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Factors associated with Oligohydramnios: age, hydration status, illnesses in pregnancy, nutritional status and fetal condition - a study from Nepal

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Abstract

Background

Amniotic fluid (AF) is marvelously dynamic milieu constantly in a transformation as pregnancy progresses are vital for foetus. The present study was undertaken to determine Oligohydramnios and associated factors like age, hydration status, pregnancy related illnesses, nutritional status and fetal condition among pregnant women in Nepal.

Methods

This hospital based study was done in Bharatpur, Chitwan, Nepal. 148 pregnant women participated in this study. Pregnancy related information was obtained from ward register. Questionnaire was distributed to obtain associated sociodemographic factors.

Results

Oligohydramnios cases were more among the age group ≥25 years, weeks of gestation >40, history of leaking ≤7, extreme thirst, less urine production. History of high blood pressure, deficiency of extra dietary meat, fish, eggs, vegetables, low pregnancy BMI, had higher risk.

Conclusion

Oligohydramnios is associated with high perinatal morbidity and mortality. There are multiple factors connected with it. Early intervention is required in the form of induction of labour, close intrapartum monitoring, maternal hydration to increase amniotic fluid volume, artificial rupture of membrane in active phase of labour, early planning of mode of delivery can prevent poor perinatal outcome.

Key words

Amniotic fluid, foetus, Oligohydramnios, Nepal, pregnancy.

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Background

Amniotic fluid (AF) is marvelously dynamic milieu constantly in a transformation as pregnancy progresses. A number of nutrients and growth factors present in AF assist growth of foetus, acts as a cushion and antimicrobial properties allow foetal protection. In the early stages AF volume and fetal size follows a linear pattern. The increase in AF volume is enormous; showing a jump from 25 ml at 10 weeks to 400 ml at 20 weeks and 800 ml at 28 weeks then enters in a plateau phase near term and decreases to 400 ml at 42 weeks. Determinants of AF primarily a) excretion of fetal urine. b) Secretion of oral, nasal, tracheal and pulmonary fluids. So fetal growth and development is dependent on AF [1-3]. Amniotic fluid volume is measured by Amniotic fluid index (AFI). Normally AFI ranges between 10 to 24 centimeters [4].

Deficiency of amniotic fluid during pregnancy termed as Oligohydramnios. It is defined as a single pocket of amniotic fluid measuring < 2 cm in both vertical and horizontal planes in ultrasound and amniotic fluid index (AFI) <5cm [5]. Sometimes it's difficult to rule out the cause of oligohydramnios giving it idiopathic nature [6]. Amniotic fluid forms from the fetal urine so, obstruction in fetal urinary tract can lead to oligohydramnios. Low amniotic fluid levels during the first or second trimester may associates with some fetal abnormalities. Several factors like leaky or ruptured amniotic membranes, fetal abnormalities, genetic factors, maternal illness, nutrition status, carrying twins, NSAIDs like indomethacin and certain ACE (angiotensin-converting enzyme) inhibitors may play a crucial role [7]. These causative factors can be corrected at early antepartum period to reduce the event of oligohydramnios.

Studies are deficient from Nepal. So the present study was undertaken to determine Oligohydramnios and associated factors like age, hydration status, pregnancy related illnesses, nutritional status and fetal condition among pregnant women in Bharatpur district, Tarai region of Nepal.

Material and Methods

Study Period

The current research was undertaken in the year 2016 Jan. – 2016 July (six months).

Study design, participants and data collection

The study was done in maternity unit of Bharatpur Hospital Chitwan. Obstetric cases diagnosed as oligohydramnios was high in this center and several cases were referred to this hospital for expertise consultation and management. 148 pregnant women, gestational age ≥28 week participated in this study. Participants were interviewed and their records were obtained from the ward register.

Response Rate

Amongst 152 participants (by initial screening), 148 met the criteria to participate in this research, giving an overall response rate of 97.36%.

