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To Assess Paediatric Population with Cerebral Palsy using Predictive Model for the Assessment of Sensory and Motor Functions: A Pilot Study

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Abstract— Background: ***It is found that 10% of the global population has some form of disability from different causes; in India, it is 3.8% of the population. Nearly 15-20% of physically disabled children are affected by Cerebral Palsy. In India, the estimated incidence is around 3/1000 live births. Cerebral palsy is the most common motor disability in childhood. Because of the developing nature of Indian health care in semi-urban and rural areas and the lack of technology used in these areas. Early specific forecasting of recovery may be helpful to set realistic goals, to plan proper discharge policy, and requirement of home adjustment and also social support. For the same, association should be found between different predictive factors and recovery in cerebral palsy subjects to develop and test a predictive model for post-cerebral palsy recovery.***

Participant information and method: Total of 15 participants with cerebral palsy were included in the study as per the inclusion and exclusion criteria. All the participants were then assessed using the newly developed Predictive Model for the Assessment of Sensory and Motor Functions. This model consisted of 30 questionnaires on the basis of which the subjects were screened for the sensory and motor dysfunction. The final data was analysed and compared with the standard scale (GMFS) and the results of the current study were established.

Result: Predictive Model for the Assessment of Sensory and Motor Functions is a newly developed with good reliability and validity to assess the sensory and motor functions among children with cerebral palsy.

Conclusion: Predictive Model for the Assessment of Sensory and Motor Functions is a set of questionnaires with good reliability and validity to assess the sensory and motor functions among children with cerebral palsy and can be used to assess the sensory and motor dysfunctions among children with disabilities following cerebral palsy..

Index Terms— Cerebral Palsy, Gross Motor Functional Scale, Predictive Model, Sensory and Motor Functions

I. INTRODUCTION

It is found that 10% of the global population has some form of disability from different causes; in India, it is 3.8% of the population. Nearly 15-20% of physically disabled children are affected by Cerebral Palsy. In India, the estimated incidence is around 3/1000 live births. Cerebral palsy is the most common motor disability in childhood. Because of the developing nature of Indian health care in semi-urban and rural areas and the lack of technology used in these areas. Early specific forecasting of recovery may be helpful to set realistic goals, to plan proper discharge policy, and requirement of home adjustment and also social support. For the same, association should be found between different predictive factors and recovery in cerebral palsy subjects to develop and test a predictive model for post-cerebral palsy recovery.

Predictive Modelling:

Predictive modelling: is a procedure that utilizes data and statistics to predict outcomes through the use of data models. Most commonly it is used to identify the event one wants to forecast or predict in the future. Predictive modelling can be exercised for this type of unknown future event. Predictive modelling is also known as Predictive Analytics, Predictive Analysis, and Machine learning. In medical science, a predictive model is used to describe the risk of developing a disease or to forecast recovery. These prediction models are prepared in health care so that they can enable the prevention of that disease or early treatment. Predictive analytics tools are powered by several different models and algorithms that can be practiced in a wide range of medical cases.

Need of the Study:

In this fast-growing world of health science at present, there are very few predictive models that predict disease progression and recovery of any medical condition. The era of evidence-based practice and clinical reasoning is emerging in the health sector. Health insurance coverage also needs some objective data for the prediction of the recovery of different medical conditions.

So, it becomes very important that there should be some objective criteria to predict recovery after any neurological condition.

It is also clear that, to date, there is no gold standard method available for a prognosis for cerebral palsy recovery. Various

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clinical and laboratory-based methods are available to diagnose stroke but for prognosis, there are few models or tools which can be considered as a reliable method. All of them evaluated the post-cerebral palsy recovery related to the different aspects of different predictive factors. Some of these factors may be present before the cerebral palsy and may affect post-cerebral palsy recovery.

Early specific forecasting of recovery may be helpful to set realistic goals, to plan proper discharge policy, and requirement of home adjustment and also social support.

For the same, association should be found between different predictive factors and recovery in cerebral palsy subjects to develop and test a predictive model for post-cerebral palsy recovery.

