INTRODUCTION

A human foot is a complex joint structure with different bones and muscular support. The arches act as a spring and divide the body weight equally. It also determines walking pattern of an individual. Arches should be sturdy as well as adjusting to different textures.\(^1\)

Flatfoot also known as “pes planus” or “fallen arches” is a prevailing common condition of current lifestyle. In normal individuals while on resting and standing we can see the medial longitudinal arch but in flatfeet individuals there will be either low arch or absence of arch. When a person is standing upright space is seen beneath sole of foot. When people have flat feet, space disappears when they are standing and walking. This is known as over pronation.

The causes for flatfeet could be genetic factors, weak arches, orthopedic conditions, neurological conditions, obesity and diabetes.\(^1\)

A study was done for the prevalence of flatfoot in adults for 18-21 years of age using Navicular drop test which gave 13.6% as the prevalence rate in which for males it was 12.8% and females it was 14.4%.\(^2\)

Human body responses to various external stimuli. It gives a desired voluntary response to the stimulus it perceives but between this stimulus and response there is a certain time period which is taken by the individual. It has 2 components: mental processing time and movement time. Mental processing time is time taken to perceive, identify and analyse the stimulus and then decide the response by the responder whereas Movement time is duration to execute movement as soon as the appropriate response is selected. Reaction is the voluntary response given in accordance to different stimuli such as visual, auditory etc. VRT is time required to respond to stimuli perceived visually. Many factors affect the reaction time of a person such as demographic profile, habits, personality type and the type of stimulus.\(^3\)

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SUBJECTS AND METHODS

It was a cross-sectional correlational study analysing the relationship between visual reaction time and pes planus in healthy young individuals. An independent review committee, “Ethics Committee for Human Research,” approved the study protocol. Written informed consent form, approved by the ethics committee, was obtained from all the study participants. Study Setting: Participants were recruited from Tertiary health care hospital in Belagavi from October 2018 to March 2019. Participants: The inclusion criteria were age between 18-25 years with foot posture index score between 6-12, BMI ranging between 23-24.9 kg/m2 and consent for participation. Participants having any diagnosed visual condition, central nervous system disorder condition, amputations or inability to stand were excluded.

Sample Size: It had a sample size of 54 with convenience type of sampling.

Outcome variables

Visual reaction time was measured by using the ‘Sports Reaction Trainer’. It is an instrument which is used to improve the performance of an individual which consists of 5 lamps and 1 controller. In it the number of lamps to be used can be set by using the controller along with duration of time interval between each lamp to light accordingly.

Procedure

After obtaining ethical clearance, people between 18- 25 years were screened. All the participants were explained about process of the research. As per the inclusion criteria, a total of 70 participants were screened; out of which 12 did not meet the criteria and 04 refused to participate. Thus, 54 participants were finally recruited in the study. Demographic data of each participant were obtained. For the purpose of age group-wise and gender-wise comparison and analysis; data collected was segregated accordingly for age into two groups. Group 1 having 18-22 years and Group 2 having 23-25 years of age.

Statistical Analysis

The descriptive and quantitative data in the study did not follow normal distribution. Therefore, non-parametric tests were applied for the analysis. The descriptive statistical analysis was done of taps obtained for visual reaction time with mean value of 75.50, median value of 78, mode value of 80 with standard deviation (SD) of 9.62 when compared with normal value of taps to be obtained respectively. Correlation between Visual reaction time and pes planus was assessed using Spearman’s rank test. Statistical significance was set at two-tailed at the probability levels of less than 0.05. All statistical analyses were conducted with SPSS software 21.

RESULTS

Total 54 participants were evaluated in this study, out which 06 were males and 48 were females. The mean age of total participants was 22.42 years, mean BMI score was 23.07, mean visual reaction time score was 75.50 ± 9.62. [Table 1, Graph 1][Table 2, Graph 2]

The descriptive statistical analysis was done of taps obtained for visual reaction time with mean value of 75.50, median value of 78, mode value of 80 with standard deviation (SD) of 9.62 when compared with normal value of taps to be obtained respectively. [Graph 3]No gender differences were noted with R value= 12.6 and p-value= 0.772 respectively (p>0.05) [Table 3].No changes in the mean visual reaction time values across the age groups with R value= 11.7 and p-value 0.585. [Table 4] However, no correlation of visual reaction time and pes planus in young healthy individuals was noted.

DISCUSSION

Numerous studies have revealed correlation of age, gender and hand dominance with visual reaction time. In recent years, Pes planus is the most common amongst in adults. The published reports revealed that Visual reaction time is associated with physical activity, fatigue, age, gender, head injury and more factors. Hence, in this study we attempted to evaluate the correlation between visual reaction time and Pes planus in young healthy adults.
The literature disclosed involvement of diverse factors in influencing visual reaction time including direct v/s peripheral vision, practice and errors, fatigue, distraction, intelligence, breathing cycle etc. The effect of demographic factors on the VRT of adults has been explored only in few studies. However, no one has attempted to explore the relationship of Visual reaction time and pes planus in young healthy adults. There we chose to evaluate the relationship of Visual reaction time (VRT) and pes planus in young healthy adults.

The current study findings displayed no gender differences with the variable, VRT and Pes planus. According to Jain A et al., (2015) men considerably have greater VRT compared to women.

In the current study for VRT and pes planus with respect to age showed no changes. Thus, we can say that pes planus and VRT is not related to age. Woods D et al., (2015) stated that aging causes slowness in VRT and execution.

In the current study, the outcome measure used for visual reaction time was sports reaction trainer which can be used as an assessment and rehabilitative measure. Gierczuk D et al., (2015) stated that use of equipment for VRT had good reliability. The sport reaction trainer machine had a similar design as the bataklite which is used.

Even though flatfoot, balance and reaction time were interdependent according to the literature, there was no strong correlation found between visual reaction time and pes planus in young healthy individuals. The eye-foot co-ordination / reaction time would have given more clear insight to comment about the visual reaction time in young healthy individuals having pes planus.

The limitation of this study was that it had small number of participants, so we cannot generalize the findings. Besides, the data collected using self-reports from single source, could lead to common method bias. Furthermore, eye foot coordination should have been assessed along with eye hand coordination so a better correlation could have been established.

In future studies, we recommend using two kind of population that is congenital and acquired pes planus for data collection. Further, a longitudinal study design with large number of samples is recommended in order to study the exact mechanism behind the relationship between visual reaction time and pes planus. In summary, Negative correlation of visual reaction time and Pes Planus in young healthy adults was concluded.

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References
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