

## A Prospective Clinical Study of Feto-Maternal Outcome in Pregnancies with Abnormal Liquor Volume

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### Abstract

**Aims and Objective(s)** Evaluating feto-maternal outcome in pregnancies with abnormal liquor volume.

**Material and Method(s)** 200 pregnant subjects between 20 and 42 weeks of gestation, who were clinically suspected to have an abnormal amniotic fluid volume (oligohydramnios or polyhydramnios) were subjected to ultrasonographic (USG) assessment of amniotic fluid index. The subjects were closely monitored through pregnancy, labour and puerperium.

**Observation(s)** Ultrasonically, abnormal liquor volume was confirmed in 90–93% clinically suspected patients. Post term pregnancy (38.5%), PROM (30%) and prolonged pregnancy (23.5%) were associated with oligohydramnios. Fetal congenital anomalies (31.1%), diabetes mellitus (20%), PIH (17.7%), twin pregnancy (6.6%) and Rh incompatibility (4.4%) were associated with polyhydramnios. The incidence of labour induction, fetal labour intolerance, CS for fetal distress and 1 min Apgar of <7 was high in oligohydramnios subjects. Premature labour complicated 40% of polyhydramnios pregnancies. The overall incidence of congenital anomalies (14%) and perinatal mortality

(20%) in subjects with abnormal liquor volume was significantly higher ( $P < 0.001$ ) than in women with normal liquor volume (0.3, 2.3% respectively).

**Conclusion(s)** A good clinical examination can pick up most subjects of abnormal liquor volume. Abnormal liquor volumes are associated with increased maternal morbidity and adverse perinatal outcome.

**Keywords** Oligohydramnios · Polyhydramnios · Congenital anomalies · Premature rupture of membranes (PROM) · Stillbirth

### Introduction

Just as our ancestors crawled out of ocean to life on land, we too, until birth, float in amniotic fluid. It provides temperature stability, cushioning and a necessary presence in collapsed airways to help stimulate lung development. The importance of amniotic fluid volume as an indicator of fetal wellbeing has made its assessment an important part of antenatal fetal surveillance. Abnormalities such as meconium staining, congenital anomalies, growth retardation, dysmaturity and fetal asphyxia have been associated with reduced amniotic fluid volume [1–3]. Polyhydramnios is sometimes associated with major fetal anomalies [2], aneuploidy, macrosomia and stillbirth [3]. It has been proposed that amniotic fluid possesses certain bacteriostatic properties that protect against potential infectious processes and that a decrease in amniotic fluid volume may impair the gravid woman's ability to combat such infections [4].

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We report a clinical study of fetomaternal outcome in pregnancies with abnormal liquor volume managed at a tertiary care hospital.

**Materials and Methods**

This prospective study was carried out in the Department of Obstetrics and Gynaecology, Government NSCB Medical College, Jabalpur, M.P. between 1.6.07 and 31.5.08. A total of 7,111 antenatal subjects attended the OPD during this period. On the basis of a thorough clinical examination performed between 20 and 42 weeks, 248 (3.4%) subjects were suspected to have an abnormal amniotic fluid volume. Of these, 200 women who attended the ANC OPD regularly and were closely monitored through pregnancy, labour and puerperium, made up the study population. Detailed data was recorded and investigations carried out. They were subjected to ultrasound examination and assessment of amniotic fluid index by Phelan’s method [2, 4] every 2 weeks between 20 and 35 weeks, every week between 36 and 40 weeks and twice weekly thereafter.

The data obtained was tabulated and analyzed using SPSS 11.5. Appropriate statistical analysis using *t* test,  $\chi^2$  test and Fishers exact test was applied and the critical level of significance was considered at 0.05 level.

**Observations**

Of the 200 subjects, 150 were clinically suspected to have low AFI, while 140 (93%) were ultrasonographically confirmed to have low AFI (<5). 70.7% (*n* = 99) of oligohydramnios subjects belonged to the 21–30 years age group (Table 1) and 41.1% (*n* = 58) were nulliparous (Table 2); 38.5% (*n* = 54) had post term pregnancy, 30% (*n* = 42) had premature rupture of membranes (PROM) and 23.5% (*n* = 33) had prolonged pregnancy (Table 3).

