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Effect of sleep behaviour on posture in children with cerebral palsy

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Abstract
Background: Cerebral Palsy called as little's disease. Altered postural tone, affects their ability to organize and control voluntary movements effectively, producing abnormal patterns that compromise their performance during daily live activities and increase the risk of secondary complications such as contractures and deformities, pressure sores, swallowing impairments, pain.
Objective: To study the effect of sleep behavior on posture in children with cerebral palsy
Materials and methods: 30 participants were included in this study, and the project was carried out using Chailey Sleep Questionnaire.
Result: Orthopedic problems (scoliosis) are graded as (mild) 10%, (moderate) 3% (kyphosis) graded as (mild) 26.6%, (moderate) 26.6% and (severe) 3.33%
Conclusion: The present study concluded incorrect sleeping positions can lead to the development of various postural deformities, thereby increasing orthopaedic deformities, particularly kyphosis. Hence hourly change of positions during sleep is essential.

Keywords: chailey sleep questionnaire, posture, kyphosis, scoliosis

1. Introduction

Cerebral palsy is currently defined as; "a group of permanent disorders of the Development of movement and posture, causing activity limitation, that are attributed to Non-progressive disturbances that occurred in the developing foetal or infant brain. The Motor disorders of cerebral palsy are often accompanied by disturbances of sensation, Perception, cognition, communication, and behaviour, by epilepsy, and by secondary Musculoskeletal problems" [1]

It is well known that the cerebral palsied are generally limited to so – called "preferred postures", and that is very common for the deformity to develop and progress. Over the years this has been attributed to a number of factors, but the basic concept is that if the body spends prolonged periods of time in a position, it will gradually deform into that position. It is important that the cerebral palsied child experiences a variety of positions throughout the day. Most of the time spent of the cerebral palsied child is during sleep. When in supine position, many cerebral palsied children are completely unable to function, and in this position they may be most asymmetrical. While in side lying, the most common deformity to occur is the windswept deformity. Children with windswept hips tend to sleep in this position and often are woken by discomfort [2].

During early development, a child with CP inevitably stays in limited lying postures for long durations, due to difficulty changing positions. At early stages of development, most children freely flex their legs up in the air and sway them from left to right. A child with CP has the same desire to move and swing his legs from side to side, but eventually his/her legs land more onto one side repeatedly. This often results in habitual asymmetrical posture that continues to cause distortions at the hip, pelvis, spine, knees and feet. These distortions are further influenced by factors such as abnormal reflexes, muscle tone (high or low), joint ligament type (loose or stiff), the force of gravity, and motor impairment, which might be asymmetrical as well. The resultant body distortion sequla was appropriately identified in an original article (1976): "Position as a cause of deformity in children with cerebral palsy." This abnormal position causes body distortion [5].

At a very early age, children in supine positions will attempt to swing their body from side to side in order to roll to the side and eventually onto prone positions. Rolling to the side can be performed either with the trunk as one unit where the shoulders and pelvis are aligned, or with shoulders rotating before the pelvis [6]. Children with cerebral palsy who have limited repertoire of movements have difficulty completing rotation, and frequently land and stay halfway – in asymmetric, unstable postures. The following is a hypothesis for the mechanism of distortion. Incomplete rotation can lead to one of two main scenarios: either the pelvis opposes the rotation of the knees or it follows the rotation in a delayed sequence. In either case, the result is asymmetrical supine posture with distortional force around the central axis of the body. This pulling force will rotate the thoracic vertebrae with the ribcage attached to it. The next event will cause the pelvis to be pulled either forwards or backwards by the weight of the top leg compounding rotational destruction, stressing the hip joints and establishing gross asymmetry of the leg posture [7]

Lower Extremities and Pelvis

The child's difficulty bringing the legs back to center will result in the legs falling onto the side, creating an asymmetrical position with distortion influencing the whole body as described above. This common distortion is often called "windswept deformity" in professional literature,

though it would be more appropriately called a "*windswept distortion.*" This condition is described as change in body shape presenting asymmetry of lower extremities [8]. It is worth remembering that this terminology refers to the winds' effects on clouds. Windward is the direction upwind from the point of reference. Leeward is the direction downwind from the point of reference [9]. Habitual position of the legs causes the structure around the hip joint and pelvis to adapt by lengthening and tightening depending on the direction of the distortion. In an example where the knees fall to the left side the lateral structures of right leg and medial structures of the left leg are lengthened, while the medial structures of the right leg and lateral structures of the left leg are shortened. Shortened soft tissues are often incorrectly referred to as 'contractures', which emphasizes the resultant shorter soft tissues while ignoring the inevitably accompanying overlong antagonists which are an integral part of the distortion [10].

