



Research Paper

EPIDEMIOLOGY AND RISK FACTORS OF SPINA BIFIDA IN SUDAN

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Abstract

Background: In babies with spina bifida, a portion of the neural tube doesn't close or develop properly, causing defects in the spinal cord and the bones of the spine, and is associated with lifelong mortalities and morbidities. **Objectives:** This study aimed to detect the epidemiology and risk factors of the spina bifida in soba hospital, Sudan. **Material and methods:** Forty-seven patients with spina bifida were studied in Pediatric Surgery Unit in Sudan (Soba Hospital) during the period from Sep2011-Jan 2014. **Results:** The incidence of spina bifida in females was high than males (59.6%). 51.1% of spina bifida children diagnosed antenatally and the remainder diagnosed postnatally. Minengiomylocele was found to be the most common type affecting 78.7% of the cases while meningocele affecting 21.3%. Most of the cases were associated with hydrocephalus represented 76.6% and encephalocele affecting 6.4%. Most of the cases were found to be related to irregular folic acid intake during pregnancy and the rest of the mother take folic after 1st trimester. 19.1% of mothers take medication, the medications do not affect neural tube development. The parents with consanguinity were found to have a high percentage (51.1%) than those with no consanguinity. **Conclusion:** spina bifida is a serious neurological problem associated with morbidity and mortality. Attention should be taken to pregnant mothers or those intending to become pregnant, including medical advice, especially taking folic acid tablets before pregnancy and during the first three months after pregnancy.

Key words: epidemiology, risk factors, spina bifida.

INTRODUCTION

Spina bifida is one of the most common birth defects with a worldwide incidence of about 1 in every 1000 births. It is a developmental congenital disorder caused by the incomplete closing of the embryonic neural tube. Some vertebrae overlying the spinal cord are not fully formed and remain unfused and open. If the opening is large enough, this allows a portion of the spinal cord to protrude through the opening in the bones.

There may or not be a fluid-filled sac surrounding the spinal cord. Spina bifida malformations fall into three categories: spina bifida occulta, spina bifida cystica with meningocele, and spina bifida cystica with Myelomeningocele. The most common location of the malformations is the lumbar and sacral areas. Myelomeningocele is the most significant and common form, and this leads to disability in most affected individuals. The terms spina bifida and Myelomeningocele are usually used interchangeably [1].

In the spina bifida occulta, the outer part of some of the vertebrae is not completely closed. The splits in the vertebrae are so small that the spinal cord does not protrude. The skin at the site of the lesion may be normal, or it may have some hair growing from it; there may be a dimple in the skin or a birthmark. The spina bifida cystica with meningocele is the least common form of spina bifida is a posterior meningocele (or meningeal cyst). In this form, the vertebrae develop normally, but the meninges are forced into the gaps between the vertebrae. These may be classified by their localization to occipital, frontoethmoidal, or nasal [2].

The spina bifida cystica with Myelomeningocele often results in the most severe complications. In individuals with Myelomeningocele, the unfused portion of the spinal column allows the spinal cord to protrude through an opening. The meningeal membranes that cover the spinal cord form a sac enclosing the spinal elements.^[1,2]

Spina bifida with myeloschisis is the most severe form of Myelomeningocele. In this type, the involved area is represented by a flattened, plate-like mass of nervous tissue with no overlying membrane [3].

Like many other birth defects, it seems that spina bifida is associated with a variety of risk factors such as genetic history, lifestyle, a deficiency of folic acid, Diabetes, and Obesity [1].

MATERIAL AND MEDTHODS

A retrospective study was done from Sep2011-Jan2014 in pediatric surgery to unite Soba hospital (Sudan) to detect the distribution, type, and risk factors affecting spina bifida as a common type of neural tube defect. The questionnaire was used to collect the data from the file and record of children from the department of statistics in soba hospital. The study was designed to detect the gender distribution and type of spina

bifida among affected children. Also, folic acid intake, mother age, and other congenital anomalies associated with spina bifida were studied. The results were analyzed using Spss software version 20. The results were compared with previous studies done worldwide.