43.5% (*n* = 61) of the oligohydramnios subjects went into spontaneous labour. Of them, 90% (55/61) needed augmentation of labour and 73.85% (45/61) delivered vaginally. 56.5% (*n* = 79) of the oligohydramnios subjects were induced and 44% (35/79) delivered vaginally (Table 4). Overall, 57.2% delivered vaginally. The incidence of meconium staining, abnormal fetal heart rate (FHR) patterns, caesarean section (CS) for fetal distress (80%) and 1 min apgar of <7 (39%) was high in oligohydramnios subjects.

Of the 50 clinically suspected subjects of polyhydramnios, 7 were between 20 and 28 weeks and 43 > 28 weeks. In 13 subjects who had a normal liquor volume at 20 weeks, polyhydramnios developed gradually during the third trimester. Overall 45 (90%) were confirmed by USG. 55% (*n* = 25) had moderate elevated AFI (30.1–35 cm) while

**Table 1** Distribution of subjects by age

Age (years)	Oligohydramnios ( <i>n</i> = 140)		Polyhydramnios ( <i>n</i> = 45)		
	<5 cm	5.1–8 cm	25–30 cm	30.1–35 cm	>35 cm
15–20	6 (4%)	10 (7.1%)	2 (4.2%)	3 (6%)	–
21–25	16 (11.4%)	55 (39.2%)	7 (14%)	8 (16%)	–
26–30	8 (5.7%)	20 (14.2%)	11 (24.4%)	6 (13.3%)	2 (4.4%)
>30	10 (7.1%)	15 (10.7%)	5 (10%)	–	1 (2.2%)

There is no significant difference (*P* > 0.05) in mean age of oligohydramnios (24.71 + 4.58 years) and polyhydramnios group (25.39 + 4.33 years)

**Table 2** Distribution of subjects by parity

Parity	Oligohydramnios ( <i>n</i> = 140)		Polyhydramnios ( <i>n</i> = 45)		
	<5 cm	5.1–8 cm	25–30 cm	30.1–35 cm	>35 cm
P <sub>0</sub>	18 (12.8%)	40 (28.5%)	4 (8.8%)	2 (4.4%)	–
P <sub>1</sub>	12 (8.5%)	25 (17.8%)	6 (13.3%)	4 (8.8%)	–
P <sub>2</sub>	6 (4.4%)	15 (10.7%)	4 (8.8%)	3 (6.6%)	1 (2.2%)
P <sub>3</sub>	4 (2.8%)	20 (14.2%)	6 (13.3%)	8 (17.7%)	2 (4.4%)
≥P <sub>4</sub>	–	–	5 (11.1%)	–	–
Total	40				

The mean parity of the oligohydramnios group is 1.08 + 1.12 while that of polyhydramnios group is 2.09 + 1.26. The association of polyhydramnios was significantly higher (*P* < 0.0001) with high parity

**Table 3** Factors associated with oligohydramnios

Factors	AFI (cm)		Total no.
	<5 cm	5.1–8 cm	
PIH	5 (3.5%)	23 (16.4%)	27 (19.2%)
PROM	10 (7.1%)	32 (2.8%)	42 (30%)
Malpresentation	19 (13.5%)	20 (14.2%)	39 (27.8%)
Chronic abruption	0	1 (0.7%)	1 (0.7%)
Prolonged pregnancy (40–42 weeks)	15 (10.7%)	18 (12.8%)	33 (23.5%)
Post term pregnancy (>42 weeks)	20 (14.2%)	34 (24.2%)	54 (38.5%)
Fetal congenital anomalies	7 (4.2%)	5 (3.5%)	12 (8.5%)
IUGR	20 (14.2%)	16 (11.4%)	36 (25.7%)

Subjects with AFI of <5 cm had a higher probability of malpresentation (*P* < 0.0001), prolonged pregnancy, post term pregnancy and fetal congenital anomalies (*P* < 0.05) as compared to subjects with AFI between 5.1 and 8 cm

6.8% (*n* = 3) had markedly elevated AFI (>35 cm). 5.5% (*n* = 34) of polyhydramnios subjects belonged to 21–30 years age group and 13.3% (*n* = 6) were nulliparous (Tables 1 and 2). Fetal congenital anomalies was present in 31.1% (*n* = 14), diabetes mellitus in 20% (*n* = 9), PIH in 17.7% (*n* = 8), twin pregnancy in 6.6% (*n* = 3) and Rh

