COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE,

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

Pregnancy Outcomes and associated factor among Women with Oligohydramnios at ≥37 weeks of gestation in the Two Teaching Hospitals in Addis Ababa, Ethiopia: cohort study

BY
SIMEGNEW TILAHUN NEBYOU (MD, OBY GYN RESIDENT)

CELL PHONE: 0924510173

E.mail:simegnewtilahun60@gmail.com

PRINCIPAL ADVISOR: Dr. MAHLET YIGEREMU (MD, ASS, PROFFESOR OF OB GYN, REI SUB SPECIALIST)

DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

COLLEGE OF HEALTH SCINCE

ADDIS ABABA UNIVERSITY

E.mail: mahlet.yigeremu.aau.edu.et

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SIMEGNEW TILAHUN NEBYOU (MD, OB GYN FINAL YEAR RESIDENT)

CELL PHONE: 0924510173

E.mail:simegnewtilahun60@gmail.com

A DISSERTATION SUBMITTED TO THE DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, SCHOOL OF MEDICINE, COLLEGE OF HEALTH SCIENCE, ADDIS ABABA UNIVERSITY FOR PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE SPECIALITY CERTEFICATE IN OBSTETRICS & GYNECOLOGY

PRINCIPAL ADVISOR: MAHLET YIGEREMU (MD,ASS, PROFESSOR OF OB GYN, REI SUB SPECIALIST)

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DECLARATION

ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

POSTGRADUATE PROGRAM

I, Dr. Simegnew Tilahun, hereby declare that this research report entitled " **the pregnancy outcomes and associated factor among women with oligohydramnios at and beyond term in two teaching hospitals in Addis Ababa university: cohort study.** " in line with the requirement of graduate studies was fully undertaken by me under the guidance of my advisors and that I have, to the best of my knowledge and effort, avoided plagiarism or duplication of materials unless and otherwise cited and/or acknowledged and that it has not been so far submitted for any form of research application or consideration.

Dr. Simegnew Tilahun_____ _____ _____

Principal investigator Signature Date

I hereby certify that I have read and evaluated this research report relating to" the pregnancy outcomes and associated factor among women with oligohydramnios at and beyond term in two teaching hospitals in Addis Ababa university" under my guidance from its inception up to in its current format that it can be submitted to the DRPC for final approval in partial fulfilment to the Degree of Specialty in Obstetrics and Gynecology.

Dr. Mahlet Yigeremu_____ _____ _____

1. Advisor Signature Date

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I would also like to thank interns and residents who were involved in data collection and the women participated in the study. I also thank the Department of Obstetrics and Gynaecology for giving me the opportunity to conduct this study.

LIST OF ABBREVIATIONS

ACOG	American College of Obstetricians and Gynaecologists
ABO	Adverse birth outcome
AFV	Amniotic fluid volume
ANC	Antenatal Clinic
AOR	Adjusted odds ration
CS	Caesarean section
CTG	Cardiotocograph
EFW	Estimated Fetal Weight
EOPD	Emergency Outpatient Department
GA	Gestational Age
GMH	Gandhi memorial Hospital
IO	Isolated Oligohydramnios
IUGR	Intrauterine growth restriction
MSAF	Meconium stained amniotic fluid
MAS	Meconium aspiration syndrome
NIO	Non-isolated Oligohydramnios
NICU	Neonatal intensive care unite
NRFHRP	Non-reassuring fetal heart rate pattern
PIH	Pregnancy induced hypertension
PNMR	Perinatal Mortality Rate
RCT	randomized controlled trial
SDP	single deepest pocket
SGA	Small for gestation age
SMFM	Society for Maternal-Fetal Medicine
SSOL	second stage of labor
TASH	Tikur Anbessa Specialized Hospital

Abstract

Background -Oligohydramnios is a state of deficient amniotic fluid defined objectively using ultrasound measurements as SDP less than 2 centimetres and/or amniotic fluid index less than 5 centimetres. It has been correlated with conditions that threaten health of the fetus. The aim of the study is to assess determinants of adverse maternal and perinatal outcomes in women with singleton pregnancy with oligohydramnios at and after 37+0 weeks in Addis Ababa university two teaching hospitals.

Methods-. A prospective cohort study at the 2 teaching hospitals of Addis Ababa University namely Tikur Anbesa specialized (TASH) and Gandhi Memorial Hospital (GMH) from December 1, 2022 to May 31, 2023.Using whole population sampling method, 213 women diagnosed with oligohydramnios at or beyond 37 completed week of gestation were recruited. The data was analysed using SPSS version 25 and descriptive statistics was used as presented and the association between variables was done using chi square for categorical variables and t-test for continuous. Bivariate and multivariate regression analysis was also used.

Result – During the study period, oligohydramnios was found in 3.8% of all deliveries. Over all cesarean rate was 41.8 % and the commonest indication was Non-reassuring fetal heart rate pattern followed by non-reassuring fetal meconium- stained amniotic fluid (MSAF). A significant half (50.5%) had adverse perinatal outcomes. The commonest reason for NICU admission was Meconium Aspiration Syndrome (73.9 %). Gestational age and low 1st minute Apgar score had a positive correlation with the degree of oligohydramnios. The multivariate logistic regression showed obstetrics comorbidities were 2.9 folds likely to result in Adverse birth outcome (AOR=2.9, 95%CI=1.13, 7.41) and spontaneous labor increased composite adverse birth outcome by 6.5 folds (AOR=6.5, 95%CI=1.64, 25.95). Neonates with Adverse birth outcomes 8.6 times likely to be delivered by Cesarean section (AOR=8.6, 95%CI=1.64, 25.95).

Conclusion - Oligohydramnios is a common obstetric complication with significant neonatal and maternal complications. Adverse neonatal outcomes were observed significantly in women with oligohydramnios who had other obstetric conditions. The mere presence of oligohydramnios was not an indication for cesarean delivery.

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1. Introduction

Oligohydramnios has always been an issue in obstetrics because It is associated with adverse perinatal outcomes of poor first minute APGARs, increased risks of thick meconium in labour with risks of meconium aspiration, high admission rates to neonatal intensive care unit (N-ICU) and risks of perinatal deaths.(1) There is also an association of oligohydramnios with intrauterine growth restriction (IUGR) , risk of congenital anomaly and increased maternal operative interventions (2)

Oligohydramnios is a state of deficient amniotic fluid defined sonographically as single deepest vertical pocket less than 2 centimetres and/or amniotic fluid index less than 5 centimetres (3). Amniotic fluid index [AFI] and single deepest pocket [SDP] are the most-used semi quantitative techniques. AFI is calculated by summing the depth in centimetres of 4 different pockets of fluid not containing cord or fetal extremities in 4 abdominal quadrants using the umbilicus as a reference point and with the transducer perpendicular to the floor.(4)

SDP refers to the vertical dimension of the largest pocket of amniotic fluid with a horizontal measure of at least 1 cm not containing umbilical cord or fetal extremities and measured at a right angle to the uterine contour and perpendicular to the floor. SDP is the criterion used in the biophysical profile to document adequacy of AFV (5). Studies from different institutions and countries show that the prevalence of oligohydramnios ranges from 1-5% at term but it can go as high as 12-14 % after 41 weeks and as high as 30% in post term pregnancies (5). The reported prevalence of oligohydramnios at term gestation in the Ethiopian context is 2.3% (6)

The importance of amniotic fluid volume as an indicator of fetal health status is a great dilemma to the scientific world. Oligohydramnios is associated with obstetrical conditions like PROM, fetal growth abnormalities, pregnancy induced hypertension, post term pregnancies and Fetal anomalies or can be an idiopathic finding in women carrying low risk pregnancy (7). It is well established in most studies that oligohydramnios is associated with a high risk of adverse perinatal outcome(8). But other studies has shown that oligohydramnios is a poor predictor for adverse outcomes(9). An explanation for these seemingly conflicting and inconsistent observations lies in the fact that the studies use different study designs and populations(8).

1.1. Statement of the Problem

Oligohydramnios is associated with adverse perinatal outcomes .It also puts the mother at risk of procedures and operative interventions like induction of labor and caesarean delivery (10).

To the contrary there are studies that show oligohydramnios does not predict maternal and neonatal outcome.(7) According to these studies there is a need for increased pregnancy surveillance if an oligohydramnios is detected. Otherwise, pregnancy interventions including induction or caesarean delivery for the mere presence of oligohydramnios cannot be justified.

In general there is no sufficient evidence to optimize the management of women with oligohydramnios and hence has always been area of controversy.