RESULTS

Forty-seven spina bifida children in the pediatric surgery unit in Soba Hospital were studied to detect spina bifida types, risk factors, and distribution among sex from sep2011to Jan 2014. 19children (40.4%) were males and 28 children (59.6%) were females.

Mother age distribution was categorized into 3 age groups as follows

1. Mothers with age less than 20 years; 1mother ;(2.1%).
2. Mothers with age between 21 & 30; were 27; (57.4%).
3. Mothers with age more than 30 years; were 17; (36.2%).

The mothers were asked about their relationship degree with their husbands (parents' consanguinity); 24 parents (51.1%) with no consanguine, 18(38.3%) parents with different degrees of consanguine.

Taking folic acid during pregnancy was evaluated; 29(61.7%) of mothers took folic acid during pregnancy, 18(38.3%) not took folic acid, 2(4.3%) took folic before pregnancy, 21(44.7%) took during 1st trimester of pregnancy, 5(10.6%) took at 2nd trimester of pregnancy, 1(2.1%) took at 3rd trimester of pregnancy. Twenty (42.6%) mothers were on regular folic acid during pregnancy, 10 mothers (21.3%) were taken folic acid irregular. (Table 1)

Twelve (23.4%) mothers have a history of diseases during pregnancy, while 36mothers (76.6%) with no history of disease during pregnancy. (Table 2)

Nine (19.1%) mothers took medications rather than folic acid during pregnancy, while 38 (80.9%) of mothers did not take medication during pregnancy. (Table 3)

Spina bifida affected more than one child in the same family in 4 cases. Three of them affecting the first child and the one were the third children (Table 4), and not affected siblings in 31 (66.0%) cases.

44(93.6%) children were full-term babies, 3(6.4%) of them were premature.

Ten (21.3%) of spina bifida were meningocele type, 37(78.7%) with meningocele. (Table 5)

There were associations between spina bifida and other congenital abnormalities rather than hydrocephalus in 11 (23.4%) children. (Table 6)

36(76.6%) of children had hydrocephalus (Table 7), 3(6.4%) with encephalocele.

24(51.1%) of cases of spina bifida were diagnosed antenatally and 23(48.9%) of cases of spina bifida were diagnosed postnatally.

Table 1: Distribution of folic acid intake (regular vs. irregular):

The dose of folic acid	Frequency	Percent
Regular	19	40.4
Irregular	10	21.3
Total	29	61.7

Table 2: Mothers Disease History during pregnancy of spina bifida child:

History of disease	Frequency	Percent
Yes	11	23.4
No	36	76.6
	47	100.0

Table 3: History of Medication among Mother rather than folic acid:

History of medication	Frequency	Percent
Yes	9	19.1
No	38	80.9
Total	47	100.0

Table 4: History of spina bifida among families:

Family history	Frequency	Percent
No	31	66.0
Yes	4	8.5
Total	35	74.5

Table 5: Distribution of Spina Bifida types:

Spina bifida type	Frequency	Percent
Meningocele	10	21.3
Meningomyelocele	37	78.7
Total	47	100.0

Table 6: Others congenital abnormalities in association with spina bifida:

Congenital abnormalities	Frequency	Percent
Yes	11	23.4
No	36	76.6
Total	47	100.0

Table 7: Distribution of Hydrocephalus among spina bifida children:

Hydrocephalus	Frequency	Percent
Yes	36	76.6
No	11	23.4
Total	47	100.0

DISCUSSION:

Spina bifida occurs during the third and fourth weeks of pregnancy when a portion of the fetal spinal cord fails to properly close. The commonest of spina bifida presented it's at the lumbosacral regions. As a result, the child is born with a part of the spinal cord exposed on the back and it's associated with causes more mortality and morbidity for children around the world. There are three common subtypes: spina bifida occulta (there is only a small defect or gap in the small bones (vertebrae) that make up the spine), spina bifida meningocele (occurs when the bones do not close around the spinal cord and the meninges are pushed out through the opening, causing a fluid-filled sac to form), and spina bifida myelomeningocele (a portion of the spinal cord itself protrudes through the back) [5, 6, 7, 8, 10]. In our study, 21.3% of spina bifida was meningocele type, 78.7% with meningocele, and no spina bifida occulta was detected.

