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Reliability of a self-report questionnaire to assess parents' postural knowledge

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Abstract

Study aim: To develop a reliable and valid questionnaire to assess parents' postural knowledge.

Material and methods: This questionnaire was conducted on 30 Iranian parents. The questionnaire assessed knowledge of abnormalities in body posture and ergonomic knowledge of parents, which were in line with their postural knowledge. The kappa coefficient (test–retest reliability) of the questionnaire included assessing its stability over 1 week among 30 participants. The validity of the content of the questionnaire was checked and agreed upon by three experts from three different institutions.

Results: The kappa coefficient for 19 questions and their 46 sub-questions ranged from 0.30 to 1. Out of these items, 89% (n = 41) had a value of 0.6 or above and 11% (n = 5) were below 0.6. Questions were categorized as "no change expected" (0.86÷1), "change unlikely" (0.68÷1), and "change likely" (0.30÷0.68).

Conclusions: The Parent's Postural Knowledge Questionnaire was found to be highly reliable and its contents relevant for the assessment of postural knowledge among Iranian parents. This tool is appropriate for studying larger populations in the variable of interest.

Keywords: Postural knowledge – Postural literacy – Parent – Children – Posture – Ergonomic

Introduction

The attitude assumed by the body in either static or dynamic positions is referred to as posture. It is achieved through the coordinated action of various muscles working together to maintain stability [3]. Posture is an important indicator of musculoskeletal health and it holds the body upright against gravity while standing, sitting, or lying down. Maintaining good posture entails training one's body to move and function in ways that place the least strain on the bones, joints, and soft tissues [3].

Poor posture is defined as misalignments in body parts that can cause discomfort to the muscles, tendons, ligaments, cartilage, and other tissues of the affected parts, making appropriate joint movements more difficult to achieve [30]. In turn, incorrect movements injure the musculoskeletal system and limit one's ability to perform daily activities [27].

There are intrinsic and extrinsic factors that can influence a child's posture, such as heredity, the environment or physical conditions under which the child lives, the level of physical activity, the socioeconomic level, emotional factors, and physiological abnormalities due to human growth and development [23]. Among environmental factors, prolonged sitting positions adopted in the classroom, poor or incorrect postures, the absence of adequate-sized furniture for the students' anthropometric dimensions [22], the way of carrying the school backpack and its (often) excessive weight [18], and a lack of physical activities might have an important effect on the posture of the growing child.

Poor posture is a modern age pandemic [13] and a serious problem for a modern society. A recent study indicated

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that 60-80% of children had postural deficiency [11]. According to epidemiological data, for example in Poland, the prevalence of postural abnormalities ranged from 30–69% [4] to more than 50% [21], in Brisiel 50% [24], in India 63% [15], in Italy 34% [28], in Bulgaria 58.85% [20], in the Czech Republic 38.3% [14], in Lithuania 46.9% [11], in Slovakia more than 50% [25], and in Serbia 60.4% [10]. In a recent study in China on 595,057 students, the overall prevalence of incorrect posture in children and adolescents was reported at 65.3% [31].

If these poor postures are not addressed in a timely manner, they can persist into adulthood and lead to postural defeats [7]. As a result, diagnosing postural failures in children under the age of 15 is especially important, not only because the child is more prone to bone system modifications, but also because poor formation and poor posture are more easily corrected at this stage of development [23]. Faulty posture that goes unnoticed or untreated can lead to musculoskeletal disorders, pain, muscular dysfunctions, increased health-care costs, and the development of psychological symptoms. Unfortunately, if not corrected in time, postural disorders in children can result in asymmetric bone growth, and the changes will last a lifetime [9].

Certain people, such as the family doctor or general practitioner, a paediatrician, and even a physical education teacher at school, should pay special attention to a child's body posture. Parents, on the other hand, appear to be able to help their children avoid developing postural abnormalities by monitoring the quality of their body posture or detecting postural disorders as early as possible and seeking a means of correction [9].