Literature review

Amniotic fluid is vital to the well-being of the fetus. It cushions the fetus from injury, helps prevent compression of the umbilical cord, and allows room for it to move and grow. In addition to its bacteriostatic action it helps to prevent infection of the intra-amniotic environment(11). The quantity of amniotic fluid at any time in gestation is the product of water exchange between the mother, fetus, and placenta(12). The volume is maintained within a relatively narrow range.

Numerous factors contribute to the formation and removal of amniotic fluid. Following keratinization of the fetal skin (slightly after mid-gestation), amniotic fluid is considered to be a product mainly of fetal urination. By term, a fetus produces on average from 500 to 700 ml/day with a slight decline in hourly fetal urine production after 40 weeks' gestation(3). Fetal lung liquid also play an important role in amniotic fluid formation. During normal fetal life, fetal breathing movement provide to-and–fro movement of amniotic fluid into and out of the lung with a net outward movement in to the amniotic compartment(13).

The primary source of elimination is through fetal swallowing which has been observed as early as 16 weeks. Studies using radio-labelled red blood cells and radioactive colloid estimate that, on average, a fetus swallows from 200 to 450 ml/day at term, removing 50% of the amniotic fluid produced through fetal urination(12). This fluid is absorbed through the fetal gastrointestinal system and is either recycled through the kidneys or is transferred to the maternal compartment through the placenta. The second route for the amniotic fluid removal has been suggested, namely the intramembranous pathway. This route of absorption is now being actively investigated and researchers have noted that 200 to 500ml/day leaves the amniotic compartment under normal physiologic condition(13).

Many factors have been associated with a change in amniotic fluid volume (AFV). AFV reach its peak volume between 36 and 38 weeks' gestation and decreases thereafter(11). The observed aetiology of the relative reduction in amniotic fluid volume towards term and in uncomplicated post-term pregnancies remains unclear. Other well established factors affecting the amniotic fluid volume include: maternal diseases, including hypertension, diabetes in pregnancy (especially poorly controlled), and auto-immune disorders; maternal medications (prostaglandin syntheses inhibitors); altitude; fetal anomalies, fetal weight (macrosomia and growth-restricted) and fetal malpresentations (14). AFV is also significantly affected by maternal hydration status(15). Sherer et al in 1990 reported a severely dehydrated

patient with oligohydramnios in whom massive intravenous maternal hydration was associated with sonographic confirmation of increasing AFV(16).

On other study done in Iran showed that 48 hr after completing fluid therapy, statistically significant differences were observed in the mean AFI in the intervention group .the results of this study suggested that maternal intravenous hydration significantly increases AFI in women with oligohydramnios. Subsequent prospective studies confirmed this observation, significant increases in the amniotic fluid index (AFI) after oral or intravenous maternal hydration(17).

Oligohydramnios or decreased amniotic fluid volume is extremely poorly defined yet is often acted upon clinically, even when occurring as an isolated finding. Utilizing precise dye-dilution techniques, varying definitions of 200 and 500 ml have been applied. A meta-analysis including 12 studies of either direct or dye measurement suggested a cut-off of 318 ml for oligohydramnios(18).

Although there is no clear cut off point to define sever oligohydramnios, authors have used AFI of less than 5cm, 4cm , 3 cm or 2 cm(19). Oligohydramnios is ranked as severe oligohydramnios AFI <5 cm and borderline oligohydramnios as AFI > 5 cm and <8. The degree of decreased AFI also seems to affect the perinatal and maternal outcomes(20)(21).For example in retrospective matched case control study done in Hadassah Medical Centre, Jerusalem women with anhydramnios had a higher rate of CS done for suspected fetal distress compared to in the control group(AFI < 5 cm).

Oligohydramnios poses a dilemma in management especially in set – ups with no continuous fetal monitoring. Due to intrapartum complication and high rate of perinatal morbidity and mortality associated with oligohydramnios, rates of caesarean section are rising, but decision between vaginal delivery and caesarean section should be well balanced so that unnecessary maternal morbidity is prevented and perinatal morbidity and mortality are reduced. (6)

High level evidence depicts that an antepartum AFI < 5 cm is associated with a significantly increased risk of Caesarean delivery for ‘fetal distress’ and a low Apgar score at 5 min, an increase still birth, ,LBW ,non-reassuring fetal heart rate, and admission to the NICU, meconium, aspiration syndrome and neonatal death (20,22).

Due to the anticipated perinatal adverse outcomes labor in oligohydramnios should be regarded as high risk and continuous fetal monitoring should be employ to improve the

perinatal outcome(23). To the contrary ,isolated oligohydramnios in term pregnancies is not associated with increased risk of adverse perinatal outcome however there is an increased rate of obstetrical interventions like induction of labour and caesarean section(10,23, 24). But recent Systematic Review and Meta-Analysis showed that concluded that Patients with isolated oligohydramnios had significantly higher rates of labour induction. increase in operative delivery because of Non reassuring fetal heart rate pattern (25).

Although observational study showed an overall higher rate of caesarean deliveries and caesarean deliveries for non-reassuring fetal status in the oligohydramnios group (26), recent RCT done on induction of labour for oligohydramnios compared to expectant management didn't result in higher operative deliveries, even in severe oligohydramnios (AFI <4 cm) (27).

Few studies done in low-middle income countries, including Ethiopia also show conflicting results as in some Women diagnosed with oligohydramnios had higher rates of haemorrhage, fetal malposition, caesarean delivery and unfavourable fetal and neonatal outcome than women without oligohydramnios. (28). While in other but similar settings, the adverse outcome for both the fetus and mother are no different than those without oligohydramnios at term (30).

2. Significance of the study

Only few studies have been conducted on the subject in the Ethiopian context. With this in mind, this study tried to examine determinant predictors of composite adverse maternal and neonatal outcomes. Context specific appreciation of magnitude of the problem of oligohydramnios and factors related to poor outcome could help stratify management of these mothers and can aid prompt interventions and mobilization of resources for resuscitation and early transfer to NICU.

As there is no clear national or institutional guideline addressing oligohydramnios, women with oligohydramnios continue to be managed differently in the different hospitals. This study showed effect of oligohydramnios on neonatal outcomes and maternal morbidities and providing relevant information in the development of clinical guideline in management of women with oligohydramnios at and beyond term for hospitals in Ethiopia.

3. Objectives

3.1. General objective

To identify factors associated with adverse perinatal outcome in women diagnosed with oligohydramnios at and beyond 37 week of gestation and generate evidence to help in developing clinical guideline for the management of oligohydramnios in pregnant women managed in the two teaching Hospitals of Addis Ababa University.

3.2. Specific objectives

3.2.1. Primary Objective

- ✓ To determine the incidence of oligohydramnios in pregnant women at term and beyond managed in the teaching hospitals of Addis Ababa University.
- ✓ To assess mode of deliveries of women diagnosed with oligohydramnios.
- ✓ To assess adverse perinatal outcomes of women managed for oligohydramnios at term and beyond.
- ✓ To identify determinants of adverse maternal and perinatal outcome of pregnancies diagnosed and managed for oligohydramnios

3.2.2. Secondary objectives

- ✓ To identify obstetric and medical conditions co-existing with oligohydramnios at or beyond term pregnancies.
- ✓ To assess the adverse maternal outcome following the diagnosis of oligohydramnios at and beyond 37 weeks of gestation.

4. Method

4.1. Study area and period

The study was conducted at Tikur Anbesa specialized Hospital (TASH) and Gandhi Memorial Hospital (GMH) from December 01, 2022 – May 31, 2023 G.C. These hospitals are the largest teaching and obstetrics referral hospitals respectively in Ethiopia. The hospitals receive mainly high risk pregnancies referred from their catchment health centres and other hospitals. In 2022 G.C there were a total of 4381 deliveries at TASH and 8469 deliveries at GMH.

Tikur Anbesa specialized Hospital (TASH) is a university hospital with specialized clinical services with 78 in – patient beds in two wards, 4 delivery couches, 1 emergency room, 1 procedure rooms for Obstetrics and Gynaecology care services. There are also 2 OR table for caesarean delivery with back up of operating tables at the major OR. The neonatal ICU of TASH also has 35 beds and 5 intensive phototherapy and 4 radiant warmer with room dedicated for preterm, term, critical and for KMC purpose.

Gandhi Memorial Hospital (GMH) is the only Addis Ababa region hospital dedicated for maternity and new born care and it is an affiliate hospital to the Addis Ababa University with similar structural and functional service like TASH except the lack of multidisciplinary care.

