

The Effects of Headphone Usage on Postural Stability in Young Adults

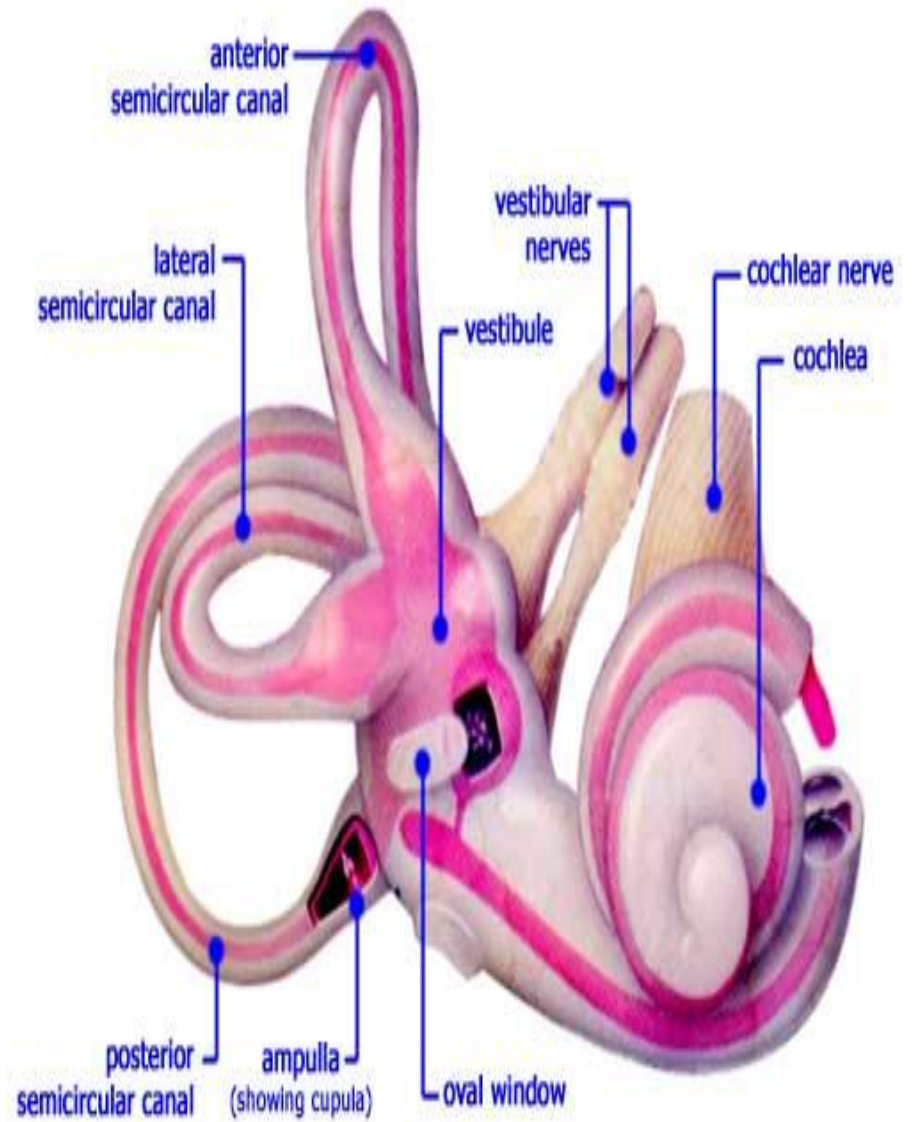
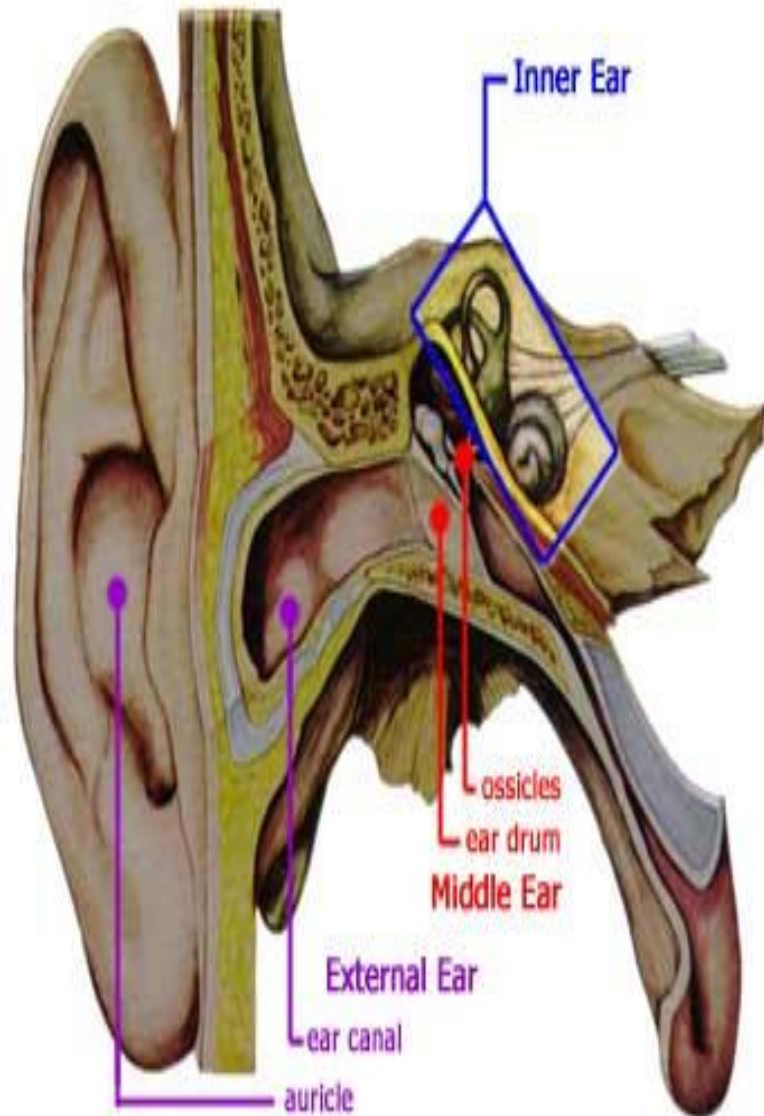
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- The first sensory system to develop in humans is the vestibular system (Blayney, 1997). The vestibular system comprises two components: the semicircular canal system, and the otolith organs.
- The vestibular system sends signals primarily to the neural structures that control eye movements through **vestibulo-ocular reflex (VOR)** , and to the muscles that creates balance and posture of the body through **Vestibulo-spinal reflexes (VSR)**