According to some studies, parents' knowledge about the prevention and correction of postural defects and posture ergonomics is an important factor in the formation of a child's body posture [16]. It has been stated that awkward, constrained, asymmetric, repeated, and prolonged postures can overload the soft tissues [29], causing postural problems. On the other hand, the association between posture ergonomics (postural and psychosocial factors) and reduction of musculoskeletal pain/discomfort and postural abnormalities has been accepted [19]. These are important areas of postural and ergonomics knowledge that can be useful in prevention and recognition of postural abnormalities by parents. The primary educational environment for a child is his or her family. This is where they learn the fundamentals of social functioning, develop behavioural patterns, and shape their personality. It is important to understand that parents should be provided with relevant information about posture and ergonomics because they are the ones who can modify the child's environment to be conducive the child's health and proper development. It is critical that parents furnish their child's room appropriately, providing ergonomic work and leisure conditions, as well as paying attention to what position their child is in when doing homework or watching TV [12]. Parents with relatively basic knowledge (literacy) and perceptions about ergonomics, postures, and the risks associated with faulty posture, on the other hand, are the ones who can identify any major postural deviations in their child [8, 12]. As a result, preventing and managing postural defects in children may become easier in this manner. To assess parents' knowledge of postural health and their children's pro-health behaviours', first a comprehensive, reliable, and valid measuring tool is needed.

To the best of the researchers' knowledge, no comprehensive research or assessment tool on parents' postural specific literacy and knowledge has been performed or published. However, limited studies [9, 12, 25] on parents' posture knowledge have been conducted, but the contents and details of their questionnaire and sub-questionnaire are not accessible, making it impossible to judge the content or the internal validity and reliability of their questionnaires. As a result, the authors of this study evaluated the available existence scientific background to develop a questionnaire as a tool to assess what parents know about correct and incorrect posture (posture-specific knowledge and literacy).

Material and methods

Parent's Postural Knowledge Questionnaire (PPKQ)

A 19-item questionnaire (9 questions on postural knowledge and 10 questions on ergonomic knowledge of the parents) was developed. Each main question in both sections concerned three sub-items/questions (including 57 pictures and 180 closed questions in three columns).

The 9 main questions in the Parent's Postural Knowledge Questionnaire were designed specifically to assess: first, the parent's basic knowledge on the recognition of the abnormalities (the first column of the questionnaire which consisted of 9 main question with 27 pictures, 3 pictures for each abnormality); second, the naming of the abnormality (the second column of the questionnaire, which consisted of 45 sub-questions, 5 possible answers for each of 9 main questions); and third, knowledge of the mechanism and probable causes of the abnormality (the third column of the questionnaire, which consisted of 45 sub-questions, with 5 possible answers for each of 9 main questions).

The main items (abnormal postures) assessed in the PPKQ contained 9 main questions concerning: forward head, forward shoulder, thoracic hyperkyphosis, lumbar hyperlordosis, scoliosis in the spinal column and in the lower extremities, genu valgum (knock knees), genu varum, foot abnormalities, and toe abnormalities.

In addition to questions designed to assess the postural knowledge, there were 10 other closed questions to assess

the ergonomic knowledge of the parents, which were in line with the postural knowledge of the respondents.

The 10 ergonomic knowledge questions consisted of postures of: picking up/carrying an object, sitting, working with a computer, reading, writing, sleeping, walking, texting/smartphone and wearing and carrying school backpacks, which are considered as an important risk factor in posture formation. This part of the questionnaire contained 30 pictures, 3 pictures for each ergonomic questions in column one (recognition) of the questionnaire and 90 closed questions, 45 each in the second column (naming) and third column (probable causes).

In addition to analysing the answers given to individual questions, the number of points in the subscales, which are the columns of the questionnaire, and the total score are summed up.

Before starting to complete the PPKQ questionnaire, the respondents were asked for their educational status and their lifestyle (Table 1).

It needs to be mentioned that the original questionnaire was developed in Persian. In order to be able to invite experts from other countries to collaborate on the questionnaire, it was initially translated into English. The experts from Iran (2 people) and Poland (3 people) considered which issues were the most important and should be addressed in the questionnaire. They also agreed on the list of answers and how to evaluate the questionnaire. The discussions on the questionnaire were conducted in English, but the questionnaire was written in Persian. The group of researchers working on the questionnaire agreed that the next step would be to develop a questionnaire exploring parents' and then also physical education teachers' knowledge of posture in English and Polish.

Evaluation of the questionnaire

The testing of the questionnaire included assessing its stability over 1 week (test-retest reliability). The questionnaire was conducted on 30 (15 female and 15 male) Iranian parents. They were recruited from 3 different sources, including universities, school teachers, and ordinary people, to represent parents with high, medium, and low education levels. Considering the difficulty of finding subjects willing to participate in the study on two separate occasions (test-retest), time, and budget (no funding was available for the study), the sample size needed to investigate internal consistency for test-retest reliability was estimated at n = 30 using a rule of thumb [1] and the recommendation [17] for interrater reliability using the kappa statistic that sample sizes of 30 would be sufficient.

