Evaluation of neuromuscular tone phenotypes in children with autism spectrum disorder: An exploratory study

Évaluation du tonus musculaire chez les enfants avec un trouble du spectre de l’autisme : étude exploratoire

Aude Paquet a,b,c,d,*, Bertrand Olliac c,e, Bernard Golse a,b,f, Laurence Vaivre-Douret a,b,f,g,h

a Faculty of medicine, university of Paris Descartes, Paris, France
b Inserm 1018, CESP, university Paris-Sud, UVSQ, university of Paris-Saclay, Paris, France
c Department of child and adolescent psychiatry, Esquirol hospital, Limoges, France
d Research and neurostimulation unit, research federation for psychiatry and innovation at Limousin, Esquirol hospital, Limoges, France
e UMR 1094, university of Limoges, Limoges, France
f Department of child psychiatry, Necker—Enfants-Malades university hospital, Paris, France
g Department of paediatrics, child development, Cochon-Port Royal university hospitals of Paris center, Paris, France
h Endocrinology laboratory, Imagine institutes, Paris, France

Received 19 April 2017; accepted 10 July 2017
Available online 4 August 2017

KEYWORDS
Autism spectrum disorder;
Children;
Muscular tone;
Neurodevelopmental standardized assessment

Summary
Objective. — Motor disorders are known in autism spectrum disorder (ASD), but muscle tone assessments are rarely performed. Muscle tone underpins movement. We investigated muscle tone in 34 ASD children using a standardized neuro-developmental battery, which uses the French norms for muscular tone in children.

Methods. — Dangling and extensibility were used to examine passive muscle tone in the upper and lower limbs and the body axis. A comparison between muscles of the right and left sides enabled the determination of tonic laterality.

Results. — We found a disharmonious tonic typology, with a tonic component for the muscles of the trunk and the proximal muscles of the lower limbs and a laxity component for the ankles and the proximal and distal muscles of the upper limbs (wrists and shoulders). No establishment of tonic laterality was found in the upper limbs in 61% of ASD children (P < 0.001).

* Corresponding author at: unité de recherche et de neurostimulation, centre hospitalier Esquirol, 15, rue du Dr-Marcland, 87000 Limoges, France.
E-mail address: audepaquet@gmail.com (A. Paquet).

http://dx.doi.org/10.1016/j.neucli.2017.07.001
0987-7053/© 2017 Elsevier Masson SAS. All rights reserved.
**Introduction**

Autism spectrum disorder (ASD) is a neurodevelopmental disorder with a multifactorial origin that affects a child's development at an early stage and persists into adulthood. Children are characterized by pervasive impairments in several areas of development associated with restricted patterns of behavior and interests, which affects social functioning and communication. Recent literature indicates movement and coordination disorders and impairment in gross motor skills in autism, but no systematic and standardized approach has been used despite the increased performance of motor assessments [22]. Muscle tone assessment is a difficult examination in children with ASD because it requires physical contact and access to voluntary muscle relaxation. Few studies have reported neurological examination or investigations of walking in people with autism, nor data regarding muscular tone [11,18]. Moreover, tone data are often derived from imprecise muscular tone exploration methodologies without any reference to standards in children. Passive or active muscular tone is not explored in a standardized manner. Shetreak-Klein et al. [29], measured joint angles and found evidence of greater ligament laxity in distal limbs in children with ASD compared to a control group. Hypotonia was also reported in several observational clinical studies. Adrien et al. [1] retrospectively analyzed video of young children later diagnosed with autism and noted a "passivity" in these children that was characterized by a lack of initiative, hypoactivity and hypotonia (i.e., low tone and no tonic reactions to stimuli). Ming et al. [18] performed physical examinations of children aged 2 to 18 years and highlighted reduced resistance to passive movement in the limbs. These authors found a high prevalence of mild to moderate hypotonia in approximately 63% of the 2–6-year-old children, and the prevalence in 7–18-year olds was only 38%. Another study demonstrated minor neurological dysfunctions using assessments of soft signs with the Touwen examination in children with ASD; this study mentioned dysfunctional muscle tone without specifying the nature or localization of the dysfunction [8]. Other studies used the Physical and Neurological Examination for Soft Signs (PANESS) but provided no information on muscle tone [13,17]. No current studies have specifically examined muscle tone in children with ASD. However, according to Bergès [6], muscle tone is the foundation on which movement emerges and is elaborated. The examination of muscle tone is an essential prerequisite to any examination of motor skills that account for neuromuscular maturation, subject typology (e.g. hyperlaxity and hypertonicity), tonic lateral dominance and possible neurological or neuromuscular disorders. Most studies have assessed gross motor skills in children with ASD using global batteries of movement without developmental references. However, these tools do not elucidate our understanding of the nature of dysfunction,
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات