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CENTRAL NERVOUS SYSTEM ANOMALIES IN TEACHING HOSPITAL HYDERABAD

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ABSTRACT

***Objective**: The present study was undertaken to explore the incidence of central nervous system anomalies in present geographical area. **Method**: Study includes 2000 consecutive pregnancies that have come for check up in second and third trimester with clinically relevant CNS malformations detectable by ultrasonography. **Results**: Analysis has revealed that there are 74 fetal anomalies in 34 fetuses with CNS anomalies and 18 fetuses with neural tube defects.**Conclusion**: The overall incidence of congenital foetal anomalies in the present study is 1.7 % which needs to supplementation of folic acid and vitamin B12 during peri-conceptional period and early diagnosis by available protocol.*

KEY WORDS

Central nervous system anomalies, Neural tube defect, Anencephaly

INTRODUCTION

Congenital anomalies of the fetuses are a great concern since time immemorial. Etiological factors for these anomalies are plenty. Environmental pollution, radiation, exposure to different chemicals, teratogenic drugs are some of the reasons for these anomalies. There is a strong correlation between the congenital anomalies of the fetuses and chromosomal abnormalities, either structural or numerical.Central nervous system (CNS) malformations are some of the most common of all congenital abnormalities (1)

The Central nervous system is of ectodermal in origin and appears as the neural plate at the middle of the 3rd week. After the edges of the plate become folded, the neural folds approach each other in the midline to fuse into the neural tube. The cranial end closes approximately at day 25, and the caudal end closes at day 27. The CNS then forms a tubular structure with a broad cephalic portion, the brain, and a long caudal portion, the spinal cord.The various developmental anomalies of the central nervous system are anencephaly, menigomylocele, spina bifida, encephalocele and hydrocephalus.

An opening in the spinal cord or brain is called Neural tube defect which amounts to about 1–2 cases per 1000 births, the most frequent CNS malformations. Anencephaly is one of most common anomaly characterized by failure of the cephalic part of the neural tube to close. As a result, the vault of the skull does not form, leaving the malformed brain exposed. Later, this tissue degenerates, leaving a mass of necrotic tissue(2).The incidence of intracranial abnormalities with an intact neural tube is uncertain as probably most of these escape detection at birth and only become manifest in later life. Long-term follow-up studies suggest however that the incidence may be as high as one in 100 births (3). Gaining hands on experiences show that, birth defects pose multifarious social, economic and cultural problems as well as mental trauma to the whole humanity. It is widely noticed that, many mothers are not aware of the impact of factors in causing congenital defects in the

fetuses. For better understanding of the etiological factors of congenital anomalies, knowledge of embryology, teratology, clinical genetics and diagnostic ultrasonography is very important (4,5). Highly advanced imaging techniques such as 3-D and 4-D ultrasound have been helping largely in diagnosing and treating birth defects in the fetus during the antenatal period. It is strongly advised that, antenatal ultrasonography has to be conducted compulsorily for a minimum of two times to all antenatal mothers. Detection of the CNS anomalies in the prenatal period is very important for the prognosis of fetus because they result in abortions and still births.

Further, early detection of CNS anomalies identification enables us to do corrective surgeries for these fetuses. As a result we can give a healthy and normal baby to the mother. Identification of these abnormalities also has become easy with the invention of ultrsonography without causing any discomfort either to the mother or to the fetus.Also medical management which includes termination of pregnancy and counseling the eligible couple will result in betterment of the society by attaining eugenics. All these reasons created interest to study the CNS anomalies and to show the incidence of their abnormalities. Anencephaly, menigomyelocele, spina bifida, encephalocele are categorized under neural tube defects.

MATERIALS AND METHODS

The present study was undertaken to explore the incidence of CNS fetal anomalies during the antenatal period. The present study is based on the ultrasonographic diagnosis of 2000 pregnancies in 2011-12 which were studied in the department of Radiology, government maternity hospital attached to Osmania medical college, Hyderabad from. Cases were selected from women in second and third trimesters with age of 20-35 years who came for obstetric services.

