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Comparison of Developmental Coordination Disorder at Different Levels of Autism in Children

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ABSTRACT

Background: Developmental Coordination Disorder (DCD) is a neuro-developmental condition that is highly associated with autistic children globally. Children with Autism spectrum disorder (ASD) also have neuro-developmental issues early or late in their lives. However, Developmental Coordination Disorder association with autistic children depends on the fact that in which category of 'Level of Autism' children is falling. **Objective:** To determine the association of Developmental Coordination Disorder (DCD) with different levels of Autism in children. **Study Design:** It is cross sectional study design. **Settings:** Clinics of Lahore, Reactive Physio and Life Line Pain Relief Center. **Duration:** Five Months from 13 December 2021 to April 2022. **Methods:** The data was collected from Lahore after ethical approval and sample size was 99 children. The parent reported Developmental Coordination Disorder Questionnaire (DCDQ07) was used. We asked the questions to from parents and filled out the questionnaire by ourselves. At the end of the data collection process, we counted the total score of the questionnaire. **Results:** A total of 99 subjects were recruited for this study. Among the subjects 46 were male and 53 were female. There was significant statistical association found between Autism levels of children and Developmental coordination disorder as (p-value is 0.00) where level 2 showed the highest association with DCD, then level3and the least association of DCD was with level1. **Conclusion:** Among all three level of Autism DCD was highly associated with level 2 then with level 3and least with level 1. There was also significant association seen between DCD and gender of child where highest DCD was associated with females.

Keywords: *ASD, DCD, Levels of autism, DCDQ-07, DSM-5andNNDs.*

INTRODUCTION

Autism spectrum disorder (ASD) is an early onset neuro-developmental condition which according toDSM-5 has alterations in social and communication skills in combination with repetitive and inflexible behavior patterns causing significant impairment and reduced quality of life.[1] Autism spectrum disorder (ASD) is a common neuro-developmental disorder with reported prevalence in the United States of 1 in 59 children (approximately 1.7%).[2]

According to the Autism Society of Pakistan there are more than 350,000 children who are suffering from this disease.[3] DSM-5 Autism spectrum criteria include three severity classifications. Level 1 (Requiring support), Level 2 (Requiring substantial support) and Level 3 (Requiring very substantial support).[4,5] Developmental Coordination Disorder (DCD) is a neuro-developmental condition that significantly affects the child's accession of new motor skills and ability to perform other activities.[6] DCD is commonly seen to affect 5-6% of children but is frequently unrecognized. DSM-5 establish four criteria to diagnose the DCD (1) Assessing motor skill to determine age (2) evaluating difficulty in motor skill affect daily living (3) determine the onset is early (4) ensuing the disturbance is not relate to medical or neurological condition.[7]

Autism Spectrum Disorder (ASD) and Developmental Coordination Disorder (DCD) are developmental disorders that as the DSM-5 can be diagnosed as conditions occurring at a same time. Some studies show that Autism Spectrum Disorder (ASD) and Developmental Coordination Disorder (DCD) have similar characteristics while others show behavioral differences between the two conditions. From the articles reviewed it is reported that there are more differences than similarities in individuals with ASD and DCD, with clear differences for working memory ability, gestural performance, grip selection, and cortical thickness.[8,9]

The DCDQ'07 is apparent reported questionnaire, designed to assess motor difficulties and developmental coordination disorder in children aged 5 - 15 years old.[10,11] The total score ranges between 15 to 75, at the end of cut off score it support whether "indication of DCD" or "probably not DCD".[12] Gross motor skills are the actions performed by large muscle groups and enable person in climbing and balancing. Fine motor skills are actions performed by the small muscle groups which enable precise movements of the extremities.[13]

Physical therapy can also be used in conjunction with behavioral and cognitive therapy to help children cope with neuromuscular disorders. Autism and its different level association with developmental coordination disorder (DCD) is an issue that is less recognized worldwide and in Pakistan and there is literature gap in studies that are being conducted before. Moreover, this study will be helpful for Physiotherapists and other health care professionals in future as well. Along with other healthcare professionals, physical therapy can help reduce the prevalence of DCD in children with autism. According to the requirement of this study to determine the association of DCD with autistic children specific age group of children between 5-7 years and 11 months of age was considered.

METHODS

This cross-sectional study was conducted in Lahore. The data was collected from different clinics of Lahore, including Clinics of Lahore, Reactive Physio and Life Line Pain Relief Center. The study was conducted from 13th December 2021 to April 2022. The sample size was 99 children with developmental disability. The data was collected using convenient sampling.

We have included Autistic children with 5 - 7 years 11 months of age. Both genders (male and female) different level of autism and a Gross motor and fine motor skill deficient.