Introduction



- Recently there are a lot of attention grow up on the effects of noise on the inner ear.
- Noise is an unwanted sound or a combination of sounds that may cause hearing problems.
- **Noise is often considered to be a leading cause of hearing loss at worldwide.**
- 10 million adults and 5.2 million children in the US, and 250 million people worldwide having a Noise induced hearing loss
- Listening to the high volume music by earphones is another significant factor can cause hearing problems even if the user is listening for short durations (Shargorodsky et al., 2010).

- According to the studies done on vestibular evoked myogenic potential have shown that , the levels of noise that can cause damage to the cochlea could also stimulate the balance system (Akin et al., 2003; Welgampola et al., 2005).
- **So with similar stimulation, there is a probability of the balance being affected because of noise exposure.**
- There are many studies have been done to show the effect of noise on balance accompanied with hearing loss condition (Raghunath et al., 2012),
- **However, there're no studies until now that show the effect of noise on postural stability prior to hearing loss stage.**

- **1) To investigate the difference between frequent and non-frequent headphone users in relation to effects of noise on postural stability among young adults.**
- **2) To investigate the difference between frequent and non-frequent headphone users in relation to effects of noise on dizziness and activities of daily level among young adults.**

- **Subjects**

-

A Convenient sample of 60 subjects were selected based on specific inclusion and exclusion criteria .



Group 1: **Frequent users** (N= 30)

Group 2: **Non-Frequent users** (N=30)
based on headphone usage criteria.

Inclusion criteria for Frequent users	Inclusion criteria for Non frequent users
Heavy Users: Using headphone more than 4 hours per day and for 5-7 days/week.	•Less than an hour per day. •Using headphone for 1-4 days/week.
Light Users: Using headphone for 1-3 hours/day and for 1-4 days/week.	

Outcome measures:

◆ Postural Stability:

• 95% confident center of pressure (COP) Ellipse and Fukuda test were used to measure postural stability (Rocchi et al., 2005).



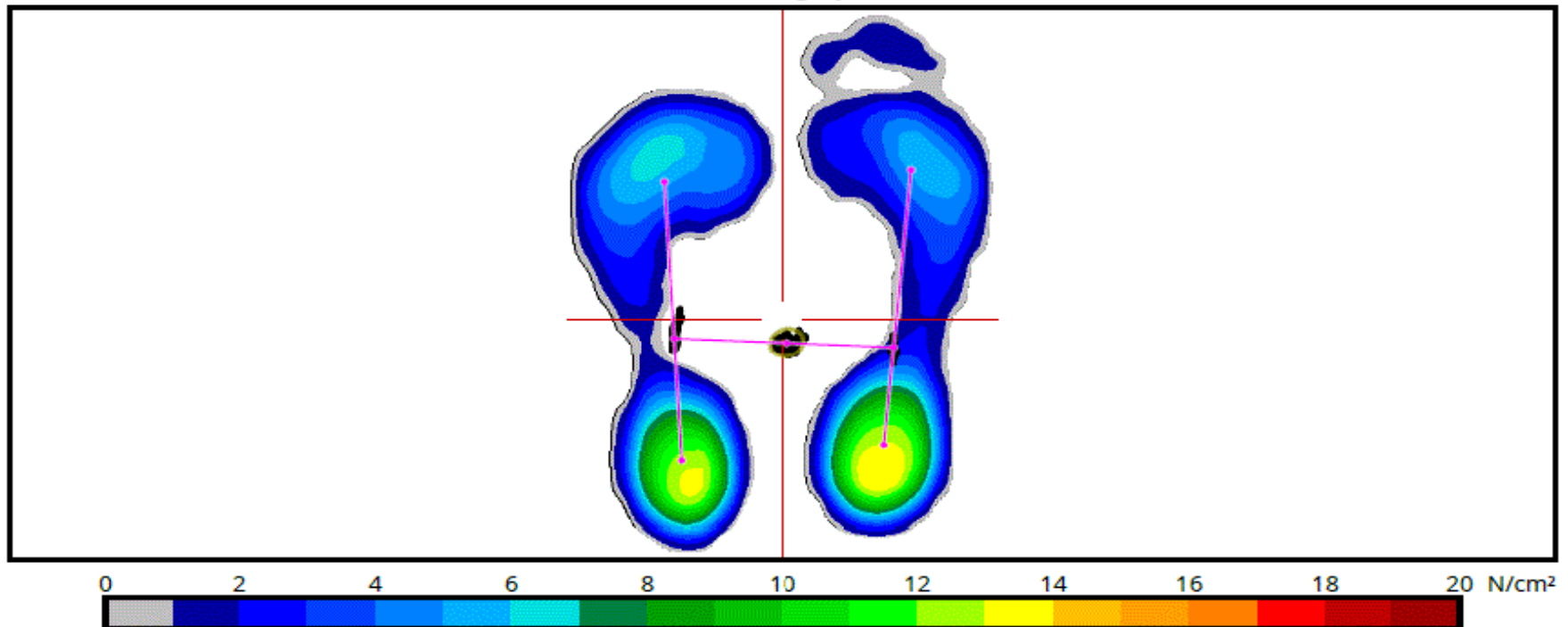
• **Zebris FDM-T system** was used to measure 95% confident COP Ellipse in different standing position; Feet together, semi-tandem and tandem.



