Research Article

Cuestiones de Fisioterapia

OBG

FETO-MATERNAL OUTCOMES IN OLIGOHYDRAMNIOS DIAGNOSED IN THE THIRD TRIMESTER: A HOSPITAL-BASED CROSS-SECTIONAL STUDY

Dr. Gayathri Devi

Associate Professor, Department of OBG, Indira medical College and Hospital, Tiruvallur, Tamil Nadu, India.

Abstract

Background: Oligohydramnios, a pathological reduction of amniotic fluid volume, is a recognised marker of the compromised fetoplacental unit and is frequently identified during routine third-trimester ultrasonography. In resource-constrained settings of South India, it remains an important antenatal finding that influences the timing and mode of delivery and is associated with adverse perinatal outcomes. Objectives: To describe the sociodemographic and obstetric profile of women with third-trimester oligohydramnios and to determine the associated feto-maternal outcomes in a tertiary care teaching hospital. Methods: This hospital-based, cross-sectional, STROBE-compliant study analysed a dataset of 280 women with third-trimester oligohydramnios, defined as an amniotic fluid index (AFI) below 5 cm or a single deepest pocket below 2 cm. Sociodemographic characteristics, diagnostic profile, fetal surveillance findings, management approach, mode of delivery and neonatal outcomes were summarised using descriptive statistics. Results: The mean maternal age was 29.3 +/- 7.0 years and the mean gestational age at diagnosis was 33.9 weeks. Oligohydramnios was mild in 130 (46.4%), moderate in 100 (35.7%) and severe in 50 (17.9%). Fetal growth restriction was documented in 26.4% and abnormal umbilical artery Doppler in 33.2%. The overall caesarean rate was 42.9% (120/280), most commonly for fetal distress. Adverse neonatal findings included low birth weight (49.6%), preterm birth (39.6%), NICU admission (31.4%) and neonatal respiratory distress (15.0%). Perinatal mortality was 4.6% (13/280). Conclusion: In this cohort, third-trimester oligohydramnios was associated with a substantial burden of operative delivery and adverse neonatal outcomes, underscoring the value of structured fetal surveillance and timely delivery.

Keywords: Oligohydramnios; Amniotic fluid index; Third trimester; Perinatal outcome; Caesarean section; South India

Introduction

Amniotic fluid performs indispensable roles in fetal development, providing mechanical cushioning, permitting musculoskeletal movement, supporting pulmonary maturation and offering a bacteriostatic milieu. Its volume reflects a dynamic equilibrium between fetal urine production and swallowing, and any disturbance of this balance may signal underlying fetoplacental compromise. Oligohydramnios, the pathological reduction of amniotic fluid volume, is one of the most frequently encountered abnormalities in the third trimester and remains a common indication for enhanced antenatal surveillance and intervention.[1]

Consistent terminology and reproducible measurement underpin the clinical utility of amniotic fluid

assessment. Contemporary practice defines oligohydramnios as an amniotic fluid index (AFI) below 5 cm or a single deepest vertical pocket below 2 cm, and standardisation of reporting has been advocated to reduce inter-observer variability and to harmonise clinical decision-making.[1] The single deepest pocket technique has been proposed as preferable in some contexts because it may reduce the rate of intervention without increasing adverse outcomes, whereas the AFI remains widely used in routine practice across South India.[2]

The clinical significance of reduced amniotic fluid volume lies in its association with adverse perinatal outcomes. Oligohydramnios may arise from uteroplacental insufficiency, ruptured membranes, post-term pregnancy, congenital urinary tract anomalies or maternal conditions such as hypertension, and it frequently coexists with fetal growth restriction. Several investigators have reported that a low AFI at term predicts an increased frequency of intrapartum fetal distress, meconium-stained liquor, operative delivery, low birth weight and neonatal intensive care admission. Indian studies have been particularly influential in characterising this relationship: Bhagat and Chawla demonstrated a significant correlation between a reduced AFI and adverse perinatal outcome, and Bachhav and Waikar similarly identified low AFI at term as a predictor of poor perinatal results in an Indian population, observations of direct regional relevance to South Indian obstetric practice [2,3].

