Research Article

Evaluation the Prevalence of association between cranial congenital fetal anomalies and renal congenital fetal anomalies

Hossam El-Din Shawky, Mohamed E. Ali, Saad A. Ahmed El-Gelany, Mahmoud H. Ibrahim and Mohammed Y. Mohammed Ahmed
Department of Obstetrics and Gynecology, El-Minia Faculty of Medicine

Abstract
The purpose of this study evaluated the Percentage of association between cranial congenital fetal anomalies and extra-cranial congenital fetal anomalies. Patients and methods: The study conducted for two years in Minia University Fetomaternal Unit 2018-2019, We examined 2091 cases referred to us from all Minia regions because of congenital anomalies risk ,263 cases detected carrying different types and numbers of anomalies . **Results:** The number of congenital anomalies in this study was 263 with percentage (12.5%) but when these number of congenital anomalies linked to all Antenatal care cases that attached to Minia University hospital in two years with average number (40,000) cases in two years we found percentage was (0.65%).In this study the top affected system was the central nervous system with percentage 32.7% ,then the renal system 18.6%, then the cardiovascular system 14.8% ,then the chest 8%, then the musculoskeletal system 7.2% then hydrops fetalis 6.5% followed by GIT 5.7% then the neck 5.3%, followed by face which was the least prevalent Anomalies which the percentage was1.1%. **Conclusions:** We found that CNS was the most common system affected and the most rare system affected was the face. The ratio of congenital anomalies in Minia Governorate was 0.65% Which was less than the global percentage.
Key words: Prevalence, cranial, Anomalies,CNS.

Introduction
Congenital mutations influence roughly 2-3% of all live births each year (Whiteman et al., 1994). Innate brain inconsistencies, whether they are disconnected (single) or portion of disorders, are a common cause of therapeutic mediation, long-term ailment, and passing.

The neonatologist or perinatologist regularly is the primary individual to recognize essential assessments and administration and to clarify the cause of the peculiarities and the forecast for the child to the guardians. Diverse inconsistencies may be classified as distortions, distortions and disturbances (Smith & Smith 2006). Co-existent bunch of peculiarities is portrayed as polytopic field imperfection, arrangement, disorder and affiliation. Other classification may be major and minor inconsistencies. Major irregularity is one with a therapeutic, surgical or corrective significance and with affect on dreariness and mortality. Minor inconsistency is one that does not have a genuine surgical, restorative or restorative importance and does not influence ordinary life anticipation or way of life.

Central anxious framework (CNS) irregularities are the moment most visit genuine intrinsic irregularity, after inherent heart malady. There's critical variety in frequencies of congenital CNS inconsistencies in several districts of world counting Europe (Barkovich, 2005). Innate CNS irregularities are a heterogeneous malady for which hereditary, irresistible, teratogenic and neoplastic causes have been embroiled (Barkovich et al., 2005).

The prevalence of birth defects is comparable all over the world; about 3% in the United States, 2.5% in India] and 2% to 3% in the United Kingdom the most prevalent conditions include congenital heart defects, orofacial clefts, Down syndrome and neural tube defects (Canfield et al., 2006).

The diagnostic ability of ultrasound is well established by a number of studies. Detection of fetal abnormalities depends on a number of factors including the nature or type of

abnormality, sophistication of equipment and experience of operator. (Patel et al., 2005).

Neonatal screening includes clinical examination and screening for disorders of the blood, metabolism and hormone production. Screening for deafness and heart defects, as well as early detection of congenital anomalies, can facilitate life-saving treatments and prevent progression towards some physical, intellectual, visual, or auditory disabilities. In some countries, babies are routinely screened for abnormalities of the thyroid or adrenal glands before discharge from the maternity unit (Leong et al., 2014).

Patients and methods

The study was carried out in obstetrics and Gynecology Department, Minia maternity and children university hospital, Minia governorate, Egypt during the period from The 1st May 2017 to the 1st of May 2019; Ethical approval of the study was obtained from the local ethical committee of the department.