Methods

Person: AHLIA PROJECT AHLIA PROJECT,
Record: 03/24/2015 13:59 NF2FT1EO, Stance Analysis

Stance, average pressure



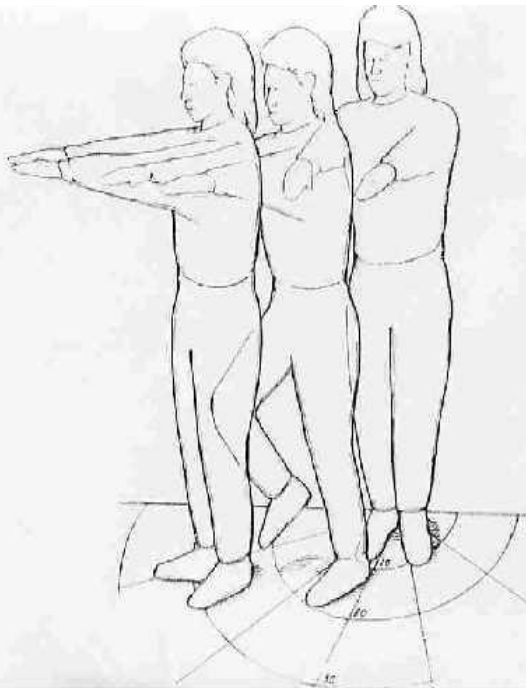
95% Confidence Ellipse

Length of minor axis, mm	12.6		120 mm
Length of major axis, mm	15.5		120 mm
Angle betw. Y and major axis, deg	0.3		0.5 deg
95% confidence ellipse area, mm²	154		190 mm²

Outcome measures:

◆ Postural Stability:

- **Fukuda test** was used to measure the displacement in centimeters and angle of rotation in degrees of the subject postural stability.



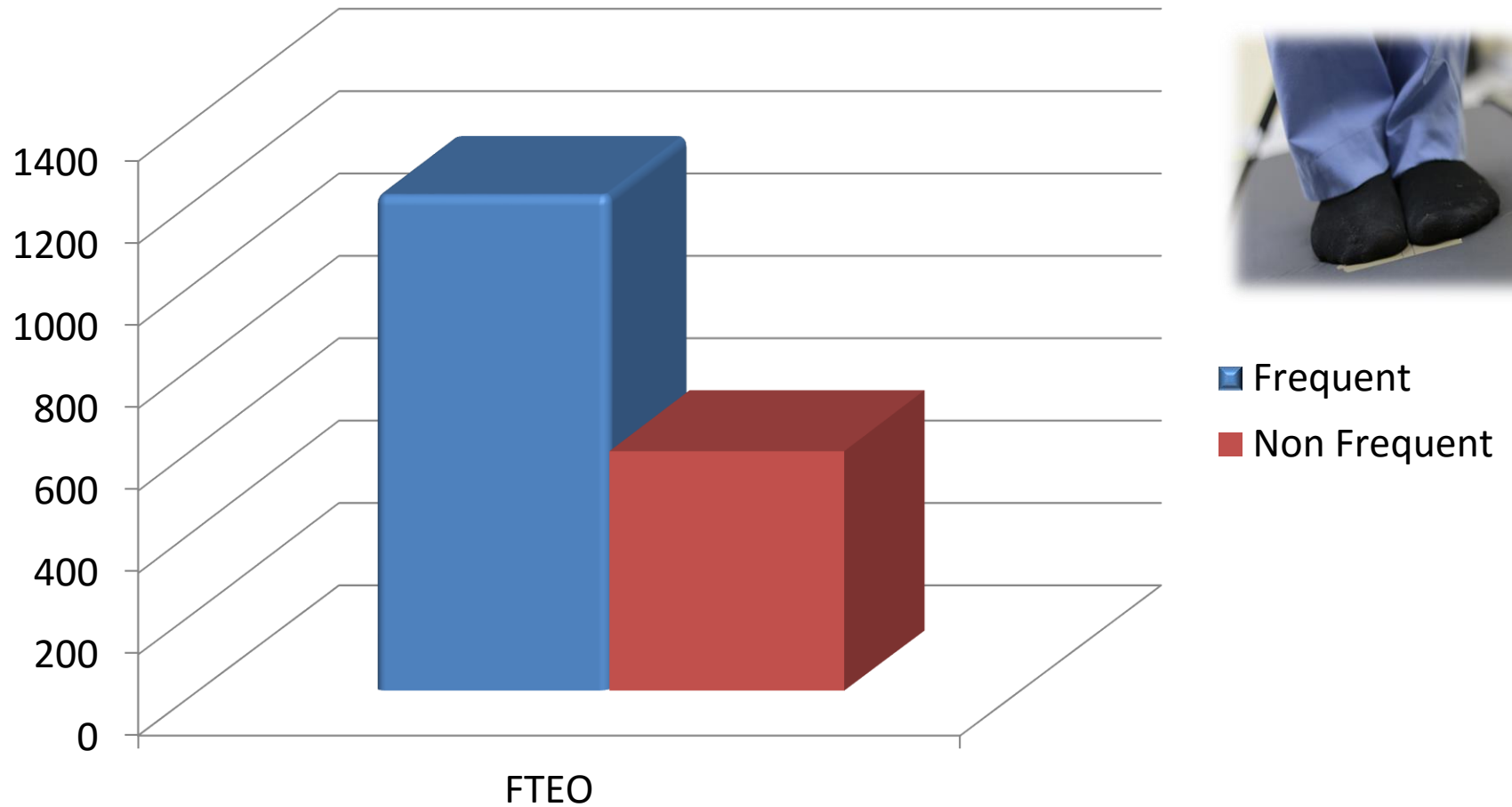
- **Outcome measures:**
- **◆ Dizziness and ADLs:**
- UC Irvine Dizziness Questionnaire was used to measure dizziness level and its effect on quality of activities of daily living (Raghunath et al., 2012).

Methods (Procedure)

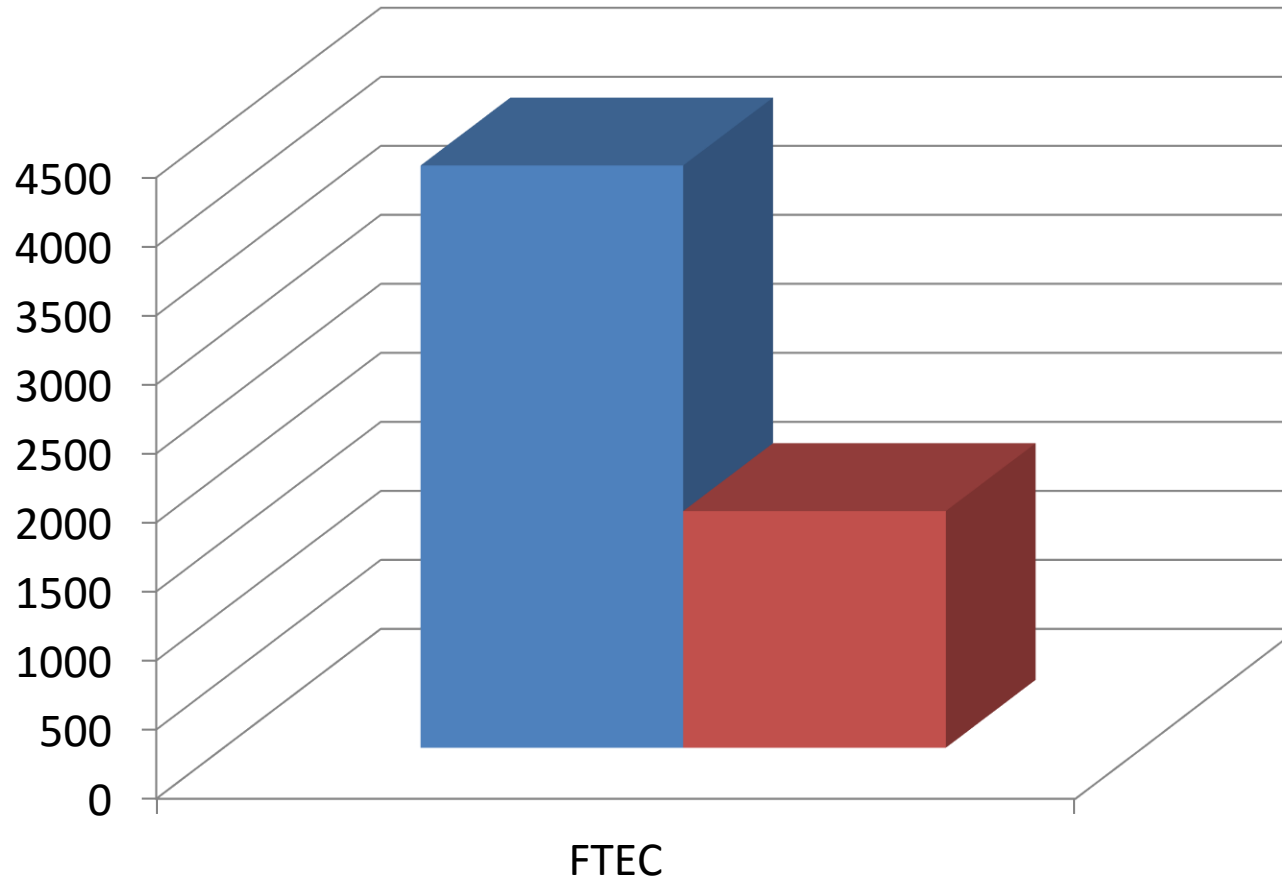
- Each subject was told to stand for 20 seconds as still as possible in different Feet positions:
- **Feet-together (FT)** **Semi-tandem (ST)** **Tandem (T)**
- Subjects were tested both with their eyes open and eyes closed
- To avoid carry over and learning effect each subject was randomly assigned to one of the three pattern of standing position sets.



Results (Postural stability)

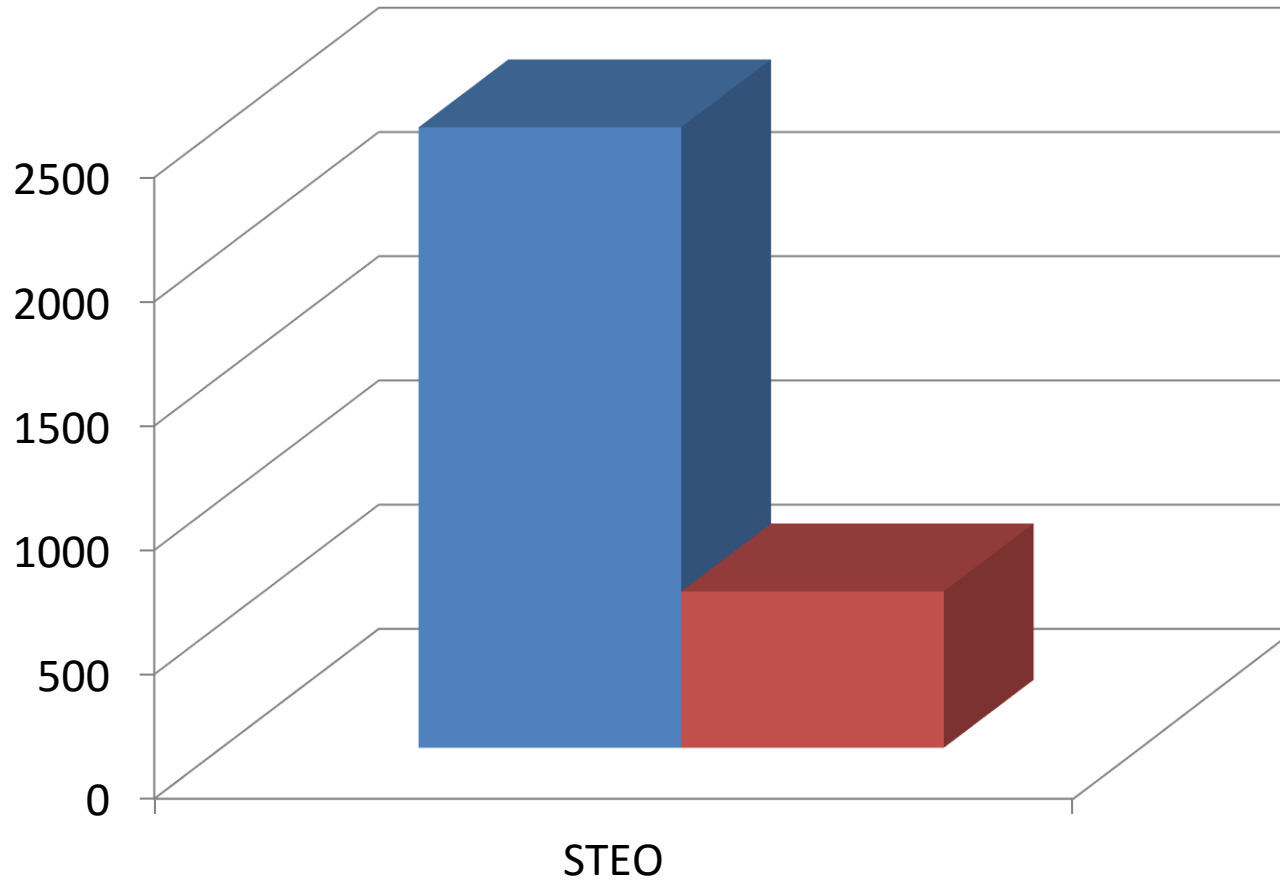


Results (Postural stability)



