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Obstetrics and Perinatal Outcomes with Isolated Oligohydramnios at Term Pregnancy

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Abstract

Isolated oligohydramnios refers to the presence of oligohydramnios without any fetal and maternal complications. Effects of this condition on perinatal outcomes were inconclusive across a broad range of studies. We reviewed the literature on isolated oligohydramnios with perinatal outcomes. Electronic databases like PubMed, CINAHL, Web of Science, EMBASE, and Medline were searched from inception to 2022 using keywords and MeSH terms for perinatal outcomes and isolated oligohydramnios. Observational studies (Cohort, case-control) and systematic review & meta-analysis studies published in English were included. Whereas, letters of personal communications, case reports, and case series were excluded. Studies with singleton and low-risk pregnancy, cephalic presentation, and oligohydramnios (amniotic fluid index ≤ 5 cm) were included. Exclusion criteria were studies that include pregnancies with fetal malformation, chromosomal anomaly; growth restriction, and interventional drugs. We obtained 557 full texts from electronic databases but only 35 articles met the inclusion criteria. The narrative review revealed that an association does not exist between isolated oligohydramnios and low Apgar score, non-reassuring fetal heartbeat pattern, fetal distress, and umbilical artery/vein pH less than 7.1/7.2. However, isolated oligohydramnios is significantly associated with higher rates of labor induction and cesarean sections. Nevertheless, the impact of isolated oligohydramnios on meconium-stained amniotic fluid and neonatal intensive care unit were inconclusive across the finding. Further large-scale follow-up studies are needed to better elucidate the available evidence.

Introduction

Adequate amniotic fluid volume is a sign of normal placental functioning and it is the most important component of biophysical profile for fetal well-being tests [1-3]. Amniotic Fluid Index (AFI) is the preferred method of amniotic fluid measurement. To measure AFI, the uterus is divided into four equal quadrants. AFI is the sum of the deepest pocket from each quadrant. The normal range of AFI is 5 cm to 24 cm. Any value greater than 24 cm is considered as polyhydramnios and a value below 5 cm is oligohydramnios [4]. Isolated Oligohydramnios (IO) refers to the presence of oligohydramnios without any fetal and maternal underlying conditions. Globally, IO incidence ranges from 0.5% to 5% [5,6].

Oligohydramnios has been associated with a variety of adverse perinatal outcomes prospective study conducted among 180 pregnant women at 37 to 40 weeks of gestation with IO with an AFI ≤ 5th percentile associated with low Apgar score and cesarean delivery [7]. Likewise, study conducted among 3,050 women showed oligohydramnios carries an increased risk of adverse perinatal outcome, even in low-risk pregnancies after 40 weeks [8]. Moreover, study conducted on oligohydramnios at or beyond 34 weeks' gestation was showed antepartum oligohydramnios is associated with increased perinatal morbidity and mortality [9]. A meta-analysis of studies showed an antepartum or intrapartum amniotic fluid index of less than or equal 5.0 cm is significantly increased risk of cesarean delivery for fetal distress and a low Apgar score at 5 min [10]. Similarly, studies revealed, perinatal death, non-reassuring fetal status, meconium-stained fluid, need for resuscitation, admission to the Neonatal Intensive Care Unit (NICU), and risk of Operative Vaginal Deliveries (OVD) [11,12].

However, recent studies showed IO is not associated with fetal growth restriction or an increased risk of adverse perinatal outcomes [13]. Adverse perinatal outcomes were associated with IO due to the higher rates of obstetrical interventions [14,15]. Additionally, a five retrospective cohort study isolated oligohydramnios showed at term by itself is not associated with increased obstetrical morbidity [16].

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In contemporary obstetrics, termination is a recommended intervention for term pregnancy complicated with oligohydramnios [17]. The time of intervention for IO complicated pregnancy remained controversial. However, clinicians are managing IO as they do for oligohydramnios at term [18]. This approach leads to unnecessary obstetric intervention without a benefit [19]. Besides, some studies suggested that AFI is not a good predictor of perinatal outcome alone in the case of IO [17]. Hence, routine intervention for oligohydramnios at term may not be justified [13].

