/dL) (%)	57.1	22.7	0.002*
Lack of Antenatal Care (%)	38.1	15.1	0.03*

Out of 506 pregnant women, 21 were diagnosed with pre-eclampsia, yielding a frequency of **4.1**%.

A total of 21 (4.1%) out of 506 pregnant women sampled were diagnosed with pre eclampsia. The number of patients under the class of pre-eclampsia was considerably greater for nulliparity (66.7% vs. 38.1%) and obesity (BMI> or= 30 kg/m², 71.4% vs. 52.3%). 47.6% vs. 18.6%), in chronic hypertension (71.4% vs. 12.2%), in severe anemia (57.1% vs. 22.7%), and in lack of antenatal care (38.1% vs. 15.1%) in comparison with its absence, with all differences statistically significant ($p \leq 0.03$). These results provide a working picture of the main socio-demographic and clinical determinants of higher risk of pre-eclampsia in these people.

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2.Risk Factors Associated with Pre-Eclampsia

Table 2:Logistic regression identified the following independent risk factors

Risk Factor	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Chronic Hypertension	7.75	3.50 – 17.18	<0.001*
Obesity (BMI ≥30 kg/m²)	3.90	1.65 – 9.22	0.002*
Severe Anemia	2.98	1.20 – 7.39	0.019*
Nulliparity	2.04	1.01 – 4.10	0.047*

Several independent risk factors for pre-eclampsia were found to be positively correlated with pre-eclampsia through Logistic regression analysis. Chronic hypertension was the best predictor – an 8-fold rise in odds of developing pre-eclampsia (AOR 7.75); 95% CI: 3.50–17.18; $p < 0.001$). Obesity, which is any BMI of or greater than 30 kg/m², was also a major risk factor almost doubling the risk (AOR 3.90; 95% CI: 1.65–9.22; $p = 0.002$). The risk more than doubled in severe anemia (AOR 2.98; 95% CI 1.2–6.6). 95%CI: 1.20-7.39; $p = 0.019$), nulliparity increased the risk of pre-eclampsia by a factor of two each (AOR 2.04; 95%CI: 1.01-4.10; $p = 0.047$). These results are consistent with international literature that pre-existing high-blood pressure, raised BMI, anemia, and first pregnancies are primary causes of pre-eclampsia risk and reveal the need to identify and treat these risk factors at an early stage during the antenatal care to reduce the bad indices of maternal and fetal outcome.

3.Maternal and Perinatal Outcomes

From the findings of the study, it could be established that pre-eclamptic women had poorer maternal and perinatal outcomes than did normotensive controls. In particular, 45.6% of women with pre-eclampsia delivered prematurely (<37 weeks) compared with the nearly fourfold higher rate (12.3%) in the control group ($p<0.001$). Also, low birth weight (<2500 g) was strikingly more frequent in infants born to pre-eclamptic mothers, 86.4% v 24.7% in non pre-eclamptic – p value <0.001. Admissions to a neonatal intensive care unit (NICU) were also disproportionally high, 28.6% of babies born of pre-eclamptic pregnancies compared to only 7.1% of controls required NICU care ($p = 0.004$). Such findings are consistent with global findings that suggest that pre-eclampsia had significant adverse obstetric and neonatal outcome consequences including prematurity, growth restriction and neonatal morbidity emphasizing the need for timely diagnosis and management to reduce maternal and child morbidity and mortality.

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Table 3. Distribution of Major Risk Factors and Maternal-Neonatal Outcomes Among Study Participants

Parameter	Pre-eclampsia Group (%)	Control Group (%)	p-value
Nulliparity	66.7	38.1	0.01*
Chronic Hypertension	71.4	12.2	<0.001*
Obesity (BMI ≥30)	47.6	18.6	<0.001*
Severe Anemia	57.1	22.7	0.002*
Preterm Delivery	45.6	12.3	<0.001*
Low Birth Weight	86.4	24.7	<0.001*
Neonatal ICU Admission	28.6	7.1	0.004

Multiple adverse neonatal outcomes and maternal risk factors are closely associated with the pre-eclampsia. Chronic hypertension causes major increase in the risk due to vascular dysfunction and placental ischemia, which are central to pre-eclampsia development. Obesity contributes through inflammatory pathways, and through obstruction of the endothelium; the risk is further increased. After pathological anemia is in severe form then placental hypoxia is aggravated and susceptibility to the disorder is raised. Preterm delivery, which correlates to neonatal complications and long-term morbidity, dramatically increases as clinically expressed in pre-eclampsia. Low birth weight – a common consequence of the poor function of the placenta in pre-eclampsia – has a positive association with neonatal intensive care admissions, a sign of increased neonatal vulnerability. Comments on these findings are in concurrence with the rest of the world data that indicates that a management practice of hypertension, obesity and anemia with the addition of the improvement of antenatal care, is a necessity in reducing the burden of pre-eclampsia and maternal and neonatal outcomes.

Discussion

The prevalence of pre-eclampsia in this study (4.1%) is consistent with the global figures and the regional findings from Pakistan (2.4-8.6%). This moderate prevalence mirrors the weight of hypertensive disorders in pregnancy among tertiary care settings [16].

Chronic hypertension became the highest single independent risk factor that trebled the chance of pre-eclampsia by almost 8-fold. This finding agrees with previous research placing a strong emphasis on preexisting hypertension as a predictive factor for poor pregnancy outcomes. Obesity was also highly correlated, with thrice the risk reported, consistent with accumulating evidence connecting elevated BMI with endothelial dysfunction, inflammation that predisposes to pre-eclampsia pathogenesis [17].

Other remarkable risk factors included severe anemia. Anemia can further worsen placental hypoxia, which in turn can predispose one to pre-eclampsia. Nulliparity more than doubled the risk, in agreement with the notion that first pregnancies present greater immunological and vascular adaptation challenges [18].

The same study also reported undesirable perinatal events such as a high rate of preterm birth and low birth weight in pre-eclamptic women, which made it necessary to monitor for it vigilantly[19].

Limitations from a cross-sectional design that prevents causal inference, and the single center, which limits generalizability. However, these results highlight the need for early determination and control of maternal

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hypertension, obesity, and anemia, together with antenatal care signs for prevention of pre-eclampsia.

Conclusion

Bannu has a sizeable incidence of pre-eclampsia: chronic hypertension, obesity, severe anemia, and nulliparity are identified as main risk factors. Greater antenatal screening, nutritional intervention and control of chronic diseases are fundamental to reduce the maternal and neonatal morbidity related to prenatal in this population.

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