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A comparative study on selected psychomotor abilities and heart rate of adolescents with Down syndrome and intellectually disability

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Abstract

The purpose of the study was to compare selected psychomotor abilities and resting heart rates between adolescents with Down syndrome and Intellectually Disability. To achieve the purpose of the study, fifteen intellectually disabled and fifteen adolescents with Down syndrome were selected randomly from Love Shore Institute for Mentally Challenged, Calicut. The selected subjects were divided into two equal groups of fifteen each (i.e., $N_1=15$, down syndrome and $N_2=15$ intellectually disabled). The selected variables were flexibility, balance, shoulder girdle strength, leg strength and resting heart rate. 't' test was applied to compare the data on the selected variables. The results revealed that there was no significant difference in the selected psychomotor abilities and heart rate between adolescents with Down syndrome and intellectual disabilities.

Keywords: down syndrome, intellectual disability, resting heart rate, flexibility, balance, shoulder girdle strength and leg strength

1. Introduction

People with disabilities are more sedentary and less active than their nondisabled counterparts. (Croce & Horvatt, 1992) ^[1]. Research has found that persons with disabilities have higher morbidity and mortality rates than people who are not disabled because they are less active (Beange, McElduff & Baker, 1995) ^[2]. Down syndrome is a type of intellectual disability (mental retardation) which is caused by extra genetic material in chromosome 21. It affects people of all ages, religions, races backgrounds and economic conditions. It is estimated that each year around 3000 to 5000 children are born with this chromosome disorder. Physical activity is an essential factor for children with Down syndrome. It supports to develop proper muscular functions, facilitate to perform full range of movements in joints and improve aerobic capacity. Fitness and exercise habits developed in the early years proved the foundation for life time. Regular physical activity has long-term benefits. It reduces the risk of developing heart diseases, osteoporosis, obesity depression and diabetes. Hence inactivity leads them more rapidly to mortality.

2. Material and Methods

The purpose of the study was to compare the selected psychomotor abilities and heart rates between adolescents with Intellectual disability and Down syndrome. 15 subjects with Down syndrome and intellectual disability were randomly selected from Love shore Institute for Mentally Challenged, Calicut. The subject's age ranged from twelve to eighteen years. The subjects were divided into two equal groups viz., Intellectually Disabled (ID) and Down Syndrome (DS) group. The criterion measures adopted for the assessment of the variables is presented in Table I.

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Table 1: Criterion measures

Variables	Tests	Criterion measures
Flexibility	Sit and reach	Recorded to the maximum reach in cm
Balance	Stork stand test	Recorded to the nearest 1/100 th sec
Shoulder girdle strength	Modified chair push-up	Number of push -ups per 20 sec
Leg strength	Standing broad jump	Recorded to the maximum reach in cm
Resting heart rate	Radial pulse rate	Total number of beats per minute

2.1 Test administration

Standing broad jump was administered to measure leg strength. Maximum jump achieved in centimeter was recorded with three trials. Modified chair push up was administered to determine shoulder strength and the score is recorded as the number of push-ups performed by the subjects in 20 seconds. Radial Wrist (pulse) rate test was administered

to found the resting heart rate; the score is recorded to the total heart beats per minutes.

3. Data analysis and Results

T test for independent data was used to assess the between-group difference. The level of significance was fixed at 0.05 levels. The results are presented in table-II.

Table 2

Variables	ID.	Mean		SD		SEM		t value	P value
		DS	ID	DS	ID	DS	ID		
Flexibility	11.042	12.713	6.3617	6.758	1.642	1.745	0.6973	0.4914	
Balance	2.735	2.507	1.6438	2.2743	0.424	0.587	0.3147	0.7553	
Shoulder strength	8.8	7.00	3.8396	3.3594	0.991	0.867	1.3665	0.1827	
Leg strength	58.955	57.778	28.8414	35.3243	7.447	9.121	0.100	0.9211	
Resting heart rate	79.2	79.067	6.3606	6.4749	1.642	1.672	0.0568	0.9551	

*significant at 0.05 level, degree of freedom=28

Flexibility

The table-II presents the results of intellectual disability group and Down syndrome group with regard to the selected psychomotor abilities. The mean and standard deviation value of flexibility of the intellectually disabled were 11.045 and 6.3617 respectively. The mean and standard deviation values of Down syndrome group were 12.713 and 6.758 respectively. The “t” value on flexibility was 0.6973 and is not significant ($p>0.05$). The mean score of the groups are graphically presented in Figure-I.