Findings about the effect of IO on obstetric and perinatal outcomes are inconclusive. Updated evidence on the effect of this condition on adverse outcomes will help health care providers to improve clinical interventions. This narrative review was designed to compare perinatal outcomes related to IO in low-risk singleton pregnancies and normal amniotic fluid volume.

Literature Search

Studies for this review were obtained from Pub Med, CINAHL, Web of Science, EMBASE, and Medline databases from inception to 2022 published the English language. The following keywords/ MeSH terms were used for searching. Amniotic fluid, pregnancy, amniotic fluid index, perinatal outcome, obstetrics outcome, fetal outcome, neonatal outcome, isolated oligohydramnios, induction of labor, cesarean delivery, operative vaginal delivery, mode of delivery, instrumental delivery, Apgar score, non-reassuring fetal status, meconium stained amniotic fluid, meconium aspiration syndrome, perinatal morbidity, perinatal mortality, admission to neonatal intensive care unit, neonatal resuscitation, umbilical artery PH, and fetal weight. The bulian words (AND/OR) were used to combine the aforementioned keywords. Also, the search strategy has been complemented by checking the reference lists of the retrieved articles for additional articles.

Study Selection

We included observational studies (cohort and case-control) and meta-analysis. Inclusion criteria for this review were articles with a singleton pregnancy, cephalic presentation and define Amniotic Fluid Index (AFI) ≤ 5 cm, and outcomes compared with/without a control group (pregnancies with normal amniotic fluid volume). Exclusion criteria were studies that included pregnancies with fetal malformation, chromosomal anomaly or growth restriction and other obstetric complications. In addition, we excluded studies that did not clearly define the timeframe between measurements of the amniotic fluid index. Letters of personal communications, case reports, case series, and non-English language articles were also excluded.

The initial database search returned a total of 557 articles and 8 meta-analysis review articles were retained for the narrative review. After the initial electronic database search, 7 additional relevant articles were identified through manual reference and Google searches. Though, this review is synthesized from 35 sources (Figure 1). A summary table is presented with study year, study design, sample size, key points, and limitation for the studies include in the review (Table 1).

Findings

Isolated oligohydramnios and antepartum fetal surveillance

Antepartum fetal surveillance is one of the indicators for fetal well-being in utero. IO was associated with an increased risk of abnormal Doppler indices of the umbilical artery, non-reactive for Cardio Topography (CTG) and a non-stress test [7,20]. Similarly, a prospective matched case-control study revealed deceleration of fetal heart rate was significantly associated with IO [21]. Furthermore, a review of meta-analysis indicated, when oligohydramnios cases were followed using fetal electronic monitoring during labor abnormal findings were detected. For this reason, obstetric interventions were high [19].

Isolated oligohydramnios and maternal outcomes

Isolated oligohydramnios and induction of labor: According to the American College of Obstetricians and Gynecologists (ACOG), diagnosis of oligohydramnios after 37 weeks is an indication for labor induction [22]. Two prospective cohort studies aimed to evaluate perinatal outcomes in women with IO, depicted a risk of induction was significantly high for isolated oligohydramnios [23,24]. Correspondingly, a prospective case-control study over a period of 21 months from November 2014 to July 2016 was conducted on 50 pregnant women complicated with complicated with IO. The result showed increased rate of induction of labor among women complicated with IO [25].

Furthermore, a retrospective cohort study (IO=987 & normal AFI=22,280) to analyzed the obstetric and perinatal outcome on IO showed higher labor induction among pregnancies complicated with IO [16]. Also, IO was associated with significantly higher rates of labor induction as compared to pregnancies of normal amniotic fluid volume for fetal/maternal indications [21,26]. These findings strengthen by a systemic review and meta-analysis study; in the twelve studies were included with 35,999 women: 2,414 (6.7%) with isolated oligohydramnios and 33,585 (93.29%) with normal AFI. Women with isolated oligohydramnios had significantly higher rates of labor induction (OR=7.56, CI: 4.58,12.48) [27].

