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RESEARCH ARTICLE

ESTABLISH REGISTRY OF CEREBRAL PALSY IN KAFRELSHEIKH GOVERNORATE-EGYPT

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ABSTRACT

Background: Prevalence of cerebral palsy (CP) in developing country is high. It is one of the most common causes of childhood physical disability. **Purpose:** To establish a registry of CP in Kafrelsheikh Governorate except Kafrelsheikh city-Egypt. **Subject and Methods:** One hundred and three children with CP of both genders who were receiving physical therapy in Kafrelsheikh Governorate except Kafrelsheikh city participated in the study. Their ages ranged from one month to 18 years. They were subjected to confidential modified Australian Registry Form. They were recruited from nine governmental hospitals. This study was conducted from August 2018 up to October 2019. **Results:** The findings revealed that the prevalence of CP children who received physical therapy services was 1/10000 live birth in Kafrelsheikh Governorate except Kafrelsheikh city. Boys represented 33% and girls represented 67% from total cases. All the reported cases were spastic CP where 5.8% of the children were diplegic, 7.8% children were monoplegic, 25.2% were left hemiplegic, 28.2% were right hemiplegic and 33% were quadriplegic CP. According to Gross Motor Function Classification System; level IV has the highest percentage. **Conclusion:** Prevalence of CP in Kafrelsheikh Governorate except Kafrelsheikh city is low. Spastic type of CP has the highest frequency.

INTRODUCTION

Cerebral palsy (CP) is a neuromuscular disorder caused by an injury to the fetal or infant brain that affects the development of movement and posture and causes activity limitations. The motor disorders of CP are often accompanied by disturbances of sensation, perception, cognition, communication and behavior, epilepsy and by secondary musculoskeletal problems (Rosenbaum *et al.*, 2006). This consensus definition not only acknowledges the initial static or nonprogressive injury to the immature brain but also recognizes the resulting dynamic and evolving medical, developmental, and social issues that this disruption in normal brain development creates throughout the life span (Hurley *et al.*, 2011 and Oskoui *et al.*, 2013). There are two methods by which CP could be classified. One method is to describe the predominant motor features, which include spastic, hypotonic, athetotic, dystonic, and ataxic in which there is a topographical pattern of limb involvement, such as monoplegia, diplegia, triplegia, hemiplegia, or quadriplegia. A second method classifies CP into two major physiologic types; pyramidal (spastic) and extra pyramidal (nonspastic), indicating the area

of the brain that has been affected as well as the resulting predominant motor disorder (Jones *et al.*, 2007). The incidence rate is a measure of the frequency with which some event, such as a disease or accident, occurs over a specified time period. Incidence rate or "incidence" is numerically defined as the number of new cases of a disease within a time period, as a proportion of the number of people at risk for the disease. They often refer to a birth cohort or longitudinal study and are therefore more difficult to study in resource-poor settings where follow-up and health access were difficult (Ashwal *et al.*, 2004). To understand the complexity of CP, registries using total population of a geographically defined area as the denominator were established and became instrumental in the contribution to our understanding about prevalence, risk factors, etiology and perinatal care (Cans *et al.*, 2011). The prevalence was recorded in different governorates in Egypt. Each governorate had a different prevalence of CP. Therefore; the purpose of this study was to establish registry of CP in Kafrelsheikh governorate, Egypt.

MATERIALS AND METHODS

Subjects: One hundred and three children with CP of both genders participated in the study. Their ages ranged from one month up to 18 years. All children with CP were recruited from nine governmental hospitals in Kafrelsheikh governorate

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(except Kafelsheikh city). Children were recruited according to the following inclusion criteria: a) diagnosed as CP, b) age ranged from birth up to 18 years, c) children who live in Kafelsheikh governorate, Egypt, d) children who receive physical therapy as a part of their management.

Materials: A modified version of the Australian Cerebral Palsy Register (ACPR) was used (Australian Cerebral Palsy Register, 2016). It uses validated measurement tools to record spasticity and functional severity of CP by Gross Motor Function Classification System (GMFCS) with excluding data including post code and emails. It includes clinical details of person with CP (Lee *et al.*, 2015). The GMFCS is a reliable and valid method for classifying functions among children with CP. It is based on self-initiated movement, with emphasis on sitting, transfers, and mobility. It includes five-level classification system. Level I: Walks without restrictions (limitations in more advanced gross motor skills. Level II: Walks without assistive devices (limitations in walking outdoors and in the community). Level III: Walks with assistive mobility devices (limitations in walking outdoors and in the community). Level IV: Self-mobility with limitations (children are transported or use power mobility outdoors and in the community). Level V: Self-mobility is severely limited even with the use of assistive technology (Lee *et al.*, 2015)

