

PREVALENCE OF NEURAL TUBE DEFECT AND ITS RELATIVE FACTORS IN SOUTH-WEST OF IRAN

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ABSTRACT

Objectives: The main objective of this research was an analytic assessment of Neural Tube Defects (NTDs) in pregnant women who visited Jundi Shapur university hospitals in Ahvaz from March 21, 2002 till March 20, 2004 and possible contributory factors.

Methodology: This is a retrospective study from the medical documents. The results have been analytically assessed.

Results: Total numbers of pregnant women were 13262 and 56 pregnancies were complicated with Neural tube defect, an incidence of 4.2 in 1000 births. Prevalence in primigravida was 42.6% and in multigravida 57.4%, the major prevalence was among mothers between the ages of 21 to 30 (72.2%). Thirty-one percent of couples had family relationships. Most fetuses with NTD were female (70%) and the most common anomaly was anencephaly. Prevalence of NTD was 2-4 fold than mentioned in reference books.

KEYWORDS: Neural tube defect, Folic acid.

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INTRODUCTION

Neural tube defects (NTDs) are among the most common defect of human congenital malformations, affecting 0.6 per 1,000 live births in the United States, where there are approximately 4,000 NTD complicated pregnancies annually.¹ Spina bifida and anencephaly are the most commonly reported NTDs which affect 4,000 pregnancies resulting in 2,500 to 3,000 births in the United States each year.^{2,3} Although its etiology remains a mystery, remarkable advances have been made in the

understanding and prevention of neural tube defects over the past few decades.

A number of risk factors are associated with NTDs. A previous pregnancy with an NTD has the strongest association, with a relative risk (RR) of 10. There are strong ethnic and geographical associations with NTDs.⁴

The most commonly cited mechanisms for NTDs include a deficiency in folate concentrations, genetic susceptibility, environmental factors, in utero drug exposure, and/or abnormal metabolic pathways that lead to a failure of neural tube closure during fetal development. The rationale for the folate deficiency hypothesis is that prenatal supplementation with antioxidant vitamins containing folic acid decreases the incidence of birth defects, especially neural tube defects.⁵⁻⁸

Since the etiology could be multifactorial for these malformations, the possible contributory factors in our study cases could be socioeconomic with malnutrition, inter marriages, chemical bombing during the war as well as many unknown factors.

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METHODS

Medical records of all pregnant women with documented neural tube defects who visited Jundi Shapur University Hospitals, in Ahwaz, from March 21st 2002 till March 20th 2004 were reviewed. Data regarding NTDs variations, gender of affected fetuses, maternal age, parity, family relationship, previous affected pregnancy or wastage, and mother's blood group and RH were looked for and recorded. The results were analytically assessed. Data were compared using Chi square test and \bar{n} values less than 0.05 were considered statistically significant. All analysis were performed using SPSS/PC+ software (version 7).

RESULTS

Among 13262 medical records, 56 women had fetuses or newborn with neural tube defects (4.2 per 1000 birth). Anencephaly [n=30(53.6%)], spina bifida [n=15(26.8%)], meningocele [n=5(8.9%)], oncephalocele [n=3(5.4%)] anencephaly plus meningo-myelocele [n=3(5.4%)], were the malformations detected.

Among 56 affected NTDs, 39(70%) were female and 17(30%) were male. This difference is statically significant ($p < 0.05$). Among 56 women affected NTDs, 7(12.5%) had 10-20 years, 39(69.7%) had 21-30 years while 10(17.8%) had 31-40 years. Amongst the mothers with affected babies, 24(42.8%) women were primiparous and 32(57.1%) women were multiparous.

Thirty one couples had intermarried in the family. Fifty three (94.6%) women had pregnancy affected NTDs for the first time and only 3(5.4%) women had the history of NTDs in previous pregnancies. Out of the pregnancies affected 10(17.8%) women had history of one previous abortion and 6(10.7%) women had more than one abortion.

DISCUSSION

Neural tube defects are thought to have multifactorial etiology with environmental and genetic susceptibility, maternal age, nutritional

intake, exposure to drugs and harmful material, geographic region and socioeconomic status.⁹ Among 13262 women, 56 fetuses had neural tube defects (4.2 per 1000 birth). This incidence is markedly higher (2-4 folds) than prevalence noted in textbooks. Worldwide prevalence of neural tube defects is 1.4 - 2 per 1000 birth.⁸⁻¹⁰

In our study the defect with highest frequency was anencephaly with 22.6 per 10.000 births. [Spina bifida (11.3 per 10.000 births), meningocele (3.8 per 10.000 births), oncephalocele (2.3per 10.000 births)]. Our results had significantly difference ($p < 0.05$) with data published in 1999 by Hendrick KA [anencephaly: 6.4, spina bifida: 7.1 oncephalocele: 1.1 per 10.000 birth].¹¹

In 1999, Leach et al¹² reported 2.6 per 1000 birth, the prevalence of anencephaly in Poland. A study from Rosch et al in 1999 reported 1.64 per 1000 birth, the incidence of neural tube defects in Magdeburg, Germany.¹³ The incidence of NTDs in Oman is 1.25 per 1000 birth, according to study of Rajab et al.¹⁴ Because of the high incidence of NTDs and specially anencephaly in Khuzestan, it seems mandatory to arrange a nationwide educational programming to prevent or decrease the rate of NTDs. There is some evidence to suggest that the gender of female may be associated with a higher risk for NTDs.¹⁵ Two-third of newborn affected NTDs are female.¹⁶ In our study, 70% of newborn affected NTDs were female.

The effect of maternal parity on NTDs risk is probably stronger than maternal age. Studies have shown both a modest risk in mothers of parity three or more, and an increased risk in primiparous mothers.¹⁷ We found no difference in occurrence rate of NTDs between primiparous and muliparous mothers ($p = 0.02$). Women with a previous history of NTD birth have 10 times increased risk for another NTD birth. However, the majority (95%) of NTD pregnancies occur in women without a previous history of NTD births.¹⁸ Thus the prevention of the first occurrence is of real public health importance.¹⁹

The frequency of NTD was seen highest during two seasons of spring and autumn,¹⁵ so the defects are mostly seen in individuals born late in winter and early in the spring.⁶ In our study, the season in which NTDs prevalence is higher was spring. With respect to neural tube development in first trimester, in our analysis, most affected fetuses born occurred among mothers who became pregnant early in the summer. Human beings are warm blooded animals. Inside body temperature in all whether in genital tract remain constant.

Over the last few decades, there has clearly been a substantial body of literature that supports the association of maternal use of multivitamins containing folic acid in early pregnancy and a reduced risk for offspring with neural tube defects. Because of the high incidence of NTDs in south west of Iran, it is recommended to arrange a nationwide educational programming and to establish public health guidelines for neural tube defects prevention.

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