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PREVALENCE OF COGNITIVE IMPAIRMENT AND BALANCE IMPAIRMENT AMONG URBAN ELDERLY POPULATION OF KANPUR

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Abstract: Purpose: ***To find out prevalence of cognitive impairment and balance impairment among urban elderly population, Kanpur.***

Material and Methods: ***Community based cross- sectional study was done at field practice area of Urban in Kanpur College, by using systematic random sampling with PPS among 134 rural elderly individuals. Assessment of cognitive impairment was done using Mini Mental State Examination and assessment of balance impairment was done by using Berg Balance Scale Data was entered & analyzed using SPSS 20. Chi- Square test was used. P value <0.05 was considered significant.***

Result: ***The prevalence of cognitive impairment was found to be significant relationship of the prevalence of cognitive impairment was observed with the age, gender, literacy status, & marital status.***

Conclusion: ***There is significant effect of cognitive impairment and balance impairment among urban elderly population of Kanpur.***

Keywords: *balance, cognition, elderly population.*

INTRODUCTION

The geriatric population is defined as population aged 60 years and above [1] .There is no United Nations (UN) standard numerical criterion, but the UN agreed cut off is 60+ years to refer to the older population [2] According to Indian Scenario of geriatric population 2011, 99 million out of 1. 21 billionare over the age of 60, which was 77 million in 2001. According to an estimate, by 2021, India's elderly population will cross 137 million. Currently, India has the second largest aged population in the world. [3,4]

Balance is the ability of an individual to successfully maintain the position of their body or restore the centre of mass over time [5]. In a good posture it can be achieved by the minimal work of involved muscles or with a minimal postural way. Balance is achieved by the complex integration and coordination of sensori-motor control systems including the sensory input (vision, proprioception and vestibular system), integration of that sensory input and by motor output to the head, eye, trunk, and limb muscles [6]. It has been reported that balance is multifactorial and may be effected by a variety of factors. Apart from medical and psychological factors, aging process plays a significant role in maintaining balance of the body [6]

Balance impairments are often associated with impaired vision, poor hearing, vestibular dysfunction, polyneuropathy, diabetic neuropathy and many chronic diseases and disorders i.e., cerebral and cerebellar disorders, cerebrovascular disease, spinal cord disorders, intervertebral disc disorders, psychological factors, dementia, high blood pressure, postural hypotension, diabetes mellitus, heart disease, arrhythmias proprioception, joint problems, arthritis and muscular weakness[4-13].

Balance, or postural stability, is a generic term used to describe the dynamic process by which the body's position is maintained in equilibrium. Equilibrium means that the body is either at rest (static equilibrium) or in steady-state motion (dynamic equilibrium).Balance is greatest when the body's center of mass (COM) or center of gravity (COG) is maintained over its base of support (BOS).

Center of mass: The COM is a point that corresponds to the center of the total body mass and is the point at which the body is in perfect equilibrium. It is determined by finding the weighted average of COM of each body segment [14]

Center of gravity: The COG refers to the vertical projection of the center of mass to the ground. In the anatomical position, the COG of most adult humans is located slightly anterior to the second sacral vertebra [15] or approximately 55% of a person's height [16].

Base of support: The BOS is defined as the perimeter of the contact area between the body and its support surface; foot placement alters the BOS and changes a person's postural stability[17].

Aging process has remained one of the hot topics in developed countries and a plethora in the literature regarding the problems associated with aging can be seen.. This cross sectional survey was carried out in order to find out the frequency of fall in elderly population. In the united states, approximately 20% to 30% of elderly persons experience problems with dizziness or balance [18,19].

Balance disorders present significant challenges for elderly patients, causing limitations on daily activities. Balance dysfunction is associated with poor functional capacity and an increase risk of falling [20]. Management of elderly patients with dizziness or balance disorders requires additional consideration, because the etiology of dizziness and balance disorders may be multifactorial, and medications often prescribed for dizziness and vertigo may disproportionally and adversely impact elderly patients due to side effects and/or interactions with other medication [21,22].

Balance disorders requires consideration of multiple organ system, including the vestibular, central, and peripheral nervous system as well as the cardiovascular system. On account of better education, health facilities and increase in life expectancy, the percentage of elderly population (60+) has gone up from 6% to 8.3% during the period 1991-2013[23].

Cognitive impairment (CI) is defined as "Confusion or memory loss that is happening more often or is getting worse during the past 12 months [24].

Regular physical activity, control of blood sugar and cholesterol can attenuate its risk [24]. Aging is considered as the main reason behind it; however, other factors such as literacy, family history, injury to brain , etc. along with diseases like Parkinson's may also contribute in development of cognitive impairment [24].

Cognitive impairment debilitates daily life routine ultimately resulting in decreased quality of life and increase dependence. Population aging is a global phenomenon. bIt is estimated that between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%. The people aged 60 years and older are expected to outnumber children younger than 5 years by 2020 [25,26].

It is estimated that between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%. State wise data reveal that Kerala has maximum proportion of elderly people in its population (12.6%) (27). Cognitive impairment, being the most consistent and characteristic symptom of Alzheimer's disease, can be considered a proxy for the disease in population based studies [28].

Several studies suggest that nutritional status, as well as health behaviours, frailty, disability, functionality status and chronic diseases (e.g. hypertension, cardiovascular disease, diabetes mellitus and metabolic syndrome) are associated with cognitive impairment and dementia. [28]

REVIEW OF LITERATURE:

Hoaider Darain (2016) et al in their study *"Balance Problems in Geriatric Population: A Population Based Survey"* concluded that frequency of balance problems among elderly population was found high and more in wom0en than men. Balance impairments may result in falls and may result in increased morbidity in these cases.

