

COMPARISON OF FETOMATERNAL OUTCOMES IN PREGNANT WOMEN WITH AND WITHOUT POLYHYDRAMNIOS

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Abstract

Background: Polyhydramnios is an excessive accumulation of amniotic fluid and is associated with maternal and fetal complications. Ultrasound evaluation, particularly the amniotic fluid index (AFI) measured by the four-pocket method, is central to the diagnosis and clinical assessment of this condition.

Objective: To compare fetomaternal outcomes in pregnancies with adequate amniotic fluid and in pregnancies complicated by polyhydramnios.

Methods: A comparative study was carried out at Syed Medical Centre, Bahawalpur, over nine months. The thesis results tables contained 218 singleton pregnancies, comprising 109 pregnancies with adequate amniotic fluid and 109 pregnancies with polyhydramnios. Ultrasound was performed using a Toshiba Aplio 300 machine with a 3.5-MHz convex transducer. Maternal age, gestational age by last menstrual period (GA LMP), gestational age by ultrasonography (GA USG), fetal biometry, birth weight, AFI, and recorded fetal and maternal outcomes were analyzed. Descriptive statistics and independent-samples t-tests were used in SPSS version 25.

Results: The mean GA USG was significantly higher in the polyhydramnios group than in the adequate-fluid group (30.20 ± 3.45 vs 28.06 ± 3.59 weeks; $p < 0.001$). Mean AFI was also significantly higher in the polyhydramnios group (27.86 ± 1.69 vs 18.30 ± 3.76 cm; $p < 0.001$). Maternal age, GA LMP, BPD, AC, HC, FL, and birth weight were not significantly different between groups. Abnormal fetal position (32 vs 21), cord prolapse (14 vs 3), maternal dyspnea (20 vs 11), placental abruption (4 vs 1), PPRM (8 vs 0), and preterm labor (10 vs 5) were more frequent in the polyhydramnios group. Low birth weight occurred only in the adequate-fluid group, whereas both macrosomia cases occurred in the polyhydramnios group.

Conclusion: Polyhydramnios was associated with significantly increased AFI and higher ultrasound-estimated gestational age, together with a greater descriptive burden of several adverse fetal and maternal outcomes. Careful

ultrasound-based assessment of AFI and associated pregnancy findings remains important for surveillance and risk stratification in such pregnancies.

INTRODUCTION

Amniotic fluid is an essential component of normal pregnancy. It cushions the fetus, permits fetal movement, contributes to musculoskeletal development, helps maintain a stable intrauterine temperature, and plays an important role in pulmonary development. Abnormalities in amniotic fluid volume may therefore reflect underlying disturbances in maternal, placental, or fetal status. Among these abnormalities, polyhydramnios represents an excessive accumulation of amniotic fluid and remains an important obstetric problem because of its association with maternal discomfort, preterm labor, fetal malpresentation, and a range of perinatal complications [1,5]. The thesis describes polyhydramnios as occurring in approximately 1% to 3% of pregnancies, while 50% to 60% of cases may be idiopathic. Even when no structural or metabolic cause is identified, the presence of increased amniotic fluid volume often prompts closer surveillance because it may be associated with adverse pregnancy outcomes. The burden of polyhydramnios is not limited to the fetus. Maternal problems including dyspnea, uterine overdistension, premature rupture of membranes, placental abruption, and an increased likelihood of operative intervention can also occur [1,7,12]. Ultrasonography is the principal imaging modality for the assessment of amniotic fluid volume. The four-quadrant amniotic fluid index (AFI), introduced by Phelan and colleagues, is among the most widely used sonographic methods for this purpose [2]. In routine practice, ultrasound also provides information beyond amniotic fluid measurement, including gestational age, fetal growth, fetal presentation, placental position, and other associated findings. Because ultrasound can evaluate both the fluid abnormality and the pregnancy context in which it occurs, it is the first-line modality in the diagnosis and monitoring of polyhydramnios [2-4]. The thesis literature review summarizes a number of mechanisms and associations related to polyhydramnios. Reported etiologies include fetal structural anomalies, maternal diabetes,

multiple gestation, infections, and idiopathic causes. Increased amniotic fluid may also reflect altered fetal swallowing or increased fetal urine output. In diabetic pregnancies, fetal hyperglycemia can result in osmotic diuresis and thereby contribute to fluid excess. From a clinical perspective, distinguishing the presence of polyhydramnios is important because it may act as a marker of underlying maternal-fetal pathology and because its severity may influence obstetric management [8-10]. Several studies cited in the thesis have linked abnormal liquor volume to adverse fetomaternal outcomes, yet the magnitude and pattern of these associations vary across settings and populations. Some investigators have reported strong associations with fetal malpresentation, cord prolapse, preterm birth, postpartum or intrapartum complications, and adverse neonatal outcomes, whereas others have emphasized that the risk profile differs according to severity and etiology [6,7,9-11]. This variation highlights the continued need to evaluate local data rather than relying exclusively on external populations. In the local diagnostic-ultrasound setting, evidence describing the comparative profile of pregnancies with adequate amniotic fluid and pregnancies complicated by polyhydramnios remains limited. A focused comparison of fetal biometric measurements, gestational age estimation, AFI, and documented pregnancy outcomes can therefore provide a clearer picture of the clinical significance of polyhydramnios in the study population. Such information may support earlier recognition of high-risk pregnancies and closer ultrasound-based follow-up where necessary. The objective of the present manuscript, prepared strictly from the supplied thesis, is to compare fetomaternal outcomes in pregnant women with adequate amniotic fluid and those with polyhydramnios, using the ultrasound-derived and outcome data already reported in the thesis tables and figures.

