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Anomalies Detected in Third Trimester – A prospective descriptive study

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ABSTRACT

Objectives: To detect the incidence of structural anomalies diagnosed by third trimester ultrasound after a normal anomaly scan and classify them according to major organ systems and types.

Materials and Methods: It was a prospective descriptive study of antenatal women who had a negative second trimester anomaly screening with a newly detected fetal anomaly in the routine third trimester ultrasound conducted in the Department of Obstetrics and Gynaecology of Government Medical College, Kozhikode over a period of 18 months from September 2020 to February 2022. These women were followed-up till delivery and neonatal outcomes were measured.

Results: The incidence of congenital anomalies detected in third trimester was 0.7% (110 cases in 15,560 deliveries). Majority of them were of urogenital system (32.7%) followed by cardiovascular system (21.8%). Commonest anomaly detected was hydronephrosis, followed by congenital diaphragmatic hernia, ventricular septal defect, ventriculomegaly and corpus callosal agenesis.

Conclusion: The ultrasound examination of third trimester is of additional benefit and can detect previously undiagnosed fetal anomalies especially development dependant anomaly like agenesis of corpus callosum and progressing anomalies like gastrointestinal and skeletal anomaly. This can help in subsequent management including counselling of parents, planning of place, time, mode of delivery and also to plan neonatal interventions.

Keywords: fetal structural abnormalities, third trimester ultrasound, neonatal morbidity.

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Introduction

Major congenital anomalies occur in 3 to 4% and minor anomalies occur in 7% to 10% of the population. Anomalies are associated with increased risk of aneuploidy, genetic syndromes, and poor neonatal outcome[1]. Ultrasound scan is the primary imaging modality for the detection of congenital anomalies. Ultrasound scan at 11 – 14 weeks of gestation not only assess the risk of chromosomal abnormalities by measuring nuchal translucency but also detect major fetal malformations at this gestational age. The targeted anomaly scan is performed between 18 – 23 weeks. The overall detection rate for structural anomalies with nuchal translucency (NT) scan and second trimester ultrasound is approximately 68%. Third-trimester ultrasound scan is mainly used to assess fetal growth, amniotic fluid index and fetal wellbeing. Rarely previously undetected or late evolving fetal anomalies are incidentally detected in third trimester ultrasound. Anomalies like small ventricular septal defect may remain undiagnosed in the first-and second-trimester scans[2]. Malformations of central nervous system like agenesis of corpus callosum, gastrointestinal anomalies like bowel obstruction and atresia, some nonlethal skeletal dysplasias will develop and get manifested during the late second or third trimester[3]. Our institutional protocol includes routine ultrasonogram for all pregnant women in the last trimester to assess fetal growth, preferably between 32 – 34 weeks and even earlier, or serially if growth restriction is suspected. The objective of this study was to find out the incidence of congenital malformations detected by third trimester ultrasound scan in antenatal women with normal first and second trimester scans and to identify the major organ systems affected by late evolving anomalies. It was also aimed to find out the neonatal morbidity in the study population.

Materials and Methods

This was a prospective descriptive study conducted in the Department of Obstetrics and Gynaecology and Neonatal unit in the Institute of Maternal and Child Health of Government Medical College Kozhikode in Kerala, India from September 2020 to February 2022 after getting Institutional Ethics Committee approval. Antenatal women with singleton pregnancies, having normal NT and targeted anomaly scans, with newly detected fetal anomalies in ultrasonogram performed after 28 weeks for fetal growth assessment, were included in this study. Informed consent was obtained before recruiting each woman into the study. Antenatal women with positive aneuploidy screening, fetal anomalies detected in NT or second trimester scan and multiple pregnancy were excluded.

Antenatal women satisfying the inclusion criteria were identified. The type of anomaly detected was recorded. Detailed history was taken using a proforma which included obstetric score, maternal complications, past obstetric history, family history of anomalies, intake of any drugs during pregnancy or any maternal infection. They were followed-up till delivery and the findings were confirmed postnatally. Fetal outcomes were measured in terms of neonatal intensive care unit (NICU) admission, neonatal morbidity, intrauterine demise (IUD), neonatal death (NND) and any surgery/ intervention in the newborn period. Data was entered in Microsoft Excel worksheet and was analysed using appropriate statistical method.

