

Finding the Prevalence of Vestibular Weakness among Physiotherapy Students Using Fukuda Stepping Test

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ABSTRACT

Fukuda stepping test is a test to check vestibulospinal function. It measures the asymmetrical labyrinthine function and peripheral vestibular lesion. The amount of rotation and displacement are measured after taking 50 or 100 steps in place with the eyes closed and blindfolded in a quiet, dim lit room with arms outstretched at 90°. Individual should stand on a grid marked with 2 concentric circles with radius of 0.5 and 1.0 m, and divided into angles of 30°.

Methods: 152 normal healthy individuals were selected (18-25years) full filling the inclusion criteria. The subjects were asked to perform test called Fukuda stepping test and measured the side of lesion and angle of deviation. Then data was tabulated and analysed statistically.

Result: Study shows a very weak correlation between the positive population who performed fukuda stepping test {Pearson correlation-0.21} and moderate Correlation between the negative populations of subjects who performed fukuda stepping test {Pearson correlation-0.058}.

Conclusion: Study on Fukuda stepping test is not a reliable measure in determining the side vestibular weakness among college individual.

Keywords: Fukuda stepping test (FST), Vestibular system, Vestibular weakness/dysfunction.

INTRODUCTION

The vestibular system detects motion of the head in space and in turn generates reflexes like stabilizing the visual axis and maintaining head and body posture. Provides us with our subjective sense of movement and orientation in space. The vestibular sensory organs are in the petrous part of the temporal bone near the cochlea, the auditory sensory organ. The vestibular system is comprised of two types of sensors: the two otolith organs (the saccule and utricle), which sense linear acceleration and the three semi-circular canals, which sense angular acceleration in three planes. The receptor cells of the otoliths and semi-circular canals send signals through the vestibular nerve fibres to

the neutral structures that control eye movements, posture, and balance.

When the system is functioning normally, we are usually unaware of a distinct sensation arising from vestibular activity since it is integrated with visual, proprioceptive and other sensory, the vestibular system normally makes to gaze stabilization and postural control. [1,2,4]

Vestibular dysfunction is disease or injury damages these processing areas leads to vestibular disorders. Vestibular disorder can be inherited, acquired and idiopathic.

Vestibular disorder include benign paroxysmal positional vertigo, labyrinthitis or vestibular neuritis, meniere's disease, and secondary endolymphatic hydrops, superior semi-circular canal dehiscence, acoustic neuroma, perilymph fistula, ototoxicity,

enlarged vestibular aqueduct, migraine associated with vertigo and mal de debarquement, etc other complication can

be aging, auto immune disorder and allergies. [3,4]

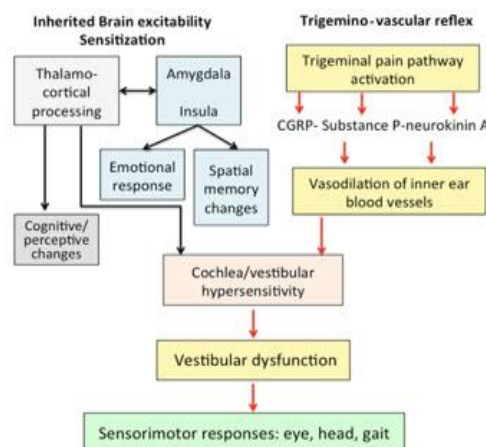
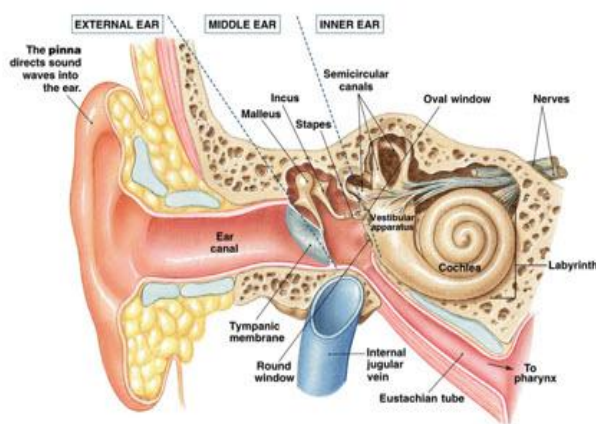


Fig1 Anatomy of vestibular system and flow chart for vestibular dysfunction [3,5]

Fukuda stepping test also known as vestibulospinal test. It measures amount of rotation and linear displacement to assess unilateral peripheral dysfunction. Tests eye motion, head and neck motion, and balance. Procedure Individual is made to stand on a grid marked with 2 concentric circle of radius 0.5m and 1.0m and divided into 30 degree each. Individual is asked to take 30-50 steps with both arms stretched straightforward with eye closed and Measure of Individual's rotation and linear displacement Rotation greater than 30 degree or displacement of 0.5m indicates asymmetrical labyrinthine function. Test is positive if rotation is greater or equal to 30 degree negative if below 30degree rotation. [6,7,8]

Aim and objective of the study is to estimate the of measure individuals with vestibular weakness among physiotherapy students between male and female Using fukuda stepping test.

