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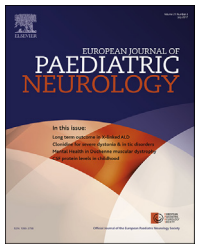

Original article

Assessing mental health in boys with Duchenne muscular dystrophy: Emotional, behavioural and neurodevelopmental profile in an Italian clinical sample

Paola Colombo [a], *Maria Nobile* [a,*], *Alessandra Tesei* [a], *Federica Civati* [b], *Sandra Gandossini* [b], *Elisa Mani* [a], *Massimo Molteni* [a], *Nereo Bresolin* [c], *Grazia D'Angelo* [b]

[a] *Child Psychopathology Unit, Scientific Institute, IRCCS Eugenio Medea, Via Don Luigi Monza 20, Bosisio Parini, Lecco, Italy*

[b] *Neuromuscular Unit, Department of Neurorehabilitation, Scientific Institute, IRCCS Eugenio Medea, Via Don Luigi Monza 20, Bosisio Parini, Lecco, Italy*

[c] *Department of Neurology, Fondazione Policlinico-Mangiagalli-Regina Elena, Istituto di Ricerca e Cura a Carattere Scientifico Ospedale Maggiore, University of Milan, Milan, Italy*

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ABSTRACT

Objective: To evaluate through a comprehensive protocol, the psychopathological profile of DMD boys. The primary aim of this observational study was to describe the emotional and behavioural profile and the neurodevelopmental problems of Italian boys with Duchenne Muscular Dystrophy (DMD); the secondary aim was to explore the relation between psychopathological profile and DMD genotype.

Method: 47 DMD boys, aged 2–18, were included in the study and assessed through structured and validated tools including Wechsler scales or Griffiths for cognitive ability, Child Behavior Check List (CBCL), Youth Self Report (YSR) and Strengths and Difficulties Questionnaire (SDQ) for emotional and behavioural features. Patients "at risk" based on questionnaires scores were evaluated by a clinical structured interview using Development and Well Being Assessment (DAWBA) or Autism Diagnostic Observation Schedule (ADOS), as required.

Results: The 47 enrolled patients, defined with a Full Scale Intelligence Quotient (FSIQ) of 80.38 (one SD below average), and presenting a large and significant difference in FSIQ in relation to the site of mutation along the dystrophin gene (distal mutations associated with a more severe cognitive deficit), were showing Internalizing Problems (23.4%) and Autism Spectrum Disorders (14.8%).

Interestingly, an association of internalizing problems with distal deletion of the DMD gene is documented.

* *Corresponding author*. Fax: +39 031 877806.
E-mail address: maria.nobile4@gmail.com (M. Nobile).

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Conclusion: Even though preliminary, these data show that the use of validated clinical instruments, that focus on the impact of emotional/behaviour problems on everyday life, allows to carefully identify clinically significant psychopathology.

1. Introduction

Duchenne muscular dystrophy (DMD) is an X-linked progressive muscular disorder affecting about 1:3000 boys caused by genetic mutations disrupting the protein dystrophin (DYS), which is normally present in many human tissues, especially in muscle. Lack of DYS leads to progressive muscular weakness and death due to respiratory muscle insufficiency.[1] DYS also plays an important role in the architectural organization of the central nervous system and has some functional consequences,[2] i.e., disruption of normal synaptic terminal integrity, synaptic plasticity and regional cellular signal integration.[3]

Clinical literature consistently reports a higher rate of intellectual disabilities (ID; ranging from 20% to 50%) among DMD patients.[4–7] The cognitive impairment is neither progressive nor correlated with the severity of the muscle disease. A discrepancy between verbal intelligence quotient (VIQ) and performance IQ (PIQ) has often been found, with greater impairment of verbal components. Such findings hint at the possibility that the lack of dystrophin might have effects on the correct brain functioning, leading to cognitive impairments as well as neurobehavioral disorders.[8]

The occurrence of psychopathology in patients with DMD has been documented in several studies. In a recent multicenter study focused on neurodevelopmental, emotional and behavioural characteristics in DMD a high prevalence of autism spectrum disorder (ASD; 21%), hyperactivity (24%), inattention (44%), internalizing (24%) and externalizing problems (15%) has been found.[9] These results are in line with previous studies on neurobehavioral functioning in DMD, which report a higher prevalence of attention deficit hyperactivity disorder (ADHD) and ASD than expected in the general population.

The prevalence rate of ADHD in patients with DMD reported in the literature varies from 11.7%[10] to 33%,[11,12] whereas ASD prevalence rate ranges from 3.79% to 19%.[10,12–16] Variability in prevalence rate across different studies possibly reflects different methods used to assess the presence of the psychopathological diagnosis. The importance of detecting mental disorders in children and adolescents is widely accepted, and the accurate estimate of the prevalence of psychopathology for these age groups is essential, both in the general population and in children with a specific illness.

The above-mentioned studies have used an assessment method based on clinical evaluations rather than structured interviews. However, structured or semi-structured interviews become necessary to accurately assess the prevalence of psychopathology in specific child populations as well as in general population. Structured interviews, besides collecting emotional and behavioural problems, provide specific questions about the onset, offset, frequency, intensity, quality, context of occurrence, and functional impairment, thus they are needed to determine clinical cases or to produce accurate diagnoses[17] according to the main nosologic classifications (i.e., DSM-IV or V, ICD 10).

The main purpose of the current study is to describe the emotional and behavioural profile and the neurodevelopmental problems of boys with DMD, using structured clinical assessment based both on self-report questionnaires and clinical structured interviews or observational protocol, when needed. In addition, this study aims to explore the relation between psychopathological profile and DMD neurological phenotype.

2. Materials and methods

2.1. Procedure

To assess emotional and behavioural features, all parents completed the Child Behavior Checklist (CBCL) and the Strength and Difficulties Questionnaire (SDQ) parent-report form. In addition, patients up to 11 years old completed the Youth Self Report (YSR) and the SDQ self-report form. Patients with at least one CBCL/YSR syndrome scale or SDQ scale above the clinical cut-off were evaluated by a clinical structured interview using the Development and Well Being Assessment diagnostic interview (DAWBA). Patients with high scores on the Autism Spectrum Problems CBCL 1/5-5 scale and patients with a clinical diagnosis of ASD based on *DSM-IV-TR* criteria were further assessed with structured observation based on the Autism Diagnostic Observation Schedule (ADOS).

The study was approved by the Ethical Committee of the E. Medea Scientific Institute according to the Declaration of Helsinki. All parents signed a written informed consent form (Fig. 1).

2.2. Participants

A clinical population of 133 boys with DMD (aged from 2.8 to 32 years) attend each year the Neuromuscular Unit of IRCCS E. Medea for periodic clinical evaluation as indicated in international guidelines.[1] Among these, 52 boys were responding to the inclusion criteria (see below) and were recruited during their attendance at the Institute as in patients or outpatients.