Results

Total number of births during the study period was 15,560 and total number of congenital anomalies detected by antenatal ultrasonogram were 353 (2.26%). 110 fetal anomalies were detected after 28 weeks of gestation with an incidence of 0.7% of the total births. This accounted to 31.16% of the total anomalies.

Table 1 shows system wise distribution of anomalies detected by third trimester scan. Renal and urogenital anomalies were the commonest (32.7%) followed by cardiovascular anomalies (21.8%).

Table 1. System wise distribution of anomalies.

System	Number	Percentage	Gestational age at diagnosis (in weeks)	
			Mean	Range
Central nervous system	18	16.3	34	28 -38
Cardiovascular system	24	21.8	33.4	30 -37
Renal and Genito-urinary system	36	32.7	34.5	29 -38
Gastrointestinal system	9	8.1	34.2	31 -37
Thoracic anomalies	12	10.9	33.2	30 -36
Skeletal system	8	7.2	32.3	29 -36
Others	3	2.7	32.6	31 -34
Total	**110**			

The different central nervous system (CNS) anomalies detected in the third trimester are shown in Table 2. CNS anomalies constituted 16.3% of anomalies detected by third trimester ultrasound, of which ventriculomegaly and dysgenesis of corpus callosum were the most common. The median gestational age of detection of CNS anomalies was 34 weeks (range 28–38). Follow-up was advised in majority of the babies after postnatal magnetic resonance imaging (MRI) confirmation of sonographic findings. Babies with fetal microcephaly underwent karyotyping and was normal. Toxoplasma gondii, rubella, cytomegalovirus and herpes simplex virus (TORCH) screening was also negative in them. Mother of one baby with microcephaly was positive for cytomegalovirus immunoglobulin M (IgM) antibodies. Mother was toxoplasma IgM positive in neonate with bilateral ventriculomegaly with intra parenchymal haemorrhage. The baby with gross hydrocephalus had neonatal death.

Table 2. Central nervous system anomalies.

Central nervous system anomalies	Number
Mild ventriculomegaly	3
Moderate ventriculomegaly	1
Arachnoid cyst	1
Blakes pouch cyst	1
Hydrocephalus	2
Absence or dysgenesis of corpus callosum	4
Cerebellar hypoplasia	1
Microcephaly	3
Schizencephaly	1
Bilateral ventriculomegaly with intra parenchymal hemorrhage	1
Total	**18**

24 cardiovascular anomalies were detected in the third trimester (21.8%) as seen in Table 3, out of which ventricular septal defect (VSD) (4 cases) was the most common anomaly. Two babies who had transposition of great arteries (TGA) with VSD were advised corrective surgery after 6 weeks. The 3 babies with tetralogy of Fallot (TOF) were advised corrective surgery later as there was no cyanotic spell or saturation fall in the neonatal period.

Table 3. Cardiovascular system anomalies.

Cardiovascular system anomalies	Number
Ventricular septal defect	4
Tetralogy of Fallot	3
Cardiogenic hydrops	1
Hypoplastic right heart syndrome with pulmonary valve atresia	1
Fetal cardiomegaly	1
Fetal pericardial effusion	2
Transposition of great arteries (TGA) with ventricular septal defect	2
Transposition of great arteries	1
Ebstein anomaly	1
Coronary sinus atrial septal defect	1
Double outlet right ventricle	1
Right sided aortic arch dilatation	2
Cardiac rhabdomyoma	2
Hypoplastic left heart syndrome (HLHS)	1
Hypoplastic pulmonary artery	1
Total	**24**

Antenatal sonographic finding of Ebstein anomaly was dilated right atrium with mild tricuspid regurgitation; postnatal echo showed very small atrialised right ventricle with patent ductus arteriosus (PDA) and dilated right atrium. Baby was managed postnatally with prostaglandin infusion and was advised tricuspid valve corrective surgery later. Baby with double outlet right ventricle (DORV) had severe pulmonary artery hypertension in the neonatal period and was planned for pulmonary artery banding at 6 weeks. The baby with hypoplastic right heart syndrome with pulmonary valve atresia was referred to higher cardiology centre immediately after birth and underwent Blalock-Taussig shunt on 4th postnatal day.

