

# PREVALENCE OF CEREBRAL PALSY IN CHILDREN OF DISTRICT SWABI, KHYBER PAKHTUNKHWA - PAKISTAN

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## ABSTRACT

**OBJECTIVE:** To study the prevalence of cerebral palsy (CP) in children of district Swabi, Khyber Pakhtunkhwa - Pakistan.

**METHODS:** This study was carried out among children of age 4-10 years of age at district Swabi, Khyber Pakhtunkhwa, Pakistan. The data was collected by a survey questionnaire adopted from surveillance of cerebral palsy in Europe (SCPE) study. Parents of the children were interviewed and completed the questionnaires. District Swabi comprised of 56 union councils with a population of 1.3 million (annual growth rate of 2.96%). Study was conducted at all (56) union councils between February and June 2014.

**RESULTS:** A total of 278 children were found as sufferers from CP, out of which 191 (68.7%) were male children and 87 (45.5%) were female. Mean age was  $7.6 \pm 1.97$  years. Prevalence rate was recorded as 1.22/1000 live births. The most affected children were found in the age group between 9-10 (39.6%) years. Out of 278 children, 109 (39.2%) were severely affected, 112 (40.3%) were moderately and 57 (20.5%) were mildly affected. Almost half of the children (49.6%) were suffering from spastic quadriplegia. The frequency of affected children was higher from urban areas (91.7%) as compared to rural areas (8.3%).

**CONCLUSION:** Prevalence of CP in children was 1.22/1000 live births in district Swabi, Khyber Pakhtunkhwa - Pakistan. Majority of affected children were in the age group of 9-10 (39.6%) years. About half of the affected children had spastic quadriplegia and severe deformities were recorded in 39.2% cases.

**KEY WORDS:** Cerebral Palsy (MeSH), Cerebral Palsy, Monoplegic, Infantile (MeSH), Cerebral Palsy, Quadriplegic, Infantile (MeSH), Cerebral Palsy, Spastic (MeSH), Spastic Diplegia (MeSH), Cerebral Palsy Children (Non-MeSH).

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## INTRODUCTION

Cerebral palsy is a non-progressive disorder that affects movements, posture and sensation.<sup>1</sup> According to Peter Rosenbaum, "Cerebral palsy (CP) describes a group of permanent disorders of the development of movement and posture, causing activity limitation that is attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders

of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior, by epilepsy, and by secondary musculoskeletal problems."<sup>1</sup>

The overall prevalence rate 2.5/1000 live births, however it varies from 1 to 6/1000 live births in developing countries.<sup>2,3</sup> In China the prevalence was found as 1.6/1000 live births with male to female ration as 1.9:1.2.<sup>4</sup> While in a similar study

it was 4.4/1000 live births.<sup>5</sup> The male to female ration was reported as 1.4:1.6 and 1.5:1.7 respectively, in Saudi Arabia and Iraq.

Defect or lesion originates in the immature brain and affects movements, posture, or motor function of the body and are considered the key elements associated with the cerebral palsy.<sup>1</sup> The prevalence of CP has been studied largely and showed variation from country to country and is the most common neuro-developmental disability in infancy.<sup>8</sup> In the developing countries the prevalence rate varied from 1.5 to 3 per 1000 live births.<sup>5</sup> In Europe a network named, "Surveillance of cerebral palsy in Europe" has found the prevalence as 1.5 to 3 per 1000 live births in the member countries, while the overall prevalence is measured as 2.2 per 1000 live births.<sup>9</sup> It has been reported that very little work has been done in our settings (Pakistan) regarding prevalence of cerebral palsy.<sup>2</sup>

The purpose of this work was to find out the prevalence of cerebral palsy in children of district Swabi Khyber Pakhtunkhwa. District Swabi was chosen for this study because most of the children with CP are referred for physical rehabilitation to the Prosthetic and Orthotic (P&O) facilities at Pakistan Institute of Prosthetic and Orthotic Sciences (PIPOS), Hayatabad, Peshawar, Pakistan.

## METHODS

Community survey was done to find out the prevalence of CP in District Swabi. District Swabi, one of the 26 districts of Khyber Pakhtunkhwa, Pakistan, comprised of 56 union councils with a population of about 1.3 million<sup>10</sup> with the annual growth rate is 2.96%.<sup>11</sup> The

campus were organized in each union council. People were informed to bring their children who have had any sort of disability with complaints of delayed milestones and are diagnosed with CP, through social mobilizers and community elders. Children not diagnosed with CP, were referred to tertiary hospitals in Peshawar for pediatrician opinion and after confirmation were included in the study. The clinical assessment/ screening were done and questionnaire was filled from the parents of children, aged 4-10 years. Our objective was to measure the prevalence, however, some additional information was also recorded as per the questionnaire. The prevalence in the rural and urban areas of District Swabi was studied. Additionally on the basis of Gross Motor Functional Classification System (GMFCS), the functional independence of children suffering from CP was evaluated and placed in five groups (I-V) as defined in the GMFCS. For finding living births per year the census data were used.