Questionnaire design

Semi-structured questionnaire which was used in this study revised by subject experts. language experts were consulted for comprehensibility and simplicity of language. Determinants of oligohydramnios like socio- demographic factors, maternal and feto-placental related factors were included in the questionnaire. Record review guide of OBG was used to fill perinatal outcomes related portions in the questionnaire. Unique Study identification number was used for this study to maintain the confidentiality.

Inclusion criteria

Pregnant women from ≥ 28 weeks of gestation who had equal or less than 8cm AFI showed by ultrasound report and delivered baby within 1day period of data collection in maternity ward were considered for the study.

Exclusion criteria

Gestational age less than 28 weeks and multipara woman were excluded from this study. Subjects, who were not willing to participate voluntarily, were not considered.

Outcome variable

Factors like hydration status, illnesses in pregnancy, nutritional status, and fetal condition were considered as outcome variable.

Explanatory variables

Explanatory variables were age, ethnicity, religion, place of residence, pregnancy related information.

Ethical committee approval

The research proposal was approved by Thesis Committee of Nursing Program, Chitwan Medical College (P) Ltd. Ethical clearance was taken from CMC-IRC Bharatpur, Chitwan. Formal permission was also taken from the Bharatpur Hospital. Consent was obtained from each respondent by clarifying the purpose of the study prior to the data collection. Respondent's dignity was maintained by giving option to reject or discontinue at any time. Confidentiality was maintained throughout the project.

Data management and statistical analysis

Non-probability purposive sampling technique was used in this study. Data was analysed in Epi data 3.1 and SPSS version 20. Descriptive statistics was used and Chi square test was used to identify the association between variables. Bivariate and multivariate analysis was done to identify the

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association between outcome variables less or equal to 5% level of significance. An odds ratio with 95% Confidence Interval was calculated.

Results

Table – 1 socio-demographic characteristics of the respondents (n=148)	
Characteristics	**n(%)**
Age group	
<20 years	33(22.3)
21-25 years	68(45.9)
26-30 years	37(25)
>30 years	10(6.8)
Ethnicity	
Dalit	25(16.9)
Janajati	64(43.2)
Madhesi	10(6.7)
Brahmin/Chhetri	42(28.4)
Others	7(4.7)
Religion	
Hindu	122(82.4)
Buddhist	19(12.5)
Christian	4(2.7)
Islam	3(2.0)
Place of residence	
Tarai region	129(87.2)
Hilly region	19(12.8)

Table 1 show that 45.9% of the respondents were in the age group of 21-25 years and 6.8% were above 30 years. The mean age of participants was 23.99 years. Ethnically 43.2% belongs to Janajati followed by Brahmins 28.4% and Dalits 16.9%; remaining 4.7% were Giri, Puri, Thakuri. A vast majority (87.2%) were from Tarai region.

Table 2 depicts oligohydramnios cases were more among the age group ≥25 years, weeks of gestation >40, primigravida and who gave one live birth. Oligohydramnios was not statistically significant with history of abortion.

Table 3 explains that oligohydramnios was more in respondents with history of leaking ≤7, extreme thirst, less urine

Table 4 shows that oligohydramnios was more in subjects with a history of high blood pressure, who had not taken extra dietary meat, fish, eggs, vegetables, low pregnancy BMI, had higher risk.

Table – 2 association between oligohydramnios with age and pregnancy related information of the respondents			
Characteristics	Oligohydramnios n(%)		p-value
	Severe (n=61)	Mild (n=87)	
Age group (in years)			
<25 years	31(34.8)	58(65.2)	0.035*
≥25years	30(50.8)	29(49.2)	
Week of gestation			
≤40 weeks	25(26.6)	69(73.4)	0.001†
>40 weeks	36(66.7)	18(33.3)	
Gravida			
Primigravida	45(53.6)	39(46.4)	0.001†
Multigravida	16(25.0)	48(75.0)	
History of abortion			
Yes	13(61.9)	8(38.1)	0.092x
No	17(39.8)	26(60.5)	
Number of live birth			
One	17(54.8)	14(45.2)	0.022*
More than one	6(24)	19(76.0)	

xP>0.05 statistically not significant
*P<0.05 statistically significant
†P<0.01 statistically significant