Roberts (2013) et al in their study *"Health Care Practice Patterns For Balance Disorders in the Elderly"* concluded that despite a high prevalence of balance problems in the elderly, a significant proportion do not come to a clear diagnosis. The0re is a noteworthy rate of prescription medication utilization in this population. Giving an increasingly agi0ng population, attention needs to be given to balance problems in the elderly to optimize diagnosis and health care utilization.

Mohm Maroof (2016) in their study *"Prevalence and determinants of cognitive impairment among rural elderly population of Aligarh"* concluded that approx one sixth of the elderly had cognitive impairment significantly related to various socio-demographic factors. Therefore, priority based care should be given to the vulnerable population by strengthening of the service available and creating awareness to utilize the services.

Dr. Jenyz M. Mundodan (2018) in their study *"Nutritional status and cognitive impairment in elderly population in a rural area of Thrissur district, Kerala"* concluded that there is no association between cognitive impairment and nutritional deficit. Therefore it is essential to screen elderly for nutritional status while assessing cognitive impairment.

HYPOTHESIS:

Null Hypothesis:

There is no significant effect of cognitive impairment and balance impairment among urban elderly population of Kanpur.

Alternate Hypothesis:

There is significant effect of cognitive impairment and balance impairment among urban elderly population of Kanpur.

AIM OF THE STUDY:

To find out prevalence of cognitive impairment and balance impairment among urban elderly population

OBJECTIVE OF THE STUDY:

To determine the prevalence of cognitive impairment and balance impairment among urban elderly population of Kanpur.

MATERIAL AND METHODS:

Design of the study

Cross sectional Survey.

Sampling

Systematic random sampling.

Study population:-

old age home (kalyanpur, kidwai nagar) Kanpur Nagar.

Sample size

134 individuals.

Place of the study:-

Saaii college of medical science and technology Kanpur.

SELECTION CRITERIA:

Inclusion Criteria

1. Gender - Both male and female was taken into consideration
2. Age Range: 60-85 years
3. Participants able to independent walk and stand.

Exclusion Criteria

1. Unstable cardiopulmonary function
2. Musculoskeletal disorder
3. Non-ambulatory person or people
4. People with same age but with any disability and those who were unable to sand and walk.
5. Who had any of the medical diseases such as {cancer, cataract, glaucoma, polyneuropathy, amputated extremities, tumor of vestibulocochlear nerve and benign paroxysmal postural vertigo etc}.
6. Severely ill.

VARIABLEES:

Dependent

- Cognition
- Balance

Independent

- Berg balance scale
- Mni mental state of examination

TOOLS:

- MMSE (Mini-Mental State Examination) SCALE.
- PAPER.
- PEN.
- PENCIL.
- ERASER.
- SPSS version-20
- Chair unsupported
- SUPPORTED.
- Berg Balance Scale (FOR BALANCING TEST).
- STOOL.
- COUCH

PROTOCOL:

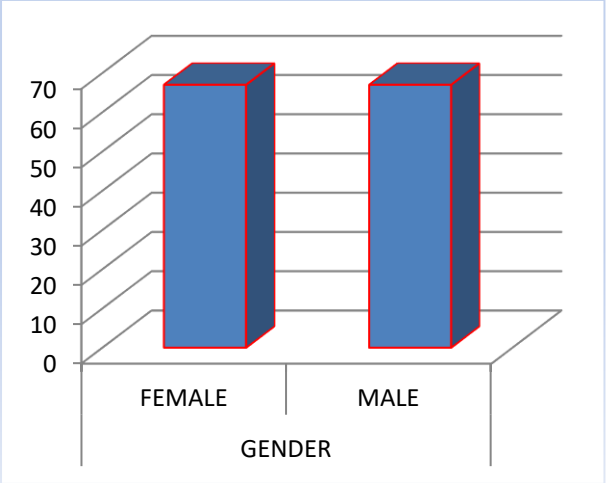
The present study is part of a large community based cross- sectional study carried out at field practice area of urban old age home Kanpur. For study research, 135 subjects will be selected. According to the inclusion and exclusion, each patient was explained the purpose of the study and a consent form was given to be filled by the patient. If the subject is willing to participate in the study, we will go with the further procedure.

Elderly individuals aged 60 years & above giving informed consent were included in the study whereas individuals aged <60 years, not giving consent, severely ill & moribund individuals were not included in the study. The sampling method used was systematic random sampling with probability proportionate to size (PPS).

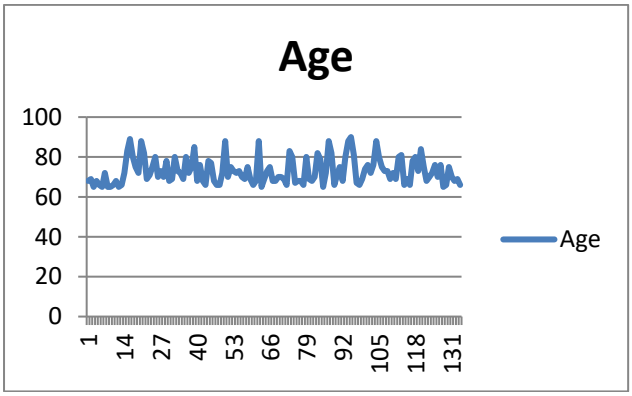
The berg balance scale is generally considered to be a gold standard with good inter-rater and intra-rater reliability and