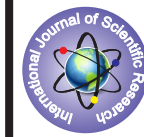


Assessment of Manual Dexterity According to Bruininks Oseretsky Test of Motor Proficiency, 2nd edition in 5-15 years school going children.



Paediatrics

KEYWORDS: Manual Dexterity, Bruininks Oseretsky Test of Motor Proficiency, 2nd edition.

Gurjit Singh	BPT Intern, Dr. D.Y.Patil College of physiotherapy, Pimpri, Pune
Dr. Sanjivani Dhote	MPT, Associate professor of MAEER'S Physiotherapy college, Talegone, Dhabahde.
Dr. Tushar Palekar	Ph.D, Principal Dr. D.Y.Patil College of physiotherapy, Pimpri, Pune
Apoorva Dighe	BPT Intern, Dr. D.Y.Patil College of physiotherapy, Pimpri, Pune.
Antara Pande	BPT Intern, Dr. D.Y.Patil College of physiotherapy, Pimpri, Pune.
Pooja Yengde	BPT Intern, Dr. D.Y.Patil College of physiotherapy, Pimpri, Pune.

ABSTRACT

INTRODUCTION : Evaluation of Manual Dexterity is important in school going children from 5 to 15 years. It is essential in children in like other factors like fine manual integration and fine manual precision. The Purpose of this study was to find out the total scores in children to compare according to gender and descriptive category according to age group.

OBJECTIVES. 1. To find out manual dexterity point score and descriptive category among genders . 2. To find out manual dexterity point score and descriptive category according to age group

MATERIALS & METHODS : It was a cross-sectional analytical study conducted in schools of Pimpri- Chinchwad area. This study included 248 males and 268 females which were assessed for making dots in circle, transferring pennies, sorting cards, stringing blocks and placing pegs in pegboards.

RESULT: The total mean point score of manual dexterity in females is 27.73 and in males is 27.96.

CONCLUSION : The study concludes that, male and female children showed similar performance on fine motor point score. also maximum numbers of children from all the age groups were in average category

INTRODUCTION :

Manual ability and performance of dexterity tasks require both gross and fine hand motions and coordination. Retarded children usually have difficulties performing manual activities such as grasping, releasing or manipulative objects, which is crucial in the performance of many activities of daily life. Manual activities require the cooperation of both hands, where the dominant hand performs both fine and gross manipulations, and the non dominant hand is used to stabilize objects. Retarded children develop their handedness on the less affected side. Manual dexterity is found to be a strong predictor of functional independence in activities of daily living.³ Fine manual dexterity is related to the performance of more precise manipulations with the fingers. Reaching for object and grasping and manipulating them usually is effortless activity. Children need many years to learn how to use hands in increasingly sophisticated ways to feel, explore, grasp and manipulate objects.⁶

For assessing manual dexterity, many scales are available such as

Movement Assessment Battery for children (Movement ABC-2),⁴

Peabody Development Motor Scale (PDMS 2),¹

Maastrichtse Motoriek Test (MMT)⁴

The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2) is an individually administered test that uses engaging, goal-directed activities to measure a wide array of motor skills in individuals ages 4 through 21. The BOT-2 uses a subtest and composite structure that highlights motor performance in the broad functional areas of stability, mobility, strength, coordination, and object manipulation.³ The Bruininks-Oseretsky Test of Motor Proficiency – BOTMP, consists of 46 items grouped under eight different subtests of motor proficiency for children between 4.5 and 14.5 years of age.⁵

MATERIALS AND METHODS : The Cross Sectional analytical study was conducted in pimprichinchwad area of age group 5 to 15 years. Total samples were studied out of which 248 were males and 268 were females.

The Subjects were divided according to gender and age groups. Age Group 1 includes 5.0-7.11, age group 2 includes 8.0-9.11, age group 3 includes 10.0-11.11, age group 4 includes 12.0-13.11 and age group 5 includes 14.0-15.11. The Samples were normal and healthy school going children, Inclusion criteria were normal and healthy school going children. Exclusion criteria were neurological trauma like spinal fractures, any visual problem, or any congenital deficit.

PROCEDURE : The study was approved by the ethical committee of Dr. D.Y. Patil college of physiotherapy, Pune. The study was to assess the Manual dexterity in 5-15 years school going children. 516 Subjects of age group 5-15 years were selected in the study fulfilling the inclusion criteria. After explaining the purpose of the study to the subject, written informed consent was taken from the parents prior to the assessment. The subject was selected on the basis of multistage sampling method. In the first stage, 3 English schools and 3 Marathi schools were selected randomly out of total schools in Pimpri Chinchwad Area. In the second stage, from each standard 1 division was selected randomly. In the third stage, from every division, boys and girls of the same age were selected by random sampling method.

A Pre- assessment was taken to record their socio demographic data and other parameters. Every child was asked to perform 5 tasks given in Manual dexterity subtest of BOT-2 Scale as follows:

- 1. Make Dots in circle :** The examinee holds the circle in preferred hand and makes one dot in each circle. The examinee may make dots in the circle in any order.
- 2. Transferring Pennies :** Two piece of the penny cards was put together so that they can form a rectangle, with both the penny outline and box outline facing up. The penny pad was placed with the penny outline in side of the preferred hand of the examinee. The Pennies were placed in front of the penny outline and the box outline. The examinee picked up one penny at a time with preferred hand, transferred each penny to non-preferred hand, and then puts each penny back into the box. The examinee could pick up pennies in any order. The examinee's hand was over the box when dropping, not throwing, pennies into the box. If the examinee threw pennies, subjects were reminded to drop them into the box.

3. **Placing Pegs Into A Pegboard :** The peg and the pegboard was in front of the examinee while the box of the pegboard on the side of the examinee The examinee holded the pegboard with non preferred hand to avoid movement during the task.The examinee used one peg at a time in any order. If the examinee dropped any peg out of the pegboard they did not need to pick that up again,especially if it rolled out of the table. The examinee picked up a new peg from the pegboard.
4. **Sorting Cards:** One red squared and blue circled card was placed in front of the examinee. These were the reference cards showing the examinee where to sort the cards.. The remaining cards were shuffled and placed between two reference cards.examinee used preferred hand to pick one card at a time from the deck,sorting each other by colour.
5. **Stringing Blocks :** The blocks and strings were placed in front of the examinee The examinee picked the string and one block at a time. The blocks did not need to be pushed to the other end of the string,, the examinee aided by lightly holding the end of the string.

RESULT:

516 samples were taken out of which 248 were males and 268 were females.

Table 1. Manual dexterity point score according to Gender

	Mean	Std Dev
FEMALE	27.73	6.90
MALE	27.96	7.43
TOTAL	27.85	7.17

The data summary of **Manual dexterity** point score according to gender is shown in table 1. The mean score of female were 27.73 ± 6.90 and males were 27.96 ± 7.43. The statistical difference between males & females were non Significant.

Table 2: DESCRIPTIVE CATEGORY ACCORDING TO GENDER

GENDER	WAA	AA	A	BA	WBA
FEMALE	0	5.24	58.87	33.47	2.42
MALE	0.37	18.66	62.31	16.79	1.87

This graph represents that more number of male subjects falls under average category followed by above average category followed by below average category and more number of female subjects falls under average category followed by below average category followed by above average category.

Table : 3 shows the data summary of Manual dexterity total point score according to gender, The mean score of female were 27.23 and males were 27.96.

AGE GROUP	WAA	AA	A	BA	WBA	Total
Age group 1	0.00%	12.61%	56.76%	27.03%	2.70%	100.00%
Age group 2	0.00%	7.37%	58.95%	28.42%	5.26%	100.00%
Age group 3	0.00%	11.11%	59.26%	28.70%	0.93%	100.00%
Age group 4	0.00%	20.00%	62.00%	17.00%	1.00%	100.00%
Age group 5	0.00%	9.80%	66.67%	22.55%	0.98%	100.00%
Age group 5	1	63	313	128	11	516
TOTAL	0.19%	12.21%	60.66%	24.81%	2.13%	100.00%

Table : 3 shows that the statistical results for score wise comparison of gender indicated a significant difference between males and females. Male Performance was higher than females Descriptive category according to age group , In all groups children coming under average category we maximum followed by below average category. This difference was statistically not significant. Hence it indicated that age group does not pursue according to descriptive category.

Table 4: DESCRIPTIVE CATEGORY OF MANUAL DEXTERITY ACCORDING TO AGE GROUP

	WAA	AA	A	BA	WBA
AGE GROUP 1 (5,6,7 years)	0.9	12.61	56.76	27.03	2.7
AGE GROUP 2 (8,9 years)	0	7.37	58.95	28.42	5.26

AGE GROUP 3 (10,11 years)	0	11.11	59.26	28.7	0.93
AGE GROUP 4 (12,13 years)	0	20	62	17	1
AGE GROUP 5 (14,15 years)	0	9.8	66.67	22.55	0.98

Table 4 shows this graph represents that more number of children from all age groups fall under average category and students falling under age group 2(8,9 years), have more percentage that is 5.26 which comes under category of well below average that is more than other age groups.

DISCUSSION : The Primary aim of this study was to assess Manual dexterity using Bruininks-Oseretsky Test of Motor Proficiency, 2nd edition. Motor development is the gradual process by which a child gains use and coordination of the large muscles of the legs, trunk and the smaller muscles of the hand. Neuromuscular development starts in embryonic stage and it continues after birth. Nutritional and socio-economic factors play an important role in affection of motor development.

The manual dexterity sub-test was designed to assess hand-eye coordination, fine motor skills & fine motor activities. Samples' score is consistent with individuals who can complete all these tests.

The study was conducted among 516 subjects out of which 248 were male & 268 were females of age 5 years to 15 years 11 months (mean age - 10.67 years & standard deviation - 3.03).

The study shows that both male and female subjects showed similar results. The mean of manual dexterity point score of female was 27.73 and of males was 27.96. There was a very slight difference between male and female in the average category in which 58.87% were females and 62.31% were males.

Our results goes in accordance with the article where Paula Aivazoglou Priosti et. al., says that as to gender, results showed that manual dexterity were similar for girls and boys in the two studied groups.⁷ According to Özgür Mülazımoglu-Balli, there were no significant difference in males and females among the manual dexterity scores.⁵

In this study we found that maximum children from all age group fall in average category. Our result is consistent with the study by Satabdi Ghosh et. al. in which they say that, fine motor performance score in school going children were better than that of other two occupational groups. This is because, the subjects are more likely to engage with fine motor tasks such as writing, drawing, grasping objects and reaching out to other objects, releasing the objects and turning the wrist in various directions the subjects were familiar in writing and drawing activities this gave them more advantage to score better in fine motor performances than other two occupational groups.⁸

According to the graph 4 (a,b,c) it shows the linear pattern that is as the age group increases the mean of manual dexterity point score also increases in both males and females. This is because, Manual dexterity of people at different age groups are influenced by various reasons like body mass, fat percentage and nutritional status.⁷

In this study we found out that students falling under age group 2 have more percentage which comes under well below average category that is more than other age groups. According to study done by T.Balakrishnan et al, It was found that Indian children with the U.S.A. normative sample revealed a significance difference in the performance when compared by age. The Indian children underperformed in the bilateral coordination subtest across all the age group 7, 8 & 9 as compared to the USA normative sample.¹¹

The study has outlined the limitation of not taking the socio economic status. Because studies have shown that the socio economic status alters the fine motor skills of the child. Ozgur Mülazımoglu-Balli in his study concluded that there were significant

differences in BOT-2 score and total score of different socio economic groups, in favor of high socio-economic group.

Limitation- It was seen that socio-economic status had not been mentioned in the study.

REFERENCES

1. Fine Motor Outcomes in Preschool Children Who Receive Occupational Therapy Services". Fine Motor Outcomes in Preschool Children Who Receive Occupational Therapy Services. Retrieved 26 October 2014.
2. Sugden, D.A., & Wright H.C. (1998). Motor coordination disorder in children. In A.E. Kazdin (Series Ed.), *Developmental Clinical Psychology and Psychiatry*: Vol.39. Thousand Oaks, CA: Sage Publications.
3. S Golubovic and S Slakovic (2014) Manual ability and manual dexterity in children with cerebral palsy. *Hippokratia*.
4. "Fine motor outcomes in preschool children who receives occupational therapy services." Retrieved 26 October 2014.
5. Özgür Mülazımoğlu-Balıh. Motor and Body Mass Index of Preschool Children: In Relation to Socioeconomic Status (2016). *Journal of Education and Training Studies* Vol.4, No.4.
6. Helge Ritter and Robert Haschke, 2015 by Taylor and Francis group, LLC. :CRC Press/Taylor & Francis, Boca Raton (FL).
7. Paula Aivazoglou Priosti et. al. grip strength and manual dexterity in down syndrome children (2013).
8. Satabdi Ghosh et al. A study on the influence of occupation on development of motor activities, 2013.
9. Brenda N. Wilson, Helene J. Polatajko, et al "Use of the Bruininks-Oseretsky Test of Motor Proficiency in Occupational Therapy", 1994.
10. Fotini Venetsanou, Antonis Kambas, et al "Use of Bruininks-Oseretsky Test of Motor Proficiency for identifying children with motor impairment", 2007.
11. T. Balakrishnan et. al. "Interrater reliability of bilateral coordination of Bruninks-Oseretsky Test of Motor Proficiency (BOTMP) & performance of Indian children compared with USA norms." *The Indian Journal Of Occupational Therapy* : Vol. XXXVIII: No. 3 (March 2007).