Procedures: An approval letter from the ethical committee of the Faculty of Physical Therapy, Cairo University as well as written consent forms from parents for participation of their children in this study were obtained prior to beginning of the study. This study was conducted from August 2018 up to October 2019. All children were recruited from nine governmental hospitals in Kafelsheikh governorate, Egypt. After approval, the aim of the study was explained to parents or caregivers. The children were then examined by the school's physician for the inclusion and exclusion criteria. Each eligible child participated in the study. Assessment of each child was started by observation from the entrance to the examination room. The child was in comfortable environment to do different functional activities without any interruption according to their age with some motivation. During evaluation, the type of CP was determined, any associated impairments was recorded and assessing the levels of motor function was performed through the use of GMFC. The total time of each session ranged from two hours to two and half an hour and some cases required more than one session according to case and his/her cooperation. The main collected information in this study included gestational age, chronological age, gender, birth weight, type of delivery, parent consanguinity, onset of CP, type of CP, associated disorders and the level of motor function.

Statistical analysis: Data were analyzed using statistical package for social sciences (SPSS V-20). Data were presented as frequency and percentage. For qualitative data, chi-squared (χ^2) was used to examine the relationship between some variables. For all tests, $p \leq 0.05$ was considered to be statistically significant.

RESULTS

The number of CP cases in Kafelsheikh Governorate, Egypt who receive physical therapy services was 103 children representing about 1/10000 live birth.

Age of the participated children ranged from 1 month to 216 months (18 years old). The general characteristics of the participated children are presented in table (1). The distribution of different types of CP among participants is presented in figure (1). The distribution of the associated disorders among the participated children were analyzed and represented in figure (2). The severity and distribution of motor function according to GMFCS are represented in table (2). The results showed a significant correlation only between the onset of CP and father educational level ($p=0.04$) and mother educational level ($p=0.03$) (Table 3). The results showed no significant correlation between the total score of GMFCS and gestational age ($p=0.557$), gender ($p=0.753$) as well as birth weight ($p=0.565$) (Table 4).

DISCUSSION

Kafelsheikh governorate is one of the governorates of Egypt. It lies in the northern part of the country, along the western branch of the Nile in the Nile Delta. Its capital is the city of Kafelsheikh. There is no documented or accurate data regarding the prevalence of CP in Kafelsheikh governorate according to the Directorate of Health. Therefore, this study may help public health official to determine actual size of the biggest problem facing the children. The latest data about the total population in Kafelsheikh governorate was about 3362183 citizens according to 2017 census with a total number of pediatric at age of 18 years or less was 1233983 which represented the target populations for this study which is about 36.7% of the total population. The number of the children with CP who receive physical therapy services was 103 children representing 0.008% of the total children in Kafelsheikh governorate. The prevalence of CP in Kafelsheikh governorate is one for each 10000 live births.

This prevalence is considered a low prevalence. This may be due to small total population in Kafelsheikh governorate. The prevalence was recorded in different governorates in Egypt. El-Tallawy *et al.*, 2011 and Tallawy *et al.*, 2014 recorded that the prevalence of CP was 2.03 and 3.6 per 1000 live births in Al-Kharga district and Al-Queir city respectively. Yasin and Abdalazim (2016) conducted a study at Banimazar district, Alminya governorate and reported a prevalence of 1/1000 live births. In Damanhur, the prevalence was 0.8/1000 live births (Abdelwanees *et al.*, 2017). Nasef and Abdel Rahman (2017) recorded that the prevalence of CP was 0.88/1000 live births in Kafelsheikh city, Kafelsheikh governorate. Radwan and Abdalazim (2017) recorded a prevalence of 0.4/1000 live births in Alexandria (Almontazah District) Egypt. Saeed *et al.*, (2017) also recorded a prevalence of 1.3/10000 live births in Alexandria (Wassat District) Egypt.

Our findings revealed that about 38.8% of mothers had complications during their pregnancy which may be a predisposing factor for having a child with CP. Mostafa *et al.*, (2017) recorded only 26.9% of mothers with complications during pregnancy in Sohag city, Egypt. The results also revealed that 54.4% of mothers took medications during pregnancy while Nasef and Abdel Rahman (2017) recorded that 94.4% of the mothers received drugs during pregnancy in Kafelsheikh city, Kafelsheikh governorate, Egypt. However, most of these drugs were taken to prevent abortion and miscarriage.