MATERIALS AND METHODS

Study design, setting, and duration

This was a comparative study conducted at Syed Medical Centre, Bahawalpur, over a period of nine months. The work was performed within the discipline of diagnostic ultrasound and focused on the comparison of pregnancies with adequate amniotic fluid and pregnancies with polyhydramnios.

Population and sample

The comparative tables contain 218 singleton pregnancies. For the comparative analysis, 109 pregnancies were placed in the adequate-amniotic-fluid group and 109 pregnancies in the polyhydramnios group. The study population consisted of pregnant women who underwent obstetric ultrasound examination at the study centre during the stated period.

Ultrasound protocol

Ultrasound examinations were performed using a Toshiba Aplio 300 machine equipped with a 3.5-MHz convex transducer. The thesis indicates that the scan protocol included documentation of fetal presentation and position, fetal heart rate, number of fetuses, placental location, amniotic fluid index by the four-pocket method, and routine fetal biometry. BPD, AC, HC, and FL were measured according to obstetric sonographic practice, and gestational age was determined by both last menstrual period and ultrasonography.

Variables and outcomes

The analyzed variables included maternal age, gestational age by last menstrual period (GA LMP), gestational age by ultrasound (GA USG), BPD, AC, HC, FL, estimated birth weight as recorded in the thesis tables, and AFI. Recorded fetal and maternal outcomes included abnormal

fetal position, cord prolapse, low birth weight, macrosomia, maternal diabetes, maternal dyspnea, placental abruption, preterm premature rupture of membranes (PPROM), preterm labor, and normal outcome.

Statistical analysis

Data entry and analysis were reported having been performed in SPSS version 25. Continuous variables were summarized using mean and standard deviation. Independent-samples *t*-tests were applied for comparison between the adequate-fluid and polyhydramnios groups. Categorical variables were summarized using frequencies and percentages. This manuscript reproduces the numerical results already presented in the thesis tables and does not introduce new calculations beyond graphing and formatting of the same reported data.

Ethical considerations

The states that institutional ethical rules and regulations were followed. Written informed consent was obtained from participants, privacy and confidentiality were maintained, and no participant was compelled to take part in the study.

RESULTS

The results tables contained 218 pregnancies, equally divided between adequate amniotic fluid and polyhydramnios groups (109 cases each). The overall mean maternal age across groups was in the early thirties. Descriptive assessment showed that polyhydramnios pregnancies had higher ultrasound-estimated gestational age and markedly higher AFI values, while most fetal biometric parameters remained similar between groups.

