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RESEARCH ARTICLE

GENDER DIFFERENCE OF DEVELOPMENTAL COORDINATION DISORDER IN PRIMARY, SECONDARY & HIGHER SECONDARY SCHOOL

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ABSTRACT

Context: Since the early 1900s, the scientific community has acknowledged a large group of children with movement skill difficulties who have not been diagnosed with a general medical condition. This difficulty in motor skill competence, observed in children who are developing well intellectually, is termed 'developmental coordination disorder' (DCD). Considering the importance of timely diagnosis of DCD and the child's performance on the BOT-2 will allow the physical therapist to identify areas of strength and areas of need in regards to the child's gross motor functioning, and can therefore help to guide treatment. The early diagnosis of DCD can be helpful to prevent the future secondary complications. So purpose of this study is to find out the prevalence of developmental coordination disorder on BOT-2 in 5 to 15 years school going children.
Settings and Design: It was a cross-sectional analytical study conducted in PCMC area schools.
Methods and Material: Multistage stratified sampling done to assessing 516 children's included 248 males and 268 females which were assessed by Using BOT-2nd edition.
Statistical analysis used: Mean and Standard Deviation (SD) & Fisher's test was used to analysis.
Result: Prevalence of DCD was among male 1.12% & female 1.61 from 516 children.
Conclusion: Female showed more prevalence of Developmental coordination disorder than Male.

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INTRODUCTION

Growth is an essential feature of life of a child that distinguishes him or her from an adult. The process of growth starts from the time of conception and continues until the child grows into fully mature adult. The terms growth and development are often used together. These are not interchangeable, because they represent two different facets of dynamics of change, i.e; those of quantity and quality. Growth and development usually proceed concurrently, but may not always be interrelated. Growth denotes a net increase in the size or mass of tissues. It is largely attributed to multiplication of cells and increase in the intracellular substance. Hypertrophy or expansion of cell size contributes to a lesser extent to the process of growth. Development specifies maturation of functions. It is related to the maturation and myelination of the nervous system and indicates acquisition of a variety of skills for optimal functioning of the individual. (Ghai *et al*., 2004) Since the early 1900s, the scientific community has acknowledged a large group of children with movement skill difficulties who have not been diagnosed with a general medical condition (Magalhaes *et al*., 2006). This difficulty in motor skill competence, observed in children who are developing well intellectually, is termed 'developmental coordination disorder' (DCD). DCD is a recognized syndrome that was described by the World Health Organization in 1992 (WHO 1992) and has been included in the diagnostic manuals of the American Psychiatric Association since 1989 (American Psychiatric Association, 2000). "Developmental coordination disorder (DCD) is defined, using the Diagnostic and Statistical Manual Of Mental Disorders, Fourth Edition (DSM-IV), as a condition marked by a significant impairment in the development of motor coordination, which interferes with academic achievement and/or activities of daily living (ADL). These difficulties are not due to a general medical condition (eg, cerebral palsy) and are in excess of any learning difficulties is present (Raghu Lingam *et al*., 2009). DCD is a highly prevalent disorder (5-6% of school-aged children) so it is likely that there is at least one child with DCD in most classrooms. One of the challenges of identifying children with DCD is the variety of ways in which it is revealed. (Prado *et*

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al., 2009) The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) provides four criteria to classify a child as having DCD (American Psychiatric Association, 2000).

A. Performance in daily activities that require motor coordination is substantially below given the person's chronologic age and measured intelligence. This may be manifested by marked delays in achieving motor milestones (e.g., walking, crawling, sitting) dropping things, "clumsiness," poor performance in sports, or poor handwriting.
B. The disturbance in criterion significantly interferes with academic achievement or activities of daily living.
C. The disturbance is not due to a general medical condition (e.g., cerebral palsy, hemiplegia or muscular dystrophy) and does not meet criteria for a Pervasive Developmental Disorder.
D. If mental retardation is present, the motor difficulties are in excess of those usually associated with it. (Wilson *et al*., 1995)

The difficulties may be considered to be mild, moderate or severe. Even though this condition is observed by many schoolteachers, as well as physical and occupational therapists, it is not an easy diagnosis to make due to multi-faceted diagnostic criteria and terminology problems (Prado *et al*., 2009). Outcome measurements used to assess gross motor development in infants and children up to age 5, including the Peabody Developmental Motor Scale (Folio and Fewell, 2000), second edition and the Alberta Infant Motor Scale (Johanna Darrah *et al*., 1998). When children age out of either the PDMS-2 or the AIMS, one standardized assessment option physical therapists have is the Bruininks-Oseretsky Test of Motor Proficiency, second edition (Bruininks and Bruininks, 2005; Bruininks, 1978; Burton and Miller, 1998) (BOT-2nd). The test-retest reliability and internal consistency of the total scale were excellent, with an ICC of 0.99 (95% confidence interval) and alpha of 0.92 The BOT-2 can be used to evaluate a wide variety of fine and gross motor skills for children, teenagers and young adults 4-21 years of age. This is a test that can also be used by Physiotherapist, psychologists, adaptive physical education teachers, special education teachers and educational diagnosticians (Bruininks and Bruininks, 2005; Bruininks, 1978; Burton and Miller, 1998; Wuang and Su, 2009).

