Postural study of handicapped children studying in regular schools

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ABSTRACT : Sitting down is a natural human posture. People sit down because they feel that sitting is less fatigue giving than standing. But many children perform their table work as per convenient posture without realizing the cost of work and other physiological damages to the body in that posture with ordinary chair provided to them in the schools. So present study was carried out to find the time expenditure and posture profile of physically handicapped children, postural stress and frequency of postural changes while using ordinary chair provided to them in the regular schools. For this with the help of multistaged purposive random sampling thirty three physically handicapped children studying in regular school were selected. Data were gathered with the help of observation cum recording method. The findings of the study reveals that while using ordinary chair. Students spent maximum time in neck and shoulder tense position due to stress and work and poorly supported or unstable legs, back in stopped position. Elbow arm and joints were found in extreme position. For postural stress 3.98 percent deviation in upper angle of back and 4.90 percent deviation in lower angle of back was calculated and frequency of postural changes was found greater while using ordinary chair as compare to ergonomic chair.

Key word : Posture, ordinary chair, physically handicapped children.

We continuously change posture whether at work or at rest to keep fatigue within manageable limits. Sitting and working on a poorly designed chair is a tiring and painful experience. Shape of body is basically determined by its back bone. The human spine is made up of 33 bones called vertebral, joined together with compressible vertebral discs called inter-vertebral discs. These discs are directly affected by our body posture. So are muscles and different internal organs. Energy expenditure during work, in certain cases, may be low but lead to higher fatigue level without substantial contribution to work due to incorrect body posture. Movements made during work may prove comfortable when body is held in natural alignment. On the contrary, movements made with incorrect body posture become stressful leading to fatigue. Handicapped Children, due to their bodily disabilities are already a stressed lot. Therefore, school furniture designed for general use further stresses their work environment. This study was, therefore, undertaken at various schools of Pantnagar and Rudrapur situated in the Udham Singh Nagar of Uttaranchal State to gather basic information on postural situation of these children vis-à-vis their working while sitting on general purpose school chairs and table.

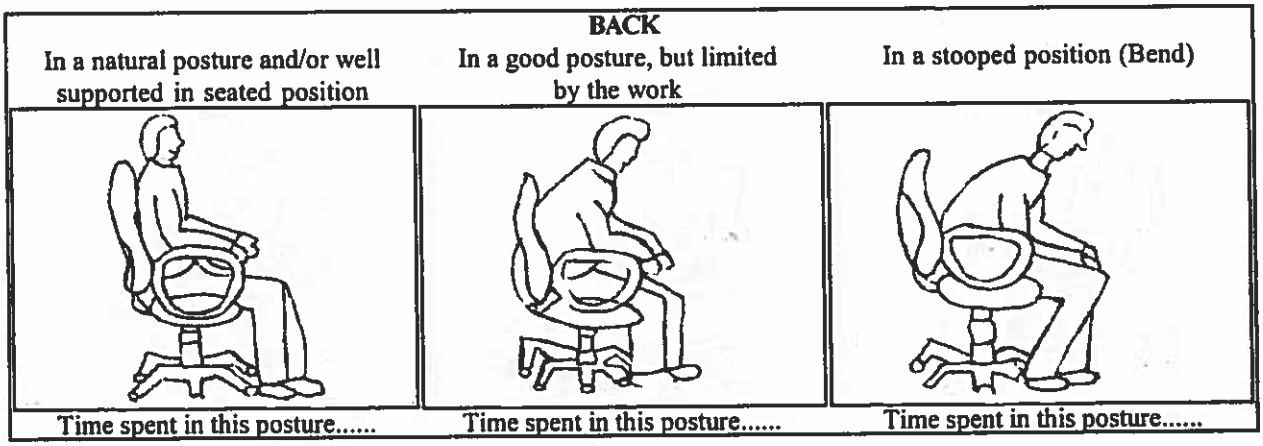


Table1:- Time spent in particular posture by physically handicapped children

S. No.	Posture N =33		Average time Spent	
			Hour	Minute
A	Neck and Shoulder	1. Free and relaxed	1	25
		2. In a natural posture but limited by the work.	1	33
		3. Tense due to work	2	39
B	Legs	1. In a free position	1	49
		2. Poorly supported or unstable		
		a. Legs forward	1	43
		b. Legs backward	1	27
C	Back	1. In a natural posture and/or well supported in seated position.	1	23
		2. In a good posture, but limited by the work.	1	31
		3. In a stooped position	2	36
D	Elbow	1. Free in position of choice.	1	09
		2. Arms in a position required by the work.	2	06
		3. Arms tense and/or the joints in an extreme position.	2	17