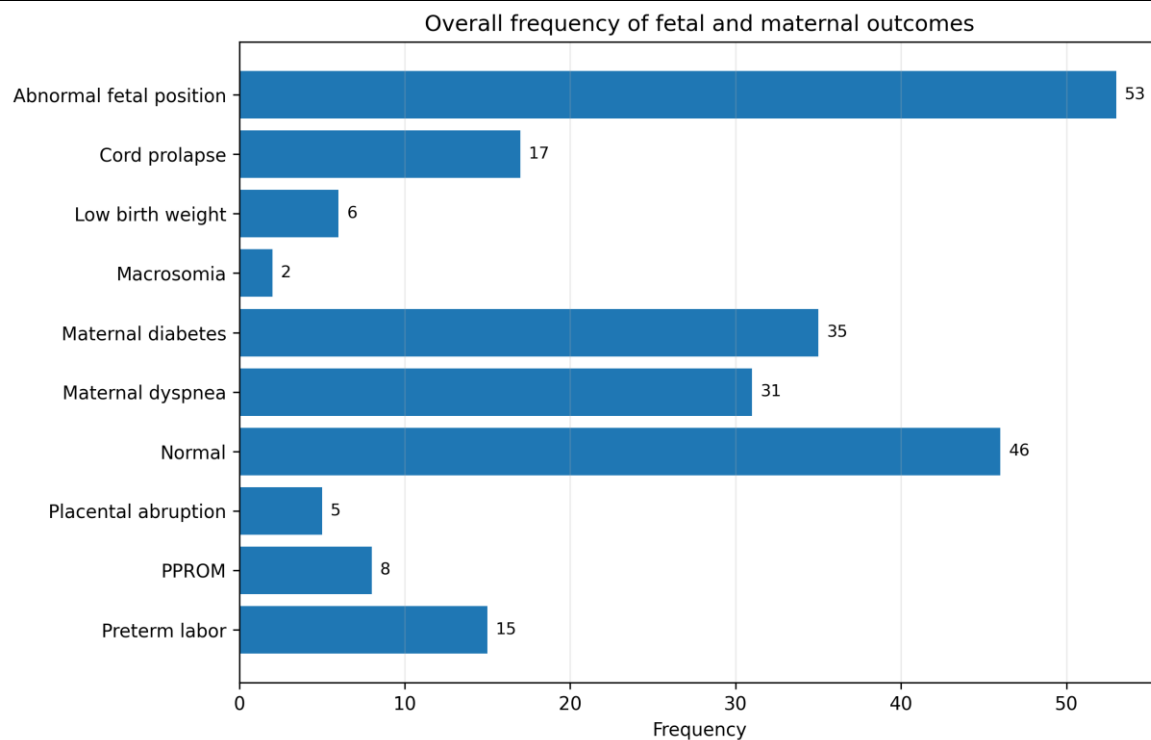


Figure 1. Overall frequency of fetal and maternal outcomes

This simple bar graph is based on Table 2 of the thesis and shows the overall frequency of recorded fetal and maternal outcomes in all 218 pregnancies. Abnormal fetal position, maternal diabetes, and maternal dyspnea were among the most frequently recorded findings.

When all pregnancies were considered together, abnormal fetal position was the most common recorded outcome (53 cases, 24.3%), followed by

normal outcome (46 cases, 21.1%), maternal diabetes (35 cases, 16.1%), and maternal dyspnea (31 cases, 14.2%). Cord prolapse, preterm labor, PPROM, placental abruption, low birth weight, and macrosomia were less frequent. These findings reflect the distribution already tabulated in the thesis and provide context for the between-group comparisons that follow.

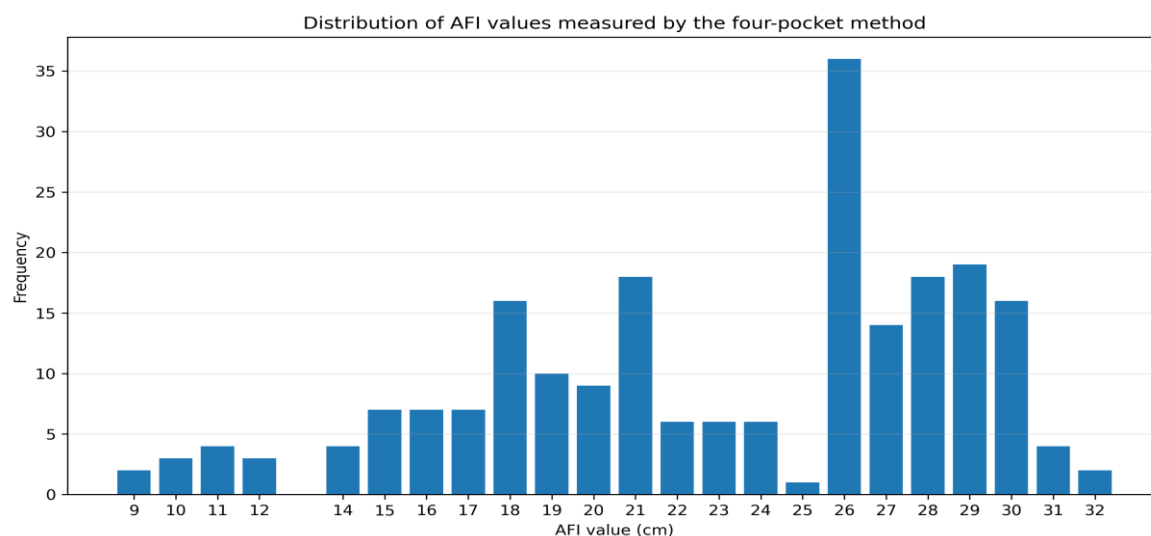


Figure 2. Distribution of AFI values

This graph is derived from Table 3 of the demonstrates the frequency distribution of AFI values measured by the four-pocket method across the full dataset. The highest concentration of values occurred around 26 to 30 cm, with AFI 26 cm representing the single most frequent measurement.

The AFI values ranged from 9 to 32 cm in the dataset presented. The most frequent individual

AFI measurement was 26 cm (36 cases, 16.5%). Values of 21 cm and 28 cm were also common, while very low frequencies were seen at the extreme lower and upper ends of the distribution. This distribution visually supports the presence of a substantial number of pregnancies with elevated amniotic fluid volume in the study sample.