4.2. Study design

A prospective cohort study was conducted from 1st of December 2022 to May 31 , 2023 at the two teaching hospitals of Addis Ababa University namely Tikur Anbesa specialized Hospital (TASH) and Gandhi Memorial Hospital (GMH).

4.3. Source and Study Population

4.3.1. Source Population

All pregnant women at and beyond term who seek service at Addis Ababa university two teaching hospitals.

4.3.2. Study Population

All pregnant women who were diagnosed and managed for oligohydramnios at and beyond 37 completed weeks and getting service at Addis Ababa university two teaching Hospitals during the study period.

4.4. Inclusion and Exclusion Criteria

4.4.1. Inclusion Criteria

1. Reliable gestational age $\geq 37^{+0}$ weeks of gestation.
2. Singleton gestations
3. AFI < 5 centimetres and/or SDVP is <2 centimetres

4.4.2. Exclusion Criteria

1. Women with PROM
2. Mothers who are admitted with antepartum IUFD and are from outside study area
3. Those mothers managed outside of the study hospitals.

4.5. Sample size calculation

The sample size was computed using the general formula for a single population proportion. It was calculated by considering the prevalence of the highest frequency of adverse perinatal outcome .From a prior study the NICU admission rate of neonates born from oligohydramnios pregnancy is 15.4%. The proportion (p) = 15.4% Z the standard normal distribution value at 95% confidence level of $\underline{Z\frac{\alpha}{2}}$= 1.96, 5% of absolute precision, and 10% non-response rate. Hence, the total sample size were;-

$$n = \frac{(Z\frac{\alpha}{2})^2 * P(1-P)}{d^2}$$

$\underline{(1.96)^2 x\ (0.15) x\ (0.85)}$ = 194

$(0.05)^2$

By taking additional 10% contingency rate, 10% * 194=19.4, the total sample size found to be =213.

4.5.1. Population and Sampling

Using whole population sampling method, women diagnosed for the first time with oligohydramnios at and beyond 37 completed week of gestation were recruited. Recruited participants were identified at emergency OPD of each hospital.

Women having SDP less than 2 cm, who full fill the inclusion criteria and consented to participate in the study were followed till deliveries and their new-borns were followed till the 7th postpartum day .Mothers were asked for consent and upon agreeing for the data collection, structured, pretested questionnaire was administered.

4.6. Study Variables:

Independent Variable- Socio-demographic variables, Obstetric variables

Dependent Variable - Composite adverse maternal and perinatal outcome

4.7. Operational Definitions

Anhydramnios:	No measurable amniotic fluid
Composite Adverse perinatal outcome:	a new born with the occurrence of any of the following outcome: low birth weight, meconium aspiration syndrome, still birth, early neonatal death, low 5th minute Apgar score, NICU admission and thick meconium.
Maternal hydration:	Women provided with oral or parenteral fluid to increases the amniotic fluid volume to improve oligohydramnios.
Non-Isolated oligohydramnios:	oligohydramnios diagnosed with the presence of other obstetric complications and maternal medical illness.
Oligohydramnios:	SDP < 2 cm or AFI < 5cm diagnosed by ultrasound.
NICU admission:	Neonate admitted for clinical care.
Thick meconium:	Grade 2 and grade 3 meconium stained liquor.

4.8. Data collection

5 Residents (year 1 & 2) and 3 interns were trained to collect the data by structured questionnaires. For women having more than one ultrasound reports, we took the last antepartum ultrasound finding. The mode of delivery and birth out comes were recorded at the time of deliveries. The new-borns was followed till 1 week after delivery. The data collections was supervised by the investigator for completeness and reliability.

4.9. Data Quality Management

The data collection tools were prepared from multiple researches. The questionnaire was prepared in English and translated into Amharic and retranslated back to English by two language experts. One day training was given for all data collectors before one week of the actual data collection. Supervision was given for interviewers at each site and regular meetings had been held between the data collectors and the investigator.

To assure the quality of data the questioner were e pre-tested prior to the actual data collection period in a comparable period on 6 cases. Then all necessary modifications was made on the tool. The collected questionnaires were checked for completeness, accuracy, clarity and consistency on daily basis and all questionnaires checked by the researcher to ensure all questionnaires are complete.

4.10 Data management and analysis

The data was cleaned for duplication and missing values and entered and analysed based on coded data by SPSS 25 software. Descriptive statics was done for maternal demographic and baseline characteristics. Internal comparison was done within the cohort for the following exposure: isolated verse not-isolated oligohydramnios and vaginal verse caesarean delivery. These groups were compared with different maternal and perinatal outcomes.

The association between various variable were done using chi square, Logistic, bivariate and multivariate regression was performed on predictors of adverse neonatal outcomes. Results was summarized using figures and tables as well.

4.10. Ethical considerations

The research was approved by Department of Obstetrics and Gynaecology and research and publication committee at Addis Ababa University of College of Heath Science. Informed consent was obtained from the participants at the EOPD while waiting for the management of oligohydramnios. The participants were identified by a code. The completed questionnaires were kept locked and only accessed by the investigator. There was no identified Conflict of interest between the study participant and the study team.

5. Result

5.1. Socio-demographic factors associated with oligohydramnios

During the study period, there were 5530 Deliveries in the study hospitals. From those deliveries, 213 mothers were participated, 123(57.7 %) were from GMH and 90(42.3%) were from TASH. During the study period, 3.8% (213 /5530) of pregnancies at and beyond 37 weeks of gestation were complicated by Oligohydramnios in the two teaching Hospitals. 4.8% (90 / 1870) for TASH & 3.4% (123 /3660) at GMH.

Most of the participants 155 (72.5%) were in the age group of 20-29 year with the mean (SD) being 27.4±4 years. The Majority (80.8%) of the women were from Addis Ababa. The youngest participant was 18yrs while the oldest was 41yrs old. Almost all were married (96.7%) and close to one in three (28.6%) were house wives. Majority 126 (59.2%) of the house hold income was ≤5000 Ethiopian birr and most are Christian in religion. Demographic and baseline characters are summarized in table 1.

Table 5. 1: Socio-demographic characteristics with the median SDP among mother who gave birth at two teaching hospital, TASH and GMH, in Addis Ababa University, from December 1, 2022 to May 31, 2023 G.C.

Characteristics	TASH	GMH	Number/percentage	p-value
Current addresses of the patient				0.324
Addis Ababa	76	96	172(80.8%)	
Out of Addis Ababa	14	27	41(19.2%)	
Age of the study participants				**0.006**
<20	2	0	2(0.9%)	
20-29	66	89	155(72.8%)	
30-34	17	25	42(19.7%)	
≥35	5	9	14(6.6%)	
Religion of the study participants				0.674
Orthodox	44	64	108(50.7%)	
Muslim	38	42	80(37.6%)	
Protestant	8	17	25(11.7%)	
Marital status				0.604
Married	86	120	206(96.7%)	
Unmarred	4	3	7(3.3%)	
Education status				0.114
unable to read and write	4	2	6(2.8%)	
able to read and write	15	16	31(14.6%)	
elementary school	26	34	60(28.2%)	
high school	30	42	72(33.8%)	
higher education	15	29	44(20.7%)	

Occupation status				**0.000**
Government employee	21	17	38(17.8%)	
House wife	29	32	61(28.6%)	
Unemployed	11	19	30(14.1%)	
Merchant	12	26	38(17.8%)	
daily labourer	16	20	36(16.9%)	
self employed	1	9	10(4.7%)	
Household monthly income				**0.001**
<5000	61	65	126(59.2%)	
5000-10000	21	55	76(35.7%)	
≥10000	8	3	11(5.2%)	

* Chi square test. P value significant at <0.05(**the bold font**)

5.2. Obstetric and medical conditions exist with oligohydramnios

Majority (46.5%) of the study participants were multiparous. almost all (98.9%) had antenatal care. Gestational age ranges from 37^{+1} weeks to 42^{+6}. Most (95.3%) had negative HIV status. The diagnosis of oligohydramnios was made for most (35.7%) between gestational age of 39-40^{+6} weeks and the mean (SD) GA was 40^{+2} ±1 week and 3 days. The median SDP was 1.5cm. Sever oligohydramnios was diagnosed in 6 (2.8%). Three fetuses (1.4%) had congenital anomaly (1 fetus hydronephrosis and 2 fetus moderate hydrocephalus) and two of them had decreased umbilical artery by Doppler Ultrasound suggesting fetal growth restriction.