The results of the two periods of the questionnaire were compared to determine the test-retest reliability. Each new questionnaire used by a researcher must have its own set of distinct psychometric properties (i.e., reliability and validity). However, reliability must be established first, as a measure cannot be considered valid unless it has a high level of reliability. The most widely used statistic in the literature for dichotomous or categorical response data is Cohen's kappa [5]. Cohen's kappa has been described as the degree of agreement between either two raters or between the same rater at two time points, corrected for the amount of agreement expected from chance alone [6]. Therefore, this measure is appropriate for intra-rater reliability or test-retest reliability (data from the same rater at two different points in time). The kappa coefficient indicates when observed agreement exceeds chance agreement; values greater than 0.6 are generally regarded as acceptable [2].

Table 1. Educational and lifestyle characteristics of participants (n = 30)

Variable		Female	Male	Total
Age group (years)	Below 20	7	4	11 (37%)
	20–25	4	10	14 (47%)
	25–35	3	0	3 (10%)
	Above 35	1	1	2 (6%)
Gender		15 (50%)	15 (50%)	30 (100%)
Educational status	Primary	0	2	2 (7%)
	High school	1	3	4 (13%)
	College	7	6	13 (41%)
	Postgraduate	7	4	11 (39%)
Average (daily) hours spent in sitting position	More than 5 h	4	4	8 (27%)
	4–5 h	5	3	8 (27%)
	3–4 h	3	2	5 (17%)
	2–3 h	0	2	2 (6%)
	less than 2 h	3	4	7 (23%)
Physically active	Yes	5	3	8 (27%)
	Not	10	12	22 (73%)

The content validity of the questionnaire (to make sure that it covers all relevant parts of the construct it aims to measure) was checked and agreed upon by several experts in related disciplines (corrective exercises, physiotherapy, ergonomics, etc.) from three different institutions.

Results

Out of the 30 participants recruited for the reliability process, all replied a second time to the questionnaire sent 1 week later. Educational status and age of the study participants are presented in Table 1.

Test-retest reliability of PPKQ

Nineteen questions consisting of 46 sub-questions were used to assess reliability. The kappa coefficient ranged from 0.30 to 1. Out of the forty-six items, 89% of the items (n = 41) had a value of 0.6 or above, whereas 39% (n = 18) ranged between 0.6 and 0.8, and 11% of the items (n = 5) were below 0.6 (Table 2).

The kappa coefficient ranged from 0.30 to 1. Questions were categorized as "no change expected" (0.86÷1), "change unlikely" (0.68÷1), and "change likely" (0.30÷0.68). Questions that showed lower values of kappa were item 2 from question 2 with the kappa value of 0.46, item 3 from question 3 with the kappa value of 0.48, item 3 from question 5 with the kappa value of 0.57, item 2 from question 8 with the kappa of 0.39, and item 1 from question 19 with the kappa value of 0.30 (Table 2).

Discussion

The development and methodological testing of a self-reporting questionnaire to evaluate the postural literacy or postural knowledge of Iranian parents on recognition of abnormalities, naming of the abnormality and mechanism/probable causes of abnormality were described.

Completion rates for each question and its sub-questions were generally good with the vast majority (89%)

Table 2. Test-retest reliability with kappa values for questions and sub-questions

	Question/item (Abnormalities)	Sub-item 1 (Recognition of abnormalities)	Sub-item 2 (Naming of the abnormality)	Sub-item 3 (Mechanism of abnormality)
1	Forward head	0.80	0.84	0.81
2	Forward shoulder	0.69	0.46	0.86
3	Thoracic kyphosis	0.69	0.85	0.48
4	Lumbar lordosis	1	0.84	0.67
5	Scoliosis	1	0.89	0.57
6	Geno varum	1	0.62	0.78
7	Geno valgum	1	1	0.61
8	Foot abnormalities	0.65	0.67	0.39
9	Toe abnormalities	0.92	0.92	0.80
	Postural Ergonomics Questions/items	Sub-item 1 kappa value (Recognition)		Sub-item3 kappa value (Mechanism)
10	Wrong posture while playing on the floor	0.67		0.63
11	Object picking up posture	0.83		0.90
12	Computer working posture	0.87		0.63
13	Sitting posture	0.94		0.72
14	Walking posture	0.79		0.89
15	Smart phone using posture	0.83		0.93
16	Writing posture	0.72		0.79
17	Back pack carrying posture	0.92		0.89
18	Sleeping posture	0.77		0.63
19	Reading posture	0.30		0.72

between 0.6 and 1. A small number (11%) of questions showed low completion rates.

For methodological purposes, the amount of change expected for each question before administering the questionnaire was defined [2]. Questions where a change had been expected actually showed larger amounts of change and lower reliability. This may mean that these items were used in an appropriate way to collect the required data.

Sub-question 2, from question 2, "naming of forward shoulder" with the kappa value of 0.46 was found to have lower re-test reliability at a 1-week interval. This can be explained by the very close similarity between the two sub-items in this question.

Sub-question 3, from question 3, "possible mechanism of thoracic kyphosis" with the kappa value of 0.48 was found to have lower re-test reliability at a 1-week interval, which can be explained by improper order of the correct answers, which might have caused confusion for the responders.

Sub-question 3, from question 5, "possible mechanism of scoliosis" with the kappa value of 0.57 was found to have lower re-test reliability at a 1-week interval, which can be explained by the similarities of the correct answers for this item.

Sub-question 2, from question 8, "naming of abnormal foot" with the kappa value of 0.39 was found to have very low-re-test reliability at a 1-week interval. This can be explained by the ambiguous answers to this question.

Sub-question 1, from question 19, "recognition of reading posture" with the kappa value of 0.30 was found to have very low-re-test reliability at a 1-week interval, which can be explained by the poor quality and small size of the images used for this item.

On the other hand, the majority of sub-questions 1, for main questions, were found to have a higher re-test reliability at a one-week interval. The kappa value for sub-questions 1 for questions 4, 5, 6 and 7 was found to be excellent (about 1) and for sub-questions 1 for questions 1, 9, 11, 12, 13, 15 and 17 was found to be higher than 0.8. These excellent (1) and very high (higher than 0.8) values of kappa for these items can be explained by the existence of some guiding signs in the images (recognition items), which may have helped to give some clue to respondents to identify the correct answers.

Changes made to the final questionnaire

In sub-question 2, from question 2, "naming of forward shoulder", the similarities between the correct options were resolved by merging similar options into one answer. In sub-question 3, from question 3, "possible mechanism of thoracic kyphosis", the problem was resolved by some amendment on re-ordering the correct answers to the question. In sub-question 3, from question 5, "possible mechanism of scoliosis", the similarities in the correct answers for this item were resolved by making some changes to them. In sub-question 2, from question 8, "naming of abnormal foot", the problem was resolved by clarifying the ambiguity in answers for this item.

As can be seen from Supplementary Materials, out of 19 main questions (except the last question), all of the first sub-questions, from 1 to 18, had kappa values higher than 0.6 and even the first sub-questions of questions 4, 5, 6 and 7 had a kappa value of 1. After double checking and looking deeper into these questions, it became clear that some overlap between the questions and some guiding signs in the images (sub-questions 1, recognition of posture) may have helped to give some clue to the responders to identify the correct answers. Therefore, to overcome this problem, the indicating signs such as facial expression in images, postural indicating signs and lines, etc., were resolved by removing the indicating signs and changing some images. Hence, by adding one more image to each sub-question of the main questions (each item had two images in the first version of the questionnaire, then one more image added to each), the problem of simplicity and choosing the answers by chance was resolved.

Questions 13 (different sitting posture on chair) and question 19 (reading position while sitting on a chair) were omitted from the questionnaire because of their overlaps with questions 12 (working with computer while sitting on a chair) and 16 (different postures while sitting on a chair). The focuses of all these 4 questions (12, 13, 16 and 19) were on assessing the knowledge of posture and position of the spinal column while sitting on a chair and doing a different task.

Finally, question 1 (forward head abnormality) was merged with question 2 (forward shoulder abnormality) as a "forward head and shoulder abnormality" because of close similarities between them.

Limitation of the study

The sample selected for this study came from a variety of educational backgrounds. However, the majority of the questionnaires that were returned belonged to younger subjects with higher education levels (college and post-graduate). Although the questionnaire was created so that it could be answered by anyone (using the figures in the questionnaire), we suggest taking into account samples from different age groups and educational levels for future studies.

