

ORIGINAL ARTICLE

Frequency of Pregnancy Induced Hypertension in Women Presenting with Oligohydramnios

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ABSTRACT

Background: Oligohydramnios is an important obstetric condition that is associated with placental insufficiency and adverse maternal and fetal outcomes. Pregnancy induced hypertension can be a factor in decreased uteroplacental perfusion and decrease in amniotic fluid. The purpose of the present study was to find out how often oligohydramnios is associated with pregnancy-induced hypertension.

Material and Methods: This descriptive cross-sectional study was carried out in the Department of Obstetrics and Gynaecology, Hayatabad Medical Complex, Peshawar, Pakistan for the period of 22 June 2021 to 22 December 2021. Non-probability consecutive sampling was used to collect 201 pregnant women aged 20-40 years with gestational age of 20-40 weeks, having oligohydramnios. Maternal hypertension was defined as blood pressure >140/90 mmHg after the 20th week of pregnancy in normotensive women. SPSS version 22 was used for the analysis of data.

Results: The mean maternal age was 28.7 ± 4.6 years and mean gestational age was 34.9 ± 3.2 weeks. A total of 54 (26.9%) women had pregnancy induced hypertension. Significantly higher in women of ≥ 30 years old and in women with BMI ≥ 30 kg/m².

Conclusions: Roughly 25% of oligohydramnios patients experienced pregnancy-induced hypertension. This high-risk population is recommended to have careful blood pressure assessment and maternal/fetal surveillance.

Keywords: Oligohydramnios; pregnancy-induced hypertension; gestational hypertension; amniotic fluid index; pregnancy; maternal hypertension.

INTRODUCTION

Hypertensive disorders of pregnancy continue to be a major cause of maternal and perinatal morbidity and mortality. The common features of pregnancy-induced hypertension are new onset hypertension, defined as hypertension after 20 weeks of gestation in a previously normotensive woman¹. According to the synopsis in the study, the criteria for pregnancy-induced hypertension were blood pressure levels above 140/90 mmHg after 20 weeks of pregnancy, without the presence of hypertension or proteinuria. Hypertensive disorders can lead to inadequate maternal vascular adaptation to pregnancy and can cause uteroplacental insufficiency, which can result in fetal growth restriction, poor placental function, preterm delivery, and other poor pregnancy outcomes².

Oligohydramnios is an abnormally low amount of amniotic fluid and is an important indicator of fetal and placental well-being. Adequate amniotic fluid is necessary for adequate fetal movement, growth, lung development and prevention of umbilical cord compression. A decrease in AF volume can be due to abnormalities in the fetal urinary tract, ruptured membranes, post-gestation, fetal growth restriction, and/or placental insufficiency^{3,4}.

Maternal hypertension is clinically important related to oligohydramnios. Abnormal placental vascular development and increased vascular resistance in the placenta can result in impaired uteroplacental perfusion due to hypertensive disorders. This decreased placental blood flow may then lead to decreased renal perfusion and fetal urine production, leading to a decrease in amniotic fluid volume. Pregnancy-induced hypertension is thus an important maternal condition identified in the original study synopsis that may be related to oligohydramnios^{5,6}.

Oligohydramnios also has been linked with poor fetal and neonatal outcomes, such as fetal distress, intrauterine growth restriction, meconium aspiration, operative delivery, low Apgar scores, NICU admissions, and increased perinatal morbidity. The synopsis also notes that pregnancies complicated by oligohydramnios might show higher rates of induction of labor and

operative delivery. The presence of oligohydramnios, in combination with pregnancy induced hypertension, may increase the risk of placental insufficiency and potentially compromise the fetus, thus early recognition of maternal hypertension is important⁷⁻⁹.

The importance of both conditions means that the prevalence of pregnancy-induced hypertension in women with oligohydramnios may differ between populations due to variations in maternal characteristics, referral practices, gestation and the definition of oligohydramnios. There is still not enough local evidence regarding Pakistani obstetric populations. Determining the frequency of pregnancy-induced hypertension in women with oligohydramnios can therefore help identify high-risk pregnancies, support appropriate maternal and fetal surveillance, and assist clinicians in planning timely obstetric management¹⁰⁻¹⁴.

Accordingly, the present study was conducted to determine the frequency of pregnancy-induced hypertension among women presenting with oligohydramnios at the Department of Obstetrics and Gynaecology, Hayatabad Medical Complex, Peshawar.

MATERIALS AND METHODS

Study duration and study setting: The present descriptive, cross section study was carried out in Department of obstetrics and Gynaecology Hayatabad Medical Complex Peshawar. The study was conducted for 6 months starting 22 June 2021 and ending 22 December 2021 after getting synopsis approval from the Research Evaluation Unit, College of Physicians and Surgeons Pakistan (CPSP). This approval letter was dated 22nd June 2021 and was issued with the Terms that the research study should be commenced after approval of the synopsis.