The management of oligohydramnios, however, remains a subject of ongoing debate. Isolated oligohydramnios at term has been examined as an indication for induction of labour, and a systematic review and meta-analysis suggested that induction in this setting is associated with an increased rate of caesarean delivery without a corresponding improvement in neonatal outcomes, raising questions about the balance between intervention and expectant management Even borderline reductions of amniotic fluid volume in the early third trimester and the late preterm period have been linked with adverse perinatal outcomes and with fetal intolerance of labour, suggesting that the spectrum of risk extends beyond the conventional diagnostic threshold. The prediction of successful labour induction, integrating maternal and ultrasound variables, is therefore of considerable practical importance when planning delivery in these pregnancies.[3]

Beyond amniotic fluid quantification, comprehensive fetal surveillance in high-risk pregnancies incorporates umbilical artery Doppler velocimetry, the non-stress test and, where indicated, assessment of fetal behaviour and neurobehavioural integrity. Abnormal Doppler indices, including a raised umbilical artery pulsatility index, the brain-sparing pattern and absent or reversed end-diastolic flow, reflect progressive placental compromise and correlate with the need for expedited delivery.[4] The wider context of high-risk pregnancy also encompasses infective aetiologies; TORCH and parvovirus B19 infections have been implicated in adverse reproductive outcomes in Indian women with high-risk pregnancies, the multifactorial nature of fetal compromise in this setting. Ultrasound additionally remains central to the evaluation of multiple gestations, in which amniotic fluid abnormalities carry distinct implications.[5]

Despite an extensive international literature, region-specific data describing the profile and outcomes of third-trimester oligohydramnios in South Indian tertiary care settings remain limited, and the heterogeneity of diagnostic thresholds and management pathways complicates the translation of published evidence into local practice. Against this background, the present hospital-based cross-sectional study was designed to characterise the sociodemographic and obstetric profile of women diagnosed with third-trimester oligohydramnios and to describe the associated feto-maternal outcomes, with the aim of informing local surveillance and delivery-planning strategies.

Materials and Methods

Study design and setting

This was a hospital-based, cross-sectional study conducted in the Department of Obstetrics and Gynaecology of [Institution Name], a tertiary care teaching hospital in [City, State], South India, over the [study period]. The study was designed and is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies.

Study population

The dataset comprised 280 women with a singleton pregnancy in whom third-trimester oligohydramnios was diagnosed. Oligohydramnios was defined as an amniotic fluid index (AFI) below 5 cm or a single deepest vertical pocket below 2 cm on obstetric ultrasonography, consistent with established terminology and management frameworks.[1,2] The third trimester was defined as a gestational age of 28 completed weeks or more. Women with multiple gestation and those with known major congenital fetal anomalies were considered outside the scope of this cohort.

Study variables and definitions

Data elements captured included sociodemographic characteristics (maternal age, residence, booking status), obstetric history (gravidity, parity, number of antenatal care visits), and the diagnostic profile (gestational age at diagnosis, AFI, single deepest pocket and severity category). Oligohydramnios severity was graded as mild, moderate or severe on the basis of the degree of amniotic fluid reduction. Associated maternal and fetal conditions recorded included maternal hypertension, premature rupture of membranes (PROM)/leaking per vaginum, gestational diabetes mellitus (GDM), postdated pregnancy and intrauterine growth restriction (IUGR)/fetal growth restriction (FGR) on ultrasound.

Fetal surveillance variables comprised umbilical artery Doppler findings (normal, raised pulsatility index, brain-sparing pattern, or absent/reversed end-diastolic flow), the non-stress test (NST) result (reactive, non-reactive or suspicious) and fetal presentation. The management approach was categorised as expectant management with surveillance, induction of labour after surveillance, or immediate delivery. Delivery outcomes included gestational age at delivery and mode of delivery. Neonatal and perinatal outcomes comprised birth weight, low birth weight (below 2500 g), preterm birth (below 37 weeks), NICU admission, neonatal respiratory distress, the five-minute Apgar score and the composite perinatal outcome.

Statistical analysis

All variables were analysed descriptively. Continuous variables are presented as mean +/- standard deviation where available, and categorical variables are presented as frequencies and percentages. Results are summarised in tables and figures. No inferential hypothesis testing was undertaken, consistent with the descriptive, intent of the study. Data were compiled and tabulated using standard statistical software.