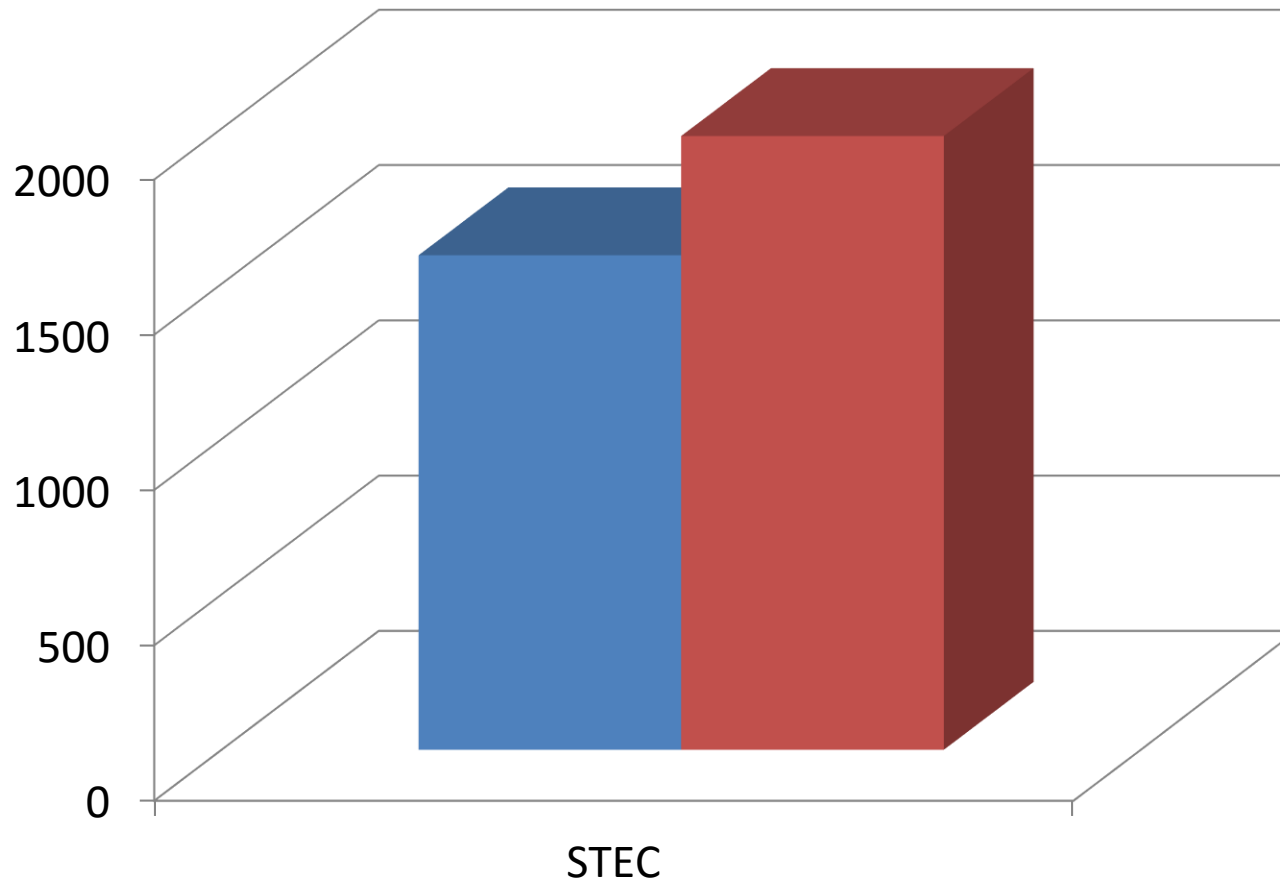
■ Frequent
■ Non Frequent

Results (Postural stability)



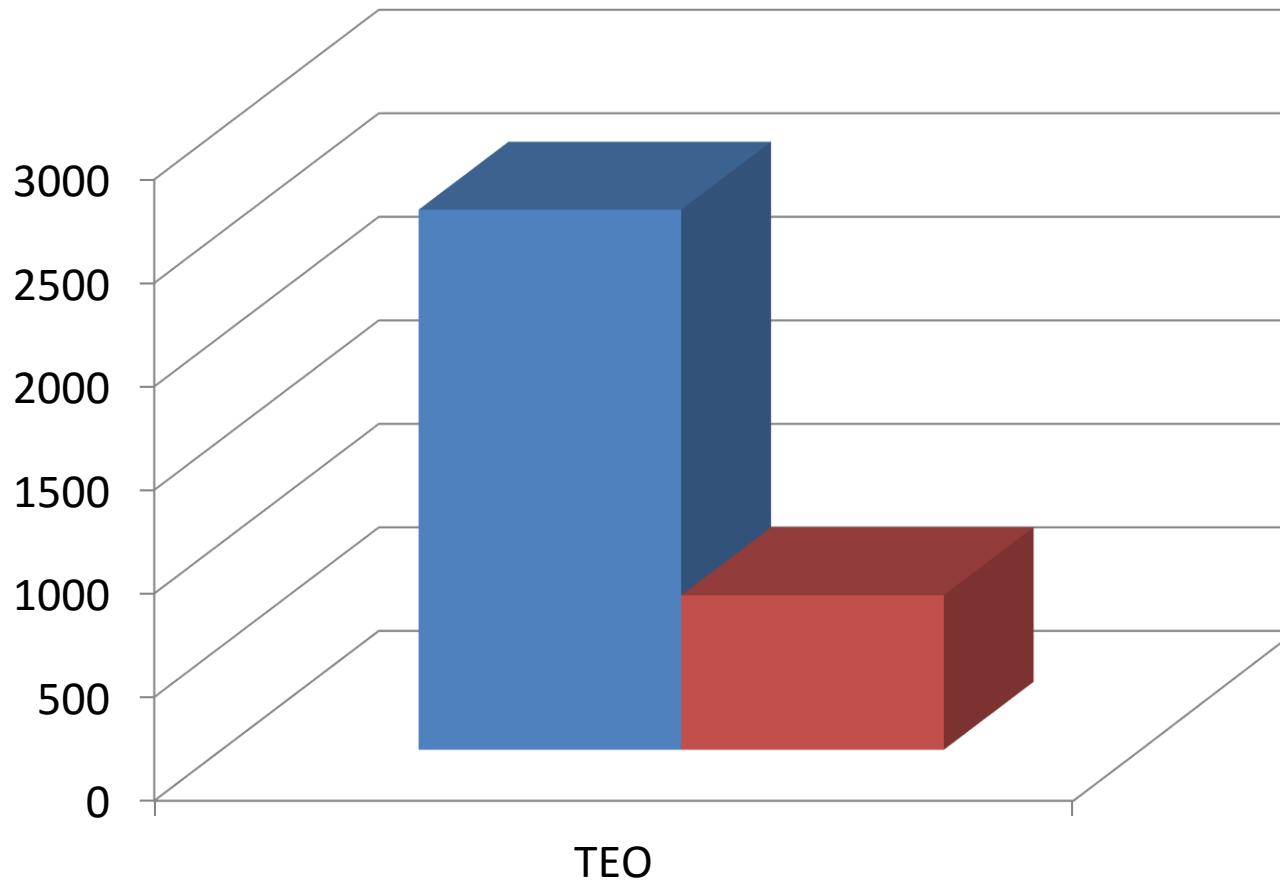
■ Frequent
■ Non Frequent

Results (Postural stability)