Table 1. Comparison of maternal and ultrasound parameters by amniotic-fluid group

Variable	Adequate fluidMean $\pm$ SD	PolyhydramniosMean $\pm$ SD	p-value
Age (years)	33.02 $\pm$ 4.710	33.97 $\pm$ 5.768	0.182
GA LMP (weeks)	28.59 $\pm$ 3.416	29.24 $\pm$ 3.548	0.169
GA USG (weeks)	28.06 $\pm$ 3.591	30.20 $\pm$ 3.453	<0.001
BPD (mm)	73.55 $\pm$ 7.879	73.35 $\pm$ 7.827	0.850
AC (mm)	252.18 $\pm$ 21.712	252.56 $\pm$ 22.285	0.900
HC (mm)	275.52 $\pm$ 18.146	276.72 $\pm$ 17.722	0.621
FL (mm)	61.00 $\pm$ 7.678	60.87 $\pm$ 7.785	0.903
Birth weight (kg)	2.21 $\pm$ 0.620	2.20 $\pm$ 0.654	0.907
AFI, four-pocket (cm)	18.30 $\pm$ 3.763	27.86 $\pm$ 1.686	<0.001

Abbreviations: GA LMP, gestational age by last menstrual period; GA USG, gestational age by ultrasonography; BPD, biparietal diameter; AC,

abdominal circumference; HC, head circumference; FL, femur length; AFI, amniotic fluid index.

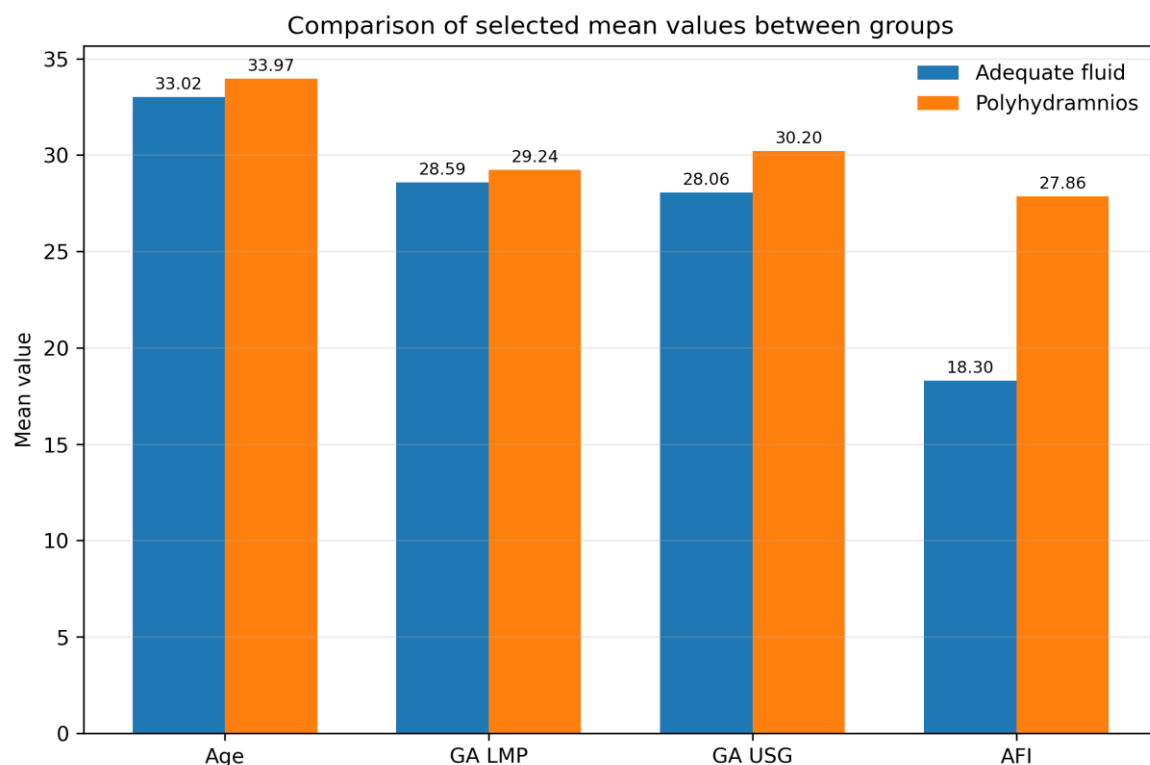


Figure 3. Comparison of selected mean values between groups

This grouped bar chart illustrates selected mean values from Table 1. Age and GA LMP were broadly similar between groups, whereas the polyhydramnios group showed visibly higher mean GA USG and AFI values.

Table 1 shows that maternal age did not differ significantly between groups (33.02 ± 4.710 years in the adequate-fluid group versus 33.97 ± 5.768 years in the polyhydramnios group; $p = 0.182$). Similarly, GA LMP, BPD, AC, HC, FL, and birth weight showed no statistically significant differences. In contrast, GA USG was significantly higher in the polyhydramnios group (30.20 ± 3.453 weeks) than in the adequate-fluid group (28.06 ± 3.591 weeks), corresponding to a reported mean difference of 2.138 weeks ($p <$

0.001). AFI also differed markedly, with means of 27.86 ± 1.686 cm in the polyhydramnios group and 18.30 ± 3.763 cm in the adequate-fluid group ($p < 0.001$).