In the "Classic" windswept scenario, the knees falls to one side while the pelvis drops to the opposite direction as if searching for a supporting surface, stopping the body from a complete turning. This thus creates a torque at the hip joint, and indeed often creates hip migration. In a different scenario, which is described as "Type 1", the pelvis follows the windswept side. The mechanism of development for either a Classic or Type 1 is not clear [11]. It might be related to timing in the developmental milestones when the child starts to roll. It is not easy to predict who will fall into one or the other windswept type. In addition to the many additional reasons including severity of motor impairment, reflexes and ligamentous laxity, another hypothesis has been proposed. It suggests that classic windswept will develop if the feet reach the supporting surface early on, so that a torque will be created at the hip. In type I the feet are in the air and the pelvis follows the legs to find the supporting surface [12]. Windswept distortions are known to be a main contributor to increased risk of hip dislocation [13]. The long-term effects of hip dislocation often lead to difficulty with daily activities, pain, difficulty in hygiene care and discomfort sitting [14]

The Chest, Trunk and Thoracic Spines

Scoliosis and thoracic distortion develop with age in children with CP [15]. There is an association between the direction of scoliosis, thoracic distortion and the direction of the windswept hip deformity such that the convexity of the lateral spinal curve is more likely to be opposite to the direction of wind sweeping [16]. The conventional chest is a vulnerable and mobile structure which distorts predictably in supine asymmetrical lying. In supine the chest distortion can be viewed by drawing an imaginary arrow – a sterno-spinal line (SSL) – connecting the sternum and its corresponding thoracic vertebrae. This line can accurately be measured by marking lines on CT images, joining the sternum and the spinous processes of the vertebrae at the level of the xiphisternum in the transverse image [17]. The rotational direction of this line can give us further information on the chest distortion. If the SSL is notvertical it will rotate clockwise or counter-clockwise [18]. Therapeutic positioning is an important factor an effective thoracic pulmonary chest developmental [19]. Chest distortion has consequences on breathing and internal organ function.

2. Materials and methodology

The data was collected from Dr. A.P.J. Abdul Kalam College of Physiotherapy (Pediatric department), and from the hospital of Pravara Institute of Medical sciences. The data was be collected by primary investigator. It is a descriptive observational study including 30 participants diagnosed with cerebral palsy. Sampling method used was Convenient sampling. The study was conducted for 4 months. Chailey Sleep Questionnaire, Consent form, Data collection sheet and evaluation sheet, Pen and Pencil were used for this study. Males and females with age between 8-14yrs, those diagnosed with cerebral palsy were included in the study and the participants not willing to participate were excluded from the study.

3. Result and Discussion

Result

Table 1: Demographic representation of the participants

Gender	No of participants (%)
Female	18
Male	12

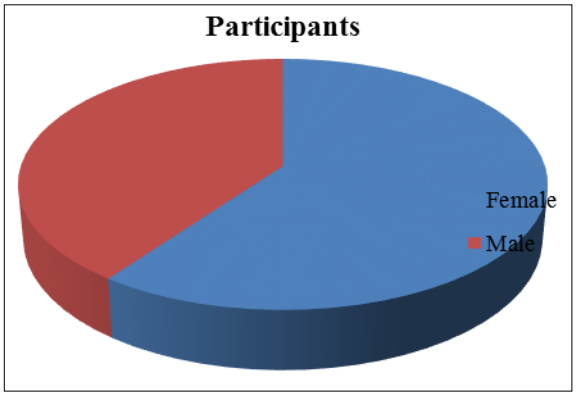

Fig 1: Represents no of participants

Table 2: Demographic representation of the participants having Bed time routine problems