The questionnaire used in this study was adopted from "Surveillance of Cerebral Palsy in Europe SCPE".<sup>9</sup> It is comprised of five sections, first of which was about personal information. Section 2 of the questionnaire has 8-10 questions related to the diagnosis while section 3 comprised of questions about the type of cerebral palsy. Part four consist of GMFS scale and part five was about severity level based on GMFS. The questionnaire was translated to local language and was validated by translation and re-translation method.

Data was collected using the structured questionnaire from the parents of the affected children. The time duration for the data collection remained 02 months and all the 56 union councils of District Swabi were covered.

The children included in this study were from District Swabi of Khyber Pakhtunkhwa, Pakistan. They were 4 to 10 years of age and already diagnosed with cerebral palsy. Children who were non residents of the District Swabi and

those diagnosed with other progressive diseases were not included in this study.

**Data Analysis**

The collected data was saved on MS excel sheet. Each of the 56 union councils was recorded separately. Data analysis was done on Microsoft excel program. Means, Standard deviation and percentages were calculated.

**RESULTS**

Thirty four forms were excluded on the basis of the inclusion and exclusion criteria, out of which 21 children were not fulfilling the age limit while 13 were because of muscular dystrophic conditions. Therefore, two hundred and seventy eight (278) children were diagnosed with CP in the 56 union councils. Mean age of the children was 7.6±1.97 years. Three groups were identified as 4-6, 7-8 and 9-10 years of age. The overall prevalence was found as 1.22 per 1000 live births with male to female ration as 2.2:1 {male = 191 (68.7%), female = 87(31.3%)}. Table I summarizes the result as below. Prevalence among the three groups (age wise) varied. It was

higher in the age group of 9-10 years (39.6%) than other age groups. Age wise results are shown in Table II below.

Analysis on the basis of area of residence shows that the situation in the urban areas (91.7%) is worse comparing to the rural (8.3%). Table III below shows the results recorded on the basis of area of living. While analyzing subtypes of CP, children with Quadriplegia ranked higher as 50%, followed by diplegia and hypotonic 18% each. Table IV below shows the results of children suffered from different conditions of CP.

The functional independence of every child was measured according to GMFCS. It was found that almost 39% of affected children are of GMFCS level V. These children are unable to perform motor function and to hold their head against gravity. Over 40% were found to be at level III and IV together and are unable to maintain the alignment/ posture without hand support. These patients can attain self-mobility for short distance (within room or lawn) by rolling and creeping on the abdomen without legs movement. Table V shows the number

**TABLE I: AGE & GENDER WISE DISTRIBUTION OF CEREBRAL PALSY CHILDREN**

| Age in years | Gender |       |        |       | Total | %age |
|--------------|--------|-------|--------|-------|-------|------|
|              | Male   | %age  | Female | %age  |       |      |
| 4 – 6        | 42     | 68.85 | 19     | 31.15 | 61    | 21.9 |
| 7 – 8        | 75     | 70.09 | 32     | 29.91 | 107   | 38.5 |
| 9 -10        | 74     | 67.27 | 36     | 32.73 | 110   | 39.6 |
| Total        | 191    | 68.71 | 87     | 31.29 | 278   | 100  |

**TABLE II: AGE WISE DISTRIBUTION OF CEREBRAL PALSY CHILDREN**

| Age in years | Sample (n) | %age | Prevalence/ 1000 live births |
|--------------|------------|------|------------------------------|
| 4 – 6        | 61         | 21.9 | 0.09                         |
| 7 – 8        | 107        | 38.5 | 1.13                         |
| 9 – 10       | 110        | 39.6 | 1.65                         |
| Total        | 278        | 100  | 1.22                         |

**TABLE III: AREA WISE DISTRIBUTION OF CEREBRAL PALSY CHILDREN**

| Area       | Sample (n) | %age  | Prevalence/ 1000 live births | area % |
|------------|------------|-------|------------------------------|--------|
| Rural area | 23         | 8.27  | 0.01                         | 8.33   |
| Urban area | 255        | 91.73 | 1.12                         | 91.67  |
| Total      | 278        | 100   | 1.22                         | 100    |

**TABLE IV: DISTRIBUTION OF CHILDREN ACCORDING TO THE TYPE OF CEREBRAL PALSY**

| Type of CP      | Sample (n) | %age |
|-----------------|------------|------|
| 1. Spastic      |            |      |
| a. Quadriplegia | 138        | 50   |
| b. Diplegia     | 50         | 18   |
| c. Hemiplegia   | 31         | 11   |
| d. Monoplegia   | 5          | 2    |
| 2. Ataxic       | 3          | 1    |
| 3. Hypotonic    | 51         | 18   |
| Total           | 278        | 100  |

**TABLE V: DISTRIBUTION OF CHILDREN ACCORDING TO GROSS MOTOR FUNCTIONAL CLASSIFICATION SYSTEM**

| Gross Motor Functional Classification System Levels | Sample (n) | %Age  |
|---|------------|-------|
| I   | 9          | 3.24  |
| II  | 49         | 17.63 |
| III   | 28         | 10.07 |
| IV  | 84         | 30.22 |
| V   | 108        | 38.85 |
| Total   | 278        | 100   |

**TABLE VI: DISTRIBUTION OF CHILDREN ACCORDING TO SEVERITY OF DEFORMITY (GMFCS)**

| Category                 | Sample (n) | %age  |
|--------------------------|------------|-------|
| Mild (GMFCS I, II)       | 57         | 20.50 |
| Moderate (GMFCS III, IV) | 112        | 40.29 |
| Severe (GMFCS V)         | 109        | 39.21 |
| Total                    | 278        | 100   |

and percentage of the affected children according to GMFCS levels.

