The Egyptian Journal of Hospital Medicine (July 2018) Vol. 72 (1), Page 3497-3702

# Spina bifida in Infants and Children in Arar, Northern Saudi Arabia

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## ABSTRACT

**Background:** Neural tube defects (NTDs) are the most common birth defect of the central nervous system. Spina bifida (SB) is a common birth defect resulting from incomplete closure of the neural tube during the first month of pregnancy and that is associated with significant clinical complications that can affect survival and the quality of life for affected individuals. **Objective:** The study objective was to estimate the prevalence, types, manifestations, diagnosis, complications as well as treatment outcomes of of Spina bifida in all neonates born in Maternity and Children hospital in Arar city, Northern Saudi Arabia.

**Methods:** This is a descriptive study involved all neonates born in Maternity and Children hospital in Arar city, Northern Saudi Arabia, KSA, during the period from 1 January to 31 December 2017. Data was collected by retrospective analysis of the recorded data and filling a pre designed questionnaire, which include questions designed to fulfill the study objectives. **Results:** The total number of spina bifida cases borne in maternity and children hospital in Arar city, Northern Saudi Arabia during the year 2017 was 14 cases with a prevalence of 0.51%; 8(57.1%) were females and 6(42.9%) were males. Consanguinity between parents found in 57.1% of cases, and folic acid deficiency during pregnancy reported in 78.6%. The site of spina bifida was lumbosacral in 57.1% and lumber 42.9%. The type was Spina bifida occulta 57.1%, Myelomeningocele 28.6% and Myeloschisis 14.3%. Weakness of legs, urinary incontinence 35.7%, hip dislocation, deformity of the body 21.4% and paralysis were the reported complications. **Conclusion:** The prevalence of spina bifida in Arar, KSAwas 5.1per 1,000 live births. Majority of the reported cases were females, Spina bifida occulta was the most common then myelomeningocele and myeloschisis. The site was lumbosacral and lumber.

**Keywords:** Spina bifida, Arar, Northen KSA, prevalence, types, site, complications, treatment.

## INTRODUCTION

Birth defects are one of the leading causes of infant mortality worldwide1–3 and affect an estimated 1% to 3% of all births [(1)].

Spina bifida is a type of neural tube defect resulting from an incomplete closure of the spinal column leading to a herniation or exposure of the spinal cord or meninges. Spina bifida is the most common birth defect that can cause disablement for a lifetime [(2,3)]. Numerous studies have extensively investigated the epidemiological characteristics of this disease.

A combination of genetic and environmental factors including family history, pre-gestational diabetes, maternal obesity, insufficient intake of folic acid, and use of anticonvulsant medications have been established as characteristics of spina bifida [(4-6)]. Recently, the prevalence of spina bifida varies by time and region. For instance, on the basis of the National Birth Defects Prevention Network, Parker [(1)] reported that the prevalence of spina bifida in the United States from 2004 to 2006 was 3.5 per 10,000 live births. In contrast, the prevalence of spina bifida was 42.8 per 10,000 live births in Algeria during the same observational period [(7-9)].

A study carrier out on total of 86 patient records with spina bifida were analyzed in Malaysia found that; prevalence rate in this study ranged from 1.87 to 8.9 per 1,000 live births depending on weight age. The most common site of the spina bifida lesion was located at the lumbar region (26.74%). In terms of mobility, 32.84% (n = 22/67) of patients between the ages 4 and 16 years old were found to be mobile.

As many as 36.07% of patients ranging from 5 to 16 years of age (n = 22/61) received formal education ranging from preschool to secondary school [(10)].



Received:28 /2 /2018
Accepted:9 /3 /2018

DOI: **10.12816/0047732**

The aim of this study is to estimate the prevalence, types, manifestations, diagnosis and complications of Spina bifida as well as treatment outcomes of the disease in all neonates born in Maternity and child hospital in Arar city, Northern Saudi Arabia, during the period from 1 January 2016 to 31 December 2017 Arar, KSA.

## PARTICIPANTS AND METHODS

### Study design, setting, period and target population

This is a descriptive study involved all neonates born in Maternity and child hospital in Arar city, Northern Saudi Arabia, KSA, during the period from 1 January to 31 December 2017.

### *Data collection*

Among 2800 delivered infant in 2016 and 2017; there was 14 cases of Spina bifida. Data was collected by retrospective analysis of the recorded data and filling a pre designed questionnaire, which include questions designed to fulfill the study objectives.

- Socio-demographic characteristics of child including sex, mother and father educational level.
- Consanguinity between parents, **mother age at child delivery, birth order of the child, if the mother had repeated abortions, if the mother had folic acid deficiency during pregnancy**
- The questionnaire included also questions about of Spina bifida **Type, Site, complications, type of treatment, complications of treatment, using of aids for movement and outcome of the treatment**
- Questions about reported symptoms, received management, outcome of the cases and cause of death in died cases.