Forty-four (20.7%) of the women had obstetrics comorbidity. Gestational hypertension and preeclampsia accounts 21(47.7%) and 13(29.5%) respectively. Two in three 146(68.5%) of the study participants were hydrated following the diagnosis of Oligohydramnios via oral intake or IV fluid.

The median SDP for women with daily laborers was 1.4 cm compared to those of government employee (1.6 cm). The median SDP for women whose monthly income of <5000 ETB had 1.5cm compared to monthly income of >10,000 ETB which had a median SDP of 1.8cm. Statically significant difference in SDP was noted for Gestational age and presence comorbidity. Women whose average gestational age were 37-40^{+6} had a median SDP of 1.4cm compared to gestational age of ≥42 wks. (SDP=1.6cm) and the median SDP of women with gestational hypertension and preeclampsia was 1.4cm SDP compared to without maternal comorbid illness with a 1.5cm.

Table 5. 2: The obstetric characteristics with the median SDP and Interquartile range among mother who gave birth at two teaching hospital, TASH and GMH, in Addis Ababa University, from December 1, 2022 to May 31, 2023 G.C.

Characteristics	Number/percentage	Median (Q1, Q3) cm)	IQR (cm)	p-value
Parity				0.742
Nulliparous	17(8%)	1.8(1.3, 1.8)	0.50	
Primparous	95(44.6%)	1.3(1.3, 1.8)	0.50	
Multiparous	99(46.5%)	1.5(1.3, 1.8)	0.50	
Grand multiparous	2(0.9%)		-	
Antenatal care follows up				0.827
Yes	210(98.6%)	1.5(1.3, 1.8)	0.5	
No	3(1.4%)	1.4(1.4, 1.8)	0.4	
Gestational age by the most preferred millstone				**0.029**
$37\text{-}38^{+6}$	40(18.8%)	1.4(1.2, 1.7)	0.5	
$39\text{-}40^{+6}$	76(35.7%)	1.4(1.2, 1.78	0.58	
$41\text{-}41^{+6}$	75(35.2%)	1.7(1.3, 1.8)	0.5	
≥42	21(9.9%)	1..6(1.4(1.8)	0.4	
HIV status				0.196
Positive	10(4.7%)	1.4(1.15, 1.5)	0.35	
Negative	203(95.3%)	1.5(1.3, 1.8)	0.50	
Estimated fetal weight				0.582
<2500	14(6.6%)	1.55(1.4, 1.8)	0.4	
2500-3999	199(93.4%)	1.5(1.3, 1.8)	0.5	
SDP in cm				
<1	6(2.8%)			
≥1	207(97.2%)			
congenital anomaly in US				0.978
Yes	3(1.4%)	1.8(1.4, -)	0	
No	210(98.6%)	1.5(1.3,1.8)	0.5	
Doppler finding				0.331
not done	88(41.3(	1.5(1.3, 1.8)	0.5	
Normal	123(57.7%)	1.5(1.3, 1.8)	0.5	
Abnormal	2(0.9%)	1.8(1.8, 1.8)	0.0	
Abnormal Doppler				
decreased umbilical artery	2(100%)			
maternal comorbidity				**0.047**
Yes	44(20.7%)	1.45(1.2, 1.8)	0.6	
No	169(79.3%)	1.5(1.3, 1.8)	0.6	
The types of comorbid disease				
Preeclampsia	13(29.5%)			
GHTN	21(47.7%)			
Chronic hypertension	9(12.3%)			
Cardiac	1(2.3%)			
Other	1(2.3%)			
maternal hydration				0.408
Yes	146(68.5%)	1.5(1.3, 1.8)	0.5	
No	67(31.5%)	1.5(1.2, 1.8)	0.6	
Types of hydrations				
Iv fluid	7(4.8%)			
oral hydration	139 (94.5%)			

Q1 (first quartile), Q3 (third quartile) , IQR (interquartile range)

* Chi square test. P value significant at <0.05(**the bold font**)

5.3. Labor characteristics Mode of deliveries in women diagnosed with oligohydramnios

28(13%) of the women labor started spontaneously and labor was induced in two-third 138(64.8%) of the participants. Except 7 (5 %) cases, all were primed by folly catheter. Majority (n=124, 58.2 %) of the women delivered by vaginally. Emergency caesarean section was done for 89 (41%) of cases and 86(96.6%) of the anesthesia were spinal anesthesia. The mean duration of waiting from diagnosis of oligohydramnios till delivery were 3 days with rang from 1 to 7 days.

Table 5. 3: Mode of deliveries and labor characteristics in women diagnosed with oligohydramnios at two teaching hospital, TASH and GMH, in Addis Ababa University, from December 1, 2022 to May 31, 2023 G.C.

Variable	Category	TASH	GMH	Frequency	Percent
mode of delivery	vaginal delivery	46	68	114	53.5
	CS	38	51	89	41.8
	Operative vaginal delivery	6	4	10	4.7
onset of labour	no labour	19	28	47	22.1
	Spontaneous	9	19	28	13.1
	Induced	62	76	138	64.8
Induced mechanism of induction	direct induction	5	2	7	5.1
	Priming	57	74	131	94.9
method of direct induction	Oxytocin	5	1	6	85.7
	Misoprostol	0	1	1	14.3
Types of CS	emergency CS	38	49	87	97.8
	elective CS	0	2	2	2.2
Indication of Operative vaginal delivery (n=10)	To shorten SSOL	2	3	5	50
	NRFHRP	3	1	4	40
	poor maternal effort	1	0	1	10
types of anaesthesia for CS delivery (n=89)	Spinal anaesthesia	37	49	86	96.6
	General anaesthesia	1	2	3	3.4

5.4. Laboring characteristics of the study participants

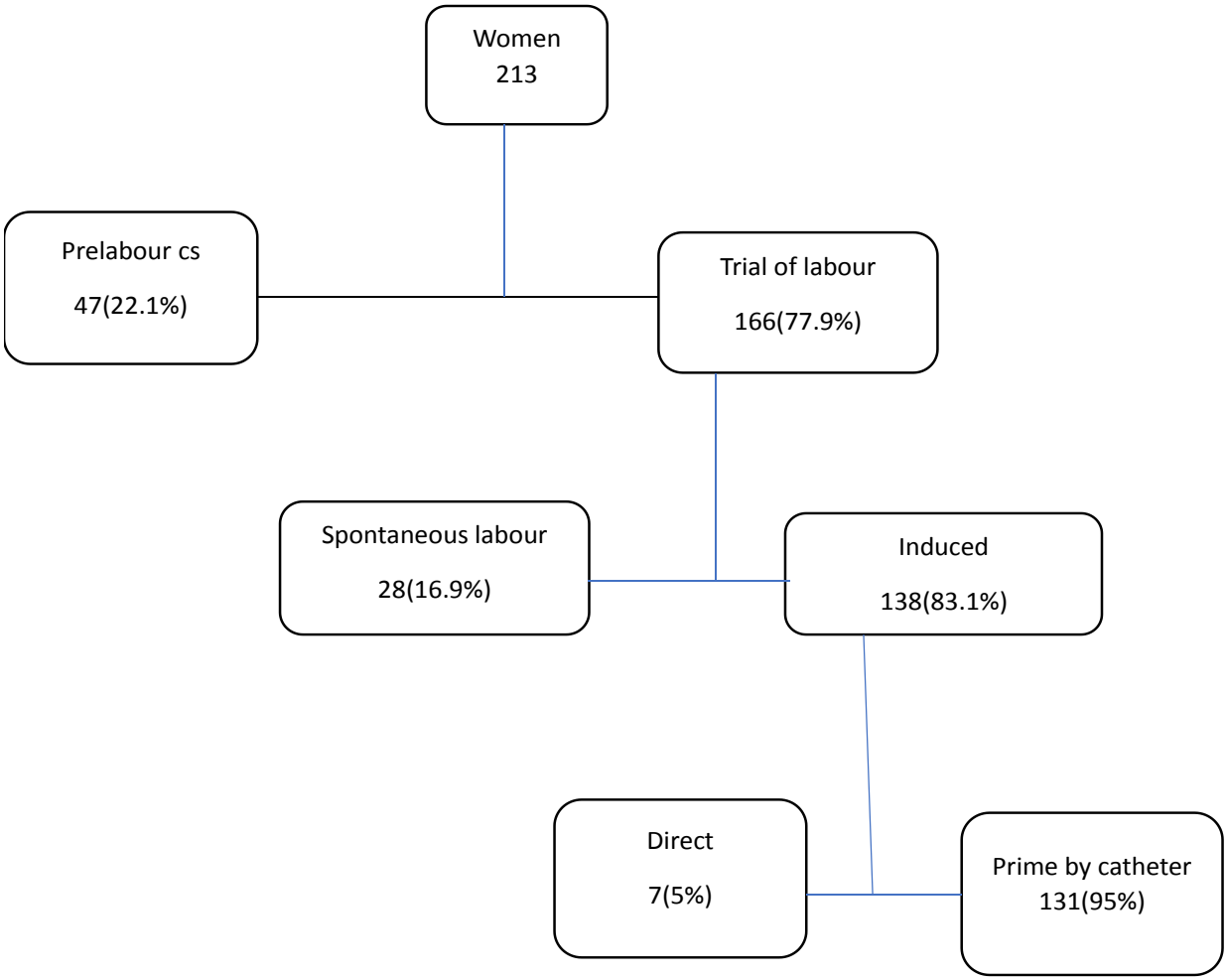

Figure 5. 1: The different mode of deliveries in cohort of 213 women with oligohydramnios (SDP<2cm) in GMH and TASH, Addis Ababa University from December 1, 2022 to May 30 2023 G.C.