Full history taking:-

Personal history: Name, age, residence, education, work, consanguinity

Obstetric history: Parity, gestation, Duration of marriage, mode of previous deliveries.

History of diseases: Diabete (anemia, hemorrhagic diseases, cardiac diseases, severe chronic allergic conditions, hepatic or renal diseases).

Surgical history: history of previous operation or previous caesarian section or exploration (vaginal or abdominal), Dtailed anatomy scan

Equipments used:

Microsoft programs and preprinted Performa were used to collect data.

Outcome measures:

Congenital anomal description and their number and association

Data statistical analysis:

Data analysis was done using the statistical method SPSS version 20(Statistical Package for Social Sciences).

Mean and standard deviation were used for quantitative data description and proportion for qualitative data.

Results

The prevalence of CFMS in Minia university in two years (2017-2018) was 12.5% with total number of cases 2091.the total prevalence as regard to the total ANC cases attached to the university hospital was 0.65%.

The possible risk factors in fetal anomalies in these study were parenteral consanguinity, Perinatal materanal infection or administration of drugs, as well as perinatal animal breeding.

The most common affected system is the central nervous system with percentage 32.7% followed by the renal system 18.6% followed with the cardiovascular system 14.8% followed by the chest 8% followed by the musculoskeletal system 7.2% followed by hydrops foetalis 6.5% followed by GIT 5.7% followed by neck 5.3% followed by face which is the least prevalent anomalies with percentage 1.1%.

Table (1): Factors affecting the prevalence of anomalies

		N=263
Gestational age	**Range** **Mean ± SD**	(13-41) 28.4±8.9
Mode of Delivery	**SVD**	159(60.5%)
	CS	104(39.5%)
Gender	**Male**	132(50.2%)
	Female	131(49.8%)
Viability	**Alive**	208(79.1%)
	Dead	55(20.9%)
Parity	**PG**	135(51.3%)
	MG	128(48.7%)
Outcome	**PT**	165(62.7%)
	FT	98(37.3%)

Table (2): Show number of anomalies

No. of Anomalies	1	178(67.7%)
	2	85(32.3%)

Table (3): Affected system prevalence

		N=263
Affected system	**Hydrops**	17(6.5%)
	CNS	86(32.7%)
	Chest	21(8%)
	CVS	39(14.8%)
	Musculoseletal	19(7.2%)
	Renal	49(18.6%)
	GIT	15(5.7%)
	Face	3(1.1%)
	Neck	14(5.3%)

Table (4): Mode of Delivery statistical significance

		Mode of Delivery		**P value**
		SVD N=159	**CS N=104**	
Affected system	**Hydrops**	2(1.3%)	15(14.4%)	<0.001*
	CNS	47(29.6%)	39(37.5%)	0.180
	Chest	16(10.1%)	5(4.8%)	0.124
	CVS	18(11.3%)	21(20.2%)	0.048*
	Musculoseletal	17(10.7%)	2(1.9%)	0.007*
	Renal	38(23.9%)	11(10.6%)	0.007*
	GIT	6(3.8%)	9(8.7%)	0.095
	Face	3(1.9%)	0(0%)	0.280
	Neck	12(7.5%)	2(1.9%)	0.047*

Table (5): Outcome statistical significance

		Outcome		P value
		PT N=165	FT N=98	
Affected system	Hydrops	9(5.5%)	8(8.2%)	0.388
	CNS	61(37%)	25(25.5%)	0.055
	Chest	17(10.3%)	4(4.1%)	0.072
	CVS	17(10.3%)	22(22.4%)	0.007*
	Musculoseletal	6(3.6%)	13(13.3%)	0.004*
	Renal	39(23.6%)	10(10.2%)	0.007*
	GIT	0(0%)	15(15.3%)	<0.001*
	Face	2(1.2%)	1(1%)	1
	Neck	14(8.5%)	0(0%)	0.003*