### *Statistical analysis*

Data were compiled and analyzed using statistical package for the social sciences (SPSS, version 16), results were analyzed with frequencies.

### *Ethical considerations*

Permission to conduct the study was obtained from the Research and Ethics Committee at the College of Medicine, Northern Border University, Arar, Saudi Arabia. The questionnaire had a brief introduction explaining the aims and significance of the study to parents. Parents of the neonates were informed about the study objectives. The participation was completely voluntary no name was recorded on the questionnaires.

## RESULTS

The total number of spina bifida cases borne in maternity and children hospital in Arar city, Northern Saudi Arabia during the year 2017 was 14 cases with a prevalence of 0.51%; 8(57.1%) were females and 6(42.9%) were males. Mother's education was University or more in 57.1% and father's education was also university or more in 78.6%. Consanguinity between parents found in 57.1% of cases, mother's age at child delivery was 25-29 years in 35.9%, the child was second or 3$^{rd}$ birth in 57.2% of cases and folic acid deficiency during pregnancy reported in 78.6%. (Table 1 & Figure 1).

As regards type of spina bifida, our study reported, Spina bifida occulta 57.1%, Myelomeningocele 28.6% and Myeloschisis 14.3%. Regarding the complications of spina bifida our study reported; weakness of legs, urinary incontinence 35.7%, Hip dislocation, deformity of the body 21.4% and paralysis, sensitivity of certain drugs, small head size, seizures, headache, weakness of legs with the same percent 14.3%. As regard to site of spina bifida our study found that Lumbosacral was the most common site by 57.1% and Lumber 42.9%. Type of treatment was neonatal surgery in 57.1% and physiotherapy in 21.4% while no treatment (neonatal death) 21.4% of cases. Outcome of cases was improving in 21.4%, no changes in 50% and death of the case in 28.6%. (Table 2).

**Table (1):** Socio-demographic characteristics of child, consanguinity between parents, mother age at child delivery, birth order of the child, mother had repeated abortions and folic acid deficiency during pregnancy among spina bifida cases, Arar, Northern KSA

| **Sex** | **No.** | **%** |
|---|---|---|
| Female | 8 | 57.1 |
| Male | 6 | 42.9 |
| **Mother's education** | | |
| Secondary | 6 | 42.9 |
| University or more | 8 | 57.1 |
| **Father's education** | | |
| Secondary | 2 | 14.3 |
| University or more | 11 | 78.6 |
| Preparatory | 1 | 7.1 |
| **Consanguinity** | | |
| No | 6 | 42.9 |
| Yes | 8 | 57.1 |
| **Income/month** | | |
| Good | 3 | 21.4 |
| Very good | 7 | 50.0 |
| Excellent | 4 | 28.6 |
| **Mother age at child delivery** | | |
| 20-24 | 2 | 14.3 |
| 25-29 | 5 | 35.7 |
| 30-34 | 4 | 28.6 |
| 35-39 | 3 | 21.4 |
| **Birth order** | | |
| 1st | 2 | 14.3 |
| 2nd | 4 | 28.6 |
| 3rd | 4 | 28.6 |
| 4th | 2 | 14.3 |
| 5th | 1 | 7.1 |
| 6th | 1 | 7.1 |
| **Mother had repeated abortions** | | |
| No | 10 | 71.4 |
| Yes | 4 | 28.6 |
| **Folic acid deficiency during pregnancy** | | |
| No | 3 | 21.4 |
| Yes | 11 | 78.6 |

**Figure (1): Prevalence of spina bifida among infants in Arar, Northern Saudi Arabia, 2017**

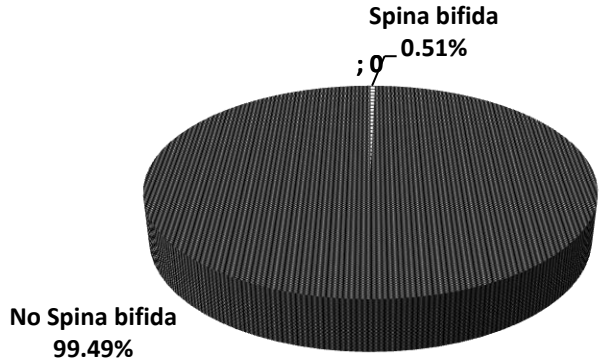


**Table (2): Type, Site, complications, type of treatment, complications of treatment, using of aids for movement and outcome of the treatment**