5.5. Indication of cesarean delivery

Majority (55%) had Cesarean delivery for fetal distress. Of these 26 (29%) was for Non-reassuring fetal heart rate pattern followed by non-reassuring fetal status (Meconium stained amniotic fluid in early labor) 23(26%). the rest was done for breech, previous CS scar and unfavorable bishop took the other percentages as shown in the figure 2. Below.

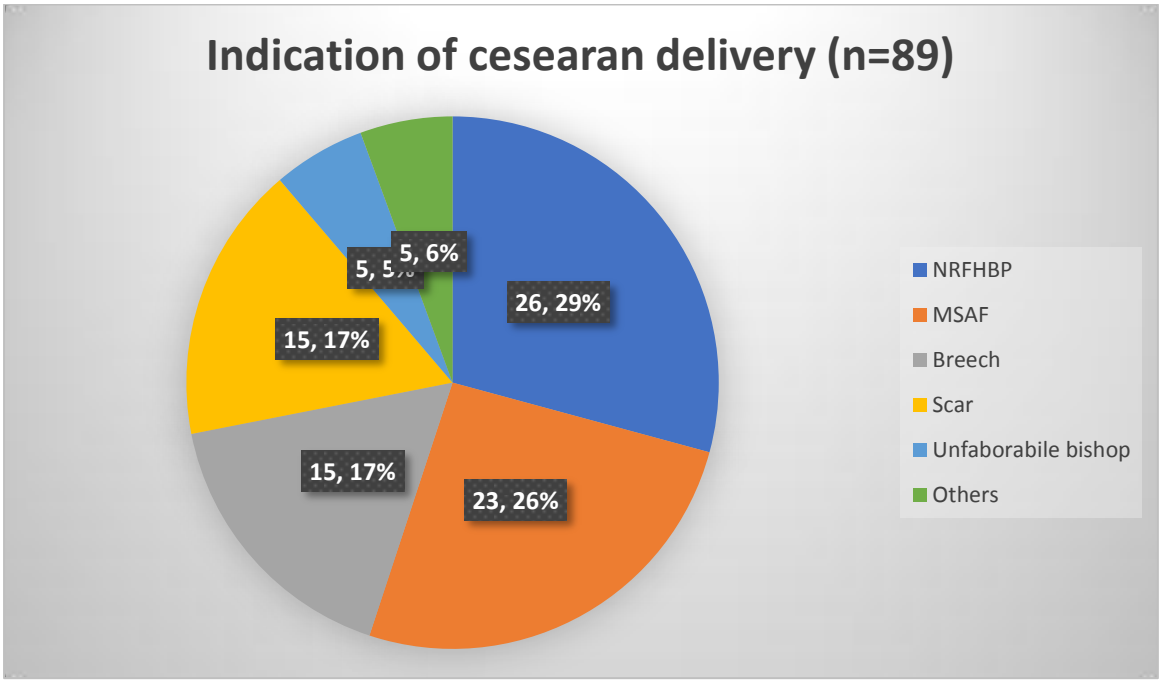

Figure 5. 2: Indication of the cesarean section for women who delivered by CS at two teaching hospital ,TASH and GMH , in Addis Ababa university , from December 1 ,2022 to May 31,2023 G.C.

5.6. Maternal outcome characteristics of women with oligohydramnios

In this study, 7(3.3%) of the participants developed complication and of which, 5 of them had develop Postpartum hemorrhage and the remaining 2 develop puerperal sepsis. The post-partum hemorrhage was after vaginal delivery in 4(57%) of cases .the majority complications 5(71 %) were at GMH.

5.7. The perinatal outcome the study participants characteristics

The Pearson correlation test of the variable having a numerical category shows that, maternal age and parity had a negative significant correlation with SDP. That means its increments were vice versa. On the other hand, first minute Apgar score had a positive significant correlation with SDP. That implies the increment of the SDP had positive influence on the increment of Apgar score.

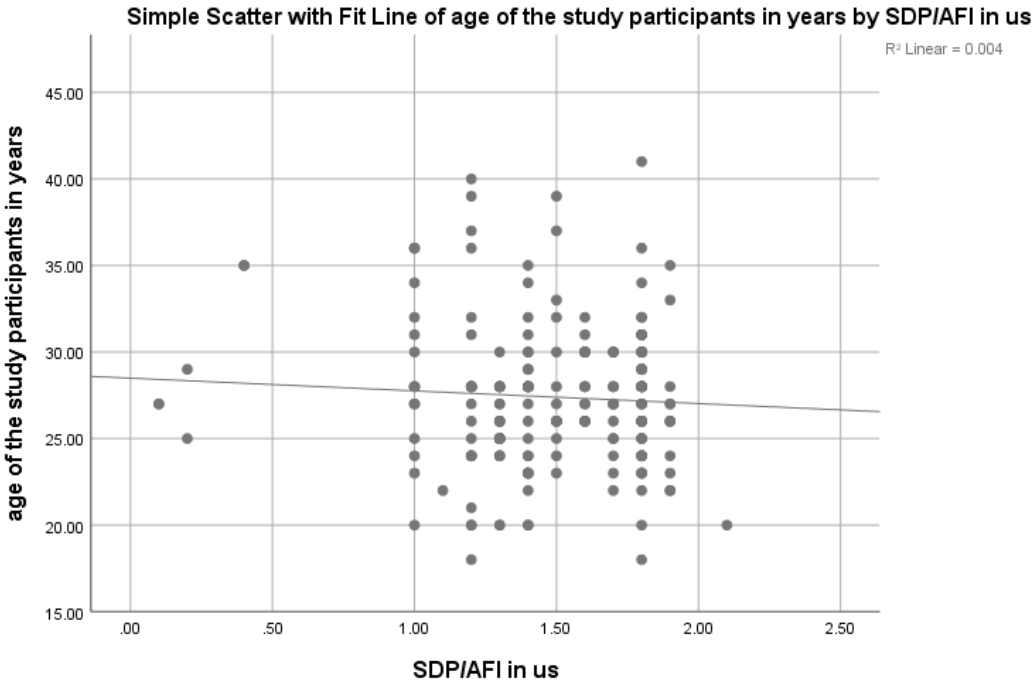

Figure 5. 3: correlation between the SDP and maternal age among women with oligohydramnios at term and beyond managed at the two teaching hospitals from December 1, 2022 to May 31, 2023.