The indications for scanning were hydramnios, history of suspected anomaly on clinical examination, determination of EDD, multiple pregnancy, oligohydramnios, history of antenatal bleeding in second and third trimesters, aged mothers, young mothers, history of anomalies in other siblings, for fetal well being and routine. Women were selected irrespective of age, parity and from all socio-economic classes. A detailed history of anomalies in other siblings, history of consanguinity, age of the mother and socio-economic status were also noted.

RESULTS

On 2000 consecutive antenatal ultrasound examinations it is reported that detection of 34 CNS anomalies in screening of these subjects. All cases of congenital anomalies were arranged anomalie wise and tabulated. Where ever possible sonographic print outs along with clinical photographs which were followed with termination were taken, these babies were injected formalin for fixation and later autopsy was done in Osmania medical college. Detailed history, period of gestation and results of present study were noted in proforma.

Total number of detected fetal anomalies by ultrasound out of 74 congenital anomalies, 34 were with CNS anomalies.Babies with NTD were 18 in incidence i.e 9 /1000 births. Following classification is made based on anomalies observed.

A) Anencephaly was seen in 10 cases (13.51%) in USG and planned for termination .On examination of fetuses 2cases with meningocele (figure-6), 2 cases associated with absence of supra renal glands (figure-7),1 case with diaphrmatic hernia and others with only anencephaly were observed. B) Spina bifida with meningocele was seen in 1 case with lubosacral meningocele (figure-9), 1 case with myelocele. C) Encephalocele was observed in 2 cases (figure-8), 1 case with associated deformity of heart and lungs. D) Hydrocephalus seen in 8 cases (figure-10). E) Multisystem involvement in 10 cases ,1 case with hydrocephalus, meningocele ,omphalocele ,renal agenesis and other with spinal bifida with dextrocardia , exompholos(figure-11).

Table/figure -1: In relation to Maternal age

Maternal age in years	Anencephaly	Spina bifida with Meningo\ myelocele	Other CNS anomalies	Associated multiple anomalies
20 - 25	4	1	2	2
26 - 30	2	3	1	4
30-35	2	3	2	1
>35	2	2	2	1
Total(34)	10	9	7	8

More cases of CNS anomalies especially NTD is more in younger age group i.e 20-25 yrs

Table/figure -2: In relation to Gestational age

Gestational age	Anencephaly	Spina bifida with Meningo\ myelocele	Other CNS anomalies	Associated multiple anomalies
2nd trimester	8	4	2	7
3rd trimester	2	4	4	3
Total (34)	10	8	6	10

Most of the cases were detected in 2 nd trimester when they come for antenatal check up.

Table/figure -3: In relation to degree of consanguinity.

Degree of consanguinity	Anencephaly	Other anomalies
0	8	10
1	2	2
2	1	5
3	2	4
Total (34)	13	21

There is significance of consangunity in the group .

Table/figure -4: In relation to Gender of fetus

Gender	Anencephaly	Spina bifida with Meningo\ myelocele	Other CNS anomalies	Associated multiple anomalies
Female	7	5	4	2
Male	3	5	2	6
Total (34)	10	10	6	8

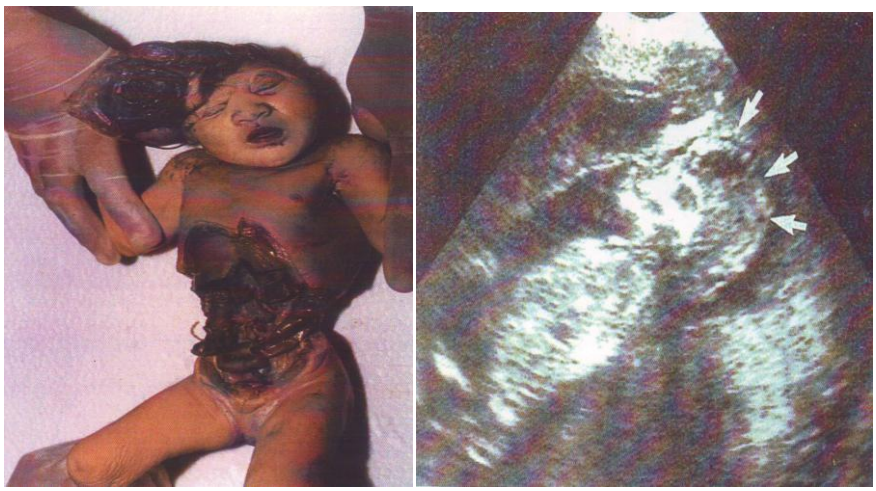
Females are more affected than males

Table/figure -5: The distribution of the CNS anomalies

CNS anomalies	No. of fetuses affected	Percentage
Anencephaly	10	13.51
Meningo\ myelocele	4	5.41
Spina bifida	2	2.70
Encephalocele	2	2.70
Hydrocephalus	8	10.81
Multi system involvement	8	10.81
Total (74)	34	45.94 %

In the present study 2000 USG scans recorded out of which 34 CNS anomalous cases were detected. Thus the all over incidence of the CNS anomalies was 1.7 %

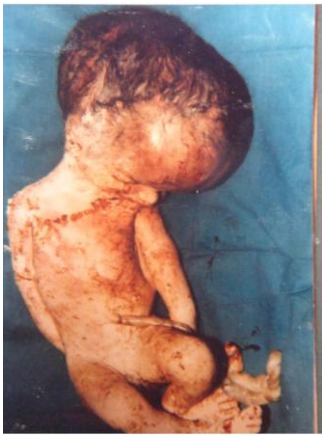
Table/figure-6: Showing anencephaly with meningocele.



Table/figure-8: Showing encephalocele and associated deformity of heart and lungs.

Table/figure-9: Lumbo sacral meningocele

Table/figure-10: Hydrocephalus



Table/figure-11: Multi system involvement with spina bifida with dextrocardia, exompholos

DISCUSSION

There are several reports that suggested the incidence, particularly pattern of congenital central nervous system (CNS) anomalies which may vary in different geographical locations (6–9). However, the extent to which such variations reported were attributable to differences in genetic inheritance, environmental factors or diagnostic accuracy is uncertain. Studies on the incidence and pattern of different types of congenital abnormalities can provide valuable information for planning health care services, including preventive programs for better future of mankind.

In this study as per the data (table-1) collected, the age of the mother does not carry much weightage because most of the mothers come under eligible couple age and none below18 years. But genetic factor shows significance here, though karyotyping and gene studies were not conducted.

From table-3 there is history of consanguinity in 10 out of 34 cases with anomalies and in the rest of the cases environmental factors probably play a role in causing CNS defects which correlates with Al-Gazali et al (10).

Prevalence is high in females compared to males in our study which is in correlation with Mahadevan et.al (table-4) (11).

The CNS anomalies are detailed in table No.5 which show 34 fetuses with central nervous system anomalies out of which neural tube defects (NTD) were diagnosed in 18/2000 and among them anencephaly was seen in 10 /2000. Reddi rani et al(12) reported 21 CNS cases of which 14 were with NTD in polyhydramnios selected by USG and also Sania

etal(13) showed 46/3310 cases of NTD . Dhapate S.S et al (14) and Bala kumar et al (15) studied CNS anomalies using USG showed incidence of 48% and 40% respectively which is in much correlation to our study which is 45.94% .Our study evenly correlates with other studies also(16,17)

Increased frequency of NTD could be due to maternal malnutrition and low socioeconomic status could be responsible for it. Advances in genetics and molecular biology have led to a better understanding the control of central nervous system (CNS) development. It is possible to classify CNS abnormalities according to the developmental stages at which they occur. The careful assessment of patients with these abnormalities is important in order to provide an accurate prognosis.

Counseling should be given to couples with consanguinity and nutritional deficiencies, regarding recurrent risk of genetic defects and educating the mothers about environmental factors responsible for occurrence of neural tube defects help to decrease its occurrence. In addition, these families provide a good opportunity to map and identify the responsible genes in order to improve our knowledge about the mechanisms of normal and abnormal development of the CNS.

Hence it is said that “Prevention is better than cure”. Health services planning should be to supplementing folic acid and vitamin B12 during peri-conceptional period and early diagnosis by available protocol.

CONCLUSION

The prevalence of CNS anomalies in the present population at risk is 1.7%. A tool used here is antenatal ultrasound method which has an advantage of detecting neural tube defects more accurately. In conclusion, this study has provided a detailed analysis of CNS abnormalities in a population with consanguinity. Careful and detailed analysis of these anomalies is required for accurate diagnosis and genetic advice.

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