Retrospective matched case-control study (IO=206, normal AFI=206) showed IO has no significant association with failure to the progress of labor or failed induction [7]. A retrospective case-control study conducted on 138 women with uncomplicated oligohydramnios (IO) at term (AFI ≤ 5 cm) and a low Bishop score (≤ 6) compared with 67 women at 42 weeks' gestation underwent induction of labor showed insignificant difference between the group in induction progress [26]. Similarly, Rainford and Manzanares et al. were reported there were no differences between the two groups in progress of induction of labor [15,28]. In contrast to these findings, one study reported significantly higher rates of failed induction among preterm gestations presented with IO [29]. The possible difference might arise from the study included only preterm pregnancy. Moreover, a single study conducted on women with IO required the use of drugs to manage tachysystole/hyperstimulation [30]. Further longitudinal study is needed to accept for the impact. However, study conducted on there was no difference in duration of labor, need for oxytocin, and augmentation between women with IO and normal amniotic fluid index [7,31].

Isolated oligohydramnios and mode of delivery: A meta-analysis showed a higher incidence of obstetric interventions in the IO group (89/657; 13.5%) compared with the control group (165/3306; 5.0%) [19]. Moreover, pregnancies complicated with IO showed a statistically significant association with operative vaginal delivery [15,16]. However, a small Randomized Controlled Trial (RCT) showed there were no significant difference in assisted vaginal deliveries [13]. The difference might be due to the small sample size

Table 1: Summary of studies on adverse obstetric and perinatal outcomes.

Author and year	Design and sample size	Key points	Limitation
Fatima Chaudhry et al. 2020	Randomized Control Trial IO = 72 IO (expectant management) = 72	IO is not associated with a low Apgar score or MSAF.	Used Chai square test and small sample size.
Musthaq et al. [24]	Prospective cohort IO = 70 Normal AFI = 140	IO didn't show any statically significant difference in perinatal outcome.	Used Chai square test.
Nefise Nazli et al. [31]	Prospective case-control IO = 159 Normal AFI = 165	IO is not associated with a higher rate of cesarean section.	Used Chai square test and inclusion of post-term pregnancy for comparison.
Samata Gupta et al. 2018	Retrospective case control IO = 51 Normal AFI = 176	IO is not an indicator of adverse perinatal outcome.	Used Chai square test (it showed weak association).
Neeta Sarma [38]	Prospective case-control IO = 100 Normal AFI = 300	IO adversely affects the perinatal outcome. However, good antepartum and intrapartum care ends with a favorable outcome.	Used Chai square test (it showed weak association).
Hangarga et al. [53]	Prospective observational study IO= 140	Perinatal outcomes like MSAF, intrapartum fetal distress, operative delivery, and NICU admissions are more common in IO.	Lack of control group
Shrem et al. [27]	Meta-analysis 12 studies were included with 35,999 women: IO= 2,414 (6.7%) Normal AFI=33,585 (93.29%)	Induction, cesarean section, Apgar score <7 at 1 min, and admission to NICU significantly higher in IO group than normal AF. However, no significant difference in Blood cord pH <7.1 and MSAF.	
Karahanoglu et al. [44]	A retrospective cohort study IO =1231 Early-term, = 347 Full-term =781 Late-term = 85	Indication for cesarean delivery and the adverse neonatal outcome was increased as GA increased. However, only MSAF was significantly associated with the trend of gestational age.	Lack of comparisons group with normal amniotic fluid index
Shrestha et al. [37]	Prospective cohort IO = 100 Normal AFI = 200	IO has increased labor induction, operative deliveries, and neonatal morbidities and mortalities.	Used Chai square test (it showed weak association)
Purvi K et al. [20]	Prospective matched case control study Cases (IO) =80 Controls (AFI) = 320	IO compared to with the normal amount of amniotic fluid increased incidence of Doppler abnormalities, CTG changes, MSAF and cesarean delivery. However, there was no difference in regards the duration of labor, the need for augmentation, the need for neonatal resuscitation, Apgar score at 5 minutes, NICU admission, and birth weight of neonates, and incidence of LSCS for fetal distress.	Late-term pregnancies not included
Abdelrahman et al. [36]	Retrospective cohort IO = 109 Normal AFI = 4921	Induction of labor in IO increases the risk of cesarean delivery.	Used Chai square test (it showed weak association)
Mariña et al. 2014	Retrospective cohort study Normal AFI =24,855 Induced labor because of IO = 1077 (A total of 27,708) Induced labor in of late-term pregnancy =1776	IO was associated with a higher risk of cesarean delivery and small for gestational age. Moreover, systematic induction of labor in these pregnancies should be questioned.	Possible confounding factors are not controlled
Ashwal et al. [16]	Retrospective cohort study IO= 987 Normal AFI = 22,280	IO at term by itself is not associated with increased obstetrical morbidity.	Limited confounder are control in multivariable logistic regression analysis
Nader Rabie et al. [40]	Meta-analysis Six articles were included with 27,526 IO = 8050 Normal AFI = 19476	IO increases the risk of MAS, CD for fetal distress, and admission to the NICU.	Inclusion of preterm pregnancies
Kolsoum Rezaie et al. [25]	Prospective case-control IO = 100 Normal AFI = 300	IO is not associated with a higher rate of prenatal complication.	Used Chai square test (it showed weak association)
Asifa Siraj, et al. [39]	Prospective cohort IO = 106 Normal AFI = 120	IO is not associated with adverse perinatal outcomes. Nevertheless, it associated with a low birth weight, CD, and MSAF.	Used Chai square test (it showed weak association)