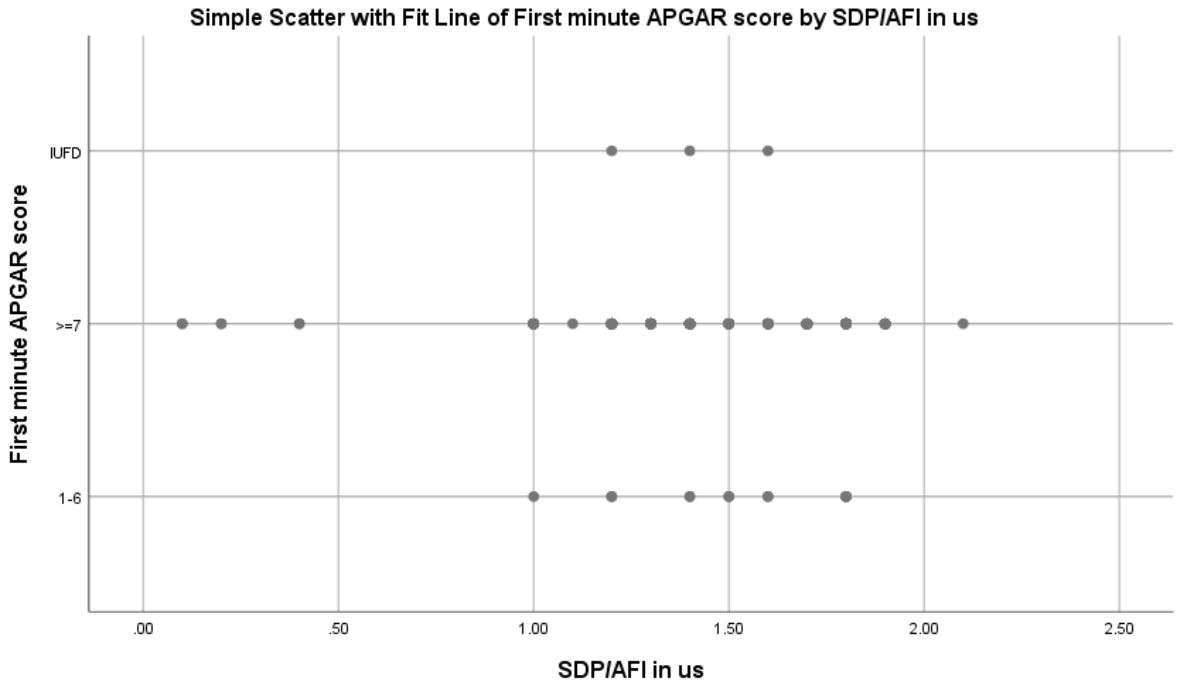

Figure 5. 4: correlation between the SDP and 1st minute Apgar score among women with oligohydramnios at term and beyond managed at the two teaching hospitals in Addis Ababa University from December 1, 2022 to May 31, 2023.

The male to female ratio were almost similar (112 vs 101) and most had 1st and 5th minute Apgar score of ≥7 in 197 (92.5) and 204(95.8%) respectively. NICU referral was made for 53(25%) of the neonates mostly 27(51%) for small for gestational age evaluation. Among the admitted, 23 (10.8%) neonates, 3(1.4%) died in the first three days of life of admission. Overall 203(95.3%) of neonates were in good state of health at the age of 7th day.

Table 5. 4: The perinatal outcome of the study participant characteristics among women with oligohydramnios at term and beyond managed at the two teaching hospitals from December 1, 2022 to May 31, 2023.

Variable	Category		Frequency	Percent
sex of the baby	Male		112	52.6
	Female		101	47.4
Birth weight	<2500		12	5.6
	≥2500		201	95.4
APGAR score at first minute	IUFD		3	1.4
	1-6		13	6.1
	≥7		197	92.5
Fifth minute APGAR score	1-6		6	2.8
	≥7		204	95.8
Neonate NICU referred	Yes		53	24.9
	No		160	75.1
Reason for NICU referral (n=53)	Septic work up		4	7.5
	RDS 2^{ndry} to MAS		18	34
	IUGR evaluation		27	51
	Others		4	7.5
Admission to NICU	Yes		23	43.4
	No		30	56.6
Reason for admission (n=23)	RD 2^{dnry}to MAS		17	73.9
	Sepsis		6	26.1
Neonatal status at the seventh day	Recovered		46	21.5
	Died		3	1.4
	still in care		4	1.9
	In good health		157	73.7
Status of liquor	Clear		128	60.1
	GI		42	19.7
	GII		14	6.6
	GIII		29	13.6

5.8. Magnitude of composed adverse neonatal outcome

The perinatal mortality rate in this study was 28/1000 birth.

Composed adverse perinatal outcome 108(50.5%) of the neonate include , NICU admission 23 (10.8%) , meconium aspiration syndrome 18(8.4%) ,small for gestational age 12(5.6%) ,low 5th minute Apgar score 6(2.8%) , still birth 3(1.4%) ,early neonatal death 3(1.4%) and thick meconium 43(20.2%).

5.9. The Association of mode of delivery and perinatal outcome

The table below shows the association between mode of delivery and perinatal outcomes. Accordingly, cesarean delivery was a significant factor for amniotic fluid status and NICU admission.

Table 5. 5: The association of mode of delivery and perinatal outcome at two teaching hospital, TASH and GMH, in Addis Ababa University, from December 1, 2022 to May 31, 2023 G.C.

Perinatal outcome	vaginal delivery	Cs	Instrumental	X^2
First minute APGAR score				0.149
1-6	6	7	0	
>=7	107	81	9	
IUFD	1	1	1	
Fifth minute APGAR score				0.353
1-6	1	2	0	
>=7	110	85	9	
END	2	1	0	
Liquor status				
Clear	77	46	5	**0.000**
GI	27	12	3	
GII	7	5	2	
GIII	3	**26**	0	
Neonate referred to NICU				0.810
Yes	27	24	2	
No	87	65	8	
Admitted to NICU				**0.013**
Yes	7	**16**	0	
No	19	9	2	
Neonatal status at the seventh day				0.720
Recovered	30	22	2	
Died	2	1	0	
still in care	1	3	0	

5.10. The determinant factor affecting adverse birth outcome by bivariate logistic regression.

The association of adverse birth outcome (ABO) were measured by odd ratio and 95%CI. Accordingly, parity, maternal comorbidity and mode of delivery were associated with composite ABO by bivariate logistic regression as shown the table below.

Table 5. 6: The determinant factor affecting adverse birth outcome by bivariate logistic regression. At two teaching hospital, TASH and GMH, in Addis Ababa university, from December 1, 2022 to May 31, 2023 G.C.

Variable	Composite ABO		p-value	COR with 95%CI
	Yes	no		
Address of the patient				
Addis Ababa	38	134	1	
Out of Addis Ababa	9	32	0.984	0.99(0.44, 2.26)
Age				
<20	1	1	0.699	1.8(0.09, 35.42)
20-29	30	125	0.157	0.43(0.13, 1.38)
30-34	11	31	0.496	0.64(0.18, 2.32)
>=35	5	9	1	
Religion				
Orthodox	24	84	1	
Muslim	17	63	0.873	0.94(0.47, 1.91)
Protestant	6	19	0.848	1.1(0.39, 3.08)
Place of delivery				
TASH	18	72	1	
GMH	29	94	0.534	1.2(0.64, 2.39)
education status				
unable to read and write	2	4	0.664	1.5(0.24, 9.34)
Able to read and write	11	20	0.328	1.6(0.61, 4.50)
elementary school	12	48	0.545	0.75(0.29, 1.90)
high school	11	61	0.199	0.42(0.15, 1.18)
higher education	11	33	1	
Parity				
Nulliparous	8	9	1	
Primiparous	19	76	0.021	**0.28(0.09, 0.83)**
Multiparous	20	79	0.022	**0.29(0.09, 0.83)**
grand multiparous	0	2	0.999	
Maternal comorbidity				
Yes	15	29	0.033	**2.2(1.06, 4.61)**
No	32	137	1	
maternal hydration				
Yes	19	127	1	
No	14	53	0.065	1.2(0.59, 2.32))
onset of labor				
no labor	11	36	1	
Spontaneous	8	220	0.619	1.3(0.45, 3.79)
Induced	28	110	0.051	1.83(0.38, 1.84)
Mode of delivery				
vaginal delivery	13	101	1	
Cs	34	55	0.000	4.**8(2.34, 9.85)**
Instrumental	0	10		

5.11. The multivariate regression of association between composite ABO and independent variable.

The multivariate logistic regression revealed that, participant with obstetrics comorbid disease were 2.9 folds likely to develop ABO than those without (AOR=2.9, 95%CI=1.13, 7.41) and participants having a spontaneous labor had 6.5 folds increase risk of developing composite ABO than those with no labor (AOR=6.5, 95%CI=1.64, 25.95). By the same, participant who delivered by emergency cesarean section were 8.6 folds increase risk of composite ABO than those delivered vaginally (AOR=8.6, 95%CI=1.64, 25.95).

Table 5. 7: The determinant factor affecting adverse birth outcome by multivariate logistic regression at two teaching hospital, TASH and GMH, in Addis Ababa University, from December 1, 2022 to May 31, 2023 G.C.