Results

Sociodemographic and obstetric characteristics

A total of 280 women with third-trimester oligohydramnios were included. The mean maternal age was 29.3 +/- 7.0 years. Slightly over half of the women resided in urban areas (151, 53.9%) and the remainder in rural areas (129, 46.1%). Most pregnancies were booked (179, 63.9%), while 101 (36.1%) were unbooked. The mean gravidity was 2.1 and the mean parity was 1.0, with a mean of 5.3 antenatal care visits

(Table 1).

Diagnostic profile and associated conditions

The mean gestational age at diagnosis was 33.9 weeks. The mean AFI was 4.9 +/- 1.8 cm and the mean single deepest pocket was 1.9 cm. Oligohydramnios was graded as mild in 130 women (46.4%), moderate in 100 (35.7%) and severe in 50 (17.9%) (Figure 1). Among associated conditions, IUGR/FGR on ultrasound was the most frequent, documented in 26.4% of women, followed by maternal hypertension (15.0%), PROM/leaking per vaginum (11.8%), maternal GDM (7.5%) and postdated pregnancy (6.8%) (Table 2).

Fetal surveillance

Umbilical artery Doppler was normal in 187 women (66.8%). Abnormal Doppler patterns were present in the remainder: a raised umbilical artery pulsatility index in 59 (21.1%), a brain-sparing pattern in 26 (9.3%) and absent or reversed end-diastolic flow in 8 (2.9%), giving an overall abnormal Doppler rate of 33.2%. The NST was reactive in 218 women (77.9%), non-reactive in 43 (15.4%) and suspicious in 19 (6.8%). Cephalic presentation predominated (243, 86.8%), with breech presentation in 24 (8.6%) and transverse or oblique lie in 13 (4.6%) (Table 3).

Management approach

Expectant management with surveillance was the commonest strategy, adopted in 137 women (48.9%), followed by induction of labour after surveillance in 83 (29.6%) and immediate delivery in 60 (21.4%) (Table 3).

Mode of delivery

The mean gestational age at delivery was 37.4 weeks. Vaginal delivery occurred in 149 women (53.2%) and instrumental vaginal delivery in 11 (3.9%). Caesarean delivery was performed in 120 women, an overall caesarean rate of 42.9%, comprising emergency lower segment caesarean section (LSCS) in 83 (29.6%) and elective LSCS in 37 (13.2%) (Table 3). The leading indications for caesarean delivery were fetal distress (n = 55), failed induction (n = 22), severe oligohydramnios (n = 21), previous LSCS (n = 8), other indications (n = 8) and malpresentation (n = 6).

Intrapartum and maternal outcomes

Meconium-stained liquor was observed in 12.9% of women and intrapartum fetal distress in 21.4%. Maternal complications included postpartum haemorrhage (n = 16), prolonged labour (n = 13), wound infection (n = 5) and other complications (n = 19). The mean maternal hospital stay was 5.0 days (Table 4).

Tables

Table 1. Sociodemographic and obstetric characteristics of the study cohort (N = 280)

Characteristic	Value
Mean maternal age (years)	29.3 +/- 7.0
Residence - Urban	151 (53.9%)
Residence - Rural	129 (46.1%)
Booking status - Booked	179 (63.9%)

Booking status - Unbooked	101 (36.1%)
Mean gravidity	2.1
Mean parity	1.0
Mean antenatal care visits	5.3

Table 2. Diagnostic profile and associated conditions (N = 280)

Variable	Value
Mean gestational age at diagnosis (weeks)	33.9
Mean amniotic fluid index (cm)	4.9 +/- 1.8
Mean single deepest pocket (cm)	1.9
Severity - Mild	130 (46.4%)
Severity - Moderate	100 (35.7%)
Severity - Severe	50 (17.9%)
IUGR/FGR on ultrasound	74 (26.4%)
Maternal hypertension	42 (15.0%)
PROM/leaking per vaginum	33 (11.8%)
Maternal GDM	21 (7.5%)
Postdated pregnancy	19 (6.8%)

Table 3. Fetal surveillance, management approach and mode of delivery (N = 280)

Variable	Value
Doppler - Normal	187 (66.8%)
Doppler - Raised umbilical artery PI	59 (21.1%)
Doppler - Brain-sparing pattern	26 (9.3%)
Doppler - Absent/reversed end-diastolic flow	8 (2.9%)
NST - Reactive	218 (77.9%)
NST - Non-reactive	43 (15.4%)
NST - Suspicious	19 (6.8%)
Presentation - Cephalic	243 (86.8%)
Presentation - Breech	24 (8.6%)
Presentation - Transverse/oblique	13 (4.6%)
Management - Expectant with surveillance	137 (48.9%)
Management - Induction after surveillance	83 (29.6%)