Cristina Rossi et al. [19]	Meta-analysis Four articles were included with 3943 IO = 679 (17.2%) Normal AFI = 3264 (82.8%)	IO increased OVD and CD for the reason of fetal distress two-fold. Moreover, the incidence of neonates with birth weight <10th was higher in the IO but it doesn't reach a statistically significant level.	Inclusion of paper oligohydramnios with high-risk pregnancies.
Bachhav et al. [7]	A prospective cohort study IO = 90 Normal AFI = 90	The occurrence of non-reactive NST, abnormal FHR tracings, MSAF; fetal distress, low 5-min APGAR score, low birth weight, and perinatal mortality are high in IO.	Inclusion of a few complicated pregnancies. And used Chai square test to shows the relationship.
Umber et al. [21]	Comparative / Cohort study Normal AFI = 353 IO = 147	Compared to normal amniotic fluid in IO increased rate of induction of labor and CD. MSAF, deceleration of fetal heart rate, and CD were significantly associated with IO.	Used Chai square test
Hina Ahmad et al. [33]	A prospective Cohort Study IO = 71 Normal AFI=350	Perinatal morbidity and mortality were no difference between groups. However, it increases the risk of labor induction and CD.	Inclusion of preterm pregnancies. And potential confounders are not controlled during analysis. Moreover, obstetricians are not double-blinded.
Manzanar et al. [15]	Retrospective matched case-control study (Matched for GA and parity) IO = 206 Normal AFI = 206	IO managed by active induction increases risk increase of OVD and cesarean section rates. However, no significant differences between the two groups in neonatal outcome. Active induction of IO costs for the health system without benefit.	Failed to see potential confounders and matching was done only for GA.
Elsandabesee et al. [43]	Retrospective cohort study IO or border line AFI = 22 Normal AFI= 48 Women with high-risk pregnancy or abnormal= 22	There was no increased perinatal morbidity when compared with pregnancies managed expectantly.	Small sample size and inclusion of borderline amniotic fluid index as IO
Danon et al. [26]	A retrospective matched case-control study (Matched for parity and race) IO= 138 Normal AFI = 276 Post-term pregnancy =67	There were no significant differences between IO and post-term pregnancy in 5-minute Apgar score, NICU admissions, and rate of instrumental delivery.	Comparison group were with post-term pregnancies
Paolo Venturini et al. [30]	Matched case-control (For GA and Parity) IO = 120 Normal AFI = 116	The rate of cesarean section in IO was not significantly different from in the control group.	In control group hypertensive, postdates and macrocosmic neonates are included
Sverker Ek et al. [13]	Randomized trial Expectantly managed = 26 Induction of labor = 28	No significant difference was found between the labor induction and the expectant management of IO for perinatal outcomes.	Small sample size and exclusion of early and late-term pregnancies
Zun Zhanga et al. [17]	A cohort study IO = 57 Normal AFI = 7534	Cesarean delivery, fetal distress, perinatal mortality /morbidity, and Apgar score at first and fifth minute less than seven were high rate but have no significant association with IO. Though, the duration of NICU stays is significantly associated with IO.	Included all third-trimester pregnancy (preterm pregnancy).
Min Joo young et al. [49]	Retrospective cohort IO = 21 Normal AFI = 100	IO is not a marker for the fetal outcome.	Small sample size
Annea Locatali et al. [42]	A prospective observational Total sample size = 3049 IO = 341(11%) Normal AFI = 2708	No significant differences were identified between the two groups in rates of MSAF, 5-min Apgar score <7, umbilical artery pH <7, cesarean delivery for NRFHP. However, IO is independently associated with a higher risk of low-birth-weight centile.	Inclusion of high blood pressure mother
Ghosh G et al. [41]	Prospective cohort IO = 49 Normal AFI = 284	IO has no significant effect on OVD for fetal distress, Cesarean Section, NICU admission, Apgar score at 1/5-minute, pH umbilical artery less than 7.10, pH umbilical vein 7.2, and NICU admission.	Inclusion of a preeclamptic women in control group
Rainford et al. [28]	A retrospective cohort study IO = 44 Normal AFI = 188	There was no difference in the OVD rate for NRFHRP, NICU admissions, 5-minute Apgar scores <7. Women with a normal amniotic fluid index had a significantly lower induction rate.	Small sample size
Kreiser et al. [34]	A retrospective studied IO = 57 AFI > 5 cm but < 2.5th percentile (Borderline AFI) = 93	There were no statistically significant differences between pregnancies with IO and borderline AFI with respect to labor induction for an abnormal non-stress test, CD for fetal heart rate abnormalities, MSAF and Apgar score <7 at five minutes.	The comparative group was borderline AFI only.
Chauhan et al. [10]	Meta-analysis Eighteen articles were included with 10,551mothers IO= 986 Normal AFI =9565	An antepartum /intrapartum amniotic fluid index of ≤ 5.0 cm is a significantly increased risk of cesarean delivery for fetal distress and a low Apgar score at 5 minutes.	Isolated and high-risk pregnancies were included in the meta-analysis.
Roberts et al. [54]	A retrospective matched case-control study (matched for parity, GA, onset of labor, medical condition) IO= 103 Normal AFI =103	IO was associated with a fourfold increase in the risk of birth weight below the fifth centile and a higher risk of admission to the NICU. Conversely, the need for emergency delivery for fetal reasons was not clinically significant.	Control group and case group level of the d/se may not clearly stated (other possible causes of adverse perinatal may include)

