Predicting the probability for falls in children with Disabilities-Autism, Intellectual Disability and Cerebral Palsy using the Timed Up & Go Test.

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This study focuses on predicting the probability of falls in these three categories of children with disabilities, which helps the therapist to ***assess and include balance training*** in exercise protocol for children at risk of falls. The sample selected for the study was 60 (N=60), consisting of children with disabilities attending NIEPMD multi-speciality clinic, Chennai, Four groups were selected in the categories- autism spectrum disorder, cerebral palsy and intellectual disability (N=15 in each category) in age group of 6 to 15 years. A fourth group was selected as reference, which consists of siblings of the clients coming to NIEPMD and those who are not effected with any sort of disability. The samples were randomly selected using a convenience sampling method. The clients were explained about the various steps of the expanded TUG test, and timings were noted on stop watch - standing up from a seated position, walking 10m, turning and coming back to the position. Using one-way analysis of variance (ANOVA), this study aimed to examine variance of performance between groups,(A-autism spectrum disorder, B-cerebral palsy and C-intellectual disability. D- Siblings of the clients coming to NIEPMD and those who are not effected with any sort of disability).The results obtained pointed out that there is no significant variance between the groups for the component “turning”, while for the other components- standing up from a seated position, walking 10 m and coming back to the position there was significance of variance between the groups at significant level of 5%.This study concludes that expanded TUG test varies in children with disabilities when compared with those who are not effected with any sort of disability and hence expanded TUG test can be used clinically by the therapist in assessing children with disabilities to find out those who are at risk of falls and to include balance training in their regular exercise protocols.

Keywords: Expanded TUG, Cerebral Palsy, ASD

I. INTRODUCTION

Balance is the even distribution of weight enabling someone or something to remain upright and steady and requires reliable sensory input from the vision, vestibular system and proprioceptors. Say emotionally or physically, balance is always needed in

moving ahead in life, failing which leads to falls. Among the children with multiple disabilities autism, cerebral palsy and intellectual disability are the categories in which balance is mostly effected. Children with autism have marked difficulties with gross motor movements and they may show obvious problems with balance, walking, running, getting up or down, starting or stopping, imitating actions, getting "stuck" in a repetitive movement, etc. Hyperactivity being the marked feature of autism spectrum disorder, chances of falls are more in autistic kids. Cerebral palsy (CP) is a developmental disability characterized by delayed motor milestones and impaired motor control.

Neuromuscular deficits noted in CP include the loss of selective motor control, abnormal muscle tone, impaired coordination and sensory deficits. Impaired postural control in children with CP has been shown to result from multiple factors: musculoskeletal problems, including contractures, reduced range of motion, and shifts in initial alignment, all inturn affecting reactive balance control in children with CP.

Children and adolescents with intellectual disability (ID) exhibit a mixture of cognitive, motor, and psychosocial limitation and identifying specific motor inadequacies like balance and postural control would improve therapeutic management enhancing functional capacity and health-related physical activity. Hence, this study focuses on predicting the probability of falls in these three categories of children with disabilities, which helps the therapist to ***assess and include balance training*** in exercise protocol for children at risk of falls.

A major feature of the TUG test is that it incorporates a series of tasks: standing up from a seated position, walking, turning and coming back to the position, all of which are critical for independent mobility. However, by only measuring the time to complete the entire series of tasks, the problems a subject may be having with any particular one of them may be masked. If one could measure the times for each of the tasks separately, then the test would provide useful clinical information, it would better isolate the areas of functional deficit, thereby aiding the clinician in devising prevention strategies and in guiding both treatment and further testing. So, we hereby adapt an expanded TUG test, in which walking distance of 10mtrs is given and time is measured during various components of the task.

II. Review of literature:

Ellinor Nordin, Nina Lindelof et al in their journal- "Prognostic validity of the Timed Up-and-Go test, a modified Get-Up-and-Go test, staff's global judgement and fall history in evaluating fall risk in residential care facilities" recommended that we need prognostic tools that help identify individuals with an increased risk of falling in order to take preventive action and stated that frequently used tool is the Timed Up-and-Go Test (TUG), recommended by the American Geriatrics Society, the British Geriatric Society and Nordic Geriatricians for screening for risk of falling.

Rose J, Wolff DR, Jones VK, Bloch DA, Oehlert JW, Gamble JG in their study- "Postural balance in children with cerebral palsy" stated that Identification of those C.P children with impaired standing balance can delineate factors that contribute to the patient's gait disorder and help to guide treatment.

Hakim Cheldav, Saeid Shakerian et al in their article- "The effects of balance training intervention on postural control of children with autism spectrum disorder: Role of sensory information", concluded that children suffering from ASD can benefit from balance training programs to improve their balance and postural control.