**Table 4** Factors associated with polyhydramnios

Factors	AFI (cm)			Total no.
	25–30 cm	30–35 cm	>35 cm	
Diabetes mellitus	5 (11.1%)	4 (8.8%)	–	9 (20%)
PIH	4 (8.8%)	2 (4.4%)	2 (4.4%)	8 (17.7%)
PROM	10 (22.2%)	9 (20%)	1 (2.2%)	20 (44.5%)
Preterm labour	10 (22.2%)	6 (13.3%)	2 (4.4%)	18 (40%)
Malpresentation	1 (2.2%)	2 (4.4%)	3 (6.6%)	6 (13.3%)
Twin pregnancy	1 (4.4%)	1 (2.2%)	–	3 (6.6%)
Cord prolapsed	–	1 (2.2%)	1 (2.2%)	2 (4.4%)
Rh incompatibility	1 (2.2%)	–	1 (2.2%)	2 (4.4%)
PPH	–	–	2 (4.4%)	2 (4.4%)
Fetal congenital anomalies	8 (17.7%)	4 (8.8%)	2 (4.4%)	14 (31.1%)

Malpresentation and PIH were found to be significantly higher ( $P < 0.05$ ) with liquor volumes of >35 cm. While comparing the two groups, it was observed that malpresentation was more common in the oligohydramnios group, whereas fetal congenital anomalies was significantly highly associated with polyhydramnios ( $P < 0.05$ )

incompatibility in 4.4% ( $n = 2$ ). None of the women with diabetes had any congenital anomaly (Table 4).

86.6% ( $n = 39$ ) of the polyhydramnios subjects went into spontaneous labour, 40% ( $n = 18$ ) prematurely. Of these, 38.5% (15/39) needed augmentation of labour and 82% (32/39) delivered vaginally. 13.3% ( $n = 6$ ) of the polyhydramnios subjects had to be induced due to co-morbid factors, of whom 50% (3/6) delivered vaginally.

Overall 42.8% oligohydramnios as against 22.2% of polyhydramnios subjects underwent CS ( $P < 0.01$ ). The average duration of labour (10.50 h) in oligohydramnios was significantly longer ( $P < 0.001$ ) than in polyhydramnios subjects (6.30 h); this indicated that there was no significant difference in terms of fetal weight or sex. The incidence of malpresentation was 13.3% ( $n = 6$ ) in polyhydramnios; cord prolapsed (11.1%) and PPH (4.4%) were dreaded complications [5].

Perinatal mortality in polyhydramnios subjects (42.25%) was significantly higher ( $P < 0.001$ ) than in oligohydramnios subjects (12.9%). The incidence of congenital anomalies was 8.5% ( $n = 12$ ) in the oligohydramnios group; the most common anomaly was of genitourinary system (5/12). Amongst polyhydramnios subjects it was 31.1% ( $n = 14$ ), the common anomalies being hydrocephalus (5/14), anencephaly (3/14), spina bifida (2/14) and duodenal atresia (2/14) (Table 5). While congenital anomaly was not the cause of any perinatal death in the oligohydramnios group, it was responsible for 31.5% (6/19) deaths in polyhydramnios group. None of the women with polyhydramnios and diabetes mellitus had any congenital anomaly in the present study. In the absence of diabetes however, polyhydramnios was significantly associated with congenital anomalies.

**Table 5** Distribution of congenital anomalies in oligohydramnios and polyhydramnios

Congenital anomaly	Oligohydramnios	Polyhydramnios
Hydrocephalus	–	5
Anencephaly	–	3
Meningocele	–	1
Spina bifida	–	2
Oesophageal atresia	–	1
Duodenal atresia	–	2
Omphalocele	2	–
B/L polycystic kidney	3	–
Hydronephrosis with hydroureter	2	–
CTEV	3	–
Cleft lip with cleft palate	1	–
Phocomelia	1	–
Total	12	14

The incidence of congenital anomalies is significantly higher ( $P < 0.01$ ) in polyhydramnios than in oligohydramnios subjects

The perinatal mortality was higher in polyhydramnios (42.2%) than in oligohydramnios (12.6%) subjects [6, 7]. The overall incidence of congenital anomalies (14%) and perinatal mortality (20%) in subjects with abnormal liquor volume was significantly higher ( $P < 0.001$ ) than in women with normal liquor volume (0.3, 2.3% respectively).