Table – 3 association between oligohydramnios and hydration status of the respondents			
Characteristics	Oligohydramnios n(%)		p-value
	Severe (n=61)	Mild (n=87)	
History of leaking during this pregnancy			
Yes	30(40)	45(60)	0.761x
No	31(42.5)	42(57.5)	
Duration of leaking			
≤7days	25(47.2)	28(52.8)	0.006†
>7days	3(13.6)	19(86.4)	
Sign of dehydration			
Extreme thirst	28(33.7)	55(66.3)	0.037*
Less urine	11(68.8)	5(31.2)	0.018*
Over heating	11(42.3)	15(57.7)	0.901x
Dry skin and mucosa	19(48.7)	20(51.3)	0.267x
Dizziness	19(44.2)	24(55.8)	0.639x
Dark urine	7(53.8)5	6(46.2)	0.333x

xP>0.05 statistically not significant
*P<0.05 statistically significant
†P<0.01 statistically significant

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Table – 4 Association between oligohydramnios and pregnancy related illnesses, nutritional status and fetal condition of the respondents

Characteristics	Oligohydramnios n(%)		p-value
	Sever (n=61)	Mild (n=87)	
History of UTI			
Yes	14(37.8)	23(62.2)	0.630[x]
No	47(42.3)	64(57.7)	
History of high blood pressure			
Yes	20(66.7)	13(33.3)	0.002[*]
No	41(34.7)	77(65.3)	
Calcium supplement			
Yes	40(40.8)	58(59.2)	0.890[x]
No	21(42)	29(58)	
Extra diet			
Yes	46(40.4)	68(59.6)	0.695[*]
No	15(44.1)	19(55.9)	
If yes, type of extra diet			
Meat, fish, egg	7(21.2)	26(78.8)	0.008[†]
Vegetables	9(24.3)	28(75.7)	0.016[*]
Rice and roti	8(42.1)	11(57.9)	0.933[*]
Milk and milk product	14(43.8)	18(56.2)	0.742[*]
Fruits	31(41.9)	43(58.1)	0.867[*]
Pregnancy BMI			
Normal	19(28.4)	48(71.6)	
Low	42(51.9)	39(48.1)	0.004[†]
Fetal condition			
Normal	51(37.8)	84(62.2)	0.006[†]
Abnormal	10(76.9)	3(23.1)	

[x]P>0.05 statistically not significant
[*]P<0.05 statistically significant
[†]P<0.01 statistically significant

Table – 5 Bivariate Analysis of Age, Obstetrical and Nutritional Status Related Information of the Respondents

Characteristics	Oligohydramnios		Odds Ratio (95% CI)
	Severe (n=61)	Mild (n=87)	
Age group			
<25	31(34.8)	58(65.2)	
≥25	30(50.8)	29(49.2)	1.935(0.989, 3.787)
Week of gestation			
≤40	25(26.6)	69(73.4)	
>40	36(66.7)	18(33.3)	5.520(2.666, 11.427)[*]
Gravida			
Multigravida	16(25.0)	48(75.0)	
Primigravida	45(53.6)	39(46.4)	3.462(1.702, 7.040)[*]
Number of live birth			
More than one	6(24)	19(76.0)	
One	17(54.8)	14(45.2)	0.679(0.195, 2.358)
Vegetables			
Yes	9(24.3)	28(75.7)	
No	52(46.8)	59(53.2)	0.804(0.558, 2.122)
Meat, fish, egg			
Yes	7(21.2)	26(78.8)	
No	54((47.0)	61(53.0)	3.288(1.322, 8.180)[*]
Pregnancy BMI			
Normal	19(28.4)	48(71.6)	
Low	42(51.9)	39(48.1)	2.721(1.369, 5.409)[*]

[†]P<0.01 statistically significant

Table 5 shows the logistic regression analysis. Respondents with gestation week were >40; 5.520 times more likely to have severe oligohydramnios as compared to ≤40. Primigravida were 3.462 times more prone to have severe Oligohydramnios as compared to multigravida. Likewise, consumption of less meat, eggs and fish increased 3.288 times risk for severe Oligohydramnios. Low pregnancy BMI had 2.71 times more likely to have severe Oligohydramnios compared to the normal BMI. No significant association observed between age, number of previous live birth and extra diet vegetables with severe oligohydramnios.

