

EFFECT OF ANTI- FATIGUE MAT ON MUSCLE ELECTRIC ACTIVITY IN LEGS AND GLUTEAL REGION

INTRODUCTION

Prolonged daily standing is involved in many professions such as health care workers, teachers, retailers. Static load in leg muscles can cause a variety of health problems: discomfort and pain in legs, feet, and lower back, venous disorders, etc. [1] Shock absorbing anti-fatigue mats have been invented to provide micromovements in leg and back muscles while standing on soft surface thus improving microcirculation and decreasing discomfort caused by prolonged standing, but the effectiveness of these mats is doubtful, as the data obtained from studies were not convincing. Some research showed that extremely soft mats cause higher discomfort than comparably harder mats. [2]

METHODS

The study involved 13 healthy volunteers aged 18-25 years (8 women and 5 men). Participants worked on a computer placed on a height-adjustable table standing for 20 minutes on each of three different surfaces – a hard floor, soft office anti-fatigue mat and moderately soft industrial anti-fatigue mat. Muscle electric activity was measured bilaterally on tibialis anterior, peroneal, and gluteus medius muscles by surface electromyography with wireless electrodes (BTS FREEMG 1000, BTS Bioengineering). After 14 minutes, a 1-minute long sEMG recording was captured. Then a 20-second sEMG fragment without artifacts was excised, from which the data were analyzed in programs MS Excel and SPSS 26, using non-parametric statistical methods (paired sample analysis, Wilcoxon signed-rank test). Data were compared in every person by body sides and standing surfaces. Significance level was set at $p < 0.05$. The study was approved by the Riga Stradiņš University Research Ethics Committee in Latvia (2-PĒK-4/24/2022).

CONCLUSIONS

The study has shown that muscle electric activity while standing on an anti-fatigue mat is higher in lower leg muscles and on softer type of mat. M.tibialis anterior showed the highest electric activity on anti-fatigue mats out of all the muscles involved.

AIM

The aim of the study was to investigate lower leg and gluteal muscle electric activity variations when standing on a hard floor compared to industrial and office anti-fatigue mats.

RESULTS

The lowest muscle electric activity was determined while standing on the floor. The median of electric activity in peroneal muscles was 110.13 Hz, while standing on the floor, 118.04 Hz – on the industrial anti-fatigue mat ($Z = -3.180$) ($p = 0.001$), but on the office anti-fatigue mat – 135.31 Hz ($Z = -3.180$) ($p = 0.001$). While standing on the office anti-fatigue mat, electric activity in lower leg muscles was the highest among surfaces. The median on tibialis anterior muscle was 110.93 Hz, while standing on the floor, standing on the industrial anti-fatigue mat – 138.17 Hz ($Z = -2.970$) ($p = 0.003$), but on the office anti-fatigue mat – 143.22 Hz ($Z = -3.110$) ($p = 0.002$). The median of gluteus medius while standing on the floor was 111.48 Hz, standing on the industrial anti-fatigue mat – 119.70 Hz ($Z = -2.411$) ($p = 0.016$), but on the office anti-fatigue mat – 123.73 Hz ($Z = -2.341$) ($p = 0.019$).

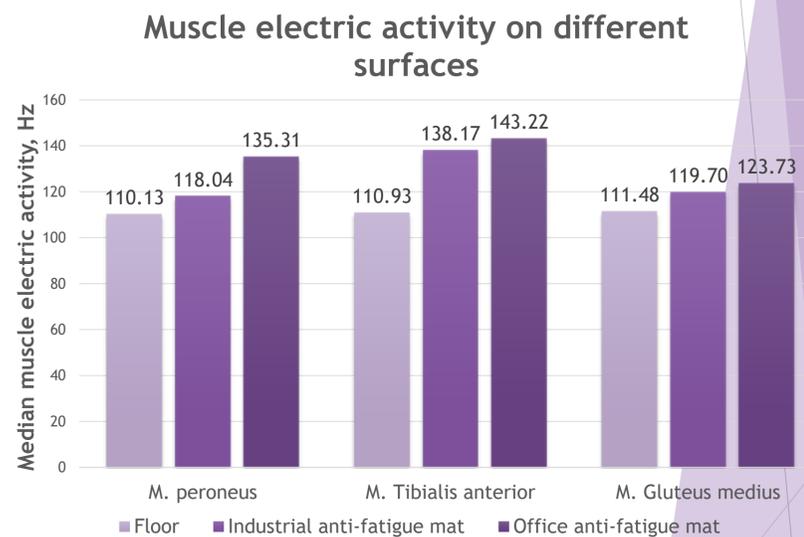


Fig 1: from personal archive