THE IMMEDIATE EFFECTS OF THE POSTURE PRO FOOT AND SPINE CORRECTOR INNERSOLE ON POSTURE

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ABSTRACT

Introduction: Modern lifestyles cause people to develop poor posture, which can lead to various postural conditions as well as pain and discomfort in joints. The Posture Pro Foot and Spine Corrector innersoles were designed to shift the wearer's centre of gravity to a more optimal position and, in doing so, correct posture. This study aimed to investigate the immediate effects of this innersole on various postural indices.

Methods: Twenty-four participants took part in this study in which a digitised postural analysis was conducted before and after walking for a period of 10 minutes either wearing the innersoles or without them.

Results: A decrease of 11.8% in the average posture score was noted in the treatment group (n=12), and a decrease of 5.8% in the control group (n=12), but neither was significantly different.

Conclusion: Although there was no significant difference in posture score between those who wore the Posture Pro Foot and Spine Corrector innersole and those who did not, it is thought to be practically significant, because there was some greater positive change in the posture score for the treatment group.

Keywords: Posture Pro Foot and Spine Corrector, posture, shoe innersoles, foot orthoses

INTRODUCTION

Poor posture is a major problem in today's world. People often develop poor posture as a result of our modern lifestyle, because of sitting or standing too long, working on a computer or watching television, slouching in chairs, looking down at cell phones, and so on (Anderson, Parr & Hall, 2009). These poor posture habits cause loss of muscle tone, and can result in pain and discomfort when carrying out activities of daily living (Guimond & Massrieh, 2012).

Ideal standing posture would be reflected by a straight line (perpendicular to the standing surface) from the mid-point of the ear lobe and travels vertically down through the tip of the shoulder, the centre of the hip and knee, and ends anterior to the ankle joint, between the heels (Kendall, McCreary, Provance, Rodgers & Romani, 2005). The closer a person's postural alignment lies to the centre of all joint axes, the less gravitational stress is placed on the soft tissue components of the supporting system. Any deviation from the plumb line indicates a defect in posture that a person may have, and the degree of this deviation can be measured.

The maintenance of posture is a complex process involving constant sensory feedback with neural recruitment leading to muscular contractions. Posture is maintained through muscular contractions that resist gravity and prevent any unwanted movement, known as stability. Bones that articulate with each other are held in place by constant muscle contractions that produce tension in the tendons and therefore keep the articulating bones in place (Saladin, 2007). Muscles that are elongated often develop their maximal force in the stretched position and are weak in the normal physiological position, known as a stretch weakness (Kendall et al., 2005).

Weakening of the muscles maintaining posture can lead to a number of conditions such as kyphosis, lordosis and scoliosis. These conditions in turn can lead to pain and discomfort, usually of the lower back, buttocks area and feet (Anderson et al., 2009). However, poor posture can be corrected with the use of specialised exercise programmes and/or orthoses (Hsieh & Lee, 2013, Kratenova, Zejglicova, Maly & Filipova, 2007, Levinger et al., 2010). For the purpose of this study, only the Posture Pro Foot and Spine Corrector (PPFSC) innersole was assessed for its effect on posture.

The PPFSC was designed to place the foot in an optimum position, which in turn positively affects the centre of gravity of the body as a whole. The developer of PPFSC found that 80% of his patients had an immediate, positive reduction in their posture score, so he called the innersoles "foot and spine correctors" (Posture Pro, 2015). The PPFSC innersole is not a custom-made innersole, meaning that it is not made for specific postural or orthopaedic problems. Instead it has a standard shape that comes in a variety of

sizes, and is fitted based on foot size taken from an inked footprint.

Position changes stimulate proprioceptors on the sole of the foot which activate the postural muscles along the kinetic chain, and optimise muscular-regulated joint.

METHODS

This study utilised a pre-test post-test experimental design, in which 24 participants were randomly assigned to either the treatment group or the control group. The treatment involved walking for 10 minutes on a level surface using the PPFSC innersoles, while the control group walked without the innersoles. Posture was analysed pre- and post-treatment for both groups.

Both males and females aged 18-60 years were included in the study. Persons with structural leg length discrepancies or chronic joint pain in the lower limbs were excluded. The participants who qualified to take part in the study were all requested to sign an informed consent form in order to participate.

An inked footprint was taken for each participant allocated to the treatment group, using a Harris Mat, which was then used to measure the participant's foot size to be able to determine the correct innersole size. Participants were required to wear neutral running shoes (i.e. not specifically for pronation or supination, and with no inserts of any kind), and the stability (Hatton, Dixon, Rome & Martin, 2008; Wyndow, Cowan, Wrigley, & Crossley, 2010).

The purpose of this study was to determine whether there was an immediate positive effect on posture score (or centre of gravity) after wearing and walking on the innersoles for 10 minutes. innersole was fitted by a clinician experienced in working with the PPFSC innersoles.

Photographs taken after 16 postural landmarks (required by the Posture-Pro software programme) were identified and marked by the researcher. Participants were asked to wear appropriate clothing for the photographs so that all the landmarks would be visible, and to stand barefoot, in as relaxed a way as possible. An anterior and right lateral photograph was taken for each participant, from which an average posture score was determined by digital analysis. All photographs were taken in front of a grid, to enable accurate calibration.

Photographs were taken of the participants before and after 10 minutes of walking, to compare the participants' posture scores, as calculated by the Posture Pro™ analysis software. The programme digitises the landmarks placed on the body in the photographs, and calculates the amount of deviation from an ideal posture, thus generating a posture score. The higher the posture score, the more deviations there would be from normal, as the spine and pelvis

compensate for these body shifts in order to maintain balance.