Only 30 participants were chosen for this study due to a lack of funding. This is the smallest sample size that has been suggested to compare test-retest reliability. The sample size did, however, provide sufficient statistical power to reveal the associations in the test-retest comparisons.

Conclusion

The PPKQ is a new self-reporting questionnaire designed to estimate Iranian parents' body posture specific knowledge in Persian. The Persian PPKQ was discovered to be highly reliable and relevant for assessing postural knowledge in Iranian parents. As a result, this tool is suitable for studying larger populations of the variable of interest. This tool can be useful for physical education and primary education teachers who can plan an educational meeting with parents to increase their awareness of the dangers of abnormalities in body posture. In this way, it will increase the vigilance of parents who, in the event of noticing a faulty body posture, will consult a specialist.

Conflict of interest: Authors state no conflict of interest.

References

1. Al-Bayyati H.A. (1971) A Rule of Thumb for Determining a Sample Size in Comparing two Proportions. *Technometrics*, 13(3): 675-677. DOI: 10.2307/1267178
2. Andrée C., Vaillant M., Rott, C. Katsarava Z., Sándor P.S. (2008) Development of a self-reporting questionnaire, BURMIG, to evaluate the burden of migraine. *J. Headache Pain*, 9(5): 309-315. DOI: 10.1007/s10194-008-0059-1
3. Bettany-Saltikov J., McSherry R., van Schaik P., Kandasamy G., Hogg J., Whittaker V., Racero G.A., Arnell, T. (2019) PROTOCOL: School-based education programmes for improving knowledge of back health, ergonomics and postural behaviour of school children aged 4–18: A systematic review. *Campbell Systematic Reviews*, 15(1-2): e1014. DOI: 10.1002/cl2.1014
4. Brzek A., Soltys J., Gallert-Kopyto W., Gwizdek K., Plinta R. (2016). Body posture in children with obesity – the relationship to physical activity (PA). *Pediatr. Endocrinol. Diabetes Metab.*, 22(4): 148-155. DOI: 10.18544/PEDM-22.04.0063
5. Cohen J. (1960) A Coefficient of Agreement for Nominal Scales. *Educ. Psychol. Meas*., 20(1): 37-46. DOI: 10.1177/001316446002000104
6. Fisher D.G., Reynolds G.L., Neri E., Noda A., Kraemer H.C. (2019) Measuring test-retest reliability: The intraclass kappa. *SAS Conf. Proc.,* Renton, CA.
7. Golalizadeh D., Toopchizadeh V., Farshbaf-Khalili A., Salekzamani Y., Dolatkhah N., Pirani A. (2020) Faulty posture: Prevalence and its relationship with Body Mass Index and Physical Activity among female adolescents. *Biomed. Hum. Kinet*., 12: 25-33. DOI: 10.2478/bhk-2020-0004
8. Iranmanesh H., Kakhki AS, Hamidreza Taheri H., Shea C.H. (2022) Motor memory consolidation in children: The role of awareness and sleep on offline general and sequence-specific learning. *Biomed. Hum. Kinet.*, 14: 83-94. DOI: 10.2478/bhk-2022-0011
9. Jankowicz-Szymańska A., Nowak B., Słomski Ł. (2010) Parents' knowledge about faulty postures. *Physiother.*, 18. DOI: 10.2478/v10109-010-0058-z
10. Jorgic B., Djordjevic S., Milenković S., Stankovic R. (2020) The Prevalence of Postural Disorders Among Eighth Grade Elementary School Students. *Phys. Educ. Sport Through the Centuries*, 7: 83-93. DOI: 10.2478/spes-2020-0007
11. Juskeliene V., Magnus P., Bakketeig L.S., Dailidiene N., Jurkuvenas V. (1996) Prevalence and risk factors for asymmetric posture in preschool children aged 6–7 years. *Int. J. Epidemiol.*, 25(5): 1053-1059. DOI: 10.1093/ije/25.5.1053
12. Klimkiewicz Wszelaki K., Sokołowski R., Kasperska P., Oleksy E., Ziółkowska A., Stemplowski W., Nesteruk E., Kwiatkowski C., Kędziora Kornatowska K., Zukow W. (2019) Assessment of knowledge about body postural defects among parents. *J. Educ. Health Sport*, 9(6): 289-300. DOI: 10.5281/zenodo.3245904
13. Kolarova M., Kutis P., Rusnak R., Hrckova Z., Hudakova Z., Lysa L., Luliak M., Babela R. (2019) Analysis of body segments and postural state in school children. *Neuro. Endocrinol. Lett.*, 40(Suppl1): 17-23.
14. Kratenova J., Zejglicova K., Maly M., Filipova V. (2007) Prevalence and risk factors of poor posture in school children in the Czech Republic. *J. Sch. Health.*, 77(3): 131-137. DOI: 10.1111/j.1746-1561.2007.00182.x
15. Mahlknecht J.F. (2007) The prevalence of postural disorders in children and adolescents: a cross sectional study. *Z. Orthop. Unfall.*, 145(3): 338-342. DOI: 10.1055/s-2007-965256
16. Makarczuk A.K., Kowalewski M. (2020) Physical activity and body posture of younger school children in the opinion of parents. *J. Educ. Health Sport*, 10(12): 138-150. DOI: 10.12775/JEHS.2020.10.12.013
17. McHugh M.L. (2012) Interrater reliability: the kappa statistic. *Biochem. Med.* (Zagreb), 22(3): 276-282.
18. Minghelli B., Nunes C., Oliveira R. (2021) Effectiveness of a Back School and Postural Education Program on the improvement of literacy about postures and low back pain in adolescents: A 1-year follow-up study. *J. Orthop. Sci.*, 26(4): 543-547. DOI: 10.1016/j.jos.2020.05.014
19. Mitchard G. (2021) Association between home office ergonomics and musculoskeletal pain. *The University of Iowa*. ProQuest Dissertations Publishing: 28651918.
20. Mitova S. (2015) Frequency and prevalence of postural disorders and spinal deformities in children of primary school age. *Research in Kinesiology*, 43: 21-24.