Convey et al. [14]	Matched case-control (matched GA and parity) IO =183 Normal AFI =183	There is no difference between the groups in the rate of CD for fetal distress. Similarly, infants from the IO group did not have significantly higher rates of low 5-min Apgar score, acidosis, low birth weight (ponderal index), MSAF, MAS, and NICU admission.	Possible confounding factors are not controlled in control group
Sara H et al. [52]	Retrospective case-control (Matched for ultrasound indication) IO= 65 Normal AFI= 122	IO increases the rate of IUGR/SGA, Birth weight <2500 g, MSAF, fetal distress, the need for pediatrician, CD, and NICU admission. However, didn't increase the risk of intrauterine death or birth asphyxia.	Small sample size with inappropriate matching

in the RCT. Additionally, IO has no significant effect on instrumental delivery for the indication of NRFHBP (Non-Reassuring Fetal Heartbeat Pattern) [28,32].

Regarding Cesarean Delivery (CD), Bachhav et al. were reported women with IO had a higher rate of cesarean delivery compared to women of normal amniotic fluid [7]. Similarly, a prospective cohort study was carried out in women with isolated oligohydramnios (n=70) and normal pregnancy (n=140) were included. The finding revealed significant number of IO women have undergone emergency caesarian section (X^2=12.98, p=0.003) [29]. In addition, numerous findings of prospective, retrospective and case control studies depicted women with IO had a higher rate of cesarean delivery compared to women of normal amniotic fluid [15-17,21,24-26,33-39]. These finding supported by pioneer meta-analysis study which includes eighteen reports (10,551 women) showed, women with IO were associated with a significantly increased risk of cesarean delivery [10]. Likewise, the recent meta-analysis which includes six studies (27,526 women); women with isolated oligohydramnios were significantly higher rates of Cesarean delivery (RR: 2.16; 95% CI; 1.64-2.85) [40]. However, study conducted on 87 women pregnant beyond 40 completed weeks showed no significant effect of IO on the risks of CD [13]. Moreover, a prospective matched case-control (matched for gestational age and Bishop-score) study conducted on women with IO 120, and normal AFI=116, women with isolated oligohydramnios were not significantly different to the control group [30]. Similarly, Convey and Ghosh et al. studies showed no difference between the groups in the rate of CD for fetal distress [14,41]. The difference might be due to the inclusion of high-risk pregnancies in the control group [14] and inclusion of preeclamptic women in control group and analysis of small sample size (IO=49 Normal AFI=284) [41].