Balance

The mean and standard deviation value of balance of the intellectual disability group were 2.735 and 1.6438 respectively. The mean and standard deviation values of the Down syndrome were 2.502 and 2.2743 respectively. The “t” value 0.3147 as shown in the above table was found statically insignificant ($p>0.05$). However, adolescents with intellectual disability have demonstrated significantly better on leg strength than adolescents with Down syndrome. The mean score of the groups are graphically presented in Figure-I.

Shoulder strength

The mean and standard deviation value of intellectual disability group the shoulder strength were 8.8 and 3.8396 respectively. However, adolescents with Down syndrome group had mean and standard deviation values as 7.0 and 3.3594 respectively. The “t” value 1.3665 as shown in the above table was found statically insignificant ($p>0.05$).

Adolescents with intellectual disability group performed significantly better on shoulder strength than Down syndrome group. The mean score of the groups are graphically presented in Figure-I.

Leg strength

The mean and standard deviation value of intellectual disability group on the leg strength were 58.955 and 28.8414 respectively. However, adolescents with Down syndrome group had mean and standard deviation values as 57.778 and 35.3243 respectively. The “t” value 0.100 as shown in the above table was found statically insignificant ($p>0.05$). Adolescents with intellectual disability group performed significantly better on leg strength than Down syndrome group. The mean score of the groups are graphically presented in Figure-I.

Resting heart date

The mean and standard deviation value of intellectual disability group on the variable resting heart rate were 79.2 and 6.3606 respectively. However, adolescents with Down syndrome group had mean and standard deviation values as 79.067 and 6.4749 respectively. The “t” value 0.0568 as shown in the above table was found statically insignificant ($p>0.05$).it has been observed that adolescents with Down syndrome group have demonstrated significantly better on flexibility than intellectual disability group. The mean score of the groups are graphically presented in Figure-I.

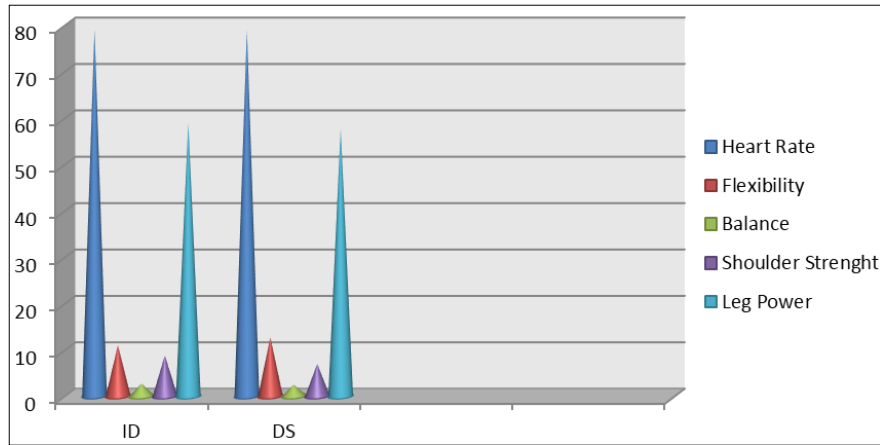


Fig 1: Means scores of the selected variables of the Groups

4. Discussion & Conclusion

It is concluded from the above findings that no significant difference was found in the flexibility between the groups. However, the Down syndrome group had better flexibility in comparison to Intellectual disability groups. This difference might be due to over extension of the joints found among the Down syndrome groups. Students with Intellectual Disability have been found to be more overweight, less physically fit, and less motor proficient than their peers without Intellectual Disability (Frey & Chow, 2006). No significant difference was found in the balance, however when comparing the mean values of balance, it is found that Intellectual Disability group have better balance as comparing to Down syndrome group. No significant difference was found in shoulder strength and leg strength. The intellectual disability groups have shown better than in both variables when comparing with other groups (Down syndrome). A study related to Down syndrome revealed that they had less brisk and more irregular patellar reflex response than normal groups and overall muscle tone was less in Down syndrome. (Morris, Vairghan & Vaccaro, 1982) [9]. Finally it was concluded that there is no significant difference in resting heart rate, ID have shown better resting heart rate than down syndrome. Limitations to using heart rate as a measure of exercise intensity in a Down's Syndrome population were analysed by Fernhall *et al* (2001) who suggested that Down's Syndrome individuals exhibit a 20-25% lower maximal heart rate (MHR) when compared to the reference population and that individuals without Down's Syndrome demonstrate an 8-12% reduced maximal heart rate when compared to the reference population.

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