Management - Immediate delivery	60 (21.4%)
Delivery - Vaginal	149 (53.2%)
Delivery - Emergency LSCS	83 (29.6%)
Delivery - Elective LSCS	37 (13.2%)
Delivery - Instrumental vaginal	11 (3.9%)
Total caesarean	120 (42.9%)
Mean gestational age at delivery (weeks)	37.4

Table 4. Neonatal/perinatal outcomes and maternal complications (N = 280)

Variable	Value
Mean birth weight (g)	2484
Low birth weight (<2500 g)	49.6%
Preterm birth (<37 weeks)	39.6%
NICU admission	31.4%
Neonatal respiratory distress	15.0%
Mean 5-minute Apgar score	8.3
Meconium-stained liquor	12.9%
Intrapartum fetal distress	21.4%
Live birth without major morbidity	192 (68.6%)
Live birth with morbidity	75 (26.8%)
Stillbirth	11 (3.9%)
Early neonatal death	2 (0.7%)
Perinatal mortality (stillbirth + early neonatal death)	13 (4.6%)
Maternal - Postpartum haemorrhage	16
Maternal - Prolonged labour	13
Maternal - Wound infection	5
Maternal - Other complications	19
Mean maternal hospital stay (days)	5.0

Neonatal and perinatal outcomes

The mean birth weight was 2484 g. Low birth weight (below 2500 g) was recorded in 49.6% of neonates and preterm birth (below 37 weeks) in 39.6%. NICU admission was required in 31.4% and neonatal respiratory distress occurred in 15.0%; the mean five-minute Apgar score was 8.3. In terms of the composite perinatal outcome, 192 neonates (68.6%) were live births without major morbidity, 75 (26.8%) were live

births with morbidity, 11 (3.9%) were stillbirths and 2 (0.7%) were early neonatal deaths. The perinatal mortality rate (stillbirth plus early neonatal death) was therefore 4.6% (13/280) (Table 4). The distribution of key feto-maternal outcomes is summarised in Figure 2.

Figures

Figure 1. Distribution of oligohydramnios severity among the study cohort (N = 280).

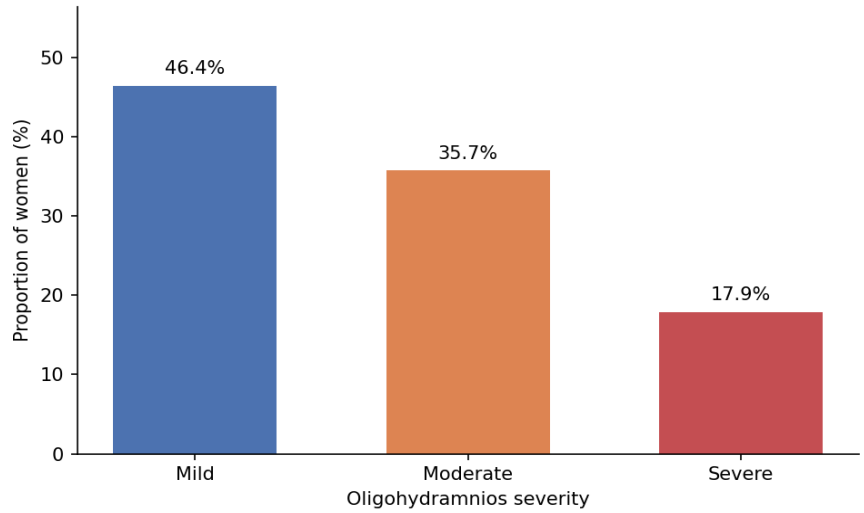
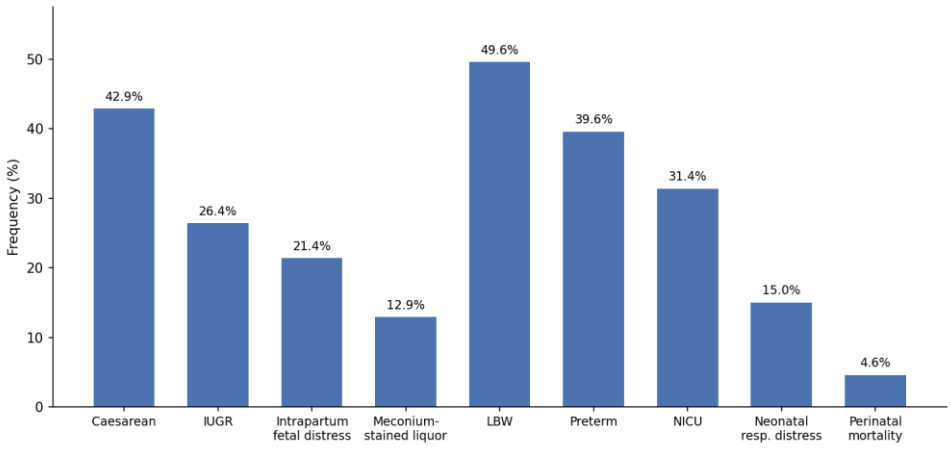