These findings indicate that the principal quantitative distinction between the two groups lay in the amount of amniotic fluid and the ultrasound-estimated gestational age, rather than in broad differences in fetal biometric measurements. In practical terms, this suggests that pregnancies complicated by polyhydramnios in the thesis dataset were more clearly differentiated by their fluid status and related clinical outcome profile than by substantial differences in routine biometric size measurements alone.

Table 2. Fetomaternal outcomes by amniotic-fluid group

Outcome	Adequate fluidn (%)	Polyhydramniosn (%)	Total n
Abnormal fetal position	21 (19.3)	32 (29.4)	53
Cord prolapse	3 (2.8)	14 (12.8)	17
Low birth weight	6 (5.5)	0 (0.0)	6
Macrosomia	0 (0.0)	2 (1.8)	2
Maternal diabetes	16 (14.7)	19 (17.4)	35
Maternal dyspnea	11 (10.1)	20 (18.3)	31
Normal outcome	46 (42.2)	0 (0.0)	46
Placental abruption	1 (0.9)	4 (3.7)	5
PPROM	0 (0.0)	8 (7.3)	8
Preterm labor	5 (4.6)	10 (9.2)	15

Percentages are calculated within each group ($n = 109$ per group). The thesis tables provide descriptive frequencies for these categorical

outcomes but do not report inferential p-values for the category-wise comparisons.

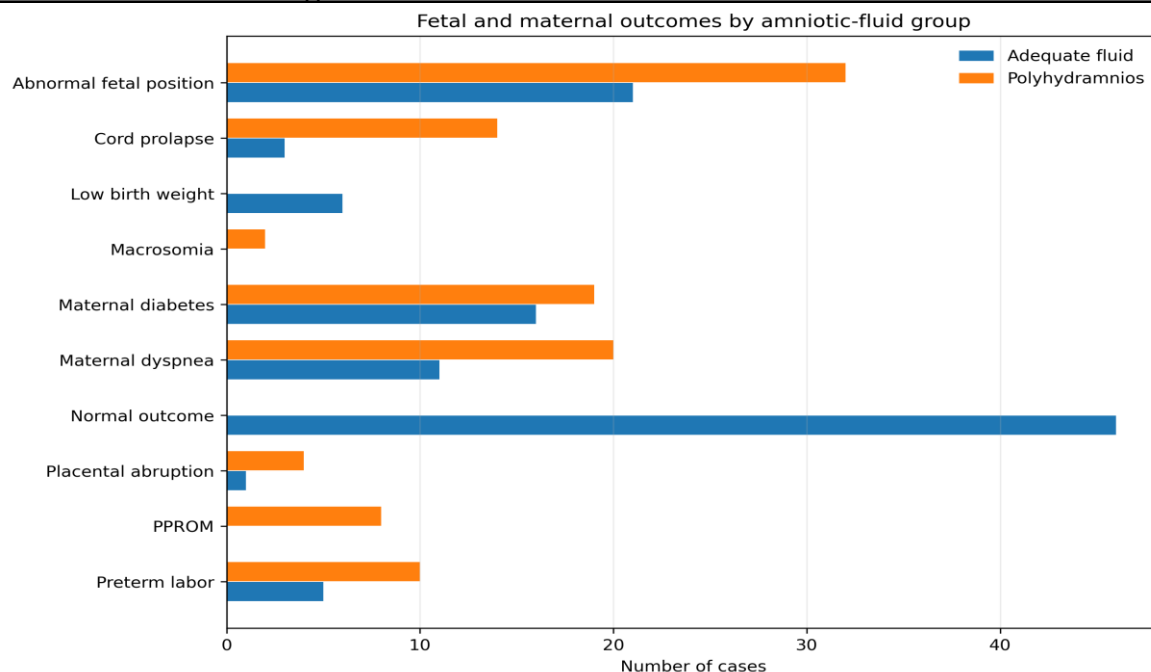


Figure 4. Fetal and maternal outcomes by group

This grouped bar graph visualizes the outcome distribution reported in Table 2. Several adverse findings, including abnormal fetal position, cord prolapse, maternal dyspnea, PPROM, and preterm labor, were more frequent in the polyhydramnios group.

The descriptive comparison of categorical outcomes showed a higher burden of multiple adverse findings in the polyhydramnios group. Abnormal fetal position was recorded in 32 polyhydramnios pregnancies compared with 21 adequate-fluid pregnancies. Cord prolapse was observed in 14 versus 3 cases, maternal dyspnea in 20 versus 11 cases, placental abruption in 4 versus 1 case, PPROM in 8 versus 0 cases, and preterm labor in 10 versus 5 cases. Maternal diabetes was also more frequent in the polyhydramnios group (19 versus 16 cases), although the difference was smaller than for some other outcomes.