Concordance between clinical and USG detected abnormal liquor volume was greatest between 28 and 35 weeks (95%) and decreased gradually on both sides i.e. <28 weeks and >35 weeks.

## Discussion

This study was undertaken to assess the value of a thorough obstetric examination in detecting abnormalities of liquor volume. The variation in clinically suspected and USG confirmed oligoamnios (7%) and polyhydramnios (10%) is fairly acceptable and compares with those reported in the literature (5–6% [4, 7]). The error decreased from 45 to 50% when the examination was performed by a house surgeon to 10% when examined by the senior resident, thereby emphasising the need of good clinical teaching in under and post graduate curricula.

When oligohydramnios is detected in the second or early third trimester, a level 3 USG to detect fetal congenital anomalies is necessary as its incidence may vary from 8.5% (present study) to 9.37–26% in other studies [8]. When no anomaly is detected, the clinician must be alerted to PROM [8] as it requires treatment with appropriate antimicrobials after vaginal swab culture and sensitivity. In the absence of any evidence of infection, associated

complications and a reassuring biophysical profile (24% of our subjects had an adequate amniotic fluid pocket of  $2 \times 2$  cm as required in biophysical profile), none of our patients were induced. 36% delivered within 2 weeks while the rest continued with their pregnancies under proper supervision. When oligohydramnios was associated with an additional risk factor, the incidence of induction was high (56.5%). The incidence of CS in our study (42.8%) is high as compared to others (10% in Sarno et al. study). Fetal distress (48/60) was the commonest indication of CS. Fetal monitoring in labour is by FHR auscultation, intermittent cardiotocography and observation of the colour of liquor and not continuous fetal monitoring and fetal pH as in the west. Also the labour rooms are mostly manned by postgraduate trainees whose decision making is skewed towards CS for fear of adverse neonatal outcome.

A metaanalysis by Chouhan et al. [9] included all published studies between 1987 and 1997. Because of the heterogeneity of data or small study population, they could not correlate antepartum AFI with neonatal outcome. However, they could find no correlation between intrapartum AFI  $<5$  and neonatal acidosis. Different investigators have suggested different cutoff to identify high risk women. Baron et al. [10] and Rutherford et al. [11] have suggested  $<5$  cm AFI as the cutoff while Moore and Cayle [12] suggested a cutoff of  $<8$  cm. Magann et al. [13] in their study of 79 women with AFI  $<5$  but excluding those with severe IUGR or congenital anomalies, found no additional risk of adverse fetal outcome. Well designed randomised controlled studies are needed to answer the issue of what should be the cut off of low AFI and whether any intervention is necessary in the absence of additional risk factors.

The criteria used to define polyhydramnios effects its prevalence. Thus, a single pocket of 8 cm diagnoses more patients [7] as compared to an AFI of  $>25$  cm [14]. Also, the more severe the polyhydramnios, the greater was the likelihood of finding a cause for it [15]. Preterm labour was seen in 40% ( $n = 18$ ) against a reported prevalence of 11.1–29.4% [6]. Neonatal outcome in prematurity is influenced by a number of variables such as poverty, literacy (nonmodifiable in the short term) and availability of quality NICU and effective paediatric surgery unit. Since the latter are available only in tertiary referral hospitals, it is prudent that all women with abnormal liquor volume are referred to a higher centre at the earliest to optimise neonatal outcome. Since the incidence of diabetes mellitus in polyhydramnios was found to be high 20% (1.5–6.6% in the literature), there is a need to screen these subjects repeatedly during the course of pregnancy and establish early euglycemia. Since none of the patients was a known diabetic and none had a congenital anomaly, it is possible that they were all gestational diabetics.

## Conclusion(s)

A good clinical examination can usually identify subjects with abnormal liquor volume. An increased or decreased liquor volume, inappropriate for gestational age, is associated with an increased incidence of complications in labour, caesarean section and adverse perinatal outcome. Since facilities for USG, particularly level 3 USG, are not available at all primary and community health centres (PHC, CHC), a good clinical examination can pick up all such subjects at primary level who can be referred early to higher centres for proper management.

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