Variable	Composite ABO		p-value	AOR with 95%CI
	Yes	No		
Parity				
Nulliparous	8	9	1	
Primiparous	19	76	0.217	0.46(0.14, 1.57)
Multiparous	20	79	0.406	0.59 (0.17, 2.04)
grand multiparous	0	2	0.999	
Maternal comorbidity				
Yes	15	29	0.026	**2.9(1.13, 7.41)**
No	32	137	1	
maternal hydration				
Yes	19	127	1	
No	14	53	0.764	0.88(0.37, 2.09)
onset of labor				
no labor	11	36	1	
Spontaneous	8	220	0.008	**6.5(1.64, 25.95)**
Induced	28	110	0.063	2.5(0.95, 6.65)
Mode of delivery				
vaginal delivery	13	101	1	
Cs	34	55	0.000	**8.6(3.48, 21.14)**
Instrumental	0	10		

6. Discussion

6.1. Incidence of oligohydramnios.

The incidence of oligohydramnios in our study (3.8%) is comparable to the earlier studies done in Ethiopia (3.2%) and India (3.1%) (2,6). In contrast , Lower incidences were also reported in a study done in Ethiopia(2.3%) ,in India (1%) and in Zambia(0.2%) (30,31,32) . The difference can be due to diagnostic criteria or study design .on the other hand higher incidences were reported by Biradar et al (14%) Twesigomwe et al (9 %) (15). These finding could be explained by the different study design, population, method of diagnosis of oligohydramnios as well as routine use of ultrasound in all pregnant women . In this study we used measurement of SDP for diagnosis of oligohydramnios while in majority of earlier study AFI was used. Current evidence showed that SDP is more specific for diagnosis of oligohydramnios.

6.2. Socio-demographic and obstetrics factors associated with oligohydramnios

The socio- demographic characteristics of the participants were merely a reflection of the population of Addis Ababa rather than their association with oligohydramnios. From the socio-demographic characteristics age, low socioeconomic status and occupation are associated with oligohydramnios. Similar results were reported in the study done in India(29) .

Most of the women were multiparous , comparable to study done by, Rizvi et al and Biradar et al (62 %) (30,31). In contrast Molla et al , Bhagat et al has reported higher percentage(51.5%) of nulliparous in their studies(32,33). Such dissimilarities could be attributed to the differences in sample size and the criteria of its selection. This increase number of multiparous may be due to high recurrence risk of oligohydramnios as stated by Leyte et al.(34).

The mean gestational age in our subject was 40^{+2} weeks. which was similar to study done by Molla et al and Ghike et al(40 ± 1.64 weeks) (21,32) . This could be due to increase prevalence of oligohydramnios in late gestational age due to uteroplacental insufficiency.

In the present study close to half (45%) of the women had pregnancy beyond 41 weeks. a study done in low income countries shows the prevalence of oligohydramnios is more common in advanced gestational age of women at or beyond 37 weeks of gestational age .

This shows a significant association between post term pregnancy and oligohydramnios. In late gestation, alteration in the expression of aquaporin on amnion, placenta and chorion are thought to be responsible for the reduction in amniotic fluid (29,31).

Gestational hypertension was noted in 44 (20.7 %)of women in our study, close to the report by Molla et al (17 %) and Vidyasagar et al (22%) (2,32).There was significant association between oligohydramnios and maternal obstetrics comorbidity in our study . Higher incidence of PIH among oligohydramnios were reported by Madhavi et al(52.2 %) , Baradar et al(24.4%) and Rizvil et al (24.0%)(30,31,35). But small number of PIH was reported in study done in Ethiopia by Hale et al (6.8%) (6).The sample size, population, study design and method may have accounted for this difference.

We found that most(79.3%) of the women had no cause ascribed to the oligohydramnios similar to Rizvi who found idiopathic oligohydramnios of 65% in his study among women at or beyond 37 weeks of gestation(30). But other studies have reported lower incidences 28%(6)(36). This difference implies that most of oligohydramnios at or beyond term are isolated and most likely reflect physiological decrement in amniotic fluid volume rather than an expression for underlying pathology.

Statically significant difference in SDP was noted in those with advanced Gestational age and obstetrics comorbidity. As it is also supported by Ghike et al that the severity of oligohydramnios is more associated with comorbidities.(21). This association with severity of oligohydramnios could be due to the presence of uteroplacental insufficiency in case of obstetrics comorbidities.

Studies showed that women who received hydration therapy had increased amniotic fluid volume and found to improve perinatal outcome by increasing amniotic fluid volume via fetal diuresis and improving placental perfusion, but our study did not show any significant difference .This may be due to sample size difference , technique and amount of hydration or skill in measurement of amniotic fluid and inadequate hydration (17,37).

The caesarean section rate in our study(41%).was low when Compared to the study done in Ethiopia by Hale et al (70 %) ,Molla et al (59 %) and Tamiru et al (80 .2%) and in India by Madhavi (68.2%).,Rizvi et al,(82 %) (6,20,30,32,35). In contrast to our study a lower c/s rate was reported by Tahimna et al (21.5 %)(38). This can be due to continuous monitoring by

CTG machine resulting in a reduction in unnecessary elective caesarean section and sample size, method and population difference may also contribute for this discrepancy.

We found that the commonest indication for CS were NRFHRP (29 %) followed by the presence of Thick meconium in early labour(26%). Caesarean delivery for NRFHRP was higher that the study done in Ethiopia Hale et al (15 %) but lower than the study done by Molla et al(40%) , Baradar et al(42%) , Gupta et al(56%) Rizvi et al and Bhagat accounting for 40% to 60% of c/s delivery.(6,20,30,32,33,39). This can be explained by the presence of oligohydramnios leads to increase number of fetal distress due to cord compression.

Regarding thick meconium in early labor as an indication for CS in our study its about 26% which is a large figure as compared to a study done in Ethiopia by Molla et al (7.6%) and a study done by Gupta et al (11.1%)(32,39).this could be due lack of protocol, fear of undetected fetal hypoxia, associated obstetrics comorbidity and decision making process dictating Caesarean delivery.

In our study, elective CS done for an indication of oligohydramnios with unfavourable cervix was 5.6% which was much lower than a study done in Ethiopia by Hale et al 22%(6). Few studies like Moses et al who suggested doing CS for anhydramnios(36). But prospective cohort study, Gupta et al and Hina et al have concluded that isolated oligohydramnios should not be an indication for elective caesarean delivery(15,39).our study also suggest the mere presence of oligohydramnios is not an indication for caesarean delivery.

Labor was induced close to half (48%) in this study which is similar with the study done by Molla et al (47.8%),Casey et al (42 %), Madhavi et al (48%)(27,32,35). But the rate of induction was lower than the study done by Rizvi et al (68.2%) and Biradar (82%) (31,34). But higher than the study reported by Hale et al (34 %)(6).This difference could be due to the increase pre labor CS rate in the later studies. We were unable to show any difference in maternal and perinatal adverse outcomes among the different induction methods used and mode of delivery. Individualization care in management of oligohydramnios in each facility and different sample size as well as sample characteristics may contribute for this discrepancy.

6.3. Neonatal out comes

The composed adverse perinatal outcome was found to be 108(50.5%) which include , NICU admission 23 (10.8%) , meconium aspiration syndrome 18(8.4%), small for gestational age 12(5.6%) ,low 5^{th} minute Apgar score 6(2.8%) , still birth 3(1.4%) ,early neonatal death 3(1.4%) and thick meconium 43(20.2%).

When the composite adverse perinatal outcome is compared to a study done in Ethiopia by Molla et al (46%) , it is much higher than reported by Hale et al (38 %) (6,32) . But when we compare the effect of oligohydramnios on perinatal outcome in the present study there were slightly lower rates of neonatal morbidities in terms of low birthweight (5.6% vs 19.8 %), admission to NICU(10.8% Vs 15.5%) and MAS (8.4% VS 19%) when it is compared with Hale et al. Other study done in India by Saxena et al also reported higher rate of IUGR (22%)and NICU admission rate (28%)(6,40). But higher rate of thick meconium (20%) was found in our study as compared with a study done by Hale et al (9.8%)(6). Similar results of NICU admission was reported in a study done in India (31).The possible explanation can be explained by due to high rate of labor in potentially undiagnosed cases of IUGR or the effect of labor on cord compression.

In a study done in India higher NICU admission rate was reported by Madhavi (34%), Baradar et al (40%) and Ghike et al (43.2%)as compared to our finding which is (10.8%)(21,31,35). Most of their admissions were also for MAS like ours. The difference in number could be due to undetected IUGR resulting in a higher delivery of SGA babies. We had high number of adverse perinatal outcome for those delivered by emergency CS, this may be due to number of thick MSAF in early labor being included in the adverse perinatal outcome which is one of the commonest indication for emergency CS and may be due to the aggravating role of labor on causing fetal hypoxia in an already compromised foetuses or the presentation of mothers with oligohydramnios late in labor could have contributed to delivery of compromised babies.