A few outcomes showed an opposite or distinct pattern. All six low-birth-weight cases were found in the adequate-fluid group, while both cases of

macrosomia occurred in the polyhydramnios group. Normal outcome was reported in 46 pregnancies within the adequate-fluid group and in none of the pregnancies categorized as polyhydramnios. Although the thesis did not provide individual p-values for the categorical comparisons, the descriptive pattern strongly suggests that polyhydramnios was associated with a greater overall complication burden in this dataset.

Representative Ultrasound Images

Representative ultrasound images of patients with polyhydramnios are presented to demonstrate the sonographic appearance of increased amniotic fluid volume and its associated clinical findings. These images provide visual correlation with the observed maternal and fetal outcomes, including abnormal fetal presentation, maternal diabetes, preterm premature rupture of membranes (PPROM), and fetal macrosomia.



Figure 5. Separate ultrasound image: abnormal fetal position

The corresponding case was described as a 37-year-old woman with polyhydramnios, AFI 30 cm, GA by LMP 30 weeks, GA by ultrasound 31

weeks, BPD 75 mm, AC 260 mm, HC 280 mm, FL 62 mm, and abnormal fetal position.

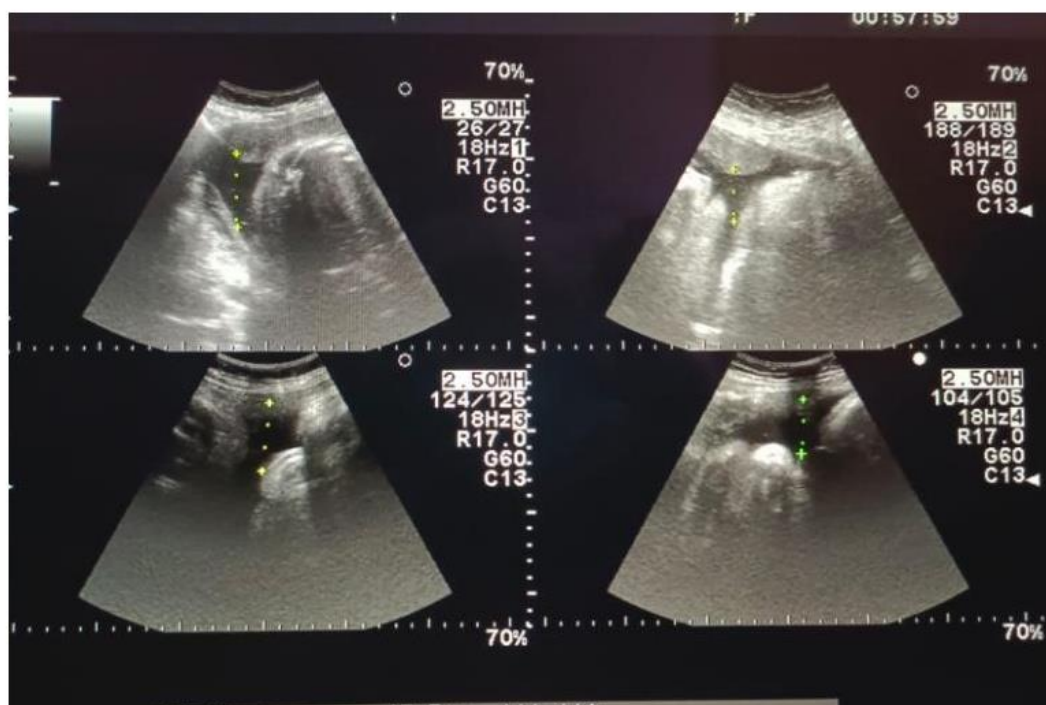


Figure 6. Separate ultrasound image: maternal diabetes

The corresponding case was described as a 33-year-old woman with polyhydramnios, AFI 26 cm, GA by LMP 32 weeks, GA by ultrasound 33

weeks, BPD 73 mm, AC 270 mm, HC 290 mm, FL 62 mm, with maternal diabetes.



Figure 7. Separate ultrasound image: PPROM

The corresponding case was described as a 25-year-old woman with polyhydramnios, AFI 29 cm, GA by LMP 34 weeks, GA by ultrasound 35

weeks, BPD 81 mm, AC 251 mm, HC 299 mm, FL 72 mm, with PPROM.