Neonatal death occurred in babies with TGA, hypoplastic left heart syndrome and cardiogenic hydrops. TGA baby also had anal atresia which was diagnosed postnatally. Other babies were kept under follow-up.

Gastrointestinal anomalies as seen in Table 4 constituted only 8.1% of the third trimester anomalies of which commonest was duodenal atresia (n = 3). One baby with duodenal atresia was detected to have trisomy 21 on postnatal evaluation. Two babies with duodenal atresia underwent open duodeno-duodenostomy. One antenatally detected case of duodenal atresia was diagnosed as gut malrotation in the postnatal period and baby underwent Ladds procedure.

Table 4. Gastrointestinal system anomalies.

Gastrointestinal system anomalies	Number
Esophageal atresia	1
Duodenal atresia	3
Jejunal atresia	1
Choledochal cyst	2
Cystic biliary atresia	1
Fetal intestinal obstruction	1
Total	**9**

The baby with esophageal atresia, detected in the early third trimester due to absence of stomach bubble and polyhydramnios expired on third postnatal day. In the fetus with jejunal atresia, antenatal ultrasound showed polyhydramnios with dilated stomach and upper gastrointestinal tract. Baby developed abdominal distension and bilious vomiting in the postnatal period and underwent emergency exploratory laparotomy with jejunal resection, but expired postoperatively.

One antenatally detected choledochal cyst was a transient finding which was not seen in the postnatal period. Other case of choledochal cyst was confirmed postnatally and was advised Roux-en-y choledocho-jejunostomy after 6 weeks. Baby with intestinal obstruction underwent exploratory laparotomy, resection and ileo-colic anastomosis and the cause for obstruction was meconium ileus. Kasai procedure was advised after one month in the baby with cystic biliary atresia.

Urogenital system was the most affected system (36 cases) of which 24 were varying degrees of hydronephrosis as shown in Table 5. All newborns with antenatal hydronephrosis underwent postnatal evaluation and Ultrasound of the Kidneys, Ureters & Bladder (KUB). Babies with posterior urethral valve underwent cystoscopy and posterior urethral valve (PUV) fulguration. 8 cases of mild hydronephrosis were a transient finding which was not seen postnatally.

Table 5. Urogenital anomalies.

Urogenital Anomalies	Number
Fetal ectopic kidney	2
Distended fetal urinary bladder	2
Mild hydronephrosis (renal pelvis dilatation 7-9 mm)	15
Moderate hydroureteronephrosis (renal pelvis dilatation 10 -15 mm)	3
Gross hydroureteronephrosis (renal pelvis dilatation > 15 mm) with posterior urethral valve	6
Polycystic kidney disease	1
Single umbilical artery, bilateral gross renal hydronephrosis.	1
Fetal congenital mega ureter	2
Ovarian cyst	1
Fetal bilateral hydrocoele	1
Duplex kidney	2
Total	**36**

Some babies with hydroureteronephrosis (HUN) had VUR (vesicoureteric reflex) and were given prophylactic antibiotics and strict follow-up was advised. Other anomalies like anal atresia, ambiguous genitalia and para-ureteric diverticulum and coarctation of aorta were detected postnatally in the baby with gross HUN and single umbilical artery.

There were 8 skeletal system anomalies of which 4 were congenital talipes equinovarus (CTEV), 3 were achondroplasia and one Binders syndrome with nonlethal skeletal dysplasia. Babies with CTEV were advised serial casting as per Ponsetti technique. All other cases were advised follow-up.