Meconium stained liquor was found in 39 % and 20.2 % of the deliveries had thick meconium which is higher than a study done in our set up by Tamru et al (12.8%) had thick meconium. But higher number observed in other studies done by Madhavi et al , Baradar et al and Ghike et al also reported 36%, 36.3% and 54.1% of meconium stained liquor respectively(21,31,35).

In contrast Molla et al reported lower percentage of meconium-stained liquor (7.6%) (32). This difference can be due to the subjective grading of meconium, study method and population variability among oligohydramnios. Only 6(2.8%) of the neonates had fifth minute Apgar score less than 7.This finding is a bit higher as compared to the study done in Ethiopia by Molla et al (2.2%) and L Hou et al (1.4%)(32,41). But higher proportion were observed in other study done by Nagar et al in which the 5^{th} Apgar score was less than 7 in 12.8% of babies (29).

Compared to study done by Molla et al (46%), we found higher rate of adverse perinatal outcomes in our study (50.5 %)(32).This could be due to increased number of meconium and high number of obstetrics comorbidities in our study. studies done in India and Texas (United States) the rate of adverse outcomes regarding to NICU admission was higher than our finding (28.5%)(40). This difference can be explained by due to set up difference and increased continuous monitoring during intrapartum care in the current study.

Women with non-isolated oligohydramnios had 3 times higher rate neonatal composite adverse outcome compared to those with isolated oligohydramnios. Maternal comorbidity and spontaneous onset of labor are associated with adverse perinatal outcome .This is similar with a study done in Ethiopia by Molla et al, Hale et al and study done in India by Saxena R et al(6,32,40). This can be due to the presence of maternal comorbidity increasing the risk of intrapartum fetal asphyxia due to the risk of uteroplacental insufficiency and those with spontaneous onset of labor may present late after onset of labor. Maternal socio-demographic factors had no statically significant association with perinatal morbidity and mortality.

7. Strengths and Limitations of the study

We used two big teaching hospitals for this study, we were able to include a large number of women with oligohydramnios, making the study among the largest and powerful to detect clinically significant maternal and fetal outcomes.

The prospective nature of the study made it possible to assess the association between the different maternal and baseline characteristics with severity of oligohydramnios.

The study included only pregnancies women at or beyond 37 weeks and the findings in this study do not represent for preterm pregnancies and those with oligohydramnios due to PROM. The study was not powered to detect pregnancy outcomes of different induction methods used. These could be taken as a future research areas in the set ups.

8. Conclusions

We have observed oligohydramnios was a frequent occurrence in the two teaching hospitals studied. Adverse neonatal outcomes were observed significantly in women with oligohydramnios who had other obstetric conditions and obstetric comorbidities.

Non reassuring Fetal heart rate pattern and non-reassuring fetal status mainly due to thick meconium stained amniotic fluid in early labor are the commonest indications for Emergency CS delivery.

Oligohydramnios at or beyond term pregnancy is associated with adverse perinatal outcomes. Emergency Caesarean deliveries and spontaneous onset of labor show higher rate of composite adverse perinatal outcome than vaginal delivery.

9. Recommendations

Strict surveillance need to be instituted to identify oligohydramnios mothers with obstetric comorbidities.

Women with oligohydramnios need close intrapartum monitoring to decrease the risk of perinatal asphyxia and meconium aspiration syndrome.

Strategies to decrease the CS rate by individualizing CS indication for thick meconium need to be looked into.

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11. Annexes

Questionnaire

Questioner prepared for research on assessment Pregnancy Outcomes and associated factor among Women with Oligohydramnios at or beyond Term in the two Teaching Hospitals in Addis Ababa, Ethiopia.

Informed Consent:

Dear Sir/Madam;

Hello, my name is _____.I am working as a data collector for the study being conducted in this hospital by Dr. Simegnew Tilahun who is studying for specialty of Obstetrics and Gynaecology at Addis Ababa University, College of Health Sciences. I kindly request you to give me your attention to explain about the study and about you being selected as the study participant.

The Study Title: Pregnancy Outcomes and associated factor among Women with Oligohydramnios at or beyond Term in the two Teaching Hospitals in Addis Ababa, Ethiopia; 2023 GC.

Importance and Purpose of the Study: The findings of this study will have a paramount importance for knowing perinatal out come and associated factor of oligohydramnios. Moreover, the aim of this study is to write a research paper as a partial requirement for the fulfilment of a specialty program of obstetrics and gynaecology for the principal investigator.

Procedure and Duration: I will be interviewing you using questionnaire, there are questions to answer. I will not take more than 20 minutes of your time.

Confidentiality: The data you will provide us will be confidential. There will be no information that will identify you. The findings of the study will be general for the study population and will not reflect anything particular of individual person. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Name of Enumerator _____ Signature _____ Interview Date _____

Questionnaire Code_____

Name of the supervisor _____Signature _____ Checking Date _____

Socio-demographic characteristic

Part –I: Sociodemographic characteristics of respondents			
S.N	**Questioner**	**Response**	
1	Address	1. Addis Ababa 2. Oromia 3. Others	
2	Age	1. ----------years	
3	Religion	1. Orthodox	
		2. Muslim	
		3. Protestant	
		4. Catholic	
		5. Other(specify)	
4	Delivery hospital	1, Tikur Anbessa hospital	
		2, Ghandi memorial hospital	
5	Marital status	1.married	
		2.single	
		3,divorced	
		4,widowed	
		5,unmarried partner	
6	Educational status	1.unable to read and write	
		2.able to read and write with out formal education	
		3,elementary school	
		3.high school	
		4.higher education	
7	Occupation	1.Goverment Employed	
		2.private employed	
		3,house wife	
		4,merchant	
		5,daily laborer	
		6,others(specify)	
8	Gross Income monthly	.... Ethiopian birr	
9	Parity	-------	
10	G/A	----------weeks	
11	HIV serostatus	Positive	
		Negative	
12	Doppler finding	1, not done	
		2, normal	
		3, abnormal-(specify)	
13	Maternal comorbidity	1.YES if yes go to Q 14 2,NO	
14	Type of comorbidity	1,preeclampsia 2,gestasional HTN	

		3,chronic hypertension 4,diabetis 5,others (specify)	
15	Maternal hydration	1, YES	
		2,NO	
16	If yes ,type of hydration	1,IV fluid 2,oral hydration	
17	Mode of delivery	1, spontaneous vaginal	
		2,C/S	
		3,operative vaginal	
		4,vaginal breech	
		5,induced vaginal	
18	If induced mode of priming	1,direct inductions	
		2,prostaglandins	
		3, trans cervical folly catheter	
19	If C/S	1,emergency	
		2, elective	
20	Indication for C/S	1,NRFHR pattern 2,meconium stained liquor 3,Oligohydramnios with unfavourable Bishop 4, oligohydramnios with IUGR 5,oligohydraminos with C/S scar 6,other	
21	If OVD ,indication	1,NRFHRP 2,prolonged SSOL 3,maternal comorbidity 4,others	
22	Type of anaesthesia used	1,spinal anaesthesia 2,general anaesthesia	
23	Time between diagnosis and delivery	------in days	
24	Birth weight	---------in grams	
25	SEX	1,male 2,female	
26	1st APGAR score	1, <7	
		2,>=7	
		3,0	
27	5th APGAR score	1,<7	

		2,>=7	
28	Liquor status	1,Clear	
		2, GI	
		3,GII	
		4,GIII	
		5,other(specify)	
29	Referral to NICU	1, YES	
		2,NO	
30	If yes reason for referral and diagnosis	1, Asphyxia 2, RD 2nd to MAS 3, HMD 4, Sepsis 5, Congenital anomalies 6, others	
31	Admission to NICU	1,YES 2,NO	
32	If yes diagnosis at admission	1, Asphyxia 2, RD 2nd to MAS 3, HMD 4, Sepsis 5, Congenital anomalies 6, others	
33	Neonatal status at 7th day	1,recovered 2,died 3,still in care 4,other	
34	ANC visit	1,yes 2,no	
35	Identifed maternal complication	1,yes 2,no	
36	If yes	1, PPH, 2, puerperal sepsis, 3,anaemia / Hct at recruitment and discharge/ blood transfusion, 4, ICU care 5,surgical site infection	
37	Length of stay	---in days	