



COMPARISON OF THE RISK OF FALLS IN GERIATRIC POPULATION WITH AND WITHOUT HEARING AIDS

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ABSTRACT

Objective: To compare the risk of falling in geriatric population with and without hearing aids.

Background: Balance is the condition in which all the forces acting on the body are balanced such that the COM is within the stability limits, the boundaries of the base of support (BOS). Age related hearing loss (presbycusis) is the loss of hearing that gradually occurs in most of us as we grow older. Possible reasons for falls associated with hearing loss are cochlear/ vestibular pathology, poor awareness of auditory and spatial environment or mediation through the effects of hearing loss on cognitive load and shared attention. Imbalance & disequilibrium are a part of aging process & the cause of the frequent falls encountered with advancing age. Falls can & should be prevented. The pathways between hearing loss and falling are intriguing because hearing loss and falling are highly prevalent but remains mostly undertreated in older adults. In elderly, the causes of unsteadiness & falls are multifactorial & overlapping. Falls and injuries caused by falls are another group of risk factors for institutionalization that warrant further investigation, particularly since they are potentially modifiable.

Methodology: 60 samples were taken with hearing impairment, 30 of them using hearing aids, 30 not using hearing aids between 4-6 months. Consent form was taken. Risk of falls was assessed using the four square step test (FSST). To perform the test, the square was formed using 4 canes resting flat on the floor. The subject standing in square 1 facing square 2. The aim is to step as fast as possible into the squares in the following sequence-square 2, 3, 4, 1, 4, 3 2 and 1. This sequence required the subject to step forwards, backwards and sideways. The stop watch was started as soon as the patient steps into step 2 and was end as soon as the patient steps into square 1 with both feet. Readings were noted. Two such readings were taken and best score was considered.

Result and Conclusion: After 6 months of study, data was analyzed using unpaired t test. Mean value of group A=18.2633 and of group B=14.5503

Study show that there is statistical significant difference between FSST score of Group A and Group B (p value is 0.0052)

Also, there is no significant correlation between the compared age and FSST score of group A and group B respectively.

Hence this study concluded that there is increased risk of fall in individuals not using hearing aids in comparison with individuals using hearing aids.

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INTRODUCTION

Balance is the condition in which all the forces acting on the body are balanced such that the COM is within the stability limits, the boundaries of the base of support (BOS)¹⁰. It is the process by which individual's maintain and move their bodies in a specific relation to the environment⁷. It is an automatic & unconscious process that allows individual's to resist the destabilizing effect of gravity.

Balance is essential for purposeful movement & effective communication. The postural control mechanism maintains balance from the information received from receptors in the proprioceptive, visual, and vestibular systems, as well as from receptors situated in the skin.¹¹

Age related hearing loss (presbycusis) is the loss of hearing that gradually occurs in most of us as we grow older. It is one of the most common conditions affecting older and elderly adults. There are many causes of age- related hearing loss. Most commonly, it arises from changes in the inner ear as we age, but it can also result from changes in the middle ear, or from complex changes along the nerve pathways from the ear

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to the brain. Certain medical conditions and medications may also play a role. Conditions that are more common in older people, such as high blood pressure or diabetes, can contribute to hearing loss.

Possible reasons for falls associated with hearing loss are cochlear/ vestibular pathology, poor awareness of auditory and spatial environment or mediation through the effects of hearing loss on cognitive load and shared attention. Falls themselves and the belief that one might fall in fall risk situations can result in restriction of mobility and activity, feeling of helplessness, loss of confidence, depression and institutionalization. It has been proved that falls are the leading cause of accidental death in adults over the age of 65. Thirty percent of people over the age of 65 years who live in the community fall each year; this proportion increases to 50 percent by the age of 80 years³. One of the leading health concerns for people over age of 60 is falling, which is often related to balance problem¹². The consequences of falls can be disastrous. Falls among the elderly represent a major economic and social problem.

MATERIAL AND METHOD

Study Design

Type of study: Cross sectional observational study.

Duration of study: 1 year.

Place of study: Metropolitan city

Study Design

Sample size: 60

Sample population: 1) Geriatric population using hearing aid
2) Geriatric Population not using hearing aids

Sampling: Convenient sampling.

Selection Criteria

Inclusion Criteria

1. Community dwelling geriatric population (60-75 years) using hearing aids.
2. Community Dwelling geriatric population not using hearing aids.
3. Good Vision/ Corrected Vision.

Exclusion criteria

1. Alcohol intoxication
2. Amputated limb
3. Neurological Deficits
4. Migraine headache and migraine variants
5. Syncope
6. Orthostatic hypotension
7. Diabetic Neuropathy
8. Glaucoma/ Cataract Surgery
9. Congenital Deformity
10. Trauma in past 6 months

Material Used

Stopwatch, notepad, pen, canes

Procedure

Geriatric Population of age between years were selected according to the above mentioned selection criteria for study.

Prior starting the study, a written informed consent was taken from the each subject in the language best understood by them. The subjects were explained about the nature and procedure of the study.

The square was formed using 4 canes resting flat on the floor. The subject standing in square 1 facing square 2. The aim is to step as fast as possible into the squares in the following sequence- square 2, 3, 4, 1, 4, 3 2 and 1. This sequence required the subject to step forwards, backwards and sideways. The stop watch was started as soon as the patient steps into step 2 and was end as soon as the patient steps into square 1 with both feet. The following instructions were given to the subject, 'Try to complete the sequence as fast as possible without touching the sticks. Both feet must make contact with the floor in each square.'

The sequence was demonstrated to the subject

The time required to complete the test was recorded.

Two trails were performed. The better time (in seconds) was taken as the score.

Demographic Data

Group A

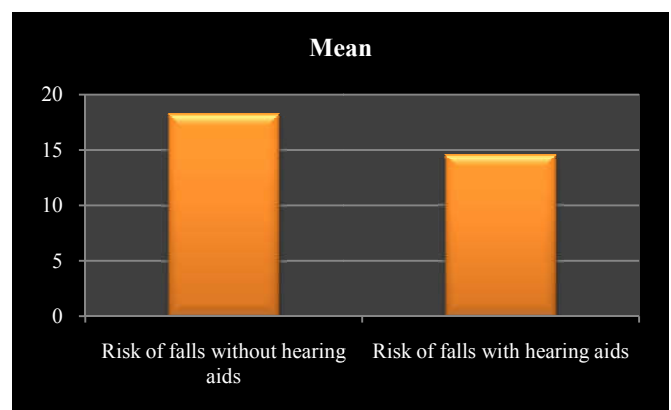
Sample Size	30
Age Group	60-75years
Mean Age	69.57 Years
Standard Deviation	3.06

Group B

Sample size	30
Age group	60-75 years
Mean age	69.40 Years
Standard deviation	2.98

RESULTS

Graph of The Difference Between The Risk of Falls In Group A And Group B



P value= 0.0052

	Group A- Risk of falls without hearing aids	Group B- Risk of falls with hearing aids
Mean	18.2633	14.5503
S.D	5.7138	4.0378
SEM	1.0432	0.7372
N	30	30

Inference: The above graph shows significant difference in risk of falls without and with hearing aids ($p < 0.05$).

DISCUSSION

The study was conducted to check the prevalence of fall risk in geriatric subjects using hearing aids & those not using hearing aids. 60 samples were selected according to convenient sampling which included 2 groups of 30, community dwelling geriatric population using hearing aids and community dwelling geriatric population not using hearing aids.

The result of our study showed that there was significant statistical difference between FSST scores of individuals not using hearing aids and those using hearing aids (P value 0.0052).

Falls warrant investigations as a risk factor for nursing home admission because falls are common & are associated with functional disability & because they may be preventable.

Among older people living in the community falls are a strong predictor of placement in a skilled nursing facility. Also, it has been well documented that untreated hearing can lead to a myriad of health & personal safety issues.

Healthy Hearing, Ohio University '16 speculate that there could be a few reasons that hearing loss is associated with an increased risk of falls. One reason could be that with hearing loss, people have less environmental awareness to people or other things going on around them.

The factors attributing to risk of fall are:

Balance in walking and standing is dependent on many factors. Good balance requires reliable sensory input from the individual's vision, vestibular system (the balance system of the inner ear), and proprioceptors (sensors of position and movement in the feet and legs).

The elderly are prone to a variety of diseases that affect these systems. Balance is also dependent on good muscle strength and joint mobility. A sedentary lifestyle and arthritis or diseases of bones and muscles can compromise strength and mobility. Most people are familiar with the problems associated with the aging of senses such as vision and hearing. However, the vestibular system is another sensory system that can also begin to function poorly with age, leading to a diminished quality of life.

The vestibular system is a complex structure of fluid-filled tubes and chambers that constitutes part of the inner ear. Specialized nerve endings inside these structures detect the position and movement of the head and also detect the direction of gravity. The signals sent from the nerves of the vestibular system are critically important to the brain's ability to control balance in standing and walking and also to control certain types of reflexive eye movements that make it possible to see clearly while walking or running.

Anatomical studies have shown that the number of nerve cells in the vestibular system decreases from about age 55. Blood flow to the inner ear also decreases with age. Idiopathic bilateral (occurring on both sides) vestibular loss becomes more severe as age progresses. When the vestibular system is damaged by any cause, an individual may experience dizziness and balance problems. However, the gradual, age-related loss of vestibular nerve endings can result in severe balance problems without any associated dizziness. This type of slow loss of vestibular function may be first noticed as difficulty walking or standing.

CONCLUSION

This study shows that there is increased risk of fall in individuals not using hearing aids in comparison with individuals using hearing aids.

Limitations

1. Small sample size
2. Does not include reported outcomes of hearing aids.

Aknowledgment

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