Need of study: The prevalence of DCD in India is found to be 1.37%. The prevalence of DCD in other countries is estimated to be (5-8%) usa, (1.8%) uk, (5.7%) greek, (5-9%) canada, (1.7%) belgium and 6% worldwide (Judith M Peters and Ann Markee, 2007; Robert C Barnhort *et al*., 2003; Ganapathy Sankar and Saritha, 2011; Georgia D. Tsiotra *et al*., 2006; Nadia Cristina Valentini *et al*., 2012). As per the literature there are no studies found on the prevalence of DCD using BOT-2 in 5-15 years of age group in Indian scenario. Considering the importance of timely diagnosis of DCD and the child's performance on the BOT-2 will allow the physical therapist to identify areas of strength and areas of need in regards to the child's gross motor functioning, and can therefore help to guide treatment. The early diagnosis of DCD can be helpful to prevent the future secondary complications. So purpose of this study is to find out the prevalence of DCD on BOT-2 in 5 to 15 years school going children among gender.

Aim : To find out the prevalence of DCD on BOT-2 in 5 to 15 years of school going children.

Objective: 1. To find out various Descriptive category of Total Motor Composite component on BOT.2nd in school going children of age group between 5 to 15 years Gender. **2.** To find out the prevalence of Developmental coordination disorder by using BOT. 2nd in 5 to 15 yr of school going children Among Genders

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 group3 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 visul problem, or any congenital deficit. By using BOT-2nd kit include examiners manual, individual record form, student booklet, two red pencils and a tennis ball. A table and chair of appropriate to the child's height, electronic timer and clipboard were additionally used.

Procedure

The synopsis of the study was submitted to institutional ethical committee, after the clearance from the institutional ethical committee. 500 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/parent, they were informed about their right to opt out of the study any time during the course of the study without giving reason for doing so. The parents/teacher were assured that their child's participation and non-participation would not affect their child's education. Subjects were selected on the basis of multistage sampling method. In the first stage, 3 English schools and 3 Marathi schools was selected randomly out of the total schools in PimpriChinchwad Area. In the second stage, from each standard, any one division was selected Ramdomly. In third stage, from every division, boys and girls of same age were selected by random sampling method. A written informed consent was obtained from the subjects/ parents one day prior to the assessment. Proper precautions was taken so that there was no harm to the child. Total children were divided into 5 age groups according to there chronological age. These age groups were divided for sampling convenience and for obtaining proper results. The age group 1 included age group ranging from 5.0-7.11 years, age group 2 included 8.0-9.11, age group 3 included 10.0-11.11, age group 4 included 12.0-13.11 and age group 5 included 14.0-15.11. The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2) was used to assess children's motorproficiency. BOT-2 is an individually-administered test that uses engaging, goal-directed activities to measure a widearray of motor skills in individuals aged 4 through 21 (Bruininks and Bruininks, 2005). The BOT-2 assesses motorproficiency in four motor-area composites; fine manual control (FMC), manual coordination (MC), body coordination (BC) and strength and agility (SA). With 53 items and each motor-area composite has two subtests. The total motor composite score can be calculated by adding four

composite scores together (53 items, 8 subtests and 4four motor-area composites; score range = 0–320 points) (Bruininks and Bruininks, 2005). Subjects were assessed for these tasks and these raw score were converted to a numerical point score. Descriptive analysis done by using manual, point score converted in to five descriptive category that of WAA-Well above average, AA- Above Average, A – Average, BA- Below Average, WBA- Well Below Average

RESULTS

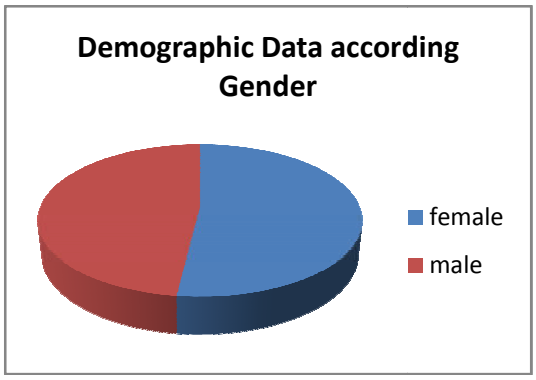
1st Table & Graph showed Five hundred & sixteen children (Mean age =10.67 years, SD = 3.03) participated in this study among that 248 & 268 were male & female respectively.

Graph 2nd showed Maximum Children were found in Average category of motor proficiency fallowed by Below average category. In the Average category male were more (70.9%) as compare to female (58.06%). Students who fall under the category of Well Below Average indicates that they have motor deficit and so they are considered as Developmental Coordination Disorders.

