

Neural Tube Defects among Neonates Admitted to Neonatal Intensive Care Unit in Al-Yermouk Teaching Hospital

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Abstract:

Background: Neural tube defects constitute one of the most common congenital malformations in newborns.

Objectives: To find out the admission rate of neural tube defects among the live birth neonates admitted to the Neonatal intensive care unit in Al-Yermouk Teaching Hospital.

Patients and methods: All cases of neural tube defects admitted to Neonatal care unit in Al-Yermouk teaching hospital for the period extended from 1st June 2009 to 31st May 2010 were included in this study. Data were collected on neonates and mothers according to special questioner sheet, all affected neonates were examined thoroughly.

Results: The total lived birth was 13634, the total number of lived neonates with congenital malformation were 71, of them 38 (53.5%) had neural tube defects, admission rate of neural tube defects during study period was 2.7/1000 live births, myelomeningocele constituted the most common cause (60.5%). It was found that female: male ratio was 2.1:1, more than two thirds of mothers aged 20-30 years (65.7%). More than half (55.2%) of the neonates were offspring of consanguineous marriage, 68.5% of mothers attended antenatal care, 31.5% of mothers received regular folate supplementation during affected period of pregnancy (the first trimester), but no one received preconception folate.

Conclusion: The frequency of neural tube defects was still high in comparison with other studies.

Keywords: Al-Yermouk Hospital, Neural tube defects.

Introduction

Neural tube defect (NTDs) is the most common congenital malformations of central nervous system.

The prevalence of NTDs varies by country, geographic zone and ethnic group, the highest incidence rates worldwide were found in Ireland and Wales and reach (5 per 1000 of live birth). In USA the average incidence of NTDs is 7:10000 live birth, the incidence is higher on the East than on the West Coast, and higher in white (1/1000 live births) than black (0.1-0.4/1000 live births)^(1,2).

Precise causes of NTDs are multifactorial, evidence suggests genetic determinants, drugs (like valproic acid), malnourishment, low socioeconomic state, radiation, maternal obesity or diabetes, and hyperthermia may adversely affect normal development of central nervous system from the time of conception⁽³⁾.

It is now known that folic acid is an important substrate for normal early neural tube development. Public health services recommended that women in childbearing age who are capable of becoming pregnant are advised to get 0.4 mg of folic acid daily, those who are pregnant should receive 1.0 mg daily, and women who have previously given birth to a child with NTDs should get 4.0 mg daily 1-3 months before and at least 12 weeks after conception^(4,5).

The objective of the study was to find out the admission rate of neural tube defects among the live birth neonates admitted to the neonatal care unit in Al-Yermouk teaching hospital.

Patients and methods

All newborns with NTDs who admitted to neonatal intensive care unit (NICU) in Al-Yermouk teaching hospital in Baghdad-Iraq during the

period extended from the beginning of June 2009 to the end of May 2010 were enrolled in this study.

Data was collected by direct interviewing with mothers using already prepared questioner sheet, questions about date of birth, age and parity of mother, place of residence, occupation, family history of NTDs, consanguinity between parents, in addition to the history of antenatal care visits (number of visits & time of first booking), and folic acid supplements before and during pregnancy.

Every neonate with NTDs was examined by the authors thoroughly for assessment of general condition, type of NTDs anomalies, associated other minor or major malformations. Birth weight by weight scale (of Kubota), which measures nearest to (50 gram)], and head circumference (by tape measure) were taken for every affected neonate.

Statistical analysis

Analysis of data was carried out using available statistical package for social science (SPSS), data was presented in numbers and percentages.

Results

During the study period total number of deliveries in maternity department in Al-Yermouk teaching hospital was 13835, of these 13634 were live births. The total number of live neonates with congenital malformations were 71, of them 38 (53.5%) had NTDs.

The number of neonates admitted to (NICU) was 679, 5.59% of them had (NTDs), so the admission rate is 2.78/1000 live births, myelomeningocele consisted the highest frequency (60.5%), as shown in figure 1. Female: Male ratio was 2.1:1.

There were seasonal variations as more cases occurred in June 7 (18.4%), in October 6 (15.7%), and November 6 (15.7%) as shown in Figure 2.

Data about mothers showing that two thirds of mothers were between the age 20-34 years (65.7%), 18.4% were less than 20 and 15.7% were over 35, all mothers were housewives, and 68.4% of them were multigravida, 63.1% of mothers resided in urban area. Regarding socioeconomic status, 52.6% of mothers were of low socioeconomic status, 31.5% of middle level and only 15.7% was of high level (depending on education, occupation, place of residence, and income). Consanguinity was present in more than half of case (55.2%). Family history of NTDs was found in 10.5%.

This study revealed that 26 (68.5%) of mothers attended antenatal care (ANC) visits, and only 11 (42.3%) of mothers had regular visits (number of visits 4+), most of visits were in first half of pregnancy.

More than two thirds (71%) of mothers reported receiving folic acid supplementation during pregnancy, of those only 12 (31.5%) were on regular folic acid supplementation during first 12 weeks of pregnancy. None of the mothers received folic acid before conception (Table 1).

The most common birth defect encountered in these neonates was hydrocephalus 13 (39%), other associated anomalies were Talipes equinovarus, microphthalmia, Brunner's bladder, bilateral hydronephrosis, ambiguous genitalia, and bilateral undescended testis as shown in Table 2.

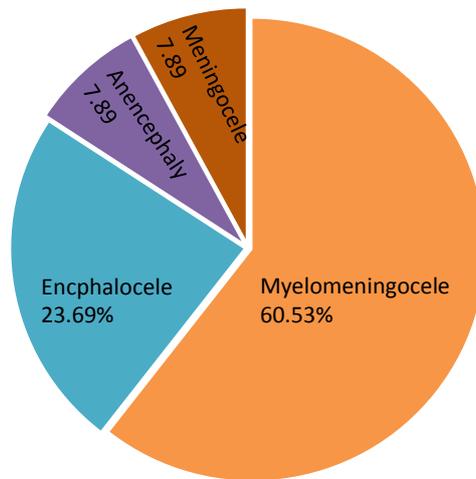


Figure 1: Distribution of studied sample according to types of NTDs

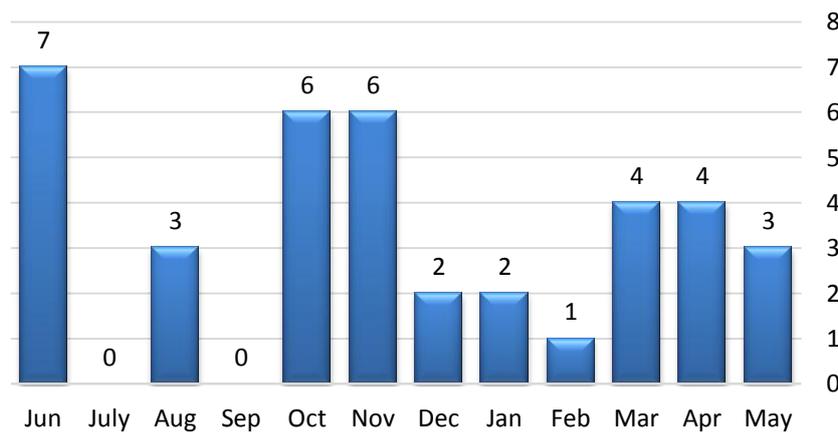


Figure 2: Distribution of number of cases according to months of delivery from June 2009-end of May 2010

Table 1: Supplementation of folic acid during pregnancy

Supplementation of folic acid during pregnancy*	No.	(%)
Yes	27	71.05
No	11	28.95
Total	38	100

*No mother received preconception folic acid supplementation in this study.

Table 2: Associated other anomalies in neonate with NTDs

Associated anomalies	No	%
Hydrocephalus	13	39.39
Talpesequina	11	33.33
Microphthalmia	3	9.09
Brunbelly syndrome	2	6.01
Bilateral hydronephrosis	2	6.01
Bilateral undescended testis	1	3.03
Ambiguous genetelia	1	3.03
Total	33*	100

*Five cases of NTDs were without associated congenital anomalies.

Discussion:

The admission rate of NTDs is 2.7\1000 lived birth, which is lower than that found in previous study by other workers in Baghdad (the incidence was 4.9 \1000 of birth), this may be due to (involvement of the lived & stillbirth neonates with NTDs) ⁽⁶⁾, and higher than study in Jordan 0.65\1000 live birth ⁽⁷⁾. It is also higher than that reported in United State (1\1000) ⁽⁸⁾, these differences may be attributed to good general health, nutritional status, and effective prenatal diagnosis and termination of affected fetus in these countries ^(4,9).

The current study showed that NTDs cases were more in female than male, Female:Male ratio was 2.1:1 and this finding was similar to study in Iran ⁽¹⁰⁾.

This study showed that there was seasonal variation as most of the cases were in June (18%) and this finding was in agreement with previous study in Atlanta ⁽¹¹⁾, this can be explained by seasonal variation in diet, hormones, exposure to environmental toxin, or infectious agents.

More than two thirds (67.6%) of mothers are between 20-34 years of age, which is the peak reproductive age of females, this finding agreed with study by other researchers in California ⁽¹²⁾.

This work showed that 68.4% of mothers were multigravida, and 63.1% from urban area, these results coincide with the figures reported by others ^(6, 10). More than half (55.3%) of affected neonates were offspring of consanguineous marriage, similar figure was reported in another study in Qatar ⁽¹³⁾.

This study showed a relationship between family history of NTDs and recurrent risk as 10% of affected neonates had positive family history of NTDs this finding agreed with study by other workers in Baghdad ⁽¹⁴⁾. The presence of consanguinity and family history indicate that genetic factors play a role in etiology of NTDs development.

NTDs were more frequent among children born to women of low socioeconomic status ⁽¹⁵⁾, and this result agreed with the current

study finding where more than half of mothers (52.6%) were of low socioeconomic state ⁽¹⁶⁾, and this may be due to poor antenatal care or bad nutrition (folate deficiency).

Several studies had shown that lack of folic acid is contributing factor in the pathogenesis of NTDs. pre- and post-conception supplementation of the mother with folate can reduce the incidence of NTDs by about 70% and can also reduce the severity of these defects when they occur ⁽¹⁷⁻¹⁹⁾. In this work we found there was no policy of preconception folate supplementation as no mother received folate before conception, the folate supplementation was only post-conceptual when only 31.5% of mothers received folic acid.

Hydrocephalus was associated with (39.3%) of cases of NTDs in the current work, and this is less than the international figure of 85-90 % ^(9,20). Talpesequina was the second associated anomalies and microphthalmia consisted the third one.

In conclusion, the occurrence rate of neural tube defects are high in this study comparing with other countries and this may be due to poor supplementation of pregnant mothers with folic acid before and after conception, and ineffective methods of early diagnosis and termination of pregnancy with affected fetus.

It is recommended that all pregnant mothers must be encouraged for regular visits to primary care health centers, with improvement of antenatal care and the methods of early diagnosis of pregnancy of fetus with NTDs. All women in reproductive age must be supplied with folic acid 1mg/day before and after conception, with increasing the dose to (4 mg/day) for mothers with risk factors for NTDs like mothers with previous affected babies, or mothers on antiepileptic drugs.

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