In previous studies, the spina bifida is associated with hydrocephalus, encephalocele, neurogenic bowel, neurogenic bladder, shunt, non-ambulators, and attention deficit hyperactivity disorder, rachischisis, depressive and anxiety symptoms [4, 9, 10, 11, 12]. In the current study, 23.4% hydrocephalus and 6.4% encephalocele were associated with spina bifida in children.

The most common spina bifida type in this study was the meningocele (78.7%), and our finding is opposite to the previously studied reported in Saudi Arabia, which showed that the spina bifida occulta (57.1%) is the most common, and followed by myelomeningocele (28.6%) [7]. Therefore, our finding is correlated to studies done in hospitals in sub-Saharan Africa: the Zambian experience and recorded that the myelomeningocele was the most common (61%) [8]. Therefore, at the Ahmadu Bello University Hospitals in northern Nigeria, 152 boys and 160 girls with spina bifida and the Meningomyelocele comprised 81% [15]. One hundred and six consecutive cases of spina bifida cystica who presented in our hospital from January 1990 to December 2004 were reviewed in Nigeria. 77.4%. Myelomeningocele was the most common type (86.8%) [16].

In the current study, the percentage of spinal Bifida in children according to sex was high in females (59.6%) than males (40.4%). Our findings related to a study carried out in Northern Saudi Arabia and showed 8(57.1%) were females and 6(42.9%) were males [7]. It was not correlated with the study has been carried out in the pediatric surgery

department center of spina bifida in India; the incidence was more common in males [13]. In Nigeria, the males constituted 54.7% and females 45.2% of cases [16].

On the other hand, the percentage of mother's age as one of the risk factors in this study was found to be more common in 21-30 (57.4%). Others studies suggested that birth order, low maternal educational level, age, smoking habits, alcohol consumption, high caffeine intake, lack of folate supplementation, low and high-calorie diet, occasional consumption of fruit and vegetables, high emotional stress, and environmental pollution are associated with an increased spina bifida risk in the Italian population [19]. In a previous study, the influence of maternal age on the risk for neural tube defects showed that mothers 19 years old or younger have a higher risk of having a child with spina bifida [20].

Because folic acid has a role in the development of neural tube, taking folic acid supplements before conception and during the early months of pregnancy can help prevent neural tube defects, including spina bifida. Folic acid preventable spina bifida would have reduced annually, neonatal, infant, and under-five mortality by 10.2%, 8.9%, and 8.3%, respectively [14, 17]. Inadequate intake of Folic acid and low socioeconomic status has been seen as the most common risk factor for Spina Bifida and maternal Fever during the first trimester increases the risk of Spina Bifida to two to three folds [13]. In this study, 21.3% were taken folic acid irregular, 38.3% were not taken folic acid, and these reasons have led to an increase in spina bifida cases among children.

The mother's diseases during pregnancy had a risk factor affecting spina bifida, this study showed that the mothers with diseases were 23.4% which less than those without diseases 76.6%, and these diseases like malaria, diabetes mellitus, respiratory tract infection, and febrile illness. In India maternal fever during the first trimester increases the risk of Spina Bifida two to three-fold [13]. The percentage of husband consequence, sibs, para, and primigravida were play rule in risk factors of spina bifida [13, 17, 18]. In our study, the percentage of parents with husband consequence (38.3%) and those with no husband consequence was 51.1%.

CONCLUSION

Spina bifida had a wide range of distribution in Sudan. Spina bifida was most common among females. The meningocele was the common type. Socioeconomic status had

a major role effect in spina bifida incidence, and irregular intake of folic acid had a wide effect in most spina bifida cases.

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