21. Motylewski S., Zientala A., Pawlicka-Lisowska A., Poziomska-Piatkowska E. (2015) Assessment of body posture in 12- and 13-year-olds attending primary schools in Pabianice. *Pol. Merkur. Lekarski*, 39(234): 368-371.
22. Murphy S., Buckle P., Stubbs D. (2004) Classroom posture and self-reported back and neck pain in school-children. *Appl. Ergon.*, 35(2): 113-120. DOI: 10.1016/j.apergo.2004.01.001
23. Penha P., Casarotto R., Sacco I., Marques A., João S. (2008) Qualitative postural analysis among boys and girls of seven to ten years of age. *Braz. J. Phys. Ther.*, 12: 386-391. DOI: 10.1590/S1413-35552008000500008
24. Penha P.J., João S.M., Casarotto R.A., Amino C.J., Penteado D.C. (2005) Postural assessment of girls between 7 and 10 years of age. *Clinics* (Sao Paulo), 60(1): 9-16. DOI: 10.1590/s1807-59322005000100004
25. Rusnak R., Kolarova M., Astaryova I., Kutis P. (2019) Screening and Early Identification of Spinal Deformities and Posture in 311 Children: Results from 16 Districts in Slovakia. *Rehabil. Res. Pract.*, 17: 4758386. DOI: 10.1155/2019/4758386
26. Ryabova I., Sobolevskaya T., Nezhkina N., Mirskaya N. (2021) School students' posture: parents' view. *SHS Web of Conferences*, 98: 01010. DOI:10.1051/shsconf/20219801010
27. Szeto G.P., Straker L., Raine S. (2002). A field comparison of neck and shoulder postures in symptomatic and asymptomatic office workers. *Appl. Ergon.*, 33(1): 75-84. DOI: 10.1016/s0003-6870(01)00043-6
28. Verma S., Shaikh J., Mahato R.K., Sheth M. (2018) Prevalence of forward head posture among 12–16-year-old school going students – A cross-sectional study. *Appl. Med. Res.,* 4(2): 18-21. DOI: 10.5455/amr.20180805064752
29. Vieira E.R., Kumar S. (2004) Working postures: a literature review. *J. Occup. Rehabil*., 14(2): 143-159. DOI: 10.1023/b:joor.0000018330.46029.05
30. Westcott S.L., Lowes L.P., Richardson P.K. (1997) Evaluation of postural stability in children: current theories and assessment tools. *Phys. Ther.*, 77(6): 629-645. DOI: 10.1093/ptj/77.6.629
31. Yang L., Lu X., Yan B., Huang Y. (2020) Prevalence of Incorrect Posture among Children and Adolescents: Finding from a Large Population-Based Study in China. *iScience*, 23(5): 101043. DOI: 10.1016/j.isci.2020.101043

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