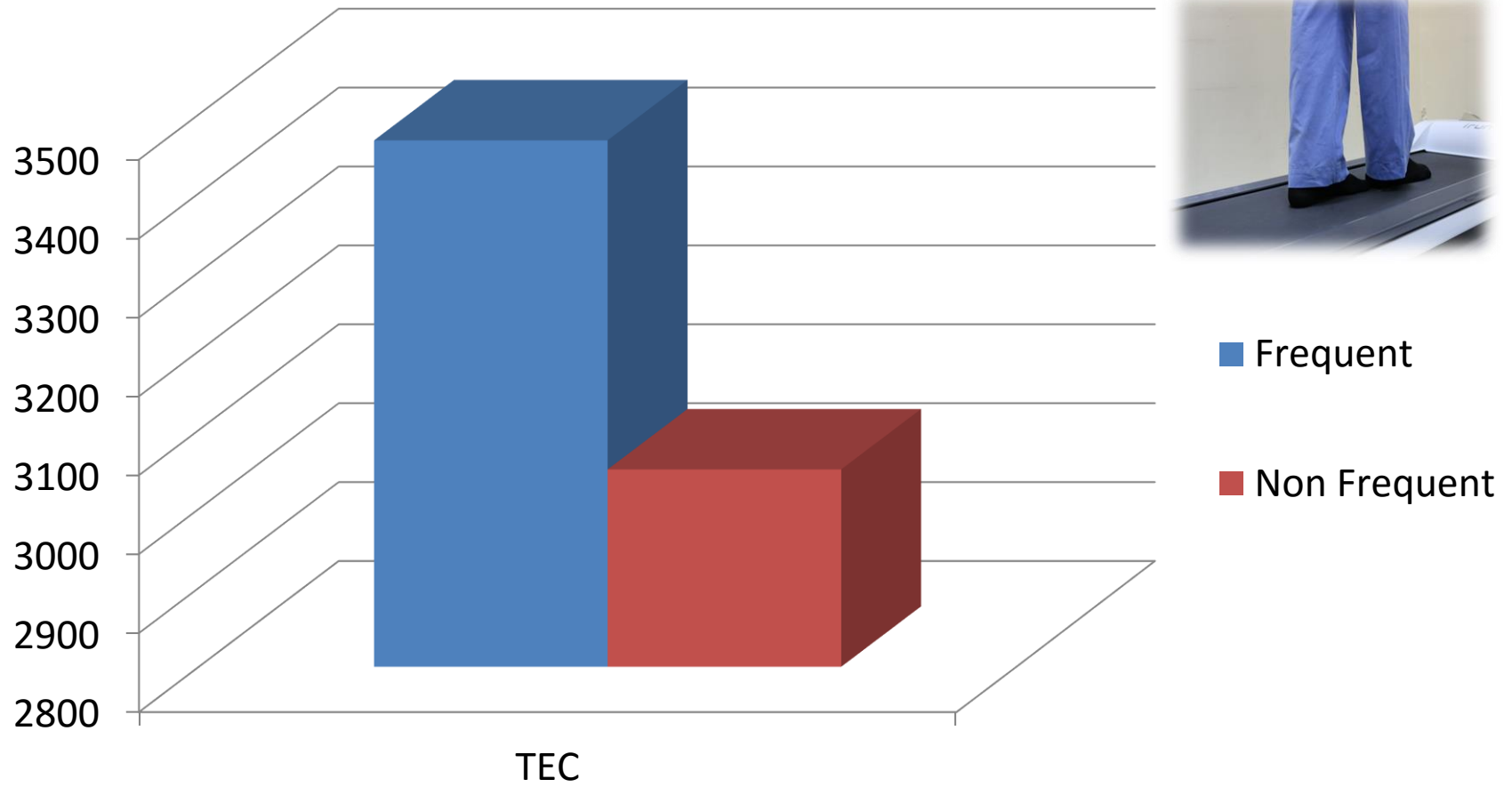
■ Frequent
■ Non Frequent

Results (Postural stability)

