Paper presented during *the First Conference on Athromathematics in the Memory of (Late) Syed Firdous (ANTHROMATHEMATICS 2013)*, Department of Mathematics, University of Karachi, Karachi, Pakistan and Government College, Hyderabad, Pakistan, September 4, 5, 2013 (Thursday, Sept. 5, 2013; 1230h-1240h, Assembly Hall, Govt. College), Technical Session Anthro13-IV, Abstract#Anthro13-15, p 21

Gait as Indicator of CNS Problems as well as Trunk and Lower-Limb Deformities

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Child's gait analysis

Posture observation of a child may generate a large number of false positives as the youngster may become conscious and assume abnormal posture. However, videotaping an undressed child walking or running a number of steps one gets a pattern, which could be analyzed to find out if the child is suffering from any musculoskeletal or neurological disorder. In fact, a crooked gait may become the first indicator of CNS (Central Nervous System), trunk or lower-limb problems. Trunk deformities may include scoliosis, kyphosis or lordosis (at times kypholordosis). Therefore, one must appreciate the diagnostic value of gait as a fine indicator to be placed at the top of a multi-level screening of school-age children as well as job seekers. It is a well-known fact that in military and paramilitary occupations as well as during a job interview, gait is the first thing noticed by the interview panel. However, the dilemma is that the majority of our children are not trained to walk properly (observe children walking to school any morning to see just how do they place their feet on the ground while walking). The gait a child is developed around the age of seven. Therefore, a careful observation of gait must be an integral part of unclothed physical examination of all children entering class two. Of course, one of the factors contributing to this may be the heavy weight of the school bags carried on one side. The bipedal locomotion could be studied from two perspectives — kinesiology and biomechanics. The legs are activated out of phase with one another in each step. However, even standing.on two legs is a state of unstable equilibrium like an inverted pendulum. The feet provide a narrow base of support for the body's center of gravity. Each step of gait may be considered as an unstable fall followed by a return to a stable posture. *Normal gait* of a human being is always in the sagittal plane. *Spastic gait* may be due to hip weakness (positive Tredelenburg sign). A limp may be present due to leg-length inequality (spinal-dimples not level). The gait was observed by asking a child to travel 20 steps to touch wall and return (next time perform the same routine while running). This was organized as a game without letting the child feel that gait was being evaluated. The gait was observed without shoes and stockings and the child completely stripped except short underpants. The child was asked to walk on solid ground and, then, on sandy path. For a child possessing normal gait, footprints on sand were the mirror image from Phase I to Phase IV. Then, the child was instructed to walk tandem (heel-to-toe) to assess balance and look for poor position sense, vertigo and leg tremors. During gait analysis of child, special attention was paid to discover any limp, which might be caused because of Tredelenburg gait, due to gluteus-muscle weakness, or foot drop, due to common peroneal nerve palsy. Further, our team looked for arm-swing asymmetry, which indicated mild hemiplegia. If any abnormality was suspected, the child was instructed to walk on tiptoe, to check for triceps-surae-muscle weakness, and on the heels, to look for tibialis-anterior-muscle weakness. If gluteus maximus was suspected, the child was asked to move forward on the knees. A vertical position of the upper torso indicated good gluteus maximus strength. When the child left the examination area (still undressed) to proceed back to the dressing area, the examiners utilized this opportunity to observe spontaneous gait. Apart from the diagnostic value, gait may serve as indicator of self-esteem (catwalk), identifier of individuals (seen from rear) and predictor of hostile intent (in sensitive places).

*Keywords***:** Human gait, trunk deformities, CNS problems, lower-limb deformities, school-going children
*Conflict of Interest Statement***:** No potential conflict of interest is identified for this work
Grant Sponsor**:** Dean's (Science) Research Grant, University of Karachi, number DFSR/2009
*Research Ethics***:** Project initiated after Institutional Review Process and conducted in compliance with ethical and human-right standards in our region.

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