According to GMFCS level I, II children lies in mild category while level III, IV lies in moderate category while level V is the more severe condition of the patient. This distribution is given in Table VI.

## DISCUSSION

The average prevalence rate of CP is 1.5 to 3 per 1000 live births in the developed countries.<sup>9</sup> The retrospective study on the prevalence of CP among Asian racial subsections children with a birth cohort, from California, of 11-year period (1991-2001) found 8397/6221001 cases as diagnosed with CP with prevalence rate of 1.40/ 1000 live births.<sup>12</sup> In

China the prevalence of CP was studied during 1993-1996 and was recorded as 1.6/1000 children.<sup>4</sup> The highest prevalence has been reported from Turkey which was as high as 4.4/1000 live births.<sup>5</sup> The results of this study were recorded as lower to the findings in the European countries as well.<sup>9</sup> In Pakistan studies have been performed on CP children but in reference to the risk factors associated with it, causes and regarding the clinical findings. Very little work has been done regarding the etiology and prevalence of CP.<sup>2</sup> However, the prevalence, in this study, was recorded as 1.2/1000 live births. These findings are in-line with most of the studies in the developing world but much lower than the findings in Turkey.<sup>5</sup> The findings of Lie et al (2001)

with 1.4/ 1000 live births is higher to our results.<sup>5</sup>

Previous studies in Pakistan have found male to female ratio as 4:1,<sup>2</sup> 1.3:1.<sup>3</sup> In India it was predominantly male with 67.5%.<sup>13</sup> In China the male to female ratio was reported as 1.9:1.2/1000 live births respectively.<sup>4</sup> In our findings it remained a little higher (2.2:1) comparing to China<sup>4</sup> and India<sup>13</sup> but lower than the previous finding in Pakistan.<sup>2,3</sup> On the basis of gender, male were more affected at the age of 7-8 (70%) while the female number was higher at age group 9-10 years (32.7%). Yam et al. (2006) found the prevalence rate as 1.3/1000 live births with male to female ratio as 3:2<sup>13</sup> higher to the studies in Saudi Arabia (1.4:1)<sup>6</sup> and Iraq (1.5:1)<sup>7</sup> In addition to this the findings of Liu et al (1999), also indicated that the male children were more affected than the female (3:2).<sup>5</sup> The male affected children in Iraq and Kingdom of Saudi Arabia are little lower than our finding.<sup>6,7</sup>

Among the three studied age groups, the prevalence was found higher in children of age 9-10 years (1.6/1000 live births) followed by 7-8 years (1.13/1000 live births). The finding related to the urban and rural areas were found higher (91.7%) and lower (8.3%) respectively, which is the similar case found in Turkey.<sup>5</sup>

Regarding the type of CP, spastic diplegia is the commonest reported form in developed countries<sup>13</sup> but spastic quadriplegic CP was recorded higher among the studies population in Pakistan (39.9%).<sup>3</sup> Similar results were found in India (spastic quadriplegic as 61%).<sup>13</sup> The findings of this study (50% spastic quadriplegic) supports the results reported previously.<sup>3,13</sup>

While using a Swedish Classification System it was found in India that most of the CP children were presented with severe conditions (CNS affected with associated problems).<sup>13</sup> In our study the functional independence was studied and

it was found that most of the children were in GMFCS level V (39.9%).

## CONCLUSION

Prevalence of CP in children was 1.22/1000 live births in district Swabi, Khyber Pakhtunkhwa-Pakistan. The prevalence of CP shows variations as stated above so, the overall prevalence in District Swabi, Khyber Pakhtunkhwa, Pakistan was found similar to the previously published papers in other developing countries except Turkey. However, in Pakistan the results vary in different studies, performed at different locations. This variation may also be due to different methodology and study design used. The results of this study cannot be generalized because the data collected is only from one district and the sample was not adequate enough. Therefore, it is recommended to have a comprehensive research in Pakistan at provincial and national levels with a good sample size and techniques on the same subject. Additionally efforts are needed both at public and private levels to look after the physical rehabilitation aspect of

these children, in order to maximize their comfort and mobility.

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### CONFLICT OF INTEREST

Authors declared no conflict of interest

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## AUTHORS' CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

- AA:** Concept & study design, acquisition of data, drafting the manuscript, final approval of the version to be published  
**NA:** Acquisition, analysis & interpretation of data, drafting the manuscript, final approval of the version to be published,  
**HI:** Critical revision, drafting of the manuscript, final approval of the version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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