Development of a Symmetry Score for Infantile Postural and Movement Asymmetries: Preliminary Results of a Pilot Study

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ABSTRACT

Objective: The purpose of this study was to develop and verify a quantifiable symmetry score for infantile postural and movement asymmetries.

Methods: Three studies were conducted. For reliability, 6 test items examining postural and movement asymmetries, which came under consideration, were investigated in 24 infants with postural abnormality (range: 14-24 weeks). The inter-rater reliability was chosen as the primary endpoint. Furthermore, intrarater reliability and test-retest reliability were determined. Analysis and weighting of the items were performed by calculating the intraclass correlation coefficient. The validity was reviewed by expert opinion and by using a study with 26 infants (range: 12-28 weeks) of a cross-section population. The pilot study involved 38 infants, aged 14 to 24 weeks, who were examined using video. Their autonomic symptoms were recorded, and subsequently, they were treated once by means of manual medicine. The parents were instructed to a daily home program that focused on "tummy time."

Results: The reliability tests led to a 4-item symmetry score with a point value between 4 points (very symmetrical) and 17 points (very asymmetrical). The chosen items achieved an intraclass correlation coefficient >0.8 and Cohen's κ >0.6, respectively. The experts' opinions matched mainly to a majority agreement (>50%). Furthermore, a comparison between the outcome of clinical testing and the symmetry score applied to 26 children without diagnosed abnormalities displayed an agreement of 84.6%. The pilot study showed a good reduction of the postural and movement abnormalities because 63% of the manual treated children were assessed as being symmetric afterward.

Conclusion: The reliable and valid 4-item symmetry score served for the diagnosis, evaluation, and follow-up of infants aged 3 to 6 months with infantile postural and movement asymmetries. The results of a pilot study showed the positive effect of a single manual medical treatment session along with a home program focusing on "tummy time." (J Chiropr Med 2018;17:206-216)

Key Indexing Terms: *Infant; Child Development*

INTRODUCTION

Although variable positional, postural, and movement asymmetries are considered to be indications of a developing physiological postural motor system, constant early childhood asymmetries of head or body posture, spontaneous movement, or muscle tone are mostly expressions of abnormal sensory-motor coordination and require diagnosis and, if necessary, treatment.[1-8] In pediatric practice in Germany, the term "kinematic imbalance due to suboccipital strain (KISS)" is widely accepted.[1,7,9] The concept ascribes a decisive importance to segmental dysfunctions in the craniocervical junction in the pathogenetic occurrence of development of asymmetry. There are references to the neurophysiological foundations

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Table 1. *Overview of the Demographic Data*

	Reliability Study	Validity Study	Pilot Study
Number of infants included	24	26	38
Time frame	February-June, 2013	November, 2014-February, 2015	March-July, 2015
Age, in wk	14-24 (mean: 17)	12-28 (mean: 20)	14-24 (mean: 17)
Sex (female/male)	9/15	13/13	12/26

for this proprioceptive musculoskeletal coordination disorder.[7,10,11] Postural and movement abnormalities of infants with systemic underlying diseases, such as neurologic disorders, genetic anomalies, dysplasias, or metabolic disorders, have to be distinguished from these.

Based on clinical observations, between 8% and 30% of all infants may develop constant postural and movement asymmetries during the first months of life.[2,3] The causes of such early childhood asymmetrical development are the subject of controversial discussion. The terminology and diagnoses are also diverse and are needed for the identical constellation of symptoms for infants without the presence of systemic underlying diseases. They range from "Siebener's syndrome (syndrome of contractures)"[12] to "infantile scoliosis"[8] and "cervical diencephalic static syndrome of infants,"[13] all the way to "idiopathic infantile asymmetry"[14] and finally to "infantile postural asymmetry."[6]

Because, from a functional orthopedic viewpoint, segmental disorders in key regions of the locomotor system stand in the forefront as catalysts for constant postural and movement asymmetries, there are various manual medicine and osteopathic concepts for diagnosis and treatment. Current treatment options for infantile postural asymmetry and KISS, respectively, are physiotherapeutic methods and manual medical or osteopathic treatments. There is indeed positive clinical experience of these treatment approaches (latest level of evidence IV for manual medicine)[15]; however, there are no evidence-based studies on levels I or II. Thus, the scientific evaluation of a manual medical treatment approach is of primary importance.

In a placebo-controlled small study, positive effects of osteopathic treatment of infants, aged between 6 and 12 weeks, were observed.[6] Because the score used by Philippi et al[6] could not be applied to the target group, the authors developed a sensory-motor symmetry score and tested it for reliability and validity. Therefore, the purpose of this study was to design an objective sensory-motor development score for infants aged 3 to 6 months with infantile postural and movement asymmetry or KISS. This study also assessed if the symmetry score was feasible for investigating manual medical treatment for affected infants in a pilot study.

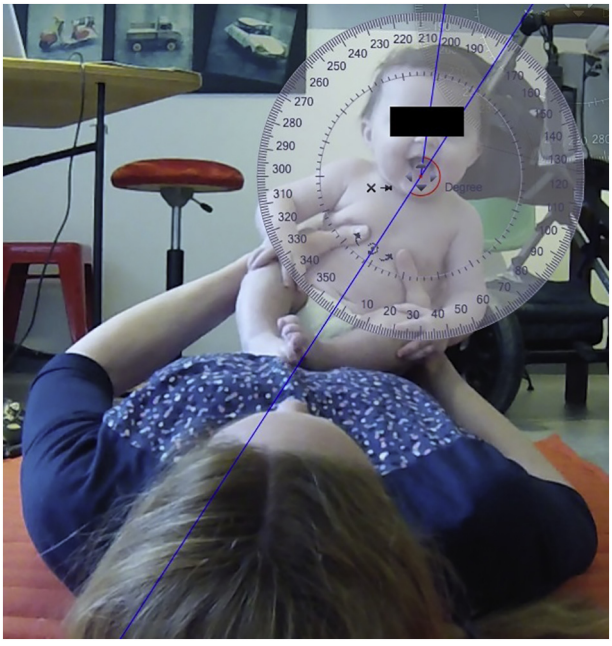

Fig 1. *Modified frontal righting reflex reaction.*

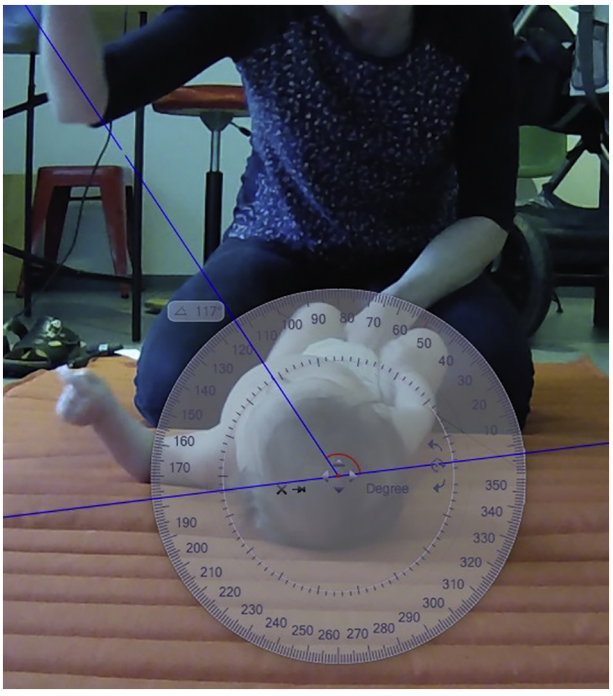

Fig 2. *Active head rotation in supine position.*