Discussion

Among the 148 respondents, 58.8% had mild and 41.2% had severe oligohydramnios. This finding is comparable with the study conducted by Nazlima *et al* where 67.9% had mild and 32.0% had severe Oligohydramnios [8].

In this research, 45.9% of the respondents were in the age group of 21-25 years. Oligohydramnios was statistically significant in the age group ≥25 (p=0.035); comparable with the finding of Nazlima et al where 46.15% of pregnant women were between 21-25 years age group. Our findings are also in accordance with Vidhydhar *et al*. where 78% cases were in the age group of 20-29 years [8, 9]. Findings of this research show primigravida 6.803 times more likely to have severe Oligohydramnios, supported by Kahkhaie et al. where respondents 51.5% were primigravida. Gurung et al. also stated that 57% of the oligohydramnios patient were primigravida [10]. In this study oligohydramnios was statistically significant among those respondents who were from ≥40 week of gestation (p<0.001). This finding is in accordance with the study of Madhavi et al. where incidence

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of oligohydramnios was 40% high among post term pregnancies (40->42 weeks) [11]. The association of prolonged pregnancy and oligohydramnios was found to be significant (p<0.05), similarity was observed in the study conducted by Mohamad et al revealed that women in the oligohydramnios group were significantly (P<0.002) less likely to have lower mean weeks of gestation compared to those in the control group (38.9±1.3 vs.39.4 ±0.9 respectively) [12].

In this study finding, 20.3% had consumed folic acid, iron by 93.9% and calcium by 66.2%. Oligohydramnios was statistically significant among those respondents who had not taken extra diet meat (p<0.008), vegetables (p<0.016). Supplementation with micronutrients (zinc, calcium, magnesium, vitamin a, folate iron vitamin C, iodine) improves nutritional status during pregnancy. Our, finding is supported by Ashwal et al. concluded that in oligohydramnios pregnancies depending on the woman's health and pregnancy records, recommend for change in the mother's diet nutritive foods and increased in fluid intake may help to prevent and reduce oligohydramnios [13].

This study finding shows that respondents who had low pregnancy BMI had 2.71 times more likely to have severe Oligohydramnios. It is supported by Neggers & Goldenberg where low rate of pregnancy weight gain was associated with increased risk of preterm birth whereas low second or third-trimester weight gain has been shown to be associated with spontaneous preterm delivery and reduced amount of amniotic fluid [14].

Conclusion

Oligohydramnios is associated with high perinatal morbidity and mortality. There are multiple factors connected with it. Early intervention is required in the form of induction of labour, close intrapartum monitoring, maternal hydration to increase amniotic fluid volume, artificial rupture of membrane in active phase of labour, early planning of mode of delivery can prevent poor perinatal outcome.

Limitations & future scope of the study

This research is based on the finding of a medical college in Tarai region in Nepal with limited number of subjects. A multi centric study comprising data from all the medical colleges of and the Universities in Nepal with higher sample size will be beneficial to assess the outcome.

Abbreviations

Amniotic fluid (AF), Amniotic fluid index (AFI)

Competing interests

The authors do not have any conflict of interest arising from the study.

Authors' contribution

RDD designed the study, deduced the data, drafted the manuscript, and revised it. DP helped RDD for data collection. DP participated in the language editing along with RDD. RDD and DP participated in statistical analysis, data interpretation, and critical revision of the manuscript. All authors approved the final manuscript.

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