Bed time routine	
Low	3
Medium	6
High	21

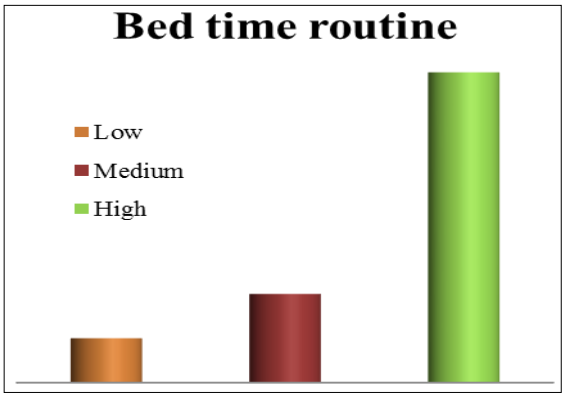

Fig 2: Represents no of participants having Bed time routine problems

Table 3: Demographic representation of the participants having Night time categories

Night time categories	
Low	0
Medium	12
High	18

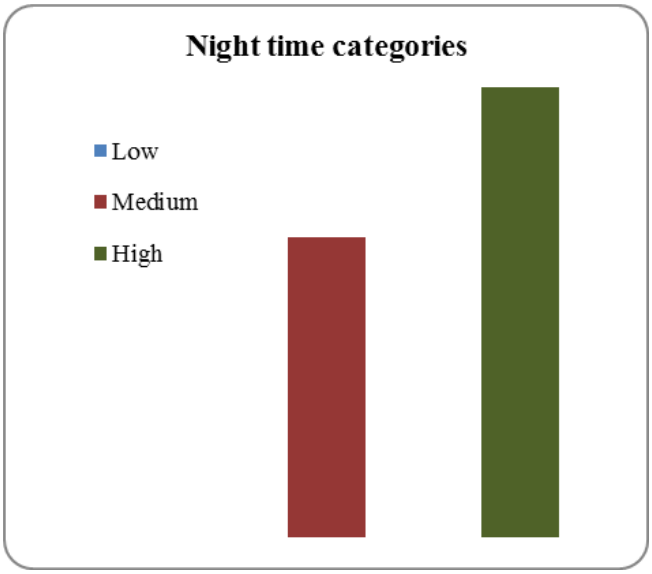

Fig 3: Represents no of participants having night time problems.

Table 4: Demographic representation of the participants having Breathing Problems

Breathing problem	Participants
Low	21
Medium	6
High	3

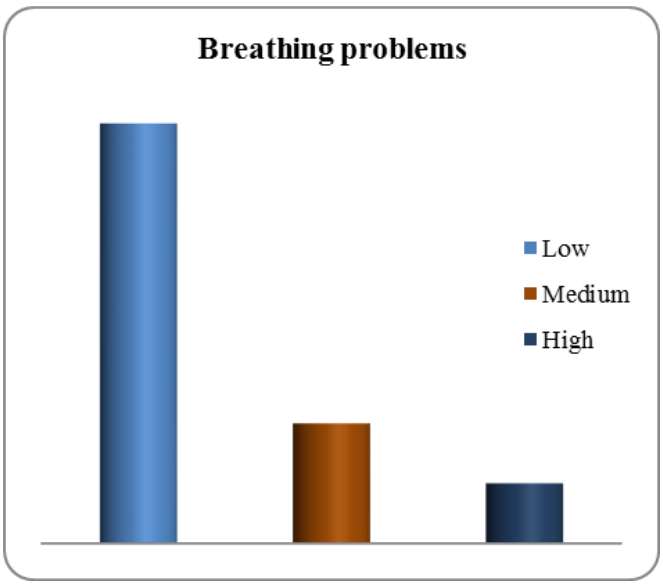

Fig 4: Represents no of participants having breathing problems.

Table 5: Demographic representation of the participants having Orthopaedic problems

Orthopaedic problems	No of participants
Yes	21
No	9

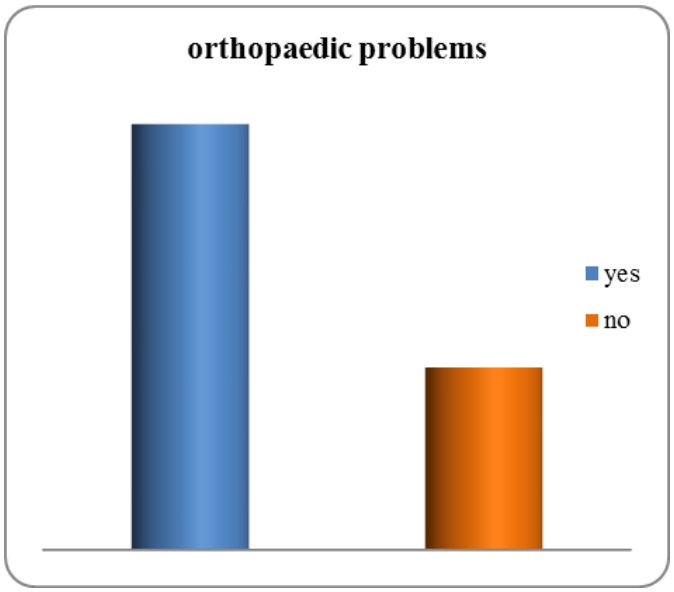

Fig 5: Represents no of participants having orthopedic problems.

Table 6: Demographic representation of the participants having Spinal Curvature problems

Spinal curvature	No of participants
Scoliosis	4
Kyphosis	17

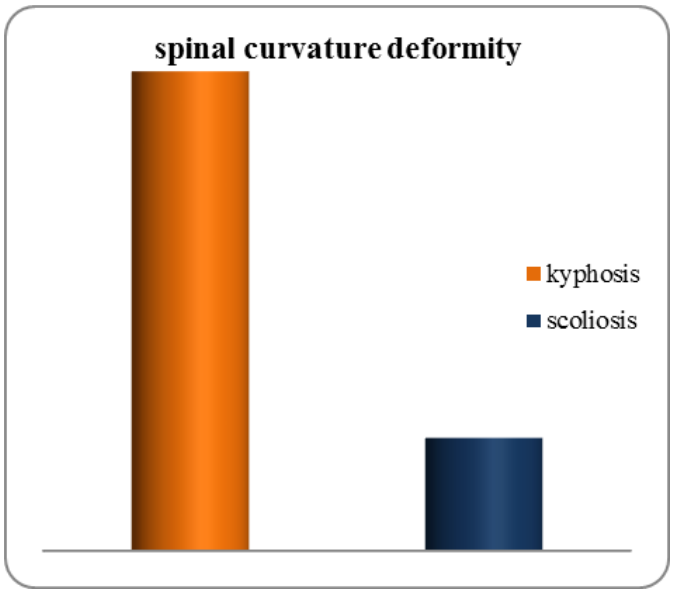

Fig 6: Represents no of participants having spinal curvature problems.

Table 7: Demographic representation of Grading of orthopedic deformities Demographic representation of Grading of orthopedic deformities: Scoliosis

Scoliosis	No of participants
Mild	3
moderate	1
severe	0

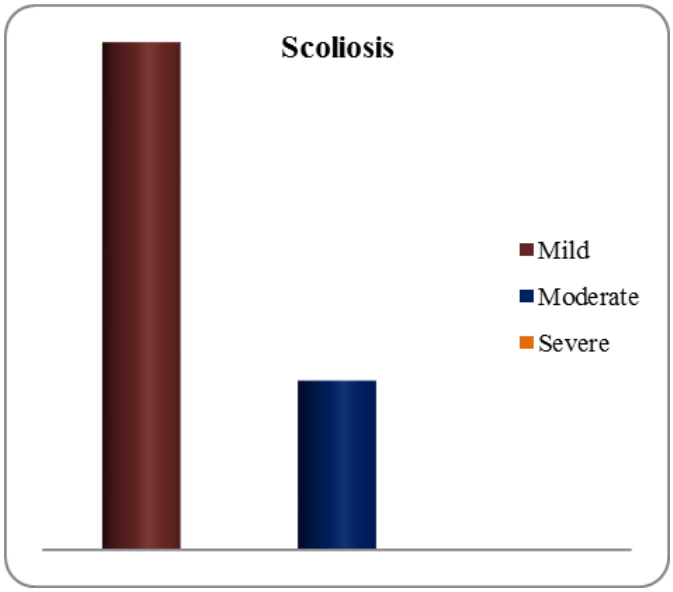

Fig 7: Represents the grading of orthopedic deformities.