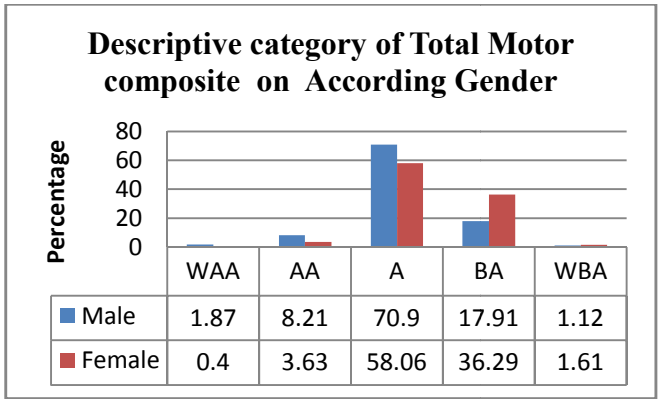
Graph 3rd shows prevalence of Developmental coordination disorder among males and females was 1.12% & 1.61% respectively, as they fall under the category of Well Below Average i.e motor impairment. Females are having more prevalence of DCD than males, however this difference is not statically significant as P=0.915 by Fisher's Exact test.

Table 1. Demographic Data according Gender

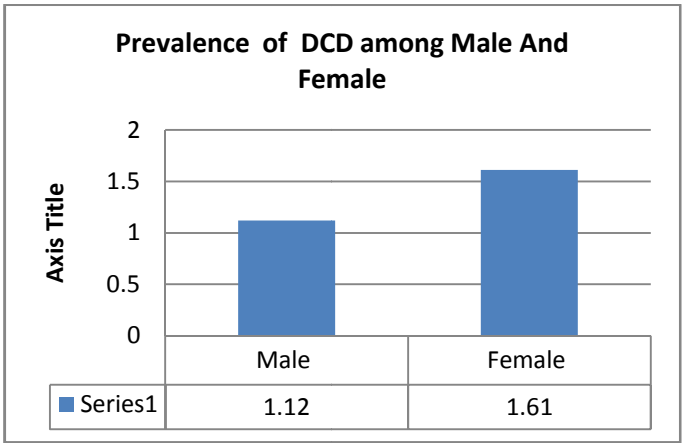
	n	mean age	SD
Female	268	10.69	3.02
Male	248	10.66	3.04



Graph 1. Demographic Data according Gender



Graph 2. Descriptive category of Total Motor composite on According Gender



Graph 3. Prevalence of DCD among Male And Female

DISCUSSION

The present study was carried out with the aim 1) To find out the prevalence of Developmental coordination disorder by using BOT-2nded in 5 to 15 yr of school going children among gender. Present study also showed that females are having more prevalence of DCD than males, however this difference is not statically significant as P=0.915 by Fisher's Exact test. These performance differences in males and females can be due to the nutritional status, as the dietary intake of boys is more than that of girls (Satabdighosh *et al*., 2013). Nutritional status appear to be significant predictor for both fine and gross motor development (Satabdighosh *et al*., 2013). Similar observations have been reported by other research workers in children of different countries (Bobbio *et al*., 2007; Chowdhury *et al*., 2010; Pollitt *et al*., 1994). Nutritional status may alter the learning process by influencing brain development and physical growth and accordingly modify the movement proficiency of the children by adjusting the strength, power, coordination and perception (Satabdighosh *et al*., 2013) Our study result are in accordance with Girish, SrilathaRaja *et al*. as in their study prevalence of DCD with girls (1.1%) affected more than boys (0.5%) at confidence interval of 95%. Girls were twice affected than boys (American Psychiatric Association, 1994). Some researchers stated that children's with low socioeconomic status were less competent in locomotors skills compared with their high socioeconomic status peers (Hardy *et al*., 2012; Mészáros *et al*., 2008). However difference among gender in present study was not statistically significant. It is difficult to make exact comparisons between countries because the estimated prevalence is highly influenced by the means of assessment and the type of sample recruited. In Bilateral Coordination component no children were found in well Above Average category (WAA) because scale score was not given for this category even though they scored maximum in Bilateral coordination point score. So need to establish normative data for Indian population is suggested. Chowdhury *et al*. (2010) reported that Indian children of higher socioeconomic status had a higher score for motor development than lower socioeconomic status counterpart. Almost all research's show that motor proficiency and socioeconomic status has a positive association. This indicates that low socioeconomic status children have low motor proficiency and vice versa (ÖzgürMülazımoğlu-Ballı *et al*., 2016). On the other hand, participating in different physical activities, in particular (e.g. gymnastics, swimming, dance etc.) outside of school, might

also determine these differences. High and middle socioeconomic status children might have more opportunity to participate in these kinds of activities. Motor skill practice is useful to improve the fine manual control competence of children (Logan *et al*., 2011). The children studied in the group were from public and private school. Limitation of the present study was socioeconomic status, Cardiorespiratory Fitness & Body Mass Index were not considered while finding out the prevalence of DCD. Further studies can be conducted to investigate Motor proficiency of school going children who were underweight at time of birth and preterm.

Conclusion

Females are having more prevalence of DCD than males. however this difference is not statically significant as P=0.915 by Fisher's Exact test.

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