Of the thoracic anomalies detected in the third trimester, congenital diaphragmatic hernia (CDH) was the commonest as shown in Table 6. Five babies with CDH underwent surgical repair of which one expired postoperatively. Other three babies expired before surgery, two due to severe persistent pulmonary hypertension and one due to pneumothorax with metabolic acidosis.

Table 6. Thoracic anomalies.

Thoracic anomalies	Number
Congenital diaphragmatic hernia	8
Congenital pulmonary airway malformation (CPAM)	2
Pulmonary hypoplasia	1
Eventration of left diaphragm	1
Total	**12**

Baby with eventration of left diaphragm underwent left subcostal incision laparotomy plus plication. Both babies with congenital pulmonary airway malformation (CPAM) had type 1 malformation and had no evidence of hydrops or lung hypoplasia and were advised follow-up. A case of pulmonary hypoplasia with severe oligohydramnios was detected at 29 weeks while ultrasound evaluation of antepartum hemorrhage (APH). This fetus had intrauterine demise at 30 weeks.

Other anomalies detected in third trimester were one case each of cleft lip, sacrococcygeal teratoma and fetal neuroblastoma. Baby with sacrococcygeal teratoma had only sacral pit with deficient levator ani muscle and rectal herniation and corrective surgery was advised.

Majority (73.6%) of the fetal anomalies were detected in women between 20 to 30 years of age. There was only one mother above 40 years of age with USG showing gross HUN with single umbilical artery. 35.4 % of study population were primigravida and 64.5% were multigravida. 24.5% of the mothers (n = 27) had history of previous abortion and 3.6% (n = 4) had previous still birth or neonatal deaths. Three mothers had previous anomalous babies. Baby with hypoplastic right heart syndrome was the third child of that mother whose second child also had congenital heart disease (VSD)[11]. mothers had family history of anomalous babies.

Maternal complications in the study population are as seen in Table 7. Out of the total 110 cases 30.8% were diabetic. One patient each had toxoplasmosis and cytomegalovirus infection antenatally. Two mothers were taking teratogenic drugs like warfarin; sodium valproate and the anomalies were Binder's facies and mild ventriculomegaly respectively. Polyhydramnios was present in 13.6 %, oligohydramnios in 14.5% and normal amniotic fluid volume in 71.8% of cases.

Table 7. Maternal complications.

Maternal complications	Number	Percentage
Overt diabetes mellitus	5	4.5
Gestational diabetes mellitus	29	26.3
Congenital heart disease	2	1.8
Teratogenic drug intake	3	2.7
Maternal TORCH infection	2	1.8
Hypothyroidism	24	21.8
Uncomplicated	45	40.9

TORCH: Toxoplasma gondii, rubella, cytomegalovirus and herpes simplex virus

Of the total cases, 70.9% anomalous babies were delivered vaginally and 29.09% by cesarean section (CS). Most of the CS were done for obstetric indications. The mean gestational

age at the time of delivery was 37.4 weeks with standard deviation (SD) of 2.59.

64 were male (58.2%) and 45 were female (40.9%). One baby was born with ambiguous genitalia. 73 babies had low birth weight (66.3%), of which 20.9% were very low birth weight babies. Mean birth weight was 2.2 kg (SD 0.77). Mean Apgar score at 1 minute and 5 minutes were 7.63 (SD 1.59) and 8.66 (SD 1.24) respectively. 61.8 % of babies needed NICU admission for further evaluation and management. 20% babies required surgical intervention in the neonatal period and 10% babies were advised surgical correction later. 9% babies became NND. Table 8 shows the procedures and interventions done postnatally.

Table 8. Neonatal procedure /intervention.