Table 8: Demographic representation of Grading of orthopedic deformities: Kyphosis

Kyphosis	No of participants
mild	8
moderate	8
severe	1

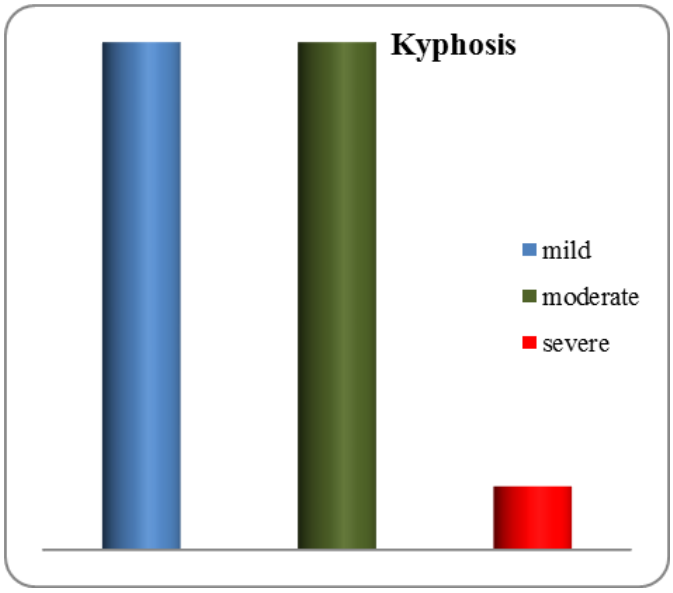

Fig 8: Represents the grading of orthopedic deformities.

Result No 1: Demographic representation of data in which 18 were females and 12 were males

Result No 2: Bed time routine problems are categorized as (low)10%, (medium) 20% and (high) 20%

Result No 3: Night time problems are categorized as (low) 0%, (medium) 40% and (high) 60%

Result No 4: Breathing problems are categorized as (low) 70%, (medium) 20% and (high) 10%

Result No 5: Orthopedic problems are seen in 17% of participants.

Result No 6: 13% of participants are found to have scoliosis and 56% of participants are found to have kyphosis

Result No 7: Orthopedic problems (scoliosis) are graded as (mild) 10%, (moderate) 3% and (severe) 0%

Result No 8: Orthopedic problems (kyphosis) are graded as (mild) 26.6%, (moderate) 26.6% and (severe) 3.33%

4. Discussion

The present study "Effect of sleep behaviour on posture in children with cerebral palsy" included 30 participants from Dr. A.P.J. Abdul Kalam College of Physiotherapy, and was conducted in the physiotherapy department and hospital of the of Pravara Institute of Medical Sciences, Loni. The aim of this study was to study the effect of sleep behaviour on posture in children with cerebral palsy assessing the problems related to bedtime routine, night time behavior and breathing quality, orthopedic problems, spinal curvature, cerebral shunt, face/ head/ neck, tonsils and adenoids, feeding, gastro-oesophageal reflux, constipation/ diarrhea, sensory impairments, learning, convulsions/ fits, headaches, chest infections/ colds, facial colour.

Children with cerebral palsy have many associated difficulties that can affect their ability to sleep and their sleep hygiene. The term 'sleep hygiene' describes the habits, routines and environmental practices that prepare for and promote appropriately timed and effective sleep. Children with severe cerebral palsy lack the ability to change position at night. Lack of movement combined with asymmetrical habitual postures can cause discomfort and hence difficulties with sleep. Gastro-oesophageal reflux may also cause discomfort. Epilepsy, breathing problems, incontinence and night-time gastro enteral feeding can also interfere with a child's ability to sleep Moreover, behavioural factors can also play a part in causing sleep hygiene difficulties. Children with cerebral palsy may take longer to learn the rules of appropriate night-time behaviour and parents may believe their child is unable to sleep well because of medical problems rather than considering the behavioural aspects that may be involved.[1] At birth, children with cerebral palsy do not have muscle contractures, hip dislocation or spinal curvature. Such deformities can be classified as postural, which may be fixed and result from altered muscle tone, or positional, which are due to the positions habitually adopted because of the influence of gravity and growth. In addition there are tonal problems as well, in children with hypotonia bony changes are secondary. In the spine and rib cage abnormal curves may be seen due to prolonged muscle pull or lack of muscle activity. This affects rib cage expansion and makes breathing more laborious. They tend to show thoracic and lumbar kyphosis and excessive cervical extension. [4]There is limited research into pain in young children with cerebral palsy despite the fact that a high percentage of adolescents and young adults with cerebral palsy (47.2 percent) are known to have chronic pain. Children who cannot verbalise their pain display common