Statistical analysis

Posture scores for pre-and post-tests were statistically analysed, using an ANOVA in order to compare the two groups. The level of significance was set at 0.05.

RESULTS

The ANOVA revealed no significant difference in posture score from pre- to post-test for the two groups. The average pre-posture score of the treatment group was 28.75±2.50, and for the control group 25.92±2.50. After walking on the innersoles (treatment) and shoes only (control) the average posture score decreased to 25.50±2.64 and 24.42±2.64 respectively. Figure 1 depicts the 11.3% decrease in the average posture score after walking on the innersoles for 10 minutes, compared with a 5.8% decrease without the innersoles, suggesting that simply walking for 10 minutes (without innersoles) has an effect on the posture score. However, there was no significant difference between the two groups (p=0.56).

DISCUSSION

The findings of this study were that the average posture score of both groups decreased after walking for 10 minutes (with or without the innersoles). The treatment group's average posture score showed a greater improvement of 11.3% (decrease) when compared with the control group's posture score change of only 5.8%, but when comparing the two groups these differences were not statistically significant.

These results are comparable to those found by other researchers evaluating prefabricated orthoses. Barton, Mentz and Crossley (2011) noted a significant change (p=0.015) in foot posture index as a result of fabric, indicating their effectiveness in the control of excessive pronation in individuals with patellofemoral pain syndrome. In contrast, Percy and Mentz (2001) found no significant effect of orthoses on postural sway in the mediolateral or anteroposterior planes in soccer players, and concluded that foot orthoses may be prescribed without fear of impairing postural performance in elite athletes. Similarly, standing balance was not affected by the application of shoe-sole lateral wedges in patients with knee osteoarthritis (Ahmadi, Forghany, Nester, & Jones, 2014).

The changes in posture score seen in this study may be due to a number of factors. The PPFSC innersoles are thought to correct the position of the feet and, in doing so, place the whole body in a more optimal postural position (Posture Pro, 2015). Because the lower limbs are perceived as a kinetic chain, starting at the feet and moving up towards the hip, it follows that any change in the feet will cause a corresponding change higher up the kinetic chain. This change in foot alignment, caused by the innersoles, is perhaps what caused the positive change

in posture number, i.e. towards a more ideal centre of gravity.

Proprioception is another factor which must be considered, because this is purported to be enhanced when walking with the innersole. Inside muscles, tendons, ligaments and joints are specialised sensory neurons, called proprioceptors, which pick up information about body and limb position and changes in position (Magill & Anderson, 2007). The central nervous system (CNS) receives sensory information from the proprioceptors about changes in body position, and then sends signals to the muscles to contract in order to maintain balance during these changes.

Thus the stimulated proprioceptors cause the postural muscles to contract in order to maintain balance, which is what the PPFSC innersole is designed to do. The fact that the treatment group's average posture score decreased by 11.3% compared with a change of only 5.8% in the control group shows that this may well be the case, and that the innersoles did have a larger proprioceptive effect compared to walking alone. Although this was not statistically significant, it could be practically significant, especially for those with poor posture.

However, there was a decrease in average posture score for both groups, which suggests that being physically active also causes proprioceptive changes, which may also have an effect on posture over a period of time. The innersoles appear to enhance this effect, which suggests that posture may be corrected over a longer period of time with their use. Further studies are needed to evaluate this.

CONCLUSION

In summary, wearing the PPFSC innersoles seemed to have a greater effect on the posture score than on physical activity alone, although this effect was not statistically significant. Thus it can be concluded that ten minutes of physical activity wearing a PPFSC innersole was not enough to induce any significant changes. However, even a small change in posture can decrease pain significantly, which would allow a person to carry out activities of daily living with greater comfort. Therefore the change in posture score noted after wearing the PPFSC innersoles may be practically significant. It is also possible, that, should the treatment be conducted for a longer period of time, there would be a greater effect seen.

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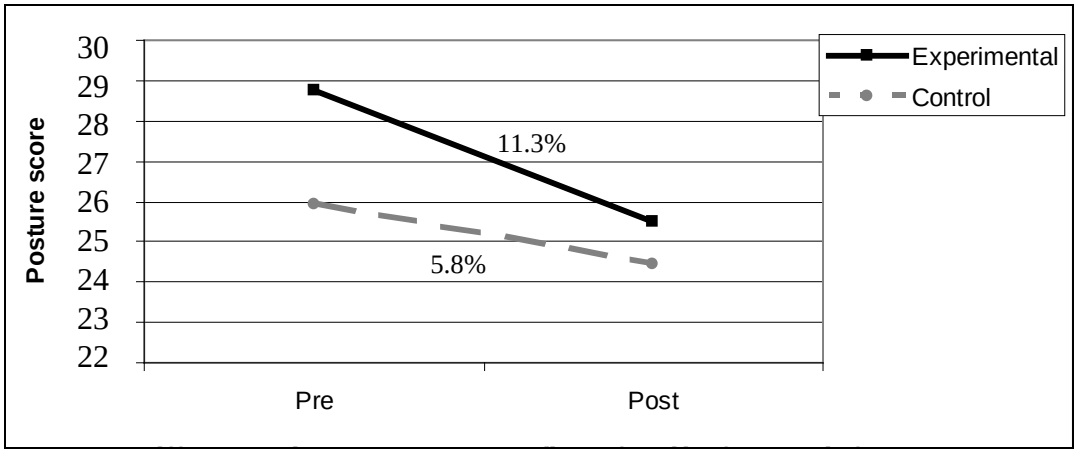

Figure 1: Change in posture score as a result of the intervention