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RESEARCH PAPER

Influence of socio- demographic factors on cerebral palsy among children

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Abstract: Cerebral palsy is a group of disorders that affect movement and muscle tone or posture. It is caused by damage that occurs to the immature, developing brain, most often before birth. The present study investigated the influence of socio-demographic factors like family type, family size, socio-economic status, and religion on cerebral palsy among children in Dharwad taluk during 2021-22. The sample size was 164 children of 6 to 16 years, on which 82 were cerebral palsy and 82 were typical children matched with cerebral palsy children. A descriptive matched pair case control design was used. Self- structured questionnaire and Agarwal's socio-economic status scale was used for data collection. The result of the study revealed that, the incidence of cerebral palsy was high among males (67.10%) than females (32.90%) also first born (56.10%) had more risk than later born (43.90%). Majority of families were (84.10%) nuclear with medium size (56.90%). The incidence of cerebral palsy was high among low socio-economic status hence, found a strongassociation between cerebral palsy and socio-economic status. Risk factors for cerebral palsy among children when compared to medium and high socio-economic status.

Key words: Cerebral palsy, Socio-economic status (SES),Typical children

Introduction

The term cerebral palsy refers to a number of disorders of movement and posture that are due to a non- progressive abnormality of the immature brain. Cerebral palsy influences the way children develop and hence is known as a developmental disability which is primarily motor in nature . It is distinguished from conditions such as brain deficits, autism, emotional disorders or mental retardation syndromes. Socio-economic status (SES) refers to an individual's place in society and strongly influences the individual experience since childhood and during adult life. Research on human's show that early malnutrition, stress, lack of stimulation and poor social interaction can affect the structure and functioning of the brain, with long lasting cognitive and emotional effects. Family SES, especially during early childhood seem to affect performance in some neuropsychological systems more than in others, particularly memory (episodic, working and semantic), oral and written language and executive functions (Hackman *et al*. 2010; Piccolo *et al*. 2014). Such influence is more prominent at younger ages, until about ten years old probably due to their complexity and prolonged development. In the first years of childhood, the socioeconomic status is very important for children development, since it may limit the conditions for stimulation, access to materials and activities that favor cognitive development (Forns *et al*. 2012). SES is evaluated as a combination of factors including income, level of education and occupation. It is a way of looking at how individuals or families fit in to society using economic and social measures that have been shown to impact individual's health and wellbeing. Previous epidemiological studies have reported a 16%-34% higher incidence of CP in males, probably due to genetic factors, hormone differences and biological vulnerability (Ghulam *et al*., 2018) In view of this the present study was conducted with the objective to study the influence of soio-demographic factors on cerebral palsy among chidren.

Material and methods

A population based cross-sectional study was conducted by using a descriptive matched pair case- control design. The target population of the study was cerebral palsy children in the age group of 6-16 years in both rural and urban areas of Dharwad taluk. A total of 77,471 typical children in the age group of 6-16 years were found in 118 villages and urban area of Dharwad taluk. Among them 82 were cerebral palsy children and 82 were match sample of typical children. So finally, 82 cerebral palsy and 82 matched sample of typical children in the age group of 6-16 years formed the sample of the study.

Tools used for the study

Self-structured questionnaire: A self-structured questionnaire was used to study the risk factors of cerebral palsy among children by eliciting information about child, parents and family.

Socio-economic status (SES) scale by Aggarwal *et al*, (2005): Socio-economic status of the family was estimated based on SES scale developed by Aggarwal *et al*, (2005). The scale consists 22 statements which assess caste, education, monthly per capita from all sources, type of house and location, family possessions, number of children, number of earning members in the family, possession of agricultural and nonagricultural land along with animals.

Statistical analysis: The data was collected and analyzed using frequency and percentage were calculated to interpret the demographics variables like age, education, occupation, ordinal position, religion, size of family, type of family and SES of family. Chi-square test is a non-parametric test used tofind out the

association between cerebral palsy and SES. Data was analyzed by using SPSS 21.0 version software.

