Paper presented during *the First Conference on Athromathematics in the Memory of Syed Firdous* (*ANTHRO-MATHEMATICS 2013*), Department of Mathematics, University of Karachi, Karachi, Pakistan and Government College, Hyderabad, Pakistan, September 4, 5, 2013 (Wednesday, Sept. 4, 2013; 1330h-1340h, Faculty Club, Dept. of Mathematics), Technical Session Anthro13-II, Abstract#Anthro13-05, p 11

# Cumulative-Scoliosis-Risk Weightage (CSRW) — Designing Preventive Strategies

*Syed Arif Kamal**, *Maqsood Sarwar* and *Urooj A. Razzaq*
SF Growth-and-Imaging Laboratory, Anthromathematics Group, Department of Mathematics, University of Karachi, Karachi 75270, Pakistan; *Subject Committee for Physical Education, Health and Sport Sciences, National Testing Service Pakistan; profdrakamal@gmail.com

Scoliosis, lateral curvatures and rotations of the spinal column, is a body-disfiguring condition detectable around the age of eight years. It, severely, affects quality of life for children and adults. Girls are affected 5 times more than the boys. The deformity may distort the body; damage vital organs and may require major spinal surgery involving delicate nerves. If recognized at an earlier stage, the deformity may be treated by a combination of exercises and braces. A two-minute-stripped-orthopedic as well as moiré examination may be able to alert the physician to early-warning signs (Fig. 1*a-d*). Our group tested a protocol in a local school, applied to 7- and 8-*year*-old boys and girls, to assign *Cumulative-Scoliosis-Risk Weightage* (*CSRW*). The protocols were based on family history, age, statuses of being tall and/or wasted, forward-bending tests (child facing the examiner and with back towards the examiner), nonalignment of plumb line, shoulder drooping, uneven scapulae, shape of midline of back (straight, C or S), unequal body triangles, uneven spinal dimples, positive moiré (back and front), https://www.ngds-ku.org/BLA/Scoliosis_Risk.pdf with the weightage of each factor increasing if the condition persists during more than one examination. The drawback of this approach is that if history information is not available and some test results are missing, CSRW cannot be compared with other students of the same class. The authors are in the process of fine-tuning this procedure.

*Keywords*: Forward-bending test • Tall children • Visual examination • Wasted 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.

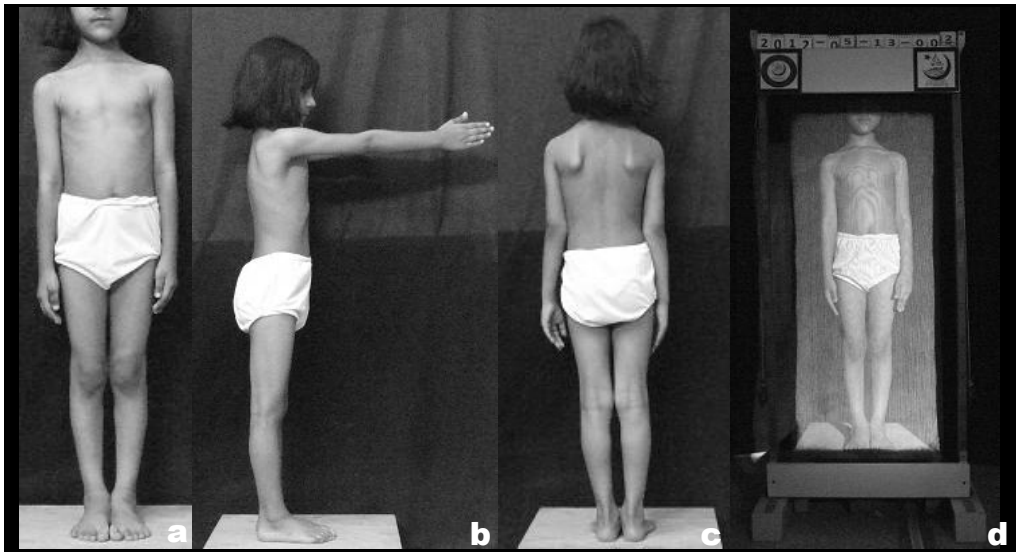


**Fig. 1*a-d*. Visual — (*a*) front, (*b*) side and (*c*) back views as well as (*d*) moiré examination of a child's torso (looking for early-warning signs leading to scoliosis, kyphosis or lordosis)**

*Web address of this document*: https://www.ngds-ku.org/Presentations/CSRW.pdf

*PhD (Neuroscience); MA, Johns Hopkins, Baltimore, MD, United States; MS, Indiana, Bloomington, IN, United States; MSc, *summa cum laude*; BSc (Honors), *summa cum laude*, University of Karachi; Project Director, the NGDS Pilot Project; Director, SF Growth-and-Imaging Laboratory; University of Karachi; Member, Subject Committee for Physical Education, Health and Sport Sciences, National Testing Service Pakistan; Sessional faculty, the Aga Khan University Medical College (1996-2006); Associated Professor in Orthopedic Surgery, Malmö General Hospital, Sweden (1988); Research Associate in Orthopedic Surgery, James Whitecomb Riley Hospital for Children, Indianapolis, IN, United States (1980) • *paper mail*: Professor and Chairman, Department of Mathematics, University of Karachi, PO Box 8423, Karachi 75270, Sindh, Pakistan • *homepage*: https://www.ngds-ku.org/kamal • *telephone*: +92 21 9926 1300-15 ext. 2293 • *the NGDS Pilot Project URL*: https://ngds-ku.org