System	Total number	Anomaly corrected with surgery	Procedure	Observation/ follow-up	NND/IUD	Surgical correction later
CNS	18	nil	nil	17	1	nil
CVS	24	Right hypoplastic heart syndrome	Blalock Taussing shunt	20	3	a) TGA with VSD (2 cases) b) TOF (3 cases) c) Ebstein anomaly d) DORV
GIT	9	a) Duodenal atresia (2 cases)	open duodeno-duodenostomy	3	2	a) Choledochal cyst (6 weeks) b) Biliary atresia
		b) Gut malrotation	Ladds procedure			
		c) Jejunal atresia	Laparotomy with jejunal resection			
		d) Intestinal obstruction	Laparotomy with bowel resection and anastomosis			
Thoracic anomaly	12	CDH (5 cases)	Laparotomy and CDH repair	2	5	nil
		Left eventration of diaphragm	Left subcostal incision laparotomy plus plication			
Skeletal	8	nil	CTEV managed with serial casting	8		
Renal and genitourinary	36	Posterior urethral valve (6 cases)	Cystoscopy with PUV fulguration	30		
Others	3	Nil	nil	3	nil	a) Sacrococcygeal teratoma b) Cleft lip

NND: neonatal death, IUD: intrauterine demise, CNS: central nervous system, CVS: chorionic villus sampling, TGA: transposition of great arteries, VSD: ventricular septal defect, TOF: tetralogy of fallot, DORV: double outlet right ventricle, GIT: gastro-intestinal tract, CDH: congenital diaphragmatic hernia, CTEV: congenital talipes equinovarus, PUV: posterior urethral valve

Discussion

This study emphasizes the role of routine third trimester ultrasound in detecting late evolving and previously undiagnosed fetal anomalies. The total incidence of congenital anomalies in this study was 2.26% and anomalies detected by third trimester

ultrasound was about one third of the total (0.70%). In a study conducted by Ficara et al, the incidence of fetal anomalies was 1.9% and 0.5% were detected for the first time at 35–37 weeks[4]. According to Manegold et al, the incidence of congenital anomalies was 1.9% and anomalies detected in third trimester was 0.87%[5]. Gonzalez et al found that of the total anomalies, 31.9% were diagnosed at 11-14 weeks and 36.8% new fetal malformations were found in second trimester and additional 31.3% structural abnormalities were found in the routine third trimester ultrasound scan[6]. This was similar to our study, where 31.1% anomalies were detected after 28 weeks. Drukker et al concluded that a congenital malformation was incidentally detected in 1 in 300 women in third-trimester growth scan, who have had a previous normal first and second trimester scan[7].

According to this study urogenital anomalies were the most common anomaly detected in third trimester (32.7%), followed by cardiovascular system (21.8%), CNS (16.3%) and thoracic anomalies (10.9%). In the study by Ficara et al, 50% of anomalies in third trimester was in genito-urinary system and 27.5% in CNS[4]. According to Drukker et al, genitourinary system anomalies were the commonest followed by central nervous system[7]. Gonzalez et al found that structural abnormalities detected in the routine third trimester ultrasound were mainly in the urogenital system, followed by cardiovascular system and central nervous system[6].

Hydronephrosis was the commonest anomaly detected by third trimester ultrasound with an incidence of 1.2 per 1,000 births. In majority of the cases the condition remained stable or resolved in the neonatal period. Studies by Ficara et al and Drukker et al also showed that the commonest anomaly detected in the third trimester was hydronephrosis[4, 7]. According to Shipp et al, a new renal abnormality was detected in 1.8% of the third trimester scans when second trimester sonographic examination was normal[8]. Manegold et al found newly detected congenital structural abnormalities in the third trimester, of which 18 were urogenital anomalies mainly hydronephrosis[5].

The most common cardiac anomaly in this study was VSD. Gestational diabetes mellitus was seen in 29.16% of the mothers with babies having cardiac anomalies. According to Manegold et al, the second largest group of anomalies detected in third trimester was cardiovascular system mainly small muscular VSD[5]. In the study by Ficara et al of the cases of ventricular septal defect, 18.3% were first diagnosed in the third trimester and 4.2% were diagnosed postnatally[4]. Cardiovascular anomalies like TOF, typically diagnosed in the mid trimester scans (18 – 22 weeks) were detected later in our study. This delayed detection may be attributed to the limited access to 3D or 4D ultrasonography for anomaly screening and fetal echocardiography being restricted to high-risk cases. Additionally, maternal obesity might have contributed to the late detection of these anomalies.