Results and discussion

Table 1 represents the familial characteristics, with respect to family type, 86.40 per cent families belonged to nuclear type of family followed by joint family (13.60%) in urban area. Majority (81.60%) in rural area belonged to nuclear family followed by joint family (18.40%).The findings of typical children in urban area showed that 86.40 per cent families belonged to nuclear family followed by joint family (13.60%). Where as in rural area majority (78.90%) belonged to nuclear family followed by joint family (21.10%).The size of the family among cerebral palsy children's' families in urban area depicts that majority (52.30%) belonged to medium family size followed by small family (34.20%) and large family (13.60%). Where as in rural area 60.50 per cent families belonged to medium size family followed by large family (5.30%) and small family (4.20%).Regarding typical children in urban area majority (63.70%) belonged to medium family size followed by small family size (6.80%); and in rural area majority (60.50%) belonged to medium size family followed by small size family (34.20%) and large family size (5.30%).With respect to socio-economic status (SES) in urban families with cerebral palsy children majority (40.90%) belonged to poor SES followed by upper middle (38.60%) and high (20.50%) and in rural area majority (52.60%) belonged to poor SES followed by high (42.10%) and upper middle (5.30%) SES category. The findings of typical children among urban families majority (43.10%) belonged to poor SES followed by high (36.40%) and upper middle (20.50%) where as in rural area majority (78.90%) belonged to poor SES followed by high (13.20%) and upper middle (7.90%).Regarding religion among cerebral palsy families in urban area majority (65.90%) belonged to Hindu religion followed by Muslim (34.10%). In case of rural area majority (78.90%) belonged to Hindu religion followed by Muslim (21.10%).Findings of typical children 63.60 per cent families belonged to Hindu religion followed by Muslim (36.40) in urban area. Where as in rural area majority (73.70%) were Hindus followed by Muslims (26.30%).With respect to education of mother in urban area, 63.60 per cent mothers with cerebral palsy children completed their primary pass but less than 10^{th} class followed by just illiterate but not schooling (25.0%) and 11.40 per cent mothers completed 10^{th} class but not graduation. Among rural area majority (60.50%) mothers had less than primary education but not attended school for at least one year followed by primary pass but less than 10^{th} class (26.30%) and 13.20 per cent were just illiterate but no schooling. In case of typical children of urban area greater number (65.90%) completed primary but less than 10^{th} followed by 13.6 per cent completed 10^{th} class but less than graduation and 2.30 per cent competed less than primary but did not attended school for at least one year. Among rural area majority (50.0%) were just illiterate but no schooling followed by primary pass but less than 10^{th} (28.90%) and 21.10 per cent completed 10^{th} but had education less than graduation. Distribution of cerebral palsy with respect to occupation of mother in urban area, majority (90.90%) of mothers were self-

Table 1. Familial, parental and child characteristics of children with Cerebral palsy and Typical children N=164

Characteristics	Category	CP children		Typical children	
		Urban CPn=44	Rural CPn=38	Urban TP n=44	Rural TPn=38
Family type	Joint	6(13.60)	7(18.40)	6(13.60)	8(21.10)
	Nuclear	38(86.40)	31(81.60)	38(86.40)	30(78.90)
Size of the family	Small (5 members)	15(34.10)	13(34.20)	13(29.50)	13(34.20)
	Medium (5-10)	23(52.30)	23(60.50)	28(63.70)	23(60.50)
	Large(>10 members)	6(13.60)	2(5.30)	3(6.80)	2(5.30)
	High	9(20.50)	16(42.10)	16(36.40)	5(13.20)
	Upper middle	17(38.60)	2(5.30)	9(20.50)	3(7.90)
	Poor	18(40.90)	20(52.60)	19(43.10)	30(78.90)
Religion	Hindu	29(65.90)	30(78.90)	28(63.60)	28(73.70)
	Muslim	15(34.10)	8(21.10)	16(36.40)	10(26.30)
Education of mother	Just illiterate but not schooling	11(25.00)	5(13.20)	8(18.20)	19(50.0)
	< primary but not attended school for at least one year	-	23(60.50)	1(2.30)	-
	Primary pass but $<10^{th}$	28(63.60)	10(26.30)	29(65.90)	11(28.90)
	10^{th} class but < graduation	5(11.40)	-	6(13.60)	8(21.10)
Occupation of mother	Self-employed with income <5000 (labourer, house wife)	40(90.90)	36(94.70)	41(93.20)	32(84.20)
	Self-employed with income >5000 (shops, petty business)	-	-	3(6.80)	6(15.80)
	Service at shops,transport, own cultivation of land	4(9.10)	2(5.30)	-	-
Gender	Male	27(61.04)	28(73.71)	30(68.20)	27(71.10)
	Female	17(38.91)	10(26.29)	14(31.80)	11(28.90)
Ordinal positionGender	First born	27(61.44)	19(50.0)	34(77.30)	23(60.50)
	Male	27(61.04)	28(73.71)	30(68.20)	27(71.10)