Figure 2. Frequency of key feto-maternal outcomes in the study cohort (N = 280).



Discussion

In this hospital-based cross-sectional analysis of 280 women with third-trimester oligohydramnios, reduced amniotic fluid volume was associated with a considerable burden of operative delivery and adverse neonatal outcomes. Almost half of the cohort had mild oligohydramnios, but a clinically important minority had moderate or severe disease, and the associated findings of fetal growth restriction, abnormal Doppler indices and a caesarean rate approaching 43% together portray oligohydramnios as a marker of the at-risk fetoplacental unit rather than an isolated sonographic curiosity[6].

The mean gestational age at diagnosis of 33.9 weeks locates the majority of these pregnancies in the early-

to-mid third trimester, a period during which the balance between the risks of prematurity and those of continued intrauterine exposure to an adverse environment is particularly delicate. The observation that IUGR/FGR coexisted in more than a quarter of women reinforces the well-recognised link between oligohydramnios and uteroplacental insufficiency and is consistent with reports that low amniotic fluid volume, even when borderline or low-normal in the early third trimester, is associated with adverse perinatal outcomes.[7] The predominance of expectant management with surveillance in our cohort reflects a pragmatic approach appropriate to a diagnosis frequently made remote from term.

The overall caesarean rate of 42.9%, with fetal distress the leading indication, aligns with the broader literature linking oligohydramnios to intrapartum compromise and operative delivery. The finding is particularly resonant with Indian data: Bhagat and Chawla reported a significant correlation between a reduced AFI and adverse perinatal outcome, and Bachhav and Waikar identified low AFI at term as a predictor of poor perinatal outcome in an Indian population, both of which carry direct regional relevance to the South Indian setting of the present study. At the same time, the systematic review and meta-analysis by Shrem and colleagues cautions that induction of labour for isolated oligohydramnios at term may increase the caesarean rate without commensurate neonatal benefit, a consideration reflected in our cohort, in which failed induction accounted for a substantial share of caesarean indications. These observations argue for careful case selection and for prediction models that integrate maternal and ultrasound variables when planning induction.[8]

Fetal surveillance findings in our cohort followed a coherent pathophysiological gradient. One-third of women demonstrated abnormal umbilical artery Doppler indices, ranging from a raised pulsatility index through the brain-sparing pattern to absent or reversed end-diastolic flow, the last representing the most advanced degree of placental compromise. This spectrum mirrors established understanding of progressive placental insufficiency and its relationship to expedited delivery, and the concordant proportion of non-reactive and suspicious NST results provides internal consistency to the surveillance picture. The relevance of fetal neurobehavioural and movement assessment in populations at risk of preterm birth has also been emphasised,[9] underscoring the value of a multimodal surveillance strategy in these pregnancies.

The neonatal outcomes observed, namely a low birth weight rate approaching 50%, a preterm birth rate of nearly 40% and NICU admission in almost one-third of neonates, are substantial and consistent with the recognised consequences of the oligohydramnios-growth-restriction complex. Borderline reductions in amniotic fluid volume have likewise been associated with adverse outcomes in late preterm pregnancies and with fetal intolerance of labour,[10] suggesting that the risk gradient we observed is unlikely to be confined to those meeting the strict diagnostic threshold. The perinatal mortality of 4.6% in this cohort, although modest in absolute terms, is an important signal in a population already selected for a high-risk sonographic finding and reinforces the rationale for structured surveillance and timely delivery.