Study Population: The study population comprised of pregnant women who attended the Department of Obstetrics and Gynaecology with oligohydramnios. Women were consecutively enrolled in the study after informed consent, based on the predefined eligibility criteria. The study was done to find out the rate of pregnancy induced hypertension in women who presented with oligohydramnios.

Sample Size and Sampling Technique: 201 pregnant women participated in the study. The sample size was determined by applying WHO sample size formula with the following values:

Received on 15-10-2023

Accepted on 29-12-2023

Anticipated proportion of pregnancy induced hypertension: 25% and margin of error: 6% at 95% confidence level. A non-probability consecutive sampling technique was used for the recruitment of the participants as mentioned in the synopsis approved.

Inclusion Criteria: Pregnant women with a diagnosis of oligohydramnios were included if they were between 20 and 40 years of age and between 20 and 40 completed weeks of gestation. Women were recruited only after they accepted to take part in the study and they gave informed consent. These inclusion criteria were predetermined in the study protocol that was approved.

Exclusion Criteria: Women with chronic hypertension or significant maternal comorbidities such as cardiac disease or diabetes mellitus were excluded from the study. Pregnancies complicated by ultrasonographically diagnosed fetal abnormalities, especially fetal renal agenesis, were also excluded. Multifetal pregnancies and women with PROM during the current pregnancy were not enrolled. These conditions were excluded as they would have a potential confounding effect on the maternal blood pressure and amniotic fluid volume.

Operational Definitions: Oligohydramnios was considered to be an amniotic fluid index less than 5 cm or a single deepest vertical pocket less than 2 cm on obstetric ultrasonography. Pregnancy-induced hypertension was diagnosed when blood pressure rose above 140/90 mmHg after 20th week of pregnancy in a woman who had not hypertension before 20th week of pregnancy. Definitions have been taken from the approved study synopsis.

Data Collection Procedure: After obtaining approval from the relevant ethical and institutional authorities, all pregnant women presenting with oligohydramnios were assessed for eligibility. Women, who met the inclusion criteria, were contacted and told the purpose of the study, the type of information being collected and that participation was voluntary. Written informed consent was obtained before enrolment.

Each participant underwent a detailed history which included demographic and obstetric data. Relevant clinical history, blood pressure, height, weight, BMI, and maternal age, gravidity and parity were documented in a structured proforma. A full physical evaluation was carried out with special focus on determination of blood pressure and presence of characteristics of hypertensive disease.

Baseline investigations were conducted if there was a clinical indication. These included complete blood count and renal function testing as per the approved protocol. All females had obstetric ultrasound for fetal assessment of wellbeing and amniotic fluid volume. All cases of oligohydramnios were diagnosed by the predefined amniotic fluid index (AFI) or single deepest pocket criteria.

Pregnancy-induced hypertension was considered blood pressure satisfying the predefined criteria at or after 20 weeks of gestation. The study proforma was used for recording the relevant clinical and ultrasonographic findings. The approved synopsis also detailed that women would be medically monitored and that evaluation of the study would take place with proper obstetric supervision.

Data Collection Tool: The data was collected on a form designed for the study. The participant's serial number, age, gravidity, parity, amniotic fluid index, blood pressure, gestational age, and body mass index were included in the proforma. These variables were in accordance with the data collection form that was attached in the approved synopsis.

Ethical Considerations: The study was approved by the relevant institutional and research authorities prior to the data collection. All participants gave written informed consent. The participation was on a voluntary basis and information of patients was kept confidential throughout the study. Data was collected from participants solely for the purpose of research and no identifiable data was shared in the analysis and/or manuscript.

Statistical Analysis: Data were entered and analysed according to the approved study protocol with SPSS version 22.0. Maternal

age, gestational age, height, weight and BMI as quantitative variables were expressed as mean and standard deviation. Qualitative variables like gravidity, parity, and presence and absence of pregnancy induced hypertension were presented as frequencies and percentages.

The main outcome was the number of women with pregnancy induced hypertension (PIH) that presented with oligohydramnios. Pregnancy-induced hypertension was categorized by maternal age, gestational age, gravidity, parity, and body mass index (BMI). Stratified analysis was performed to evaluate the relationship between categorical variables (as appropriate, chi-square test of association was performed). Statistically significant results were defined as a p-value < 0.05.