Table (6): Parity statistical significance

		Parity		P value
		PG N=135	MG N=128	
Affected system	Hydrops	5(3.7%)	12(9.4%)	0.062
	CNS	39(28.9%)	47(36.7%)	0.176
	Chest	13(9.6%)	8(6.3%)	0.312
	CVS	20(14.8%)	19(14.8%)	0.955
	Musculoseletal	14(10.4%)	5(3.9%)	0.043*
	Renal	26(19.3%)	23(18%)	0.788
	GIT	8(5.9%)	7(5.5%)	0.873
	Face	2(1.5%)	1(0.8%)	1
	Neck	8(5.9%)	6(4.7%)	0.655

Discussion

Our study carried mainly to be one of the primary studies to outline the actual prevalence of congenital fetal anomalies in our area Minia governorate also its description and its link to the socieodemographic characters and other parameters that can acornerstone to outline facts which may help to reduce fetal anomalies occuarance and fetal morbidity and mortality.

The unique finding in this study was the high prevalence of CNS anomalies as single fetal anomaly and the most common multiple anomalies was the hydrops fetalis.

The main defect in this point of research is the lack of studies that investigate the prevalence of congenital anomalies in Minia governorate so this study should be carried out to be apoint of start to fill this gap.

The main limitations in this study were firstly the lack of awarrness about the benefits of the advanced Ultasound anatomy scan also the delay of attendance to the unit and the return to follow up.another obstacle was the lack of asmilar study in this point of resarch in our governorate.

Prenatal 2D/4D Ultrasound is a standard and effective screening method in detecting patho-logies of the fetal CNS. However, Ultrasound evaluation of the fetal central nervous system is limited by the non- specific ultrasound appearance of some anomalies and technical factors that make visualization of the brain near the transducer difficult A comprehensive ultrasound examination may be indicated for a

patient who is suspected of carrying a physiologically or anatomically defective fetus by his- tory, clinical evaluation or prior ultrasound examination. A limited examination, as defined above, may be performed by ultrasonographers or specially trained personnel. The basic examination, however, should be performed or reviewed by an appropriately trained operator.

An operator with experience and expertise in such scanning should perform the comprehensive examination (Gonçalves et al., 2018).
These study designed to outline the prevalence of congenital anomalies through advanced Ultrasound fetal scan of referred cases of high suspicious in Minia Governorate that located in the north of upper Egypt .to set up the start of the first regional registry of congenital anomalies in our governorate. Such baseline data will be a part of planning and evaluating programs.

The study was conducted for two years in Minia University Fetomaternal Unit 2018-2019, We examine 2091 cases referred to us from all Minia regions because of congenital anomalies risk, 263 cases are detected carrying different types and numbers of anomalies .

The frequency of congenital anomalies in this study was 263/2091 with percentage (12.5%) but when these number of congenital anomalies linked to all Antenatal care cases that attached to Minia University hospital in two years with average number (40,000) cases in two years with percentage (0.65%).this results are not match with the global incidence of prevalence of Congenital anomalies which is between(3-5%). Also this prevalence not Mach with other Egypt previous regional studies like Giza that was found(3.17%),Alexandria was found (1.6%) (Abdou et al., 2019) .

The higher frequency in live born in Egypt may be due to either inclusion of all minor anomalies in the study or inclusion of fetal anomalies in still birth (Shawky et al., 2001).

The possible risk factors in fetal anomalies in these study were parenteral consanguinity, Perinatal maternal infection or administration of drugs, as well as perinatal animal breeding. Of interest, we found out that nearly 45% of the cases in our study were with parental positive consanguinity, which leads us to a deduction of positive relationship between both positive consanguinity & CFMS. That inference perfectly matched the study conducted by Azza A. et al., 2010, which stated that more than half of the fetuses in the consanguineous marriage group had multiple systems affection compared to only one third in non- consanguineous marriage group with the most commonly affected system is the CNS system especially the ventriculomegaly.