Table (1): Characteristics of the participated children*.

| Variables | | Frequency | Percentage | Rank |
|---------------------------------|----------------------------------|-----------|------------|------|
| Gestational age in weeks | Preterm < 37 | 33 | 32 | 2 |
| | Full term 37- 42 | 70 | 68 | 1 |
| Child age in years | 0-1 | 2 | 1.9 | 3 |
| | 1- 4 | 54 | 52.4 | 1 |
| | 4- 10 | 45 | 43.7 | 2 |
| | 10-15 | 2 | 1.9 | 3 |
| Child sex | Boys | 34 | 33 | 2 |
| | Girls | 69 | 67 | 1 |
| Birth weight in grams | Low birth of weight < 2500 | 58 | 56.3 | 1 |
| | Normal birth of weight 2500-4200 | 45 | 43.7 | 2 |
| Child weight in kilograms | 5-10 | 46 | 44.7 | 2 |
| | 10-15 | 47 | 45.6 | 1 |
| | 15-20 | 7 | 6.8 | 3 |
| | More than 20 | 3 | 2.9 | 4 |
| Child birth order | 1 st | 35 | 34 | 2 |
| | 2 nd | 37 | 35.9 | 1 |
| | 3 rd | 23 | 22.3 | 3 |
| | 4 th | 8 | 7.8 | 4 |
| Onset of cerebral palsy | Prenatal | 7 | 6.8 | 3 |
| | Perinatal | 29 | 28.2 | 2 |
| | Postnatal | 67 | 65 | 1 |
| Were any birth defects present? | No | 91 | 88.3 | 1 |
| | Yes | 12 | 11.7 | 2 |

Table (2): Levels of motor function according to Gross Motor Function Classification System

| Levels | Frequency | Percentage | Rank |
|-----------|-----------|------------|------|
| Level I | 9 | 8.7 | 3 |
| Level II | 8 | 7.8 | 4 |
| Level III | 33 | 32 | 2 |
| Level IV | 51 | 49.5 | 1 |
| Level V | 2 | 1.9 | 5 |
| Total | 103 | 100 | - |

Table (3): Relationship between some characteristics and onset of cerebral palsy

| Variables | Chi- square | Contingency Coefficient | p.Value |
|-------------------------------|-------------|-------------------------|---------|
| Father educational level | 13.03 | 0.335 | 0.04* |
| Mother educational level | 13.59 | 0.341 | 0.03* |
| Consanguinity | 1.18 | 0.107 | 0.55 |
| Mother age at delivery | 11.41 | 0.316 | 0.08 |
| Complication during pregnancy | 0.84 | 0.089 | 0.67 |
| Medications during pregnancy | 1.48 | 0.119 | 0.48 |
| Gestational age | 0.66 | 0.080 | 0.72 |
| Delivery intervention | 4.47 | 0.204 | 0.11 |
| Birth weight | 0.89 | 0.093 | 0.64 |

*Significant at $p \leq 0.05$.

The results regarding the gestational age revealed a high percentage for the full term babies. Yasin and Abdalazim (2016) as well as Elmorsy and Abdalazim (2017) also reported high percentage for the full term babies among the participated children in Bani Mazar, Minya and El-Gharbya governorate, Egypt respectively. Our findings revealed that CP can occur in both genders; with higher frequency in girls than boys. The prevalence rate of CP was also higher among girls than boys in El-Kharga District- new Valley (El-Tallawy *et al.*, 2011) and in Kafrelsheikh city, Kafrelsheikh governorate (Nasaf and Abdel Rahman, 2017). They explained their results due by neglecting periodic caring for mothers with girl's sex of fetus. On the other hand, Yasin and Abdalazim (2016) reported a higher ratio among boys than girls in Banimazar district, Alminya governorate. Saeed *et al.*, (2017) and Elmorsy and Abdalazim (2017) also recorded that the ratio was higher among boys than girls in Alexandria governorate (Wassat District) and El- gharbya governorate, Egypt respectively.