MATERIALS AND METHODS

Source of data & setting: RV College of physiotherapy

Study design: Cross sectional study

Sample design: Convenience sampling.

Study duration: 3 months

Sample size: 152 (152 normal healthy individuals of either gender aged between 18-25)

Inclusion criteria

- 1) 18-25 years
- 2) Cooperative individuals
- 3) Individual with functional vision and hearing
- 4) Individual who obey verbal commands

Exclusion criteria

Any Cardiovascular, respiratory, metabolic and neuromuscular condition which is contraindicated for exercise test diagnosed in past 6 months.

Materials used for the study: floor grid of fukuda stepping test, inch tape, measuring tape, chalk piece

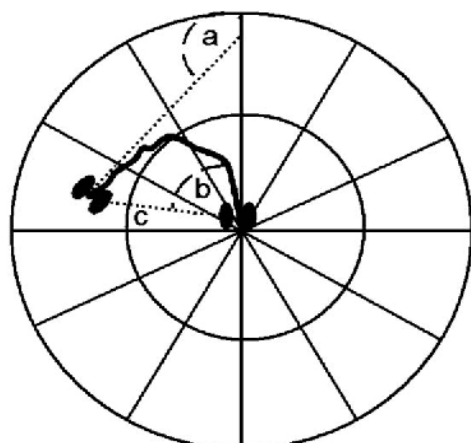


Fig 2 grid to test fukuda stepping test [6]

Outcome measure: Rotational displacement along with side of side and angle of displacement in fukuda stepping test.

PROCEDURE

The sample was recruited from RV College of Physiotherapy. 152 subjects who were fulfilling the inclusion criteria were selected for the fukuda stepping test. All the

subjects were assessed, and consent form was taken from the individual.

Fukuda stepping test -The individual was made to stand on a grid of 2 concentric circle with radius of 0.5m and 1.0m, eyes were closed, and arms are outstretched to 90-degree flexion and asked to take 50 steps. Both the concentric circle was divided in 30-degree angles. [6,8]



Fig3 FST grid and during test [6]

Statistical Analysis

All data were performed in SPSS® 20.0 IBM®

Pearson product moment correlation was performed to investigate the relationship between positive male and female and negative male and female individuals who performed FST

Table -1 demographic characteristic of participants

Variable	Mean±SD	Range
Age		
male positive	20.1±1.29	4
Female positive	19.81±1.41	7
male negative	19.85±1.62	5
female negative	19.49 ±1.36	6
Gender		
Male positive	10	
Female positive	44	
Male negative	21	
Female negative	77	

The above table shows demographic characteristic of participants in which there were male positive to FST 10 and females positive to FST is 44 whose mean ± SD of age was 20.1 ±1.29 and 19.81 ±1.41. Range is 4 and 7 respectively.

Male negative to FST 21 and females negative to FST is 77 whose mean ± SD of age was 19.85 ±1.62 and 19.49 ±1.36. Range is 5 and 6 respectively

Table-2 Correlation between positive male and positive female

	Pearson correlation	P value	N
Male positive	0.21	<.001	54[male 10 female 44]
Female positive			

The above table shows correlation of positive male and positive female done by fukuda stepping test The Pearson correlation is 0.21 [very weak].

Table-3 Correlation between negative male and negative female

	Pearson correlation	P value	N
Male negative	0.058	<.001	98[male 22 female 77]
Female negative			

The above table shows correlation of negative male and negative female done by fukuda stepping test The Pearson correlation is 0.058 [moderate].

RESULT AND DISCUSSION

The present study was done to determine the vestibular weakness using fukuda stepping test in physiotherapy graduates. Results of these cross-sectional studies suggest that there is a very weak correlation between the positive population who performed fukuda stepping test and moderate correlation between the negative populations of subjects who performed fukuda stepping test

However, our findings are in agree with the study done by Reliability of the Fukuda Stepping Test to determine side of vestibular dysfunction by YB Zhang and WQ Wang as their study says its unreliable. [9]

Our findings completely disagree with Test re-test reliably of fukuda stepping test in Indian college students. Irshad Alam Ansari, Sir John Samuel which says its excellent reliability among college students. [10]

The difference in findings reported in previous studies are most obviously due to difference in patient's population or difference in protocol for number of steps

Limitation of the study -Less sample sizes, Lack of blinding, Male and female ratio was not equal.

CONCLUSION

There is very weak correlation of positive male and positive female done by fukuda stepping test and moderate correlation between negative male and negative female done by fukuda stepping test. So according to present study Fukuda stepping test is not a reliable measure in determining the side vestibular weakness among college individual.

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