MATERIALS AND METHODS

Thirty-three physically handicapped children were selected. Research design used for the study was observational-cum-experimental. Multistaged purposive random sampling design was used. For collection of data regarding time expenditure and posture profile of the respondents, a protocol was developed with the help of suitable drawings of different possible body postures. For this different postures of children studying in regular schools, were photographed, with the help of these photographs extreme postures of different body parts were developed (appendix-1). The major body parts selected were neck and shoulder, legs, back and elbow, as these were the parts more often used in the postures. Each body part had three types of postures i.e., relaxed, limited due to work and tense. Percentage deviation in angle of back, while working, was compared with the angle of the back while under rest with the help of flexi curve. The data regarding time expenditure and posture, thus collected were tabulated and calculated for the average of all the 33 respondents and percentage deviation in angle of back was calculated using following formula:

Percent deviation = Sr - Sw/Sr X 100

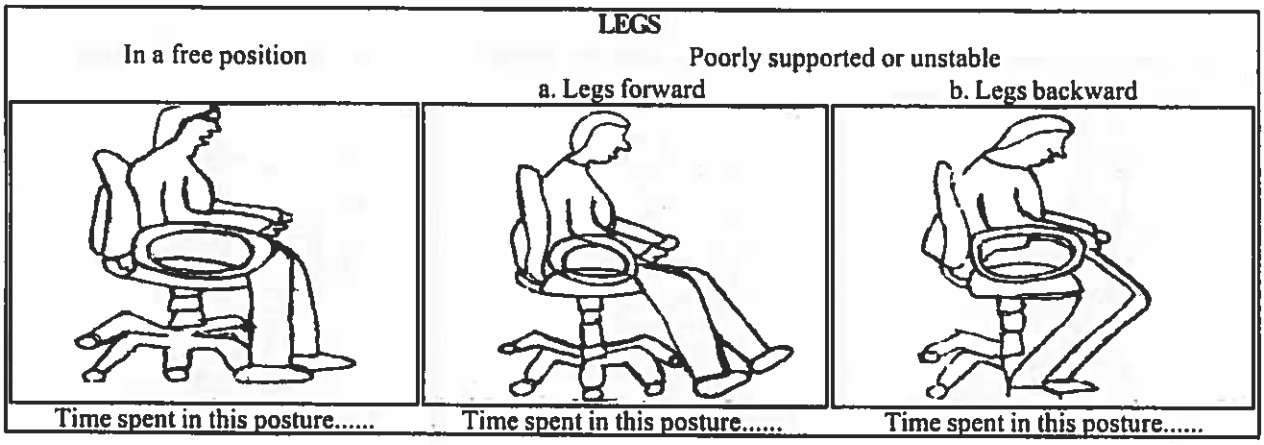
Where, Sr = strength during rest

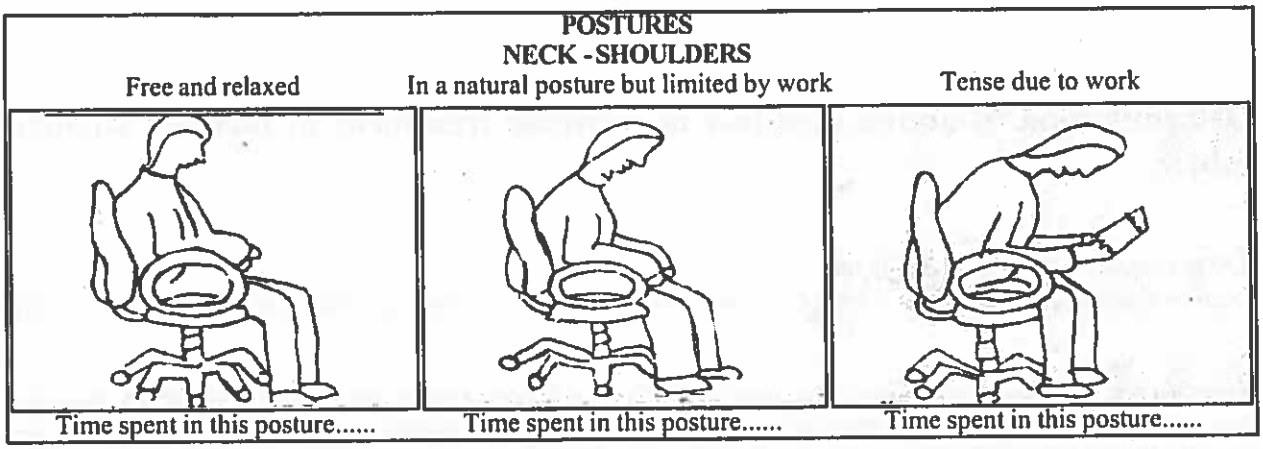
Sw = strength while working.

