CHILDREN'S POSTURAL CHANGES AT ADULT COMPUTER WORKSTATIONS

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INTRODUCTION

The increasing incidence and disability associated with RSI and MSD and their frequency among computer users has led to concern. (Gerr, 2002) This concern has been extended to young children who are potentially also at risk for these injuries. Jacobs (2002) has shown that children are reporting moderate amounts of musculoskeletal discomfort and this discomfort can be related to computer use. This risk is increased by the fact that children are often required to play and work on computer workstations which are designed for adult anthropometrics. The purpose of this research study was to examine the quality and quantity of postural movements exhibited by five and six year olds when using an adult workstation to play a computer game. The quantitative measures children's postures and joint and segmental angles and the qualitative analysis was examined by time-motion analysis.

METHODS

Six physically active 5 and 6 year old boys and girls were asked to participate in the study. After ethics approval by parents, children were asked to give verbal assent. Each child was asked to wear a dark shirt. Joint markers were placed on the shoulder, elbow, wrist, and third knuckle for upper limb joint angles. For head orientation, the earlobe and two sweat-band markers were used. For back orientation, bilateral extended markers were placed at the level of T1, T7, and L5. Although not always visible at all times, the hip, knee and ankle were marked for lower limb kinematics.

Once outfitted, each child was asked to play a pre-selected computer game for 20 minutes. The game set-up involved use of the keyboard initially, but thereafter it was primarily mousing. Digital images were taken perpendicular and posterior to the subject for the total time. After 20 minutes, each child was asked to complete a series of shoulder shrugs and head flexion, extension, lateral bending and rotation to determine their full range of motion. Neutral resting posture was also recorded.

Using Pinnacle Studio DV software, the time that subjects spent in static postures and the frequency and nature of their postural changes were recorded from the time counter. Then, individual images were extracted from each segment in order to evaluate the posture that the child was assuming. The specific postures of interest from the side camera were: 1) joint angles of the a) upper trunk, b) elbow c) lower trunk, and segment angles of a) upper trunk, b) lower trunk, c) elbow, d) forearm and e) wrist. From the rear camera, the points of interest were angles from the horizontal of a) T1, b) T7, c) L5, d) shoulder abduction, e) elbow and f) wrist. Data were analyzed using descriptive statistics and comparing their postures to recommended postures for office ergonomics.

RESULTS AND DISCUSSION

In analyzing children's postures it was observed that all children show the same postural movement patterns with a greater number of postural shifts occurring in the feet and legs. Children show little change in their upwardly tilted head position throughout the 20 minutes. Joint and segment angles were surprisingly similar between subjects. The children chose one of three arm and hand positions when using the mouse. All involved abduction of the shoulder averaging 67º and elbow displacement of 9.2 cm which exceeded the limit recommended as 0º abduction and minimal displacement. The forearm segment angle was 20º, above the recommended horizontal position. The spinal posture was also rounded from their natural upright sitting posture.

Analysis of children's postures at adult workstations show four main areas of concern: 1) spinal curves were compromised from their neutral positions; 2) their heads were upwardly inclined; 3) their arm postures were compromised in that: a) the forearm of their mouse hand rested on the desk; b) their arms were held in 90º of abduction; and, c) their wrist of the mouse hand rested on the edge of the desk; and, 4) children's frequent postural shifts indicate discomfort.

CONCLUSION

Based on these results it would be advisable to devise recommendations and guidelines for children's workstation design. This need is deemed to be imperative based on the increasing use of computers both in school and at play and the increasing amount of time spent at the computer on a daily basis. (Jacobs, 2002)

REFERENCES

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