



Sitting Ergonomics and Maintenance of a Good Posture

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Abstract

Ergonomics is defined as “the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance. Sitting is a resting position that is coordinated by motor impulse due to endogenic and exogenic influences resulting into a dynamic position. Sitting is significant in attaining the healthy body posture as it allows human being to minimize energy consumption while being involved in daily routine work to earn livelihood and others activities like communication, eating or working by using his hands. Sitting permits us to utilize upper extremities to perform activities of daily living and work. On the descriptive analysis, sitting postures varied as per the cultures, demographics, religious or traditional practices. The Neuromuscular system permits for incessant adaptation of sitting posture due to internal and external factors. Thus, active sitting occurs unconsciously. Significant increase of hip joints extensor power and respective muscle growth due to the body’s upright position, and important factors in the prospect of longer duration sitting in daily routine work life. A lot of our daily activities and work involve sitting for long duration and for this reason, it is imperative that we have correct sitting posture and ergonomics. Physiotherapists and Occupational therapists work day in and day out to promote adaptation of good sitting posture, which is a pre-requisite for prevention of a lot of musculoskeletal disorders and stress injuries like tech-neck syndrome, stress headaches, lateral epicondylitis and a lot more. Our body works like a kinematic chain, when one parts of the body is affected, there occurs stress on the connected segments and musculature, thus, maintenance of a good sitting posture minimises stress on back and neck musculature and prevents work related musculoskeletal disorders.

Keywords: Ergonomics; Posture; Joints

Introduction

In recent years, the occupational mental burden and its effects on physicians’ health, namely, burnout, have been given a lot of attention and have been extensively studied [1]. Sedentary lifestyle is a hallmark in urbanization. The International Ergonomics Association Council states ergonomics as “the branch of medical science that deals with the understanding of interactions among humans, body mechanics and physical movements, and

the profession that applies theory, principles and techniques, procedures, and methods to design in order to optimize human well-being and overall performance of human body [2].

As information technology gear up in the last few decades, it changed the entire environment and reduced the communication and time gap across the cities and states. No doubt, it has numerous advantages that make it universal platform for the businesses and contrast to this sitting jobs kills [3]. Work culture in modern society

encourages inactivity, and sitting for extended periods is leading to chronic health diseases and wreak on your body's posture [4]. Key reason for life style disorders co-related with work environments and lies in periphery of reduced physical activities [5]. Corporate culture encourages employees to sit for hours on end and promoting neuromuscular, gastrointestinal and other psychological diseases [6]. While being tied to your working desk weekdays may be inexorable, you can infuse more activity into your day—whether by keeping positioned posture upward neck or investing in a sit-stand desk. Medical community and physical therapist are continuously researching postural deformities and thus coined the term “sitting disease.” Spine sore, stiff, neck pain, body spasm and lower back pain are pathological manifestations due to seated positions [7].

Lower back and neck muscles undergo a significant stress while maintaining a prolonged sitting posture, further leading to sitting deformities at rest

This position results in tightness in gluteus muscles and hip flexors and ischemia to buttock muscles—the gluteus maximus and it has significant role to give support to the spine [8,9]. Thus, active sitting occurs unconsciously. Accordingly, devices are designed to the support of sitting postures differ in the similar pattern. Significant increase of hip joints extensor power and respective muscle growth due to the body's upright position, and important factors in the prospect of longer duration sitting in daily routine work life. Prerequisites for the indication of high quality patient compliant, seating equipment are guidelines for planning and fitting that reflect on each patho-morphologic mechanisms and the patient's condition [8]. Seating devices are designed with goal to stop recurrent sitting deformities in an individual and a step to quality of life.

While attaining a sitting posture, patient may be active or may sit with support in case of dependent or bedridden individuals. In an active sitting posture, the ability of the person to control trunk and pelvic muscles actively is directed by an intact motor system. This permits for constantly adapting the sitting posture to the environmental conditions [8,10]. Scoliotic and kyphotic postural divergence may be controlled and corrected actively. Anatomically seat and back padding and supporter with a positive angle $>90^\circ$ for activating spine extensors provide dorsal pelvic support, arm and Leg support [11]. Passive sitting refers to the person's inability to

sit on his own and can only be seated by supporting seating aids (wheel chair etc). Patient is unable to alter the position of trunk and pelvis actively due to abnormal motor system or any disease affecting CNS or PNS [9]. Trunk, pelvic and lower extremity muscles cannot be moved voluntarily. Without the use of a proper seating aid, the individual who is unable to maintain a sitting posture voluntarily, may slide to a severe asymmetric posture or would fall out of the chair.

Postural aids

It is very important to adopt a good static and dynamic posture. This helps prevent a wide variety of musculoskeletal disorders. In cases of muscular imbalance or any deformity, specialized orthotic and prosthetic devices are used to maintain an optimal upright posture. Cervical collar, lumbar support, cervical pillow, postural stabilizing vest, silicone arch support are the orthotic devices used to align and maintain the body's posture [12]. In cases of congenital or acquired deformities, such devices are used as able to produce immobilization, comfort, and maintenance of optimal muscle length. They are manufactured with high density foam with cotton stockinet that helps in effective immobilization, support, cushioning effects and comfort of the patients [9].

Corrective postures require physical devices based on body mechanics; however, wearables tend to remind about correct body posture in day-to-day life. Wearable like Jins Meme, Zikto Walk, Lumo Lift, Lumo Back [13] are available in the commercial market and these companies make a good profit by selling their products. Mechanism used by the smart wearable's are based on validated research findings on the body's postures taking into consideration the different ethnic population, terrain and geographical dissimilarities. Thus, variable angle difference in neck, back and shoulder's bent were used as an potential marker for posture correction treatment regime. These are designed to stop the further postural deformities and bring back the normal posture based on individual tracking and customized programs outputs [9].

Posture wearable and telemedicine

The use of wearable devices is a new invention that has been garnering interest in information technology and healthcare industry. Electronics wearable's are rapidly gaining importance as they are small, lightweight and might be integrated easily

into a patient's daily life. They are usually coupled with a smart phone application which enables the end-users to better engage and assume personal responsibility for their good health. This permits the exploration of wearable watches and smart devices and their application in real-life postural analysis and time bound reminders. Additionally, constant postural observation would be able to provide the continuous and single e signal measurements, as opposed to a single-time solitary data collection in a laboratory.

Conclusion

Maintenance of an optimal posture plays significant role in prevention of musculoskeletal disorders. Postural corrective orthotic devices facilitate adoption of good posture, thereby contributing directly to the health and manage pain and discomfort due to abnormal posture.

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