| **Type of Spina bifida** | No. | % |
|---|---|---|
| Spina bifida occulta | 8 | 57.1 |
| Myelomeningocele | 4 | 28.6 |
| Myeloschisis | 2 | 14.3 |
| **Site of Spina bifida** | | |
| Lumbosacral | 8 | 57.1 |
| Lumber | 6 | 42.9 |
| **Complications of Spina bifida** | | |
| Paralysis, sensitivity of certain drugs | 2 | 14.3 |
| Weakness of legs, urinary incontinence | 5 | 35.7 |
| Hip dislocation, deformity of the body | 3 | 21.4 |
| Small head size, seizures | 2 | 14.3 |
| Headache,weakness of legs | 2 | 14.3 |
| **Typeoftreatment** | | |
| Neonatal surgery | 8 | 57.1 |
| Physiotherapy | 3 | 21.4 |
| No treatment (neonatal death) | 3 | 21.4 |
| **Complications of surgery** | | |
| Post operative bleeding | 3 | 21.4 |
| Retarded growth and development | 6 | 42.9 |
| No complications and/or neonataldeath | 5 | 35.7 |
| **Using of aids for movement** | | |
| Arches | 1 | 7.1 |
| Leg braces | 5 | 35.7 |
| Catheterization of bladder | 2 | 14.3 |
| No aids (or death) | 6 | 42.9 |
| **Outcome of cases** | | |
| Improving | 3 | 21.4 |
| Nochanges | 7 | 50.0 |
| Death of the case | 4 | 28.6 |

## DISCUSSION

Neural tube defects (NTDs) are the most common birth defect of the central nervous system and they occur at a range of 0.5–10 or more in 1,000 live births worldwide **(11)**. Spina bifida (SB) is a common birth defect resulting from incomplete closure of the neural tube during the first month of pregnancy [(12)] and that is associated with significant clinical complications that can affect survival and the quality of life for affected individuals. This is a descriptive study involved all neonates born in Maternity and Children hospital in Arar city, Northern Saudi Arabia, KSA, during the period from 1 January to 31 December 2017. The study aim was to estimate the prevalence, types, manifestations, diagnosis, complications as well as treatment outcomes of of Spina bifida in all neonates born in Maternity and Children hospital in Arar city, Northern Saudi Arabia, during the period from 1 January 2016 to 31 December 2017.

Our study found that the prevalence of spina bifida among infants in Arar was 0.51%. A prospective study was conducted in two hospitals: the Maternity and Children Hospital and Ohud Hospital in the city of Al-Madinah Al-Munawarah, Western Province, Saudi Arabia; during the study period, 18 cases of spina bifida were detected, the number of live births in the hospitals concerned were 16,550 births, making an incidence of 1.09per 1,000 live births [(13)]. In Riyadh city, case-control study included 25 cases of neural tube defects born in King Khalid University Hospital found that 4(16%) had spina bifida [(14)]. In Iran a descriptive cross-sectional study wascarried out in Dezyani teaching hospital inGorgan among 37 951births, with 109 newborns and stillbirths recordedwith NTD out of the 109 NTD cases, 62 had spinabifida; The corresponding prevalence ratefor spina bifida was 16.3/10 000 births [(15)] . Another study inTehran (central Islamic Republic of Iran) reported prevalence rate 3.8/10 000 [(16)]. In Tunisia a study found that; From 1991 through 1994, the prevalence of identified spina bifida cases was equal to 0.3/10,000 births compared to 1.6/10,000 births in 2008–2011, this increase was statistically significant ($P < 0.001$) [(17)]. Another study in Tunisia, the incidence of spina bifida was reported to be 1.05/1000 [(18)]. In Algeria [(19)] the reported incidence of spina bifida was at 7.5/1000. In Malaysia data captured from 86 patients revealed prevalence rate of spina bifida in the study ranged from 1.87 to 8.9 per 1,000 live births [(20)].

As regards type of spina bifida, our study reported, Spina bifida occulta 57.1%, Myelomeningocele 28.6% and Myeloschisis 14.3%. In contrast, in Jeddah, Kingdom of Saudi Arabia another study reported 83% of the cases had myelomeningocele (MMC) and 2.5% had meningocele [(21)]. In the Asir Region of Saudi Arabia another study reported the major lesions were myelomeningocele (70%) and Meningocele represent (1.6%) [(22)]. Another study conducted among 127 patients with spina bifida, 114 (89.8%) had myelomeningocele and 13 (10.2%) had SP occulta [(23)]. Another study reported that the most commonly type of spina bifida was myelomeningocele (45.35%) then meningocele (15.12%) and other types like Lipomyelomeningocele (12.79%) and Lipomeningocele (11.63%) [(20)].

Regarding the complications of spina bifida our study reported; weakness of legs, urinary incontinence 35.7%, Hip dislocation, deformity of the body 21.4% and paralysis, sensitivity of certain drugs, small head size, seizures, headache, weakness of legs with the same percent 14.3%.

Another study reported Urinary tract infection (UTI), scoliosis and pain were the most common complications found in 46%, 30% and 28% of the patients, respectively and Less common complications were epilepsy, pressure ulcers (PU) and spasticity [(23)].

As regard to site of spina bifida our study found that Lumbosacral was the most common site by 57.1% and Lumber 42.9%. Another study reported that the most commonly level of spina bifida lesion was at the lumbar region (26.7%), Lumbosacral (20.93%) [20].Another study found that the most commonly affected sites were thoracolumbar (44.4%), lumbosacral (40%) and lumber (9%) [(23)].

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