The developmental coordination disorder questionnaire (DCDQ 07) was used. It has 15 items with main three categories. First category is MOTOR CONTROL (movement), second is FINE MOTOR (hand writing) and the last is general coordination. DCDQ-07 has total 75 points. Gender and level of autism were also included at the top of questionnaire. Following is the scoring for children 5 years - 7 years 11 months: 15 – 46 score Indication of DCD OR may be suspected and 47 – 75 score Probably not DCD As DCDQ-07 is a parent reported questionnaire, we asked the questions from parents and filled out the questionnaire by ourselves.

At the end of the data collection process, we counted the total scores that took approximately 15 minutes to complete. All the ethical considerations were considered including confidentiality, consent form and participant's identity disclosure. The data was analysis using SPSS v.22.Chi-square test was used to determine association.

RESULTS

In this study, 99 participants were enrolled. There were 46 men and 53 women among the participants. A statistically significant correlation between children's autism level and development Coordination disorder was observed (p- value =0.000), with a level 2 showing the highest correlation of DCD at 35.5%, followed by level 3 at 85.00% and level 1 at 11.80%.

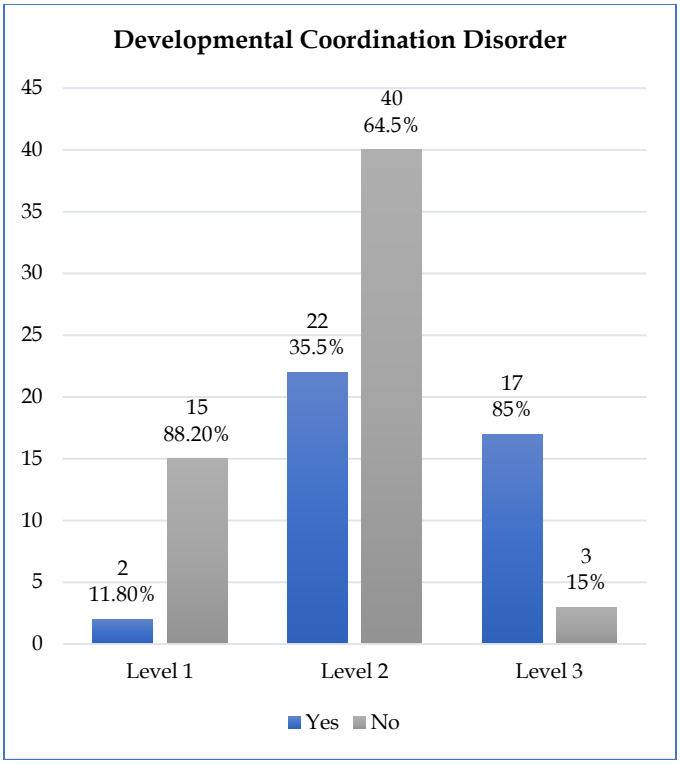
Table 1: Autism level wise association with Developmental coordination disorder

Autism Level of Child	Developmental Coordination Disorder (Yes)	Developmental Coordination Disorder (No)	Total	P-value
Level 1	2 (11.80%)	15 (88.20%)	17 100.0%	0.00
Level 2	22 (35.5%)	40 (64.5%)	62 100.0%	0.00
Level 3	17 (85.00%)	3 (15.0%)	20 100.0%	0.00
Total	41 (41.40%)	58 (58.60%)	99 100.0%	0.00

Pearson Chi-Square: 22.718a

This table associates developmental coordination disorder by autism levels Level 1 showed the least correlation of DCD 11.80% (N=2), whereas Level 2 showed the highest correlation of DCD 35.5% (N=22), followed by Level 3 (85.00%). There was statistical association found between Autism level of children and Developmental coordination disorder (p-value is 0.000).

Figure 1: Association of autism level and developmental coordination disorder



DISCUSSION

This study was being conducted to determine the association of DCD with different levels of Autism in children and we have recruited 99 children out of that 46.5% (N=46) were males and 53.5% (N=53) were females. Considering the inclusion criteria total score was being calculated and correlation with gender and levels of autism were observed.

In the studies conducted previously[14] where social skills, praxis and motor performance were observed in autism and developmental coordination disorder and the studies in which factors associated with delayed diagnosis of autism were observed. All studies showed the correlation of DCD with autism but not clearly defined DCD association according to different levels of Autism. Whereas this study showed that DCD was highly correlated with level 2 of autism N=62 then with level 3 N= 20 and with the least association with level 1 N= 17and it also showed that there was significant correlation found between DCD and Autism Level with (p-value 0.00) This study also showed a significant correlation between DCD and gender of child where highest DCD was correlated to females 50.90% (N=27) and least with males 30.40% (N=14) with (p-value 0.03) which was related to the study conducted before[15] where Autism and coordination disorder was found more prevalent in pre-school going girls than boys.

A study conducted in New Jersey[16] to check the Prevalence of autism spectrum disorder in a large, diverse metropolitan area which is varied by socio-demographic factors showed that significant variation in autism spectrum disorder (ASD) prevalence by race/ethnicity, socioeconomic status (SES) and school district size. Whereas our study showed that no correlation exists between gender and level of autism, also there was no correlation found between gender and relationship to the child and lastly no correlation found between age group and gender of child this showed that prevalence was not directly varied by age group and relationship to the child.