In addition to meta-analysis discussed above and multiple longitudinal studies indicated, cesarean deliveries specifically for the reason of NRFHRP/fetal distress were significantly lower in women with normal amniotic fluid than IO [7,15,16,19,23,25,27,31,38,40]. A finding from a prospective cohort study conducted in Pakistan revealed that the risk of CD was increased by 3-folds among women with isolated oligohydramnios under the induction of labor [33]. Nevertheless, statistically significant association was not reported in these studies [14,21,42]. The difference might be inclusion of high-risk pregnancies, showing weak association and inclusion high blood pressure pregnant women in the studies respectively.

Additionally, a large retrospective cohort study conducted on 987 pregnancies complicated by isolated oligohydramnios and to 22,280 low-risk pregnancies with normal AFI. The showed intrapartum cesarean delivery due to NRFHRP and dystocia was significantly associated with IO. However, after controlling potential confounders like parity and induction of labor the risk of CD in IO was similar to their counterparts [16]. This finding may be supported by a higher rate of CD in IO which might partially attributable to obstetricians' practice choices [43].

A retrospective cohort study exclusively conducted on IO complicated pregnancies showed that rate of CD in early term and late-term pregnancies were high compared to full-term pregnancies. However, there is no significant difference between the early period (37.8%) and the late period (35.3%). Also, there was no significant difference in induction of labor in term pregnancy classifications [44]. Therefore, to conclude the cause for cesarean delivery directly related with IO or other possible risk factors, it needs further RCT studies with controlling potential confounders.

Neonatal and perinatal outcomes

Isolated oligohydramnios and Apgar score: Apgar score can be used for rapid assessment of newborn well-being and it has five components: appearance, pulse rate, respiration, reflex irritability, and muscle tone. First minute Apgar score shows how well the baby tolerated the birthing process and the 5th-minute tells the health care provider how well the baby is doing outside the uterine environment [45]. Although low fifth minute Apgar score is associated with long-term severe neurologic sequels [46-48], many studies in the literature showed an absence of association between IO and fifth minute Apgar score [14,15,17,20,21,23-26,28,32-37,39,41-43,49,50].

Similarly, a prospective case control study conducted on 80 women with isolated oligohydramnios and these were compared with 320 with normal AFI. The finding showed there is no difference between the cases and controls as regards of fifth minute Apgar score [16]. Matched case-control study conducted on IO=120, Normal AFI=116 also revealed the same finding [30]. This evidence supported by with large retrospective cohort (IO=987 Normal AFI=22,280) study conducted by Ashwal et al. [16]. In addition, meta-analysis of four articles which includes 3,943 pregnant women (IO=679 (17.2%), Normal AFI=3264 (82.8%) has the same result [19].

Correspondingly, a large retrospective cohort study conducted on after induction of labor women with normal AFI and induced labor because of IO had no significant effect on the first minute Apgar score less than four [32]. Additionally, retrospective matched case-control study conducted on women with IO=206, and Normal AFI=206 showed no significant difference in first minute Apgar score between the groups [15]. Those findings is also supported by a comparative study among women with IO and normal amniotic fluid after 41 weeks of pregnancy [31]. Similarly, findings from two studies were revealed isolated oligohydramnios is not associated with low first minute Apgar score [17,25]. Furthermore, a small RCT conducted among actively and expectantly managed women with IO revealed no significant difference on first, fifth-, and tenth-minute Apgar score [13].

On the contrary, a meta-analysis indicated that IO was associated with low first and fifth minute Apgar scores. However, after they excluded studies with extreme values, IO had evidence of effect only

on the first minute Apgar score less than seven [27]. Similar findings were reported from two meta-analyses [19,40]. A meta-analysis on IO published by Chauhan et al. showed antepartum and intrapartum oligohydramnios were associated with low fifth minute Apgar score, which might be because of the inclusion of high-risk pregnancies in the analysis [26].