The multifactorial aetiology of fetal compromise in high-risk pregnancies deserves emphasis. Infective causes, including TORCH and parvovirus B19 infections, have been associated with adverse reproductive outcomes in Indian women with high-risk pregnancies,[11] a further finding of regional relevance that highlights the importance of a comprehensive diagnostic evaluation when amniotic fluid abnormalities are detected. Ultrasound also remains fundamental to the evaluation of multiple gestations, in which amniotic fluid disturbances carry distinct diagnostic and prognostic implications, although such pregnancies were beyond the scope of the present singleton cohort. Collectively, these considerations situate oligohydramnios within a wider framework of high-risk pregnancy surveillance rather than as a stand-alone entity.

From a clinical standpoint, the findings support a management paradigm that combines standardised

amniotic fluid assessment, individualised risk stratification incorporating growth and Doppler parameters, and judicious timing of delivery. In the South Indian tertiary care context, where a considerable proportion of women present unbooked and antenatal surveillance may be limited, the early identification of oligohydramnios offers an actionable opportunity to intensify monitoring and to plan delivery at an appropriate centre [12].

Conclusion

In this cross-sectional analysis, third-trimester oligohydramnios was associated with a high frequency of fetal growth restriction, abnormal fetal surveillance findings, operative delivery and adverse neonatal outcomes, including a perinatal mortality of 4.6%. These patterns, consistent with the existing literature and with Indian regional data, reinforce the role of oligohydramnios as a marker of the compromised fetoplacental unit and underscore the value of standardised amniotic fluid assessment, structured multimodal surveillance and timely, individualised delivery planning.

REFERENCES

1. Moise KJ. Toward consistent terminology: assessment and reporting of amniotic fluid volume. Semin Perinatol. 2013;37(5):370-374.
2. Munn MB. Management of oligohydramnios in pregnancy. Obstet Gynecol Clin North Am. 2011;38(2):387-395.
3. Shrem G, Nagawkar SS, Hallak M, Walfisch A. Isolated oligohydramnios at term as an indication for labor induction: a systematic review and meta-analysis. Fetal Diagn Ther. 2016;40(3):161-173.
4. Bhagat M, Chawla I. Correlation of amniotic fluid index with perinatal outcome. J Obstet Gynaecol India. 2013;64(1):32-35.
5. Bachhav AA, Waikar M. Low amniotic fluid index at term as a predictor of adverse perinatal outcome. J Obstet Gynaecol India. 2013;64(2):120-123.
6. Hashimoto K, Kasdaglis T, Jain S, Atkins K, Harman CR, Baschat AA. Isolated low-normal amniotic fluid volume in the early third trimester: association with adverse perinatal outcomes. J Perinat Med. 2013;41(4):349-353.
7. Sahin E, Madendag Y, Tayyar AT, et al. Perinatal outcomes in uncomplicated late preterm pregnancies with borderline oligohydramnios. J Matern Fetal Neonatal Med. 2018;31(23):3085-3088.
8. Wood SL, Newton JM, Wang L, Lesser K. Borderline amniotic fluid index and its relation to fetal intolerance of labor: a 2-center retrospective cohort study. J Ultrasound Med. 2014;33(4):705-711.
9. Prado CAC, Araujo Junior E, Duarte G, Quintana SM, Tonni G, Cavalli RC, Marcolin AC. Predicting success of labor induction in singleton term pregnancies by combining maternal and ultrasound variables. J Matern Fetal Neonatal Med. 2016;29(21):3511-3518.
10. Kishore J, Misra R, Paisal A, Pradeep Y. Adverse reproductive outcome induced by Parvovirus B19 and TORCH infections in women with high-risk pregnancy. J Infect Dev Ctries. 2011;5(12):868-873.
11. Rosier-van Dunne FMF, van Wezel-Meijler G, Bakker MPS, Odendaal HJ, de Vries JIP. Fetal general movements and brain sonography in a population at risk for preterm birth. Early Hum Dev. 2010;86(2):107-111.
12. Morin L, Lim K. Ultrasound in twin pregnancies. J Obstet Gynaecol Can. 2011;33(6):643-656.