CONCLUSION

Level 2 of Autism had the highest correlation of DCD, followed by Level 3 and Level 1, while Level 1 had the lowest correlation of DCD. The gender of the child and DCD were shown to be significantly correlated, with females having the greatest reported DCD correlation.

LIMITATIONS

The data was collected only from settings of Lahore. Further data from different cities can warrant the results.

SUGGESTIONS / RECOMMENDATIONS

In this situation, physiotherapists can aid in enhancing the women's quality of life. Both gender and the child's relationship as well as the level of autism were not shown to be significantly correlated.

CONFLICT OF INTEREST / DISCLOSURE

None.

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REFERENCES

1. Bölte S, Girdler S, Marschik PB. The contribution of environmental exposure to the etiology of autism spectrum disorder. Cell Mol Life Sci. 2019 Apr;76(7):1275-1297.
2. Trivedi P, Pandey M, Kumar Rai P, Singh P, Srivastava P. A meta-analysis of differentially expressed and regulatory genes with their functional enrichment analysis for brain transcriptome data in autism spectrum disorder. J Biomol Struct Dyn. 2022 Nov 14:1-7.
3. Noor N, Talha M, Ahmad SA, Mohydin M, Shah SS, Mohydin S, et al. Evaluation of the prevalence of childhood autism awareness amongst medical professionals in Pakistan. Consultant. 2021;1:1-0.
4. Weitlauf AS, Gotham KO, Vehorn AC, Warren ZE. Brief report: DSM-5 "levels of support:" a comment on discrepant conceptualizations of severity in ASD. J Autism Dev Disord. 2014 Feb;44(2):471-6.
5. Hannant P, Cassidy S, Van de Weyer R, Mooncey S. Sensory and motor differences in Autism Spectrum Conditions and developmental coordination disorder in children: A cross-syndrome study. Hum Mov Sci. 2018 Apr;58:108-118.

6. Lee EJ, Zwicker JG. Early identification of children with/at risk of developmental coordination disorder: a scoping review. Dev Med Child Neurol. 2021 Jun;63(6):649-658.
7. Ferreira L, Gabbard C, Vieira JL, Tamplain P. Associations Between the Developmental Coordination Disorder Questionnaire - Brazilian Version (DCDQ-BR) and Motor Competence in School-Age Children. Phys Occup Ther Pediatr. 2020;40(2):121-133.
8. Caçola P, Miller HL, Ossom Williamson P. Behavioral comparisons in Autism Spectrum Disorder and Developmental Coordination Disorder: A systematic literature review. Res Autism Spectr Disord. 2017 Jun;38:6-18.
9. Ming X, Brimacombe M, Wagner GC. Prevalence of motor impairment in autism spectrum disorders. Brain Dev. 2007 Oct;29(9):565-70.
10. Ku B. Validity of the Developmental Coordination Disorder Questionnaire'07 and Its Association with Physical Activity in Young Children with Developmental Disabilities. The Asian Journal of Kinesiology. 2021 Jan 31;23(1):10-9.
11. Shahzad N, Jameel HT. Translation, Adaptation, and Cross Language Validation of the Revised Version of Developmental Coordination Disorder Questionnaire'07 (DCDQ'07) in Urdu Language (DCDQ-UR). UMT Education Review. 2022 Dec 19;5(2):68-85.
12. Gebraël Matta G, Mourad J, Albaret JM, Richa S, Kaiser ML. Cross-cultural validation of the Arabic version of the Developmental Coordination Disorder Questionnaire DCDQ'07, in a Lebanese sample of children. Res Dev Disabil. 2021 Aug;115:103999.
13. Øksendal E, Brandlistuen RE, Holte A, Wang MV. Associations between poor gross and fine motor skills in pre-school and peer victimization concurrently and longitudinally with follow-up in school age - results from a population-based study. Br J Educ Psychol. 2022 Jun;92(2):e12464.
14. Kilroy E, Ring P, Hossain A, Nalbach A, Butera C, Harrison L, et al. Motor performance, praxis, and social skills in autism spectrum disorder and developmental coordination disorder. Autism Res. 2022 Sep;15(9):1649-1664.
15. Avlund SH, Thomsen PH, Schendel D, Jørgensen M, Carlsen AH, Clausen L. Factors Associated with a Delayed Autism Spectrum Disorder Diagnosis in Children Previously Assessed on Suspicion of Autism. J Autism Dev Disord. 2021 Nov;51(11):3843-3856.
16. Shenouda J, Barrett E, Davidow AL, Halperin W, Silenzio VMB, Zahorodny W. Prevalence of autism spectrum disorder in a large, diverse metropolitan area: Variation by sociodemographic factors. Autism Res. 2022 Jan;15(1):146-155.