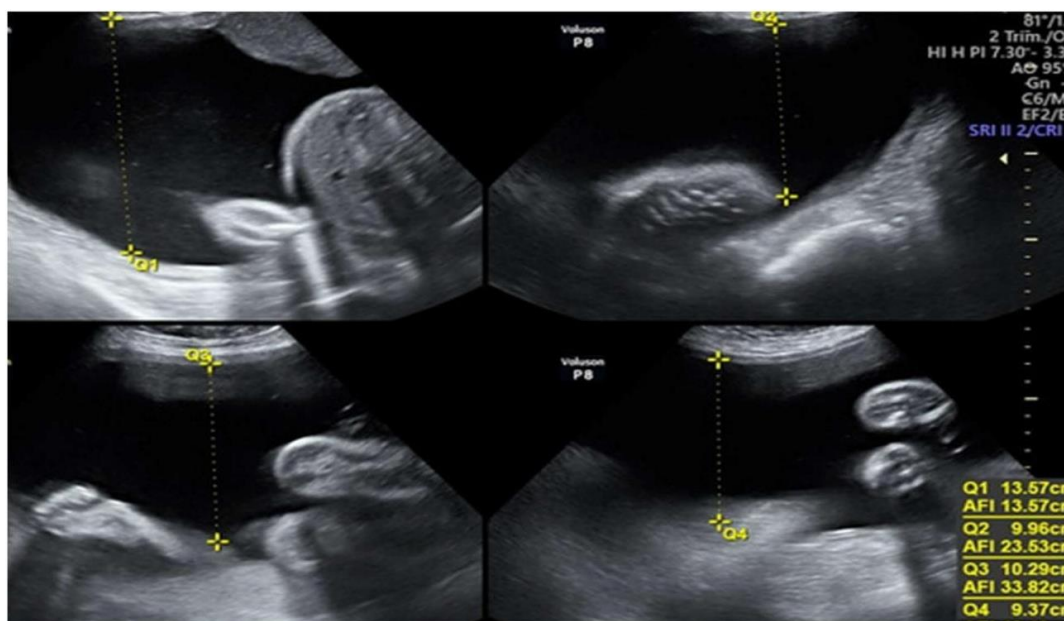


Figure 8. Separate ultrasound image: macrosomia

The corresponding case was described as a 45-year-old woman with polyhydramnios, AFI 43

cm, GA by LMP 29 weeks, GA by ultrasound 32 weeks, BPD 80 mm, AC 271 mm, HC 268 mm, FL 64 mm, and fetal macrosomia.

DISCUSSION

The present manuscript demonstrates that pregnancies complicated by polyhydramnios had a distinctly different profile from pregnancies with adequate amniotic fluid. The most prominent quantitative differences were a significantly higher AFI and a higher mean gestational age by ultrasound in the polyhydramnios group. At the same time, most standard biometric parameters such as BPD, AC, HC, FL, and birth weight remained statistically comparable between groups. This suggests that, within the present dataset, polyhydramnios was characterized more by its fluid abnormality and its associated complications than by major changes in routine fetal size measurements. The absence of statistically significant differences in most biometric measurements may reflect the fact that excess amniotic fluid does not necessarily imply generalized overgrowth or growth restriction in all pregnancies. Instead, polyhydramnios may accompany pregnancies with otherwise average biometric profiles, especially when the underlying cause is not a major fetal anomaly or when it reflects maternal and placental influences rather than a primary disturbance in fetal growth. This interpretation aligns with the thesis narrative, which emphasized that amniotic fluid abnormalities may exist even when several biometric parameters remain within comparable ranges between groups. A key finding of this analysis is the higher mean GA USG in the polyhydramnios group. The thesis literature also emphasizes the importance of gestational age and serial ultrasound assessment when evaluating pregnancies complicated by abnormal amniotic fluid volume [13,14]. The thesis author interpreted this as indicating that polyhydramnios may be more frequently observed in later gestational stages. This is clinically plausible because the condition often becomes more apparent as pregnancy advances and the cumulative effects of altered fetal urine production, maternal metabolic factors, or fetal swallowing disturbances become sonographically evident. The significant

difference in AFI between groups is expected because AFI was part of the defining distinction between the groups; nevertheless, its magnitude emphasizes the clear separation between adequate-fluid and polyhydramnios pregnancies in the study population. The descriptive outcome pattern further strengthens the clinical importance of polyhydramnios in the thesis dataset. Similar associations between polyhydramnios and adverse obstetric or perinatal outcomes have been reported in the studies summarized in the thesis [13-16,23,24]. Abnormal fetal position was substantially more frequent among polyhydramnios pregnancies. This observation is consistent with the general obstetric principle that excess amniotic fluid allows greater fetal mobility, which may predispose to unstable lie, breech presentation, or other non-cephalic positions. The thesis discussion similarly linked this finding to the increased space and buoyancy provided by excess amniotic fluid. Because abnormal presentation can complicate labor and increase the chance of operative delivery or cord prolapse, this finding is clinically meaningful. Cord prolapse also occurred much more often in the polyhydramnios group. The relationship between fetal presentation, membrane rupture, and cord prolapse is also discussed in studies cited in the thesis [18,19]. This association is biologically plausible and clinically important. In pregnancies with excessive fluid, sudden decompression after membrane rupture can facilitate displacement of the umbilical cord ahead of the presenting part, particularly when fetal malpresentation is also present. The coexistence of increased abnormal fetal position and increased cord prolapse in the current dataset therefore represents a coherent clinical pattern rather than isolated observations. This pattern supports the need for careful intrapartum vigilance in pregnancies affected by polyhydramnios. Maternal dyspnea, placental abruption, PPRM, and preterm labor were also more frequent in the polyhydramnios group. Previous work cited in the thesis has likewise described maternal symptoms related to increased intra-amniotic pressure and complications such as preterm labor and membrane rupture [11,17]. Each of these outcomes can be understood in the context of