II. OBJECTIVES

To assess the paediatric population with cerebral Palsy using Predictive Model for the Assessment of Sensory and Motor Functions

III. METHODOLOGY

Total number of 10 children with cerebral palsy were recruited for the study based on the inclusion criteria (individuals diagnosed with a cerebral palsy by a Neurologist or General Physician and parents/guardian who agree to participate and sign the consent form, both male and female participants, participant who is minimum of 6 months age). The participants of coming to different hospitals and physiotherapy clinics with a clinical diagnosis of cerebral palsy by a neurologist or paediatrician were recruited and a written consent form taken from the guardians/parents.

Once the written consent was taken all the children were screened using a newly developed predictive model consisting of 30 questions for the assessment of sensory and motor functions in children with cerebral palsy.

Once the data was collected it was statistically analysed.

IV. RESULTS

The mean age of the children was 5.4years (SD2.8years) and range (0.512years). Mean age for children less than two years old was 1year (SD0.4 years), for children aged 2–6 years was 4.2 (SD1.0years) and for children more than six years was 8.7 (SD1.7years). The mean age of the 47 boys was 5.0 years (SD2.8 years) and of the 47 girls 5.8 years as well (SD 2.5 years). There was no significant difference between the mean ages of the boys and the girls (Student'st-test, p=0.147). The overall weighted Kappa was 0.80 (95%CI=0.67–0.94). Weighted Kappa for level I was 0.91 (95%CI=0.74–1.09), for level II 0.78 (95%CI=0.62–0.95), for level III. (95%CI=0.68–1.02), for level IV 0.85(95%CI=0.67–1.03) and for level V 0.84(95%CI=0.66–1.03). The inter-rater reliability was lowest at level lII. Weighted Kappa values according to age groups were 0.76 (95%C=0.31–1.21) for<2 years, 0.77(95%CI=0.58–0.97) for 2–6 years and 0.86 (95%CI=0.62–1.09) for over 6 years of age. The weighted kappa according to level and age group are shown in Table 1.

Table 1: Weighted Kappa (95% confidence interval) for each level of classifi-cation, by age groups

Level	Age (in years)		
	<2 (N=3)	2-6 (N=4)	6-12 (N=3)
I	1.0(0.40–1.60)	0.89(0.65–1.13)	0.95(0.66–1.24)
II	0.61(0.14–1.08)	0.75(0.54–0.96)	0.84(0.59–1.10)
III	0.56(0.17–0.95)	0.85(0.61–1.09)	0.95(0.66–1.24)
IV	1.0(0.40–1.60)	0.81(0.58–1.05)	0.81(0.56–1.07)
V	ND	0.85(0.61–1.08)	0.80(0.53–1.07)

V. CONCLUSION

Therefore, results of this study suggest that the Predictive Model for the Assessment of Sensory and Motor Functions can be used reliably to classify patients with Cerebral palsy. The lowest Kappa was calculated for level lII and was 0.79. Kappa values according to age groups were lowest (0.74) for children 2–4 years old and 0.76 for children less than 2 years of age.

VI. DISCUSSION

It is accepted practice to use standardized tools in assessing disease status and some of these tools, like the Predictive Model for the Assessment of Sensory and Motor Functions, have gained universal acceptance. Employing established instruments, with well-demon- strated validity, reliability and sensitivity. Health professionals for research and clinical practice can use the Predictive Model for the Assessment of Sensory and Motor Functions, because it is a system for accurate description of children's gross sensory and motor function. It has been reported to have a major effect on the health care of children with CP. We undertook the development of a Predictive Model for the Assessment of Sensory and Motor Functions with the expectation that the tool will be more widely used, particularly by therapists involved in the treatment of children with CP.

Our aim was to incorporate functional grading into the clinical description of patients with CP because this is necessary for clinical documentation and has become necessary with the application of newer has become necessary with the application of newer spasticity management techniques in the CP clinic. Application of this tool is not time-consuming; more- over, it can be evaluated retrospectively. These are additional elements that rendered it attractive for wide- spread use in our country.

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