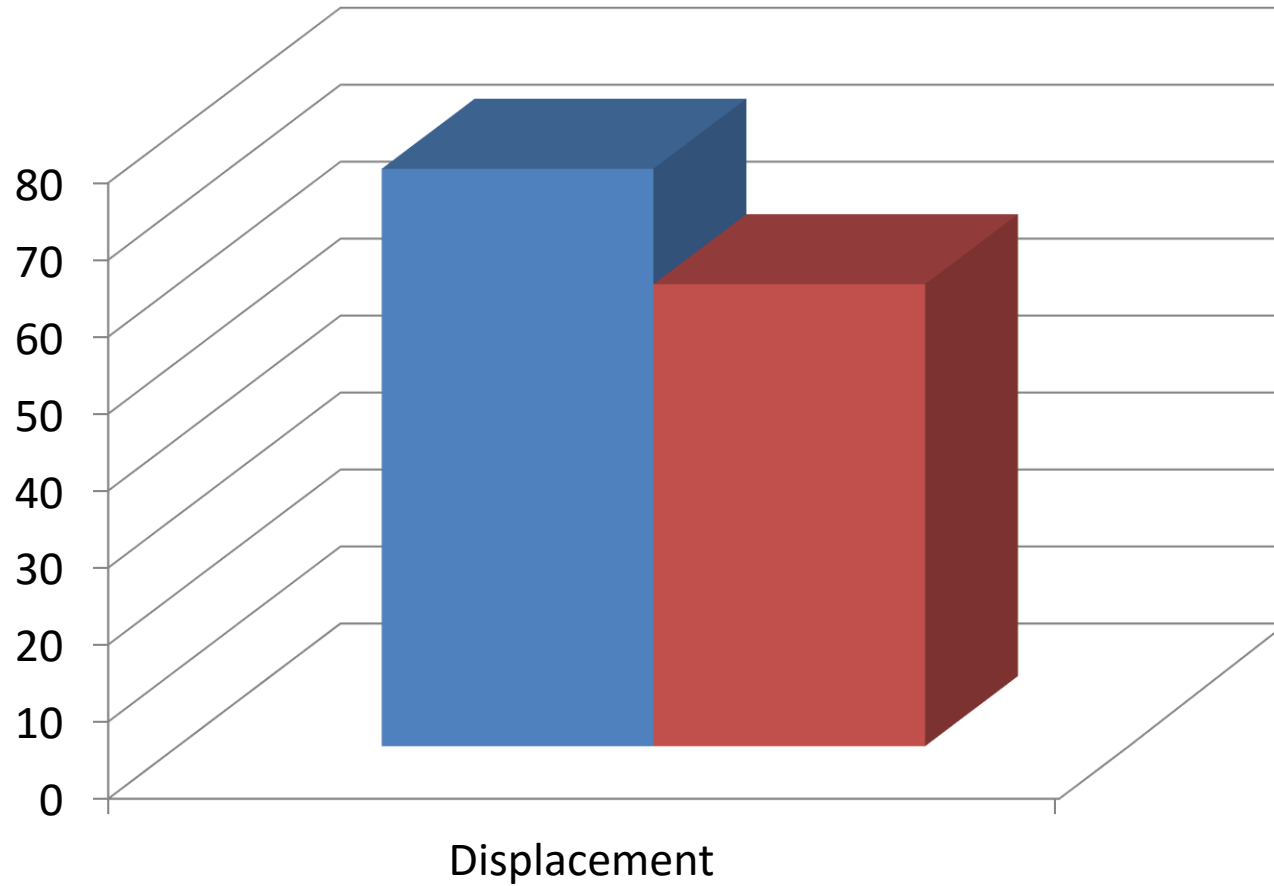


■ Frequent
■ Non Frequent

Results (Postural stability)



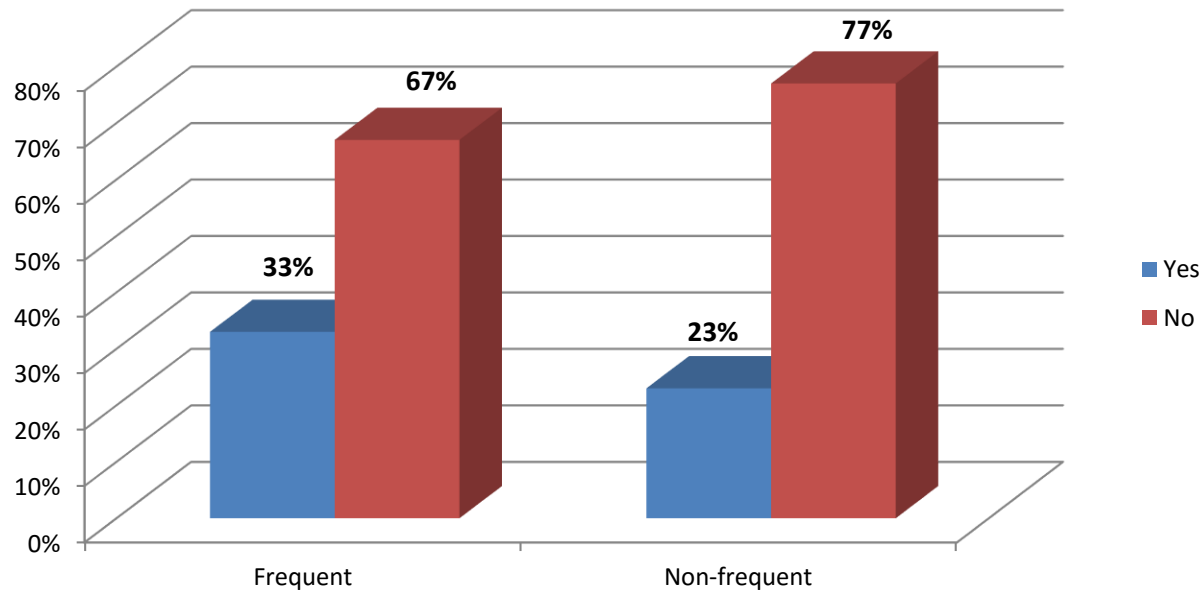
Results (Fukuda Test))



■ Frequent
■ Non Frequent

Results **Dizziness and activities of daily living (ADLs).**

*There was no significant difference between the two groups in dizziness level and activities of daily living



- ◆ Subjects who are aggressively using the headphones with high frequency are more vulnerable to be affected in their static postural stability but not in their “**ADLs**”.
- ◆ Furthermore, static postural instability in frequent headphone users could be used as pre- clinical or early sign to predict persons whom may be affected in their ADLs related to the balance in future.

THANK YOU