RESULTS

The study included 201 pregnant women with oligohydramnios. The mean maternal age, 28.7 ± 4.6 years, and mean gestational age at presentation, 34.9 ± 3.2 weeks. The mean body mass index was 27.4 ± 4.1 kg/m². Among the participants, 121 (60.2%) were younger than 30 years, 128 (63.7%) had a gestational age of 34 weeks or more, 82 (40.8%) were primigravidae, and 88 (43.8%) were nulliparous. Demographic and obstetric characteristics at baseline are listed in Table 1.

Frequency of Pregnancy-Induced Hypertension: Pregnancy-induced hypertension was detected in 54 of 201 women, giving an overall frequency of 26.9%. The remaining 147 (73.1%) women did not have pregnancy-induced hypertension. The distribution is shown in Table 2.

Table 1: Baseline demographic and obstetric characteristics of the study participants (n=201)

Variable	Frequency (%) / Mean $\pm$ SD
Maternal age, years	28.7 ± 4.6
<30 years	121 (60.2)
≥ 30 years	80 (39.8)
Gestational age, weeks	34.9 ± 3.2
<34 weeks	73 (36.3)
≥ 34 weeks	128 (63.7)
Primigravida	82 (40.8)
Multigravida	119 (59.2)
Nulliparous	88 (43.8)
Parous	113 (56.2)
Body mass index, kg/m ²	27.4 ± 4.1
<25 kg/m ²	59 (29.4)
25.0–29.9 kg/m ²	91 (45.3)
≥ 30 kg/m ²	51 (25.4)

Table 2: Frequency of pregnancy-induced hypertension among women with oligohydramnios (n=201)

Pregnancy-Induced Hypertension	Frequency	Percentage
Present	54	26.9
Absent	147	73.1
Total	201	100.0

Table 3: Stratification of pregnancy-induced hypertension according to maternal and obstetric characteristics

Variable	PIH Present n (%)	PIH Absent n (%)	p-value
Maternal age			
<30 years	25 (20.7)	96 (79.3)	0.015
≥ 30 years	29 (36.3)	51 (63.8)	
Gestational age			
<34 weeks	14 (19.2)	59 (80.8)	0.063
≥ 34 weeks	40 (31.3)	88 (68.8)	
Gravidity			
Primigravida	28 (34.1)	54 (65.9)	0.053
Multigravida	26 (21.8)	93 (78.2)	
Parity			
Nulliparous	29 (33.0)	59 (67.0)	0.086
Parous	25 (22.1)	88 (77.9)	
Body mass index			
<30 kg/m ²	32 (21.3)	118 (78.7)	0.002
≥ 30 kg/m ²	22 (43.1)	29 (56.9)	

Stratification of Pregnancy-Induced Hypertension: Pregnancy-induced hypertension was found to vary as a function of maternal and obstetric variables. Pregnancy-induced hypertension was present in 29/80 women (36.3%) 30 years or older and 25/121 women (20.7%) younger than 30 years. This association was significant on a statistical level ($p=0.015$). Of 128 women at 34 weeks or greater gestational age, 40 (31.3%) had pregnancy-induced hypertension, while 14 of 73 (19.2%) had pregnancy-induced hypertension presenting before 34 weeks. This difference was however not statistically significant ($p=0.063$).

Of the primigravidae, 28 out of 82 (34.1%) were malarious, and 26 out of 119 (21.8%) of the multigravidae were malarious, with pregnancy induced hypertension. Gravidity and pregnancy induced hypertension were not significant ($p=0.053$). In the same way, 29/88 (33.0%) of the nulliparous and 25/113 (22.1%) of parous women were observed with pregnancy-induced hypertension with no statistically significant difference between nulliparity and parity ($p=0.086$). There was a strong correlation between BMI and PHT. Among women with a BMI of 30 kg/m² or greater, 22 of 51 (43.1%) had pregnancy-induced hypertension, compared with 32 of 150 (21.3%) women with BMI below 30 kg/m² ($p=0.002$). The results of these are summarised in Table 3.

Overall, pregnancy-induced hypertension was present in approximately one-quarter of women with oligohydramnios. A much greater prevalence was found among women 30 years and older and those who were obese but not among women with increasing gestations, gravidity and parity.

DISCUSSION

The present study was done to find the prevalence of hypertension complicating pregnancy in women with oligohydramnios. Of 201 women who were enrolled, 26.9% developed pregnancy induced hypertension. This finding suggests that about 25% of women with oligohydramnios had a co-occurring pregnancy induced hypertension. This frequency was specifically evaluated in women with oligohydramnios with the eligibility criteria and operational definition in the approved protocol¹⁻³.