*Figures in the parentheses indicates percentage

employed with income less than 5000 (labourer, house wife) followed by service at shops, transport, own cultivation of land(9.10%). Among mothers of rural area majority (94.70%) were self-employed with income less than 5000 (labourer, house wife) followed by service at shops, transport and cultivated own land (4.50%).When typical children were considered, 93.20 per cent mothers were self-employed with income less than 5000 (labourer, house wife) followed by self-employed with more than 5000(6.80%). where as in rural area majority (84.24%) mothers were self-employed with income less than 5000 followed by self-employed with more than 5000 income (15.80%).With regard to gender among cerebral palsy children, majority (61.04 %) of the children from urban area belonged to male gender and 38.91 per cent cerebral palsy (CP) children were females. The distribution of cerebral palsy children from rural area indicates that 73.71 per cent belonged to male gender and 26.29 per cent belonged to female gender.The distribution of typical children showed that 68.20 per cent typical children belonged to male gender and 31.80 per cent children to female gender. Among CP children, 71.10 per cent children were males and 28.90 percent children werefemales. In case of ordinal position, among CP children in urban area majority (61.44%) were first born followed by later born (38.56%). In rural area, equal percentage of (50 % each) was first born and later born respectively. With respect to typical children in urban area, 77.30 per cent were first born and 22.70 per cent were later born. Among rural children, majority (60.50%) was first born and 39.50 per cent were later born.

The association between type of family and cerebral palsy is depicted in Table 2. The results indicate that 50.36 per cent with cerebral palsy children and 49.64 per cent typical children belonged to nuclear family. And 48.15 per cent CP and 51.85 per cent typical children belonged to joint family. The chi-square results show that there was no association found between type of family and CP. However, bivariate analysis indicates that the risk of CP in children was 4.1 times higher when compared to children in nuclear family. The association between family size and cerebral palsy. In case of cerebral palsy children, majority of the children (60%) to small family and 50 per cent belonged to large families, followed by medium families (40%). In case of typical children, about 60 per cent children belonged to medium size family type, 40 per cent families belonged to small member families, followed by large families (50%). However, there was no significant association found between family size and cerebral palsy.

Table 3 represents association between socio-economic status and cerebral palsy. Among the High SES families, majority (75.00%) were typical children followed by CP children. A significant and strong association (c^2= 20.945 at 1 % level)and difference was (ANOVA) observed indicating association between low SES and CP in children.

The bivariate analysis showed odds of risk were 5 times high among low socio-economic status when compared with other counter parts. Statistically significant results were found in association and difference between cerebral palsy and typical children. The post hoc (Tukey's HSD) values indicates that there was no difference between the children who belonged to high SES (17.14±3.22) and medium (17.01±3.83) SES regarding the risk of diagnosing cerebral palsy. Anyhow, cerebral palsy was found high among the children who belonged to low SES (19.98±3.85). So, cerebral palsy was high among the children who belonged to low SES than the children from high and medium SES. It is evident from the table that the odds of risk for CP in children was 5.12 times in low SES families and 1.31 times risk for medium SES families.