CNS anomalies detected after 28 weeks was 16.3% in this study of which dysgenesis of corpus callosum and ventriculomegaly were the commonest. In a study conducted by Yinon et al, 47 women were diagnosed with CNS anomalies after 24 weeks of gestation which included intracranial cysts, mild ventriculomegaly, absence or dysgenesis of the corpus callosum, and intracerebral haemorrhage[9]. The study by Vijayakumar et al showed that more than 50% anomalies first detected in the third trimester were in central nervous system and urogenital system[10].

Duodenal atresia was the commonest gastrointestinal anomaly detected. Ficara et al found that the most common gastrointestinal abnormality seen at 35–37 weeks was an abdominal cyst[4]. In this study, most of the GI anomalies were correctable with survival in 4 out of 5 newborns who underwent immediate surgery. Even though mortality rate of bowel atresia and anorectal malformations is very high, their outcome may improve, by promoting antenatal diagnosis, early diagnostic and therapeutic management[11].

Vijayakumar et al detected a case of eventration of diaphragm in third trimester with unremarkable postnatal period[10]. In this study, 50% of babies with CDH survived after surgical repair. The study by Chukwu et al showed that estimates of postnatal survival of CDH babies was 70%[12]. This emphasize the importance of antenatal detection of structural anomalies even in late pregnancy which helps parents and doctors to plan delivery and further management of the newborn.

CTEV was the most common skeletal anomaly followed by achondroplasia. Schram et al detected four cases of achondroplasia in third trimester[3]. There was one baby with Binders syndrome in whom mother had history of deep vein thrombosis and warfarin intake in first trimester.

73.6% of study population were between 20 -30 years of age and 20% were above 30 years. This was comparable to the study by Desai and Desai, where women less than 20 years had no babies with congenital anomalies and 73% of mothers with anomalous babies were between 20 and 30 years and 26.7% were above 30 years[13]. Other studies by Taksande et al and Desai et al also found statistically significant association of increasing maternal age and congenital anomalies[14,15].

24.5% of study population had history of previous abortion and 3.6% had previous still birth or neonatal deaths and 2.7% had previous anomalous babies. Thaddanee et al concluded that congenital anomalies in newborns were significantly associated with maternal factors like maternal age, consanguinity, previous child with malformation, history of previous abortion and severe anemia[16].

13.6% of study population had polyhydramnios and 14.5% had oligohydramnios. Wills et al concluded that the common obstetric problems identified in congenital anomalies included oligohydramnios and polyhydramnios[16].

As in studies by Desai et al and Wills et al which showed increased incidence of anomalies among male babies[13, 17]. 58.1% of babies in this study were males. According to Daizy et al, congenital malformation and gender was found to be statistically significant with male preponderance[18]. The reason for greater numbers in male population is thought to be caused by the fact that male embryos are more vulnerable to oxidative stress which could partly be explained by the biological fragility of the male embryo. Oxidative stress has been implicated in the pathogenesis of several congenital anomalies[19].

Our institution being a tertiary care centre, all the referred cases with anomalies detected in third trimester could be included in the study. Serial ultrasound scans from the fetal medicine unit and postnatal evaluation and interventions from the neonatology and paediatric surgery department could be closely followed-up. Limitation of the study was that some of the major anomalies detected in the third trimester may be due to improper targeted anomaly scan.

Conclusion

It is essential to include third trimester scan in our regular antenatal protocol and should be considered as "more than growth scan". Anomalies detected in third trimester will have lot of bearing on psychological, ethical, social and legal implications. Counselling these couple is crucial and should include selection of timing and place of delivery and postnatal investigations. It also helps to plan for neonatal intervention which potentially improve the postnatal outcome.

Potential conflicts of interest

The authors declare no conflicts of interest.