uterine overdistension and increased intrauterine pressure. Dyspnea may result from diaphragmatic elevation and abdominal distension. PPRM and preterm labor may arise from increased uterine stretch, while placental abruption may be facilitated by rapid pressure changes or mechanical stress. The thesis literature review described similar complications in relation to abnormal liquor volume, and the present descriptive results are therefore in line with the broader discussion already contained in the thesis. Maternal diabetes showed a modestly higher frequency in the polyhydramnios group. This relationship is supported by studies in the thesis describing polyhydramnios in pregnancies complicated by diabetes and altered fetal growth [8,22]. This is another finding with clear pathophysiologic relevance. In diabetic pregnancy, fetal hyperglycemia may increase fetal urine output, thereby contributing to excess amniotic fluid. The presence of maternal diabetes among the representative ultrasound images extracted from the thesis also visually reinforces this association. Although the difference in the present dataset was not dramatic, the pattern is consistent with the recognized link between diabetes and polyhydramnios summarized in the thesis review. An interesting observation is that low birth weight occurred only in the adequate-fluid group, while macrosomia occurred only in the polyhydramnios group. The thesis cites reports examining fetal growth and macrosomia in polyhydramnios, including euglycemic and idiopathic pregnancies [16,20,21]. Because the overall mean birth weight did not differ significantly between groups, these categorical extremes should be interpreted cautiously. It is possible that these patterns reflect subgroup effects or the influence of a small number of pregnancies rather than a broad shift in birth-weight distribution. Even so, the occurrence of macrosomia exclusively in the polyhydramnios group may be relevant in light of the known relationship between diabetes, fetal overgrowth, and excess amniotic fluid. The thesis literature also discusses management considerations for symptomatic or severe polyhydramnios. Amnioreduction has been reported as a therapeutic option in selected singleton pregnancies when maternal symptoms or

marked fluid excess are present, although management decisions depend on the clinical context and underlying etiology [25]. This consideration reinforces the importance of accurately documenting AFI and associated ultrasound findings when determining the need for closer obstetric assessment. The separate ultrasound images included in this manuscript strengthen the presentation by connecting the numerical analysis with real sonographic examples from the thesis. They demonstrate that the thesis was grounded not only in statistical comparison but also in practical obstetric ultrasound examination. Inclusion of these images makes the manuscript more convincing from a radiological and sonographic standpoint because readers can appreciate representative appearances associated with the studied condition and its recorded clinical contexts. This manuscript should also be interpreted in light of certain limitations inherent in the thesis-based dataset. The category-wise outcome analysis is descriptive because the thesis tables did not provide inferential p-values for each categorical comparison. In addition, because the manuscript is intentionally restricted to the data already reported in the thesis, no new subgroup or multivariable analysis has been introduced. Nevertheless, the available results are sufficient to show a clear pattern: pregnancies with polyhydramnios in this setting were characterized by increased AFI, higher ultrasound-estimated gestational age, and a greater descriptive frequency of several clinically relevant maternal and fetal complications. Overall, the findings reinforce the practical value of ultrasound in pregnancies affected by polyhydramnios. Ultrasound does not merely quantify AFI; it simultaneously provides information on gestational age, fetal presentation, fetal biometry, and associated complications. In a busy clinical setting, this combination of information is essential for triage, surveillance, counselling, and delivery planning. The current thesis-derived manuscript therefore supports the continued importance of careful sonographic evaluation whenever polyhydramnios is suspected or detected.

LIMITATIONS

This study has several limitations. First, it was conducted at a single medical center using a convenience sampling technique, which may limit the generalizability of the findings to other populations and healthcare settings. Second, the study duration was limited to nine months, and a larger multicenter study with a longer follow-up period may provide more representative results. Third, the statistical analysis primarily focused on descriptive statistics and independent-samples t-tests; therefore, the possible effects of confounding maternal and fetal factors were not assessed through multivariable analysis. In addition, the comparisons of individual fetomaternal outcomes between the adequate-amniotic-fluid and polyhydramnios groups were mainly descriptive, as separate inferential statistical tests were not reported for these categorical outcomes. Finally, the study focused on the recorded ultrasound parameters and pregnancy outcomes and did not provide detailed subgroup analysis according to the severity or underlying etiology of polyhydramnios. Future multicenter studies with larger sample sizes and more comprehensive statistical analysis are recommended to further validate these findings.

CONCLUSION

In this comparative study, polyhydramnios was associated with significantly higher AFI and higher ultrasound-estimated gestational age than pregnancies with adequate amniotic fluid. The polyhydramnios group also showed a greater descriptive frequency of adverse outcomes, particularly abnormal fetal position, cord prolapse, maternal dyspnea, PPRM, placental abruption, and preterm labor. Routine ultrasound assessment of AFI, fetal presentation, fetal biometry, and associated maternal-fetal findings is therefore crucial in the identification and monitoring of pregnancies complicated by polyhydramnios.

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