Turkish Archives of Pediatrics

SCIENTIFIC LETTER
DOI: 10.5152/TurkArchPediatr.2021.21168

Early Motor Impairment in Children with Autism Spectrum Disorder

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In recent years, a growing amount of data in the literature have highlighted that in children with autism spectrum disorder (ASD), early motor impairment may even precede the onset of the classical ASD core symptoms of social-communication deficits and restricted repetitive behaviors.[1,2] From a clinical perspective, motor impairment in these children can manifest itself very early, with a delay, mostly slight, in the achievement of motor development milestones,[3-5] with hypotonia,[6] walking on tiptoes, and/or with a sort of clumsiness in movements.[7] The other early motor symptoms highlighted by research studies (such as a reduced symmetry when lying or during unsupported gait, increased bilateral repetitive limb movements, or a more monotonous spontaneous motor activity)[8-11] are undoubtedly much harder to identify in the clinical practice, but their presence, suggested by several studies, confirms the existence of an early motor dysfunction in children with ASD. To give an idea of the prevalence of motor impairment in ASD, we can mention the work of Ming et al.,[12] who studied 154 children (median age: 6 years), finding hypotonia in 51% of cases, apraxia in 34%, walking on tiptoes in 19%, and gross motor delay in 9%. However, considering the relatively high median age of the sample reported by Ming et al.,[12] these data probably underestimate the real prevalence of early motor signs, which tend to improve over time due to natural progression and/or to interventional therapy.[12] Yet, despite its high prevalence in these individuals, motor impairment is only mentioned among the associated characteristics and not among the diagnostic criteria of ASD, according to the most recent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, 2013).[7] This gap of the DSM-5 should be filled, in line with data emerging from the early natural history of most individuals with ASD. Early motor signs might hypothetically be added to the DSM-5 criteria for ASD alongside sensory abnormalities, and included in the "Restricted, repetitive patterns of behavior, interests, or activities." One might wonder why, despite the presence of so many elements that argue in favor of a motor dysfunction, the focal pathological signs almost never emerge from the neurological examination of individuals with ASD. A likely explanation is that at the basis of motor dysfunction, there could be an early alteration of long-range brain connectivity (suggested by functional magnetic resonance imaging)[13] leading to an impairment of multisensory integration[14] which negatively affects motor milestone achievement, and not a topographically well-defined focal lesion located in the central nervous system.

From the perspective of clinical practice, what do all these data lead us to say? First of all, the assessment of motor development, possibly carried out through standardized tools such as the Peabody Developmental Motor Scales - Second Edition (PDMS-2, 2000),[15] should be more valued than it is now in the screening of ASD. For example, in an infant considered to be at high risk for ASD because he/she is the sibling of an individual with autism or because he/she was born preterm with low weight,[16] the early recognition of motor problems even in the apparent absence of socio-communicative deficits should represent an important warning signal, making one suspect the development of a clinical picture of ASD in a relatively short time. Therefore, the early motor signs should be considered in the context of those first signs that can allow a timely diagnosis of ASD and consequently a more effective treatment. Secondly, according to Elliot et al.,[17] there are now some data favoring the approach that a fundamental motor skill intervention can lead to improvements in children with ASD not only in the motor domain, but also in social skills, listening skills, and turn-taking skills. In fact,

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Received: May 15, 2021
Accepted: May 26, 2021

Cite this article as: Posar A, Visconti P. Early motor impairment in children with autism spectrum disorder. *Turk Arch Pediatr.* 2021; 56(6): 646-647.

motor impairment should not be thought of as an end in itself, as it could favor the appearance of social-communication deficits in ASD individuals, due to the crucial role of motor skills for interacting with the surrounding environment.[18] In this regard, it is probably not a coincidence that a large amount of literature data[19,20] suggest that motor development may be related to verbal and non-verbal communication development which, by definition, is always damaged, more or less severely, in individuals with ASD. Finally, at the research level, the assessment of early motor skills using standardized tools could offer relevant findings allowing a more detailed clinical characterization of subjects with ASD, useful, for example, in making adequate correlations between genotype and phenotype.

Peer Review: Externally peer-reviewed.

Author Contribution: Concept – A.P., P.V.; Design – A.P., P.V.; Supervision – A.P., P.V.; Data Collection and/or Processing – A.P.; Analysis and/or Interpretation – A.P.; Literature Review – A.P.; Writing – A.P.; Critical Review – A.P., P.V.

Acknowledgment: The authors would like to thank Cecilia Baroncini for help in editing the text.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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