Frequency of postural changes while working with ordinary school chair and an ergonomic chair were also compared.

RESULTS AND DISCUSSION

An analysis of the results presented in table 1 reveals that while seated in school provided furniture, for neck and shoulder, handicapped children spend minimum time, 1h 25 min in free and relaxed posture, maximum time, 2h 39 min in the tense posture due to work and 1h 33 min in natural posture but limited by the work. Average time spent by their legs in a free position was 1h 49min. whereas maximum time of 3h 10min. was spent in poorly supported and unstable position. Under





this position legs remained forward for 1h 43min. and backward for 1h 27min. Back, the most critical body part for the comfort/ discomfort at work point of view remained in a natural posture and well supported in seated position only for 1h 23min as compared to 2h 36min. in a stooped, i.e., highly uncomfortable position. For 1h 13min. back remained in a good posture but limited by the work. Average time spent by the elbow free in a posture of choice was 1h 09 min. It was least as compared to 2h 17min. spent under most discomfortable posture of arms tense and joints in an extreme position and 2 h 06min. spent with arms in a position required by the work.

Thus, the study brings out the fact that handicapped children spending their maximum time on school provided furniture in most discomfortable postures, basically because of their work of reading and writing and sitting on inflexible furniture which were not designed as per their body/ work requirements.

The percent deviation calculated for upper and lower angles of back while working were 3.98 and 4.90, respectively, indicating that for the majority of sample angles of the back, while working, were found more as compared to the angle of normal posture.

The mean frequency of postural changes, while working with an ordinary school chair was found to be 83.24 whereas same was found 45.69 with an ergonomic chair, lower frequency of postural changes with the ergonomic chair is certainly because of lower fatigue levels reached while working sitting on it.

Unnatural body postures do not allow muscles to relax and, thus, result in fatigue (Grandjean, 1973). Electromyographic results also suggest that maintenance of right posture at work is necessary for reducing muscular stress (Obrone, 1987) Nechemson and Elfstrom (1970), Anderson and Ostengren (1974) found that pressure on inter-vertebral discs considerably increased on trunk being in bent forward position as compared to standing in an upright position. It was also noted that the interdiscal pressure was higher in the sitting than in the standing posture. The pressure on discs in various sitting postures was low in a relaxed position. In view of these findings, the results of the present study can be safely interpreted to mean that handicapped children in the regular schools surveyed, most of the time being under unnatural/ tense postures, are open to avoidable fatigue, damage to their vertebral system and reduced efficiency. During such activity physiological cost was also increased without any profitable work, leading to lower productivity. Furniture and work space designed as per the needs of the handicapped children alone can enable him to work in correct position as defined by Chakraborthy (1974).

REFERENCES

Anderson, B.J.G. and Ostengren, R. (1974). Lumber disc pressure and muscular activity during sitting situation on office chair. *Sead J., Rehabilitation Med.* **6** (3): 104-14.

Chakraborthy, S. (1974). Application of ergonomics in industry for safety and postures. Indian J. Indus. Med. **20** (2): 49-63.

Grandjean, E. (1973). An ergonomic investigation of multipurpose chairs. *Human Factors.* **15** (3) : 246-55.

Grandjean, E. (1973). Ergonomics in Home, Londan. Taylor and Francis p. 24.

Nechemson, A. and Elfstrom, C. (1970). Intravital dynamic pressure Management in lumber discs. *Sead J. Rehabilitation Med.* **8** (3) : 112-8.

Obrone, D.J. (1987). Ergonomics at work, New York. John Willy and Sons. Pp. 21-24.