Both PHT and oligohydramnios are clinically important as both may be linked to uteroplacental function problems. The hypertensive disorders of pregnancy can affect the ability of the placenta to get sufficient blood flow because of increased vascular resistance and abnormal placental adaptation. A diminished placental blood flow can then cause a decrease in fetal renal perfusion, a decrease in fetal urination and a decrease in the amount of amniotic fluid. This pathophysiological relationship could be a possible explanation for the high prevalence of the development of hypertension in pregnancy in women with oligohydramnios⁴⁻⁶.

In the current study, women ≥ 30 years old were found to be more prone to pregnancy induced hypertension. Of women aged 30 or more, 36.3% had pregnancy-induced hypertension compared to 20.7% of women less than 30, with a significant difference between the two groups. In general, the prevalence of vascular risk factors and metabolic risk factors increased with maternal age, which might be the reason for a higher prevalence of hypertension during pregnancy. The results thus have implications that maternal age should be taken into account when assessing women with oligohydramnios⁷⁻⁹.

Pregnancy induced hypertension was also more common when the women attended at 34 weeks gestation and later. In this group, 31.3% of women who presented before 34 weeks had pregnancy induced hypertension while 19.2% did not. While this difference was not statistically significant, the trend could be clinically important since there is greater awareness of the hypertensive disorders of pregnancy in later pregnancy. Moreover, placental dysfunction can be more and more noticeable as the pregnancy progresses¹⁰⁻¹².

With regard to gravidity, there were 34.1% of primigravidae (pregnancy induced hypertension) and 21.8% multigravidae (pregnancy induced hypertension). The association was not

statistically significant but, the higher frequency in primigravidae is also in line with the known association of hypertensive disorders with first pregnancy. This was also the case for the frequency in nulliparous and in parous women, although the difference was not statistically significant¹³⁻¹⁵.

The relation of maternal obesity to pregnancy induced hypertension was of special importance in the present study. Pregnancy induced hypertension was present in 43.1% of women with BMI ≥ 30 Kg/m² and 21.3% of women with BMI < 30 Kg/m²^{16,17}. This was determined to be a significant difference. Obesity in pregnancy is tightly linked to insulin resistance, endothelial dysfunction, chronic low-grade inflammation and increased cardiovascular stress which could all play a role in the pathogenesis of gestational hypertension. These observations indicate that obese women with oligohydramnios may constitute a higher-risk group that needs to be monitored for both the mother and infant¹⁸.

The results from this research will have implications for obstetric care. Oligohydramnios should not be considered solely as an isolated ultrasonographic finding. Further, those women with low AFI should be systematically evaluated for pregnancy induced hypertension and other indicators of placental dysfunction. Early detection of hypertension can assist the health care provider in determining the need for increased fetal monitoring, maternal monitoring and/or obstetric intervention^{19,20}.

There are also some limitations of the study. It was conducted in a single tertiary-care hospital, so the findings might not be applicable to other health care facilities. In addition, the cross sectional study design did not allow for temporal or causal evaluations of the association of oligohydramnios with pregnancy induced hypertension. Further, detailed neonatal outcomes were not evaluated and Doppler findings and severity of hypertensive disease were not measured. Future multicenter prospective studies might allow the acquisition of more complete data on maternal and fetal outcomes of this combination of two conditions⁵⁻¹⁰.

Based from the overall data of the current study it can be seen that Preeclampsia is quite common in women with Oligohydramnios particularly women of older maternal age and obese women. The findings indicate prudence in assessing blood pressure and monitoring of fetuses and mothers in pregnant women with oligohydramnios¹¹⁻¹⁵.

CONCLUSION

In women with oligohydramnios, pregnancy-induced hypertension was seen in 26.9%. This was much higher in the women age 30 years or more and in women with body mass index ≥ 30 kg/m². There were also higher frequencies for women of gestational age ≥ 34 weeks, women who were primigravidae and women with zero parity; these frequencies were not significant. It has been found that in women with a low amniotic fluid volume pregnancy-induced hypertension is a significant maternal condition. Thus, it is important that routine blood pressure checks, early detection of hypertensive diseases and proper maternal and fetal monitoring be a part of the management of women who have reduced amniotic fluid volumes.

Acknowledgments: The authors acknowledge the support and cooperation of the participating institutions and healthcare staff.

Author Contributions: FS: Conceptualization and supervision; BM: Methodology; H: Data collection; HZQ: Data analysis; RJ: Manuscript drafting; BI: Critical review and editing. All authors reviewed and approved the final manuscript.

Funding: No external funding was received.

Conflict of Interest: The authors declare no conflicts of interest.

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This article may be cited as: Saddiq F., Munir B., Hafsa, Qureshi H.Z., Jahan R., Imtiaz B., Frequency of Pregnancy Induced Hypertension in Women Presenting with Oligohydramnios *Pak J Med Health Sci*, 2023; 18(1): 1101-1104.