World Health Organization (2014) reported that the prevalence of Low birth weight (LBW) infants is 15% to 20% and common in developed countries. The data in this study demonstrated that 56.3% and 43.7% of all infants with CP were born with LBW and normal birth weight (NBW) respectively. Darwish *et al.*, (2016) reported 44.7% LBW and 1.8% NBW of the reported CP children in Imbaba, North Giza. Yasser *et al.*, (2017) also reported that the LBW rate was 56.8% in Mit-Ghamer city, Egypt. However, Mostafa *et al.*, (2017) recorded 55% of CP cases was NBW and only 24.4% was LBW in Sohag city, Egypt. Oskoui *et al.*, (2013) stated that the most important risk factor seems to be prematurity and LBW with risk of CP increasing with decreasing gestational age and birth weight, CP is seen in 10-18% of babies in 500-999 grams birth weight. The results of this study revealed that postnatal onset has the highest percentage which agree with the study of Saeed *et al.*, (2017) who reported that highest percentage of CP cases was of postnatal onset in Alexandria (Wassat District) Egypt, and

Nasef and Abdel Rahman (2017) who recorded postnatal cases of 55.1% in Kafelsheikh city, Kafelsheikh governorate, Egypt. Abdelwanees *et al.*, (2017) in Damanhure, El-Behera governorate, Egypt also recorded postnatal cases of 54.7% of all cases. However, Radwan and Abdalazim (2017) recorded perinatal cases of 63.4% in Alexandria (Almontazah District), Egypt and Yasser *et al.*, (2017) recorded perinatal cases of 52.3% in Mit-Ghamer city, Egypt. In the present study, the percentage of CP among mothers delivered normally was higher (55.3%) than those delivered with caesarian section (44.7%). This agrees with the result of Yasser *et al.*, (2017) who stated that 56.8% for normal labor delivery and 43.2% for caesarian section. Darwish *et al.*, (2016) reported 51.8% for normal labor delivery and 48.2% for caesarian section. Nasef and Abdel Rahman (2017) also reported 60.8% and 39.2% for normal labor delivery and caesarian section respectively in Kafelsheikh city, Kafelsheikh governorate. This could be attributed to the perinatal asphyxia that may be associated with normal vaginal labor. There are also higher chances of the baby being injured during normal birth. On the other hand, Yasin and Abdalazim (2016) reported 37% and 63% for normal labor delivery and emergency caesarian section respectively in Bani_Mazar, Minya. Saeed *et al.*, (2017) also reported a highest percentage for caesarian section 68.7% in Alexandria (Wassat District) Egypt. Elmosry and Abd-alazim (2017) reported that caesarian section was 63% in El- Gharbya governorate, Egypt. The results in this study revealed that 63.1% of parents had positive consanguinity and 39.9% had negative consanguinity. Yasser *et al.*, (2017) and Altonoby *et al.*, (2017) reported a percentage of 37.9% and 35.7% respectively for positive consanguinity. Kruer *et al.*, (2014) stated that at least 20% of cases are believed to be inherited. Positive consanguinity is directly associated with incidence of CP, it can be a predisposing risk factor and can enhance the overall risks. Nowadays access to genetic diagnostic testing is restricted. There are a minimum of 20 completely different syndromes related to CP and its possible there are more genetic syndromes that stay unknown. Consanguinity is a social issue that needs to be addressed by government and non-government agencies, and there's a necessity for awareness through education (Daher and El-Khairy, 2014).

Children with CP usually had some associated impairments such as epilepsy, intellectual, visual, hearing, swallowing and speech disorders with different percentages. Our results revealed higher percentage for the intellectual impairment and speech disorders (74.8% for each). Altonoby *et al.*, (2017) reported 70.5% of CP cases had speech disorder. Nasef and Abdel Rahman (2017) reported about 45.6% of cases had intellectual disability with different severity. This was followed by epilepsy with a percentage of 61.2%. Nasef and Abdel Rahman (2017) who reported about 49.4% of their cases had focal epilepsy with seizure manifestations. According to GMFCS findings, the results revealed that level IV represents the highest percentage followed by level II and level V representing the lowest percentages among the participated children. These results were consistent with Pfeifer *et al.*, (2009) who reported that most of spastic children were level IV according to GMFCS but the results differed with Yasin and Abdalazim (2016) who recorded the highest percentage for Level III in Bani_Mazar, Minya. Despite the higher percentage of parent positive consanguinity, the results showed no significant correlation between the onset of CP and parent consanguinity ($p=0.55$).

Conclusion

The current study revealed that the total CP cases who are referred to physical therapy services in Kafelsheikh Governorate except Kafelsheikh city, Egypt were 103 cases representing 1/10000 live births. Their age ranged from 1 month to 18 years. Consanguinity, delivery intervention, complications during pregnancy as well as birth weight have an important effect of the prevalence of CP within the participated children.

This study has great importance aiming to establish a data base about CP. This may help to improve health services, awareness about CP and establish prevalence about CP in Kafelsheikh. It is not only counting cases but also using Australian Registry Form as a way of assessment by GMFCS. This study is limited to Kafelsheikh governorate except Kafelsheikh city, Egypt. Therefore, studies are required to investigate the prevalence of CP in other governorates in Egypt.

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