Isolated oligohydramnios and non-reassuring fetal heartbeat pattern/fetal distress & umbilical artery acidosis Case-control and retrospective cohort studies showed IO had an association with NRFHBP [15,23]. NRFHBP and the first minute Apgar score have poor sensitivity for fetal status and outcome, cord pH is a direct measure of the fetal oxygenation status [51]. Also, many published works including meta-analyses explicitly showed no relationship between IO and NRFHBP, fetal distress and umbilical artery/vein less than 7.1/7.2 [13-16,21,26,27,32,35,41,42].

Isolated oligohydramnios and meconium-stained amniotic fluid: Meconium-stained amniotic fluid during the intrapartum period is an indicator of fetal distress. Most recent studies suggest that an association exists between IO and MSAF [19,21,23,24,28,29,31,32,39,40,52-54]. In contrast, other studies concluded IO had no effect on MSAF [14-16,19,27,34,36,40,42,49,50]. However, the association of MSAF and IO was gestational age-dependent [13,55]. A meta-analysis [40] showed no difference in the rate of meconium-stained amniotic fluid and IO. However, it increased the risk of meconium aspiration syndrome (RR: 2.83, CI 1.41-5.70). Conclusive evidence is needed on the association of MSAF with meconium aspiration syndrome and poor neonatal outcomes, and status of meconium (thick or thin). Moreover, the inclusion of different indicators of fetal compromise along with MSAF is important [56].

Isolated oligohydramnios and admission to neonatal intensive care unit: Many prospective/retrospective cohort, case-control and meta-analysis studies showed IO has no significant effect on NICU admissions [13,15,16,19-21,23,24,26,31-33,35,36,54]. However, a meta-analysis and some epidemiologic studies revealed IO has a significant effect on admission to NICU [7,27,37,38,40,57]. The observed difference might be due to the inclusion of preterm and intrauterine growth restriction neonates in the studies [40,54]. For conclusive results, a large RCT is important.

Isolated oligohydramnios and neonatal morbidity/mortality: IO has no association with the following outcomes: immediate cry, hypoxic-ischemic encephalopathy, need for neonatal resuscitation and phototherapy, transit tachypnea of the newborn, hypoglycemia, sepsis, seizure, hypothermia, meconium aspiration syndrome, jaundice, intubation, and stillbirth [16,38]. Similarly, IO showed an absence of significant association with composite adverse neonatal outcomes (cesarean/operative vaginal delivery due to NRFHRP, low Apgar score, umbilical artery pH<7.10, neonatal intensive care admission, meconium aspiration syndrome, and intubation or hypoxic-ischemic encephalopathy) [16]. Moreover, IO did not show differences in perinatal mortality or morbidity compared to normal amniotic fluid volume [17,19]. However, a study conducted in Nepal evidenced an association between early neonatal death and IO [37].

Isolated oligohydramnios and birth weight: Neonatal/fetal weight indicates fetal wellbeing in the uterus. Comparison studies showed there was no difference in birth weight less than 2000/2500 grams between pregnancies complicated by IO and normal amniotic fluid volume [20]. Neonates born to mothers with isolated oligohydramnios had a higher risk of low birth weight compared with normal amniotic fluid volume. However, their weight difference had no clinical significance [16,25,26,29,31-33,35,37,42,49]. Furthermore, a similar finding was observed from a meta-analysis study [19].

Conclusion

Studies show that IO increases the rate of induction. Moreover, a lot of findings depicted woman with IO had a higher rate of cesarean delivery compared to a woman with normal amniotic fluid. More than 20 studies including meta-analyses reported low first, fifth, and tenth-minute agar score has no relation with IO. Similarly, this narrative review revealed that a relationship doesn't exist between IO and NRFHBP, fetal distress and umbilical artery/vein less than 7.1/7.2. Moreover, IO didn't show differences in perinatal mortality or morbidity compared to normal amniotic fluid volume. Even though the weight difference had no clinical significance, neonates born from mothers with isolated oligohydramnios had a higher risk of low birth weight compared with their counterparts. Furthermore, the impact of IO on MSAF and neonatal intensive care unit was inconclusive across the results. For decisive evidence large RCT and inclusion of different indicators of fetal compromise along with MSAF is important.

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