References

1. Vikram D, Pushpa C. Congenital malformations in rural Maharashtra. Indian Pediatr 2000;37:998-1001.
2. Alfirevic Z. Failure to diagnose a fetal anomaly on a routine ultrasound scan at 20 weeks. Ultrasound Obstet Gynecol 2005;26:797–8.
3. Schramm T, Gloning KP, Minderer S, Daumer-Haas C, Hörtnagel K, Nerlich A, et al. Prenatal sonographic diagnosis of skeletal dysplasias. Ultrasound Obstet Gynecol 2009;34:160-70.
4. Ficara A, Syngelaki A, Hammami A, Akolekar R, Nicolaides KH. Value of routine ultrasound examination

at 35–37 weeks' gestation in diagnosis of fetal abnormalities. Ultrasound Obstet Gynecol 2020;55: 75-80.3
5. Manegold G, Tercanli S, Struben H, Huang D, Kang A. Is a routine ultrasound in the third trimester justified?–Additional fetal anomalies diagnosed after two previous unremarkable Ultrasound examinations. Ultraschall Med 2011;32:381-6.
6. Gonzalez-Aguero R, Oros D, Tajada M, Sobreviela M, Sanz A, Ernesto F. Splement: Abstracts of the 24th World Congress on Ultrasound in Obstetrics and Gynecology, Barcelona, Spain. Ultrasound Obstet Gynecol 2014;44:14-17.
7. Drukker L, Cavallaro A, Salim I, Ioannou C, Impey L, Papageorghiou AT. How often do we incidentally find a fetal abnormality at the routine third-trimester growth scan? A population-based study. Am J Obstet Gynecol 2020;223:919-e1.
8. Shipp TD, Nguyen HT, Bromley B, Lyons JG, Benacerraf BR. Importance of renal abnormalities first identified in the third trimester after normal findings on a detailed second trimester structural fetal survey. J Ultrasound Med 2011;30:1567-72.
9. Yinon Y, Katorza E, Nassie DI, Ben-Meir E, Gindes L, Hoffmann C, Lipitz S, Achiron R, Weisz B. Late diagnosis of fetal central nervous system anomalies following a normal second trimester anatomy scan. Prenat Diagn 2013;33:929-34.
10. Vijaykumar M, Shailaja M, Nilofar M, Kulkarni N. Detection of structural fetal anomalies in third trimester which usually remains undetected in second trimester. Int J Applied Res 2017;3:158-62
11. Camara S, Fall M, Mbaye PA, Wese SF, Lo FB, Oumar N. Congenital malformations of the gastrointestinal tract in neonates at aristide le dantec university hospital in Dakar: Concerning 126 cases. Afr J Pediatr Surg 2022;19:133.
12. Chukwu J, Iro C, Donoghue V, McCallion N, Murphy JF, Quinn F, et al. Congenital diaphragmatic hernia: neonatal outcomes following referral to a paediatric surgical centre. Irish Med J 2009;102:260-1.
13. Desai N, Desai A. Congenital anomalies, a prospective study at Bombay hospital. Bombay Hosp J 2006; 48:442-5.
14. Taksande A, Vilhekar K, Chaturvedi P, Jain M. Congenital malformations at birth in Central India: A rural medical college hospital based data. Indian J Hum Genet 2010;16:159.
15. Thaddanee R, Patel HS, Thakor N. A study on incidence of congenital anomalies in newborns and their association with maternal factors: a prospective study. Int J Contemp Pediatr 2016;3:579-82.
16. Wills V, Abraham J, Sreedevi NS. Congenital anomalies: the spectrum of distribution and associated maternal risk factors in a tertiary teaching hospital. Int J Reprod Contracept Obstet Gynecol 2017;6: 1555-61.
17. Daizy NG, Pradhan A. Clinical profile of neonates with congenital malformation born at a tertiary teaching hospital in a Himalayan state of India. Int J Contemp Pediatr 2019;6:87-94.
18. Mohammed YA, Shawky RM, Soliman AS, Ahmed MM. Chromosomal study in newborn infants with congenital anomalies in Assiut University hospital: Cross-sectional study. Egypt J Med Hum Genet 2011;12: 79-90.