Besides, 15% of our cases suffered perinatal maternal infection whether with or without fever, influenza like symptoms , hepatitis B/C; that was in accordance to what was postulated by Ludwig A et al., 2009 who stated that Periconceptional and first trimester primary infection have a vertical transmission rate of 30% and are responsible for about 10% severe morbidity and mortality and another 5 to 10% of minor disabilities.7% of our cases skipped folic acid administration during pregnancy, Folic acid necessity for pregnancy was supported by De-Regil LM et al., 2010 in his study. Regarding administration of unsafe drugs with pregnancy, we recorded that in 20% of our cases, examples of those drugs we rrheumatologic drugs, some kinds of antibiotics, anticoagulants and anti-stressful drugs. The efficacy of thosteratogenic drugs was previously illustrated by Gweneth Levy, 2019 in his book , who stated that Teratogenic drugs may affect development of the embryo and fetus and upon exposure by a pregnant woman can cause birth defects, fetal loss or abnormal growth and development.

Lastly in our risk factors 18% of the cases in our study had history of breeding animals perinatally , harbouring the risk of infections as toxoplasmosis which is intimately related to Fetal infection and CNS anomalies as what was adduced by Kieffer F et al., 2013 in his study.

In this study the most common affected system is the central nervous system with percentage 32.7% followed by the renal system 18.6% followed with the cardiovascular system 14.8% followed by the chest 8% followed by the musculoskeletal system 7.2% followed by hydrops foetalis 6.5% followed by GIT 5.7% followed by neck 5.3% followed by face which is the least prevalent anomalies with percentage 1.1%.

Our results disagree with (Rizk F et al., 2014) that show the most common affected system is the musculoskeletal 16.66% and the least represented anomaly is neck 4.1%.

Our results agree in the common and least represented anomalies but differ in percentage with (Rabah, 2011) that show the most common affected system is the CNS 26.5% and the least represented anomaly is face1.5%.

Our results disagree with (Tomatir et al., 2008) that show the most common affected system is the CNS 30% and the least represented anomaly is GIT 3%

We have categorized the CNS anomalies detected in our study, where we found out that the most detectable anomaly is Ventriculomegaly (43%) followed by these anomalies in descending manner, anencephaly (29.1%), encephalocele (11.6%), spins bifida (4.7%), Dandy walker syndrome (4.7%), holoprosencephaly (3.5%), isolated vermis hypoplasia (2.3%) and the least represented CNS anomalies was Intracranial Haemorrhage (1.2%).

These order and representing percentage in CNS anomalies disagree with Rabah M. Shawky et al., 2010 as the order in CNS anomalies were Neural tube defect (29%), Microcephaly (21%), Hydrocephalus (18%), Cranial cerebrovascular anomalies (11%) Cerebral defects (7%) Neuroectodermal anomalies (7%) also these study results disagree with Rankin et al., 2003 that has the following CNS Descendind distribuation Neural tube defects (9%) , Spina bifida (5.9%) and Hydrocephaly(5%) of total congenital malformations.

In our study the Chest congenital malformations was (8%) these results disagree with Rabah M. Shawky et al., 2011 that has percentage (0.6%) of total congenital malformations. also disagree with S Dastgiri et al., 2002 that has percentage (2.1%) of total congenital malformations. as regard mode of delivery was not significant p value 0.12 that.as regard outcome not significant p value was 0.07 as regard to parity was not significant p value 0.3

In our study GIT congenital malformations was (5.7%) these results disagree with A.G. Tomatır et al., 2009 that has percentage (4%) of total congenital malformations, also disagree with Dastgiri et al., 2002 that has percentage (1,7%) of total congenital malformations. as regard mode of delivery was not significant p value 0.09 that.as regard outcome not significant p value was0.001.as regard to parity was significant p value 0.8

These study show Face malformations percentage (1.1%) as the following distribution:
Cleft lip 3(1.1%)

That disagree with Bahauddin et al., 2008 that had distribution (11.5%)of total CMFS. Also disagree with A. Queißer-Luft et al., 2002 had distribution (0.5%) of total CMFS in the form of facial cleft.