behaviours. Parents reported that children in pain tend to cry, are less active, seek comfort and are less easy to pacify. The children are less prepared to co-operate and are irritable. They may become more stiff and tense and their sleep may be affected as they become agitated and fidgety. Cognitive abilities, communication, daily living, social and motor skills are all affected by pain. Houlihan *et al* (2004) found that pain adversely affects quality of life in children with cerebral palsy. These children were more absent from school, spent more days in bed and were less able to participate in their normal daily routines and family activities. The parents of these children reported increased levels of anxiety about them compared with the parents of healthy children. Fear and anxiety are closely linked to having had the experience of pain the psychological consequences of untreated pain may lead to a decrease in motivation, a sense of loss of control and a learned helplessness. The causes of pain in children with cerebral palsy include spasticity and immobility. Sustained muscle contracture by hypertonic muscles causes pain in those muscles and in the joints they cross. In a large study, exploring the frequency of pain in children with cerebral palsy and its association with participation, function and health-related quality of life, parents suggested the causes of pain include reflux, constipation, gastrostomy feeding, positioning, spasticity, hip problems and dental pain [1]

5. Conclusion

The present study concluded that, Incorrect sleeping position can lead to the development of various postural deformities, and can cause increase the other associated orthopaedic deformities, particularly kyphosis. Hence hourly change of positions during sleep is essential.

6. References

1. Posture and sleep in Children with cerebral Palsy; Ginny Humphreys, Anne Mandy, Terry Pountney; APCP Journal. 2010, 3.
2. Dame cicely saunders, Patrica A. Downie Cash's textbook of neurology for physiotherapists Year of publication- Fourth edition. 1992, 519-534.
3. Verbena Bottini, Positioning in cerebral palsy
4. Marcia Stamer, Posture and movement of children with cerebral palsy: A guide for physical, occupational and speech therapist Journal. Year of publication-, pro ed 2000
5. How Posture Goes Wrong Body Shape Distortion in Cerebral Palsy Dalia Zwick; J Yoga Phys Ther 2014, 4:3.
6. Piper MC, Darrah J. Motor assessment of the developing infant. Philadelphia: Saunders, USA. 1994, 110.
7. Rennie J. Learning Disability: Physical Therapy Treatment and Management. A Collaborative Approach, John Wiley & Sons, Ltd, USA, 2007.
8. Goldsmith E, Golding RM, Garstang RA, Macrae AW. A technique to measure windswept deformity. Physiother. 1992; 4:235-42.
9. Windward and leeward Wikipedia, 2014.
10. Scrutton D. Position as a cause of deformity in children with cerebral palsy. Dev Med Child Neurol. 1976, 2008; 50:404.
11. Simple Stuff Works CIC-Goldsmith Indices® of Body Symmetry.
12. Okuda K, Kinoshita Y, Habara N, Matsunogi N. Mechanism of Windswept Deformities. 13th International Congress of WCPT 99. PO-RR-299-27 Poster, 1999.
13. Presentation The Japanese Physical Therapy Association, Yokohama, Japan
14. Young NL, Wright JG, Lam TP, Rajaratnam K, Stephens D, *et al.* Windswept Hip Deformity in Spastic Quadriplegic Cerebral Palsy. Pediatric Physical Therapy. 1998; 10:93-100.
15. Samilison R, Tsou P, Aamoth G, Green WM. Dislocation and subluxation of the hip in cerebral palsy. Pathogenesis, natural history and management. Bone Joint Surg Am. 1972; 54:863-873.
16. Saito N, Ebara S, Kohotsuka K, Kumeta H, Takaoka K. Natural history of scoliosis in spastic cerebral palsy. Lancet. 1998; 6:1687-1692.
17. Porter D, Kirkwood C. Patterns of postural deformity in non-ambulant people with cerebral palsy: what is the relationship between the direction of scoliosis, direction of pelvic obliquity, direction of windswept hip deformity and side of hip dislocation? Clin Rehabil. 2007; 21:1087-1096.
18. Horimoto Y, Osuda Y, Takada C, Miwa M, Tsugawa S, *et al*. Reliability of Two Protocols for Measuring Chest Wall Dimensions in the Transverse Plane in Individuals with Severe Motor and Intellectual Disabilities. J Phys Ther Sci. 2011; 23:221-224.
19. Goldsmith J, Goldmith L, Hill S. Best Practice: Lessons from the Field Working Together to Protect Body Shape. Posture and Mobility. 2009; 26:9-13.
20. Massery MP. Chest development as a component of normal motor development: implications for pediatric physical therapists. Pediatric Physical Therapy. 1991; 3:3-8.