The he prevalence rate of cerebral palsy was high (84.1%) among nuclear family, family with medium size (56.9%) and the family with low (46.4%) socio-economic background, the reason may be that the socio-economic deprivation is associated with an increased risk of cerebral palsy. This result is substantiated by the data of the present study (Table 2 & 3) where preterm babies, low birth weight, postnatal injuries, which were the risk factors for cerebral palsy was more observed in low SES families. Maternal illness, maternal infection, inadequate pre-natal care, poor nutrition, lack of medical services such as proper antenatal check-ups (CDC, 2010).

Child factor like gender was found to influence cerebral palsy, where the prevalence rate of cerebral palsy was more

Table 2. Association between type of family and size of family and cerebral palsy

Particulars	Children with CP(n=82)	Typical children (n=82)	Total(N=164)c^2	X^2	OR (%CI)	P-value
Family Type						
Nuclear	69(50.36)	68(49.64)	137(100)	0.108^{NS}	1	0.01*
Joint	13(48.15)	14(51.85)	27(100)		4.1 (2.21, 7.74)	
Family size						
Small (<5)	45(60.0)	30(40.0)	75(100)	5.92^{NS}	1	0.67^{NS}
Medium (5-10)	31(40.0)	46(60.0)	77(100)		0.75 (0.16, 3.86)	
Large (>10)	6(50.0)	12(50.0)	12(100)		0.61 (0.18, 3.01)	

Figures in the parentheses indicates percentage
*Significant at 5 per cent level
NS-Non Significant

Table 3. Association between socio-economic status with cerebral palsy

SES	Children with CP(n=82)	Typical children (n=82)	Total (N=164)c²	X^2	Mean ± SD	F-value	OR (%CI)	P-value
High	11(25.00)	33(75.00)	44(100)	20.95**	17.14±3.22[ab]	5.09*	1	0.002**
Medium	33(70.21)	14(29.79)	47(100)		17.01±3.83[ba]		1.32(0.65, 2.78)	
Low	38(52.05)	35(47.95)	73(100)		19.98±3.85[c]		5.12(1.72,12.04)	

Figures in the parentheses indicates percentage

*Significant at 1 per cent level NS-Non Significant

among male (67.10%) children than females (32.90%) children. The result is in line with the findings of Ahmad *et al.* (2021) and Gulam *et al.* (2018) who also found that prevalence of CP was high among males than female children. The reason may be that the risk of developing cerebral palsy is higher among males and its manifestations are more severe as they are more prone to white matter injury *i.e*., intraventricular hemorrhage which leads to bleeding into fluid filled areas or ventricles surrounded by the brain. (ICMR, 2010)

Ordinal position of the children is associated with cerebral palsy where, first born children (56.10%) were more likely to be developed with cerebral palsy than later born (43.90%) children. The result is in line with the findings of Sumeet and Nisha (2015) and Monica *et al.*(2010) who also found similar results with ordinal position.The reason may be that the incidence of prolonged labour and other perinatal complications are associated with first pregnancy (CDC, 2010).

Type of family and size of family (Table 2) were not significantly associated with cerebral palsy in the present study the reason may be that majority of the cerebral palsy children belonged to nuclear and medium size families. Socio economic status of the family was found to highly influence cerebral palsy prevalence among children in the current study. In which most of the families of cerebral palsy children had poor socio-economic status and significant difference also was found between cerebral palsy and typical children. The reason for diagnosis of cerebral palsy among children from poor SES families may be because the children may suffer from malnourishment, lack of medical facilities and poor home environment as well as family environment. The result of the current study is on par with the findings of Jahan *et al.* (2020) and Mc Guire *et al.* (2019) who also found that, low SES was a risk factor significantly influencing cerebral palsy.

Conclusion

The incidence of cerebral palsy was high among male gender, first born children, children from nuclear family with medium size family and low socio-economic status. Socio-economic status was significantly influencing cerebral palsy where the risk was 5 times more among low socio-economic status.

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