As regard mode of delivery was not significant p value 0.2 that.as regard outcome significant p value was 1 .as regard to parity was significant p value 1.

In our study the Neck malformation were (5.3%) in the form of cystic hygroma that disagree with Isa Abdi-Rad et al., 2005 that had distribution (7.5%) of total CMFs also mismatch with A.G. Tomatır et al., 2009 that had distribution (3%)of total CMFs .

As regard mode of delivery was not significant p value 0.04 that.as regard outcome not significant p value was0.003.as regard to parity was significant p value 0.6

In these study we found the distribution of Renal anomalies was (8.6%) in the following distribution

Bilateral renal agenesis17(6.5%)
Potter-120(7.6%)
Bilateral hydronephrosis10(3.8%)
Post uretheral valve obstruction2(0.8%)

That disagree with Bahauddin et al., 2008 that had distribution (38.6%)of total CMFS and A.G. Tomatır et al., 2009 that had distribution (1.6%) of total CMFS.

The gender of baby in these study had no impact on the prevalence of CMFS as the ratio nearly (1:1) that contradict with Isa Abdi-Rad et al., 2005 where the females more than males with ratio (1.8:1).

The mean of Gestational age was 28 weeks that had no influence on the prevalence of CMFS that mismatch with S Dastgiri et al., 2002 that had mean of Gestational age was 23 weeks.

Conclusion

Evaluating the Prevalence of association between cranial congenital fetal anomalies and extra-cranial congenital fetal anomalies from The 1st May 2017 to the 1st of May 2019 the early detection of major congenital malformations categorize the detected anomalies and try to find any relation between their association and if this match with the known syndromes try to find any suspected predisposing factor aiming to reduce its impact the early detection of anomalies that give the opportunity to parents counseling and early intervention or termination of pregnancy aiming to reduce the maternal complication.

References

1. Whiteman VE, Reece EA. (1994). Prenatal diagnosis of major congenital malformations. Curr Opin Obst Gynae, (October 1994), Vol. 6, No.5,pp. 459-467.
2. Smith NC, Smith APM. (2006). Detection of congenital fetal anomalies. In; Obstetric ultrasound made easy, 2th, Smith NC, Smith APM, (Eds), 49-57, Churchill Livingstone, ISBN 044310055 1, Philadelphia, USA.
3. Barkovich AJ. (Ed). (2005). Pediatric neuroimaging. 4th ed. Lippincott Williams & Wilkins Publishers, lSBN 0-7817-5766-5, New York, USA.
4. Canfield MA, Honein MA, Yuskiv N, Xing J, Mai CT, Collins JS, Devine O, Petrini J, Ramadhani TA, Hobbs CA, Kirby RS. National estimates and race/ethnic-specific variation of selected birth defects in the United States, 1999-2001. Birth defects. Res A Clin Mol Teratol 2006 Nov; 76 (11):747-756.
5. Patel ZM, Adhia RA. Birth defects surveillance study, year 2005. Indian J. Pediatr 2005 Jun; 72(6): 489-491.
6. Leong, Y. H., Gan, C. Y., Tan, M. A., & Majid, M. I. (2014). Present status and future concerns of expanded newborn screening in malaysia: sustainability, challenges and perspectives. The Malaysian journal of medical sciences: MJMS, 21(2), 63–67.
7. Gonçalves L. F, Lee W. Diagnostic accuracy of ultrasonography and magnetic resonance imaging for the detection of fetal anomalies: a blinded case–control study, Ultrasound Obstet Gynecol, 2018;48(2): 185-192.
8. Abdou, M. S. M., Sherif, A. A. R., Wahdan, I. M. H., & El din Ashour, K. S. (2019). Pattern and risk factors of congenital anomalies in a pediatric university hospital, Alexandria, Egypt. Journal of the Egyptian Public Health Association, 94(1), 3.
9. Shawky RM, El Sedfy HH, Abolouz SK, Labatia GY. Prevalence of congenital malformations in a thousand consecutive Egyptian liveborn. Egypt J Med Hum Genet 2001;2(1):43–53.