James C . Wall, PhD ; Churan Bell, BS ; Stewart Campbell ; Jennifer Davis in their clinical report- "The timed get-up-and-go test revisited : Measurement of the component tasks" stated that the Extended TUG test is a sensitive and objective assessment of function that requires minimal equipment, training, or expense. It better isolates functional deficits, thereby aiding the clinician in devising prevention strategies and guiding both treatment and further testing.

III. Objectives of the study:

To Predict the probability for falls in children with Disabilities-Autism, Intellectual Disability and Cerebral Palsy using the Timed Up & Go Test.

IV. Hypothesis:

There exists no significant relationship in prediction of probability for falls in children with disabilities and the Timed Up & Go Test.

V. Methodology:

The sample selected for the study was 60 (N=60), consisting of children with disabilities attending NIEPMD multi-specialty clinic, Chennai. Four groups were selected in the category autism spectrum disorder, cerebral palsy and intellectual disability (N=15 in each category) in age group of 6 to 15 years. A fourth group was selected as reference, which consists of siblings of the clients coming to NIEPMD and those who are not effected with any sort of disability. The samples were randomly selected using a convenience sampling method. The clients were explained about the various steps of the test, and timings were noted on stop watch - standing up from a seated position, walking, turning and coming back to the position.

VI. Results:

Using one-way analysis of variance (ANOVA), this study aimed to examine variance of performance between groups, (A-autism spectrum disorder, B-cerebral palsy and C-intellectual disability. D- Siblings of the clients coming to NIEPMD and those who are not effected with any sort of disability). The results obtained pointed out that there is no significant variance between the groups for the component "turning", while for the other components- standing up from a seated position, walking 10 m and coming back to the position there was significance of variance between the groups at significant level of 5%.

Statistical analysis:

SOURCE OF VARIANCE	SUM OF SQUARE	DEGREE OF FREEDOM	MEAN OF SQUARE	F	P
Between:	66.428	3	21.809	6.274	0.002
Within	125.138	36	3		
Total	190.56	39			

Table-1 One Way Anova For Analysing The Variance Of The Component "standing up from a seated position"

SOURCE OF VARIANCE	SUM OF SQUARE	DEGREE OF FREEDOM	MEAN OF SQUARE	F	P
Between:	466.319	3	155.440	7.733	0.000
Within	723.661	36	20.102		
Total	1189.980	39			

Table-2 one Way Anova for Analysing the Variance of the Component "walking 10 m"

SOURCE OF VARIANCE	SUM OF SQUARE	DEGREE OF FREEDOM	MEAN OF SQUARE	F	P
Between:	45.075	3	15.025	2.480	0.077
Within	218.120	36	6.059		
Total	263.195	39			

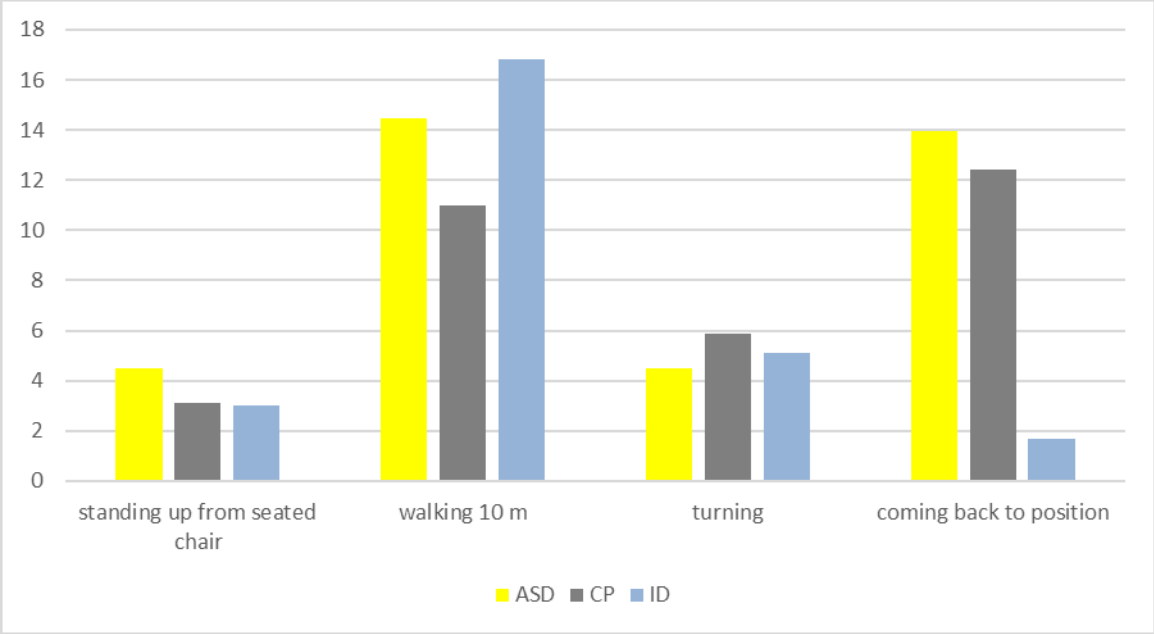
Table-3 One Way Anova For Analysing The Variance Of The Component "Turning"

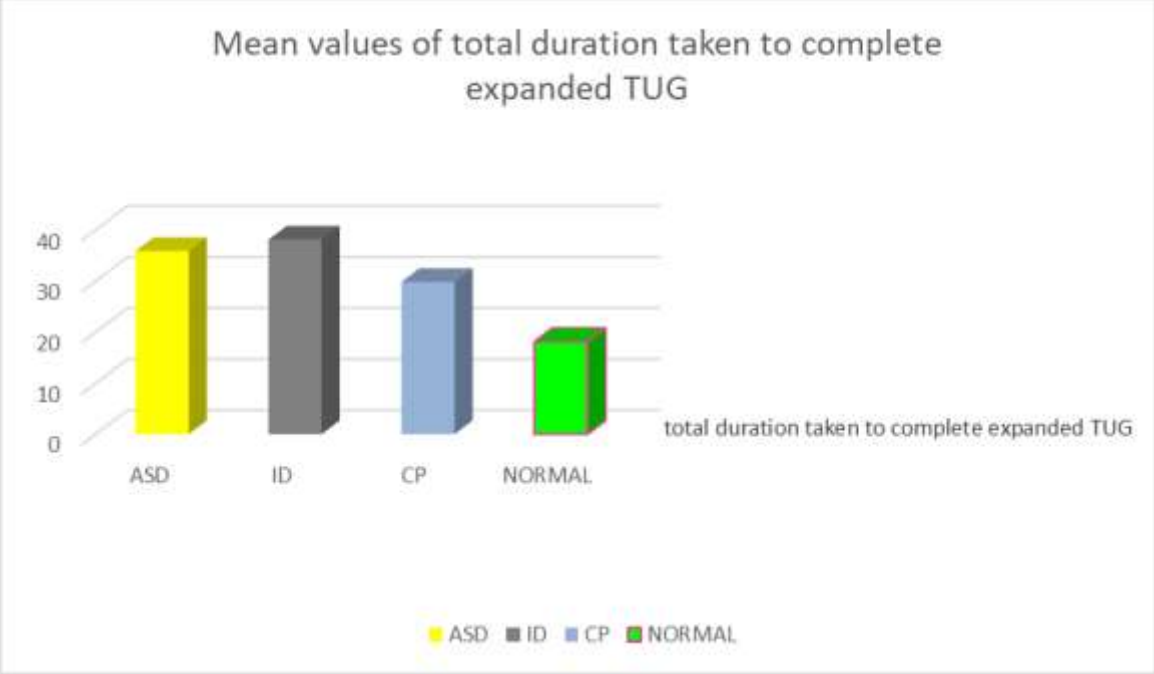
SOURCE OF VARIANCE	SUM OF SQUARE	DEGREE OF FREEDOM	MEAN OF SQUARE	F	P
Between:	251.769	3	83.923	3.634	0.022
Within	831.270	36	23.091		
Total	1083	39			

Table-4 One Way Anova For Analysing The Variance Of The Component "coming back to the position from turning"

SOURCE OF VARIANCE	SUM OF SQUARE	DEGREE OF FREEDOM	MEAN OF SQUARE	F	P
Between:	2408.85	3	802.95	18.215	0.000
Within	1586.97	36	44.083		
Total	3995.83	39			

Table -5 One Way Anova For Analysing The Variance Of The "Total Duration Taken Or Sum Of All Components"





VI. Conclusion:

This study concludes that expanded TUG test varies in children with disabilities when compared with those who are not effected with any sort of disability and hence expanded TUG test can be used clinically by the therapist in assessing children with disabilities to find out those who are at risk of falls and to include balance training in their regular exercise protocols. Parents of children at risk can also be cautioned regarding precautions to be taken from preventing their child from falls.

VII. Demerits:

The clients for the study were selected randomly, and not based on the type of CP, severity of ASD and ID.

VIII. Recommendations:

Further studies are recommended in larger samples and also aiming to include all the types of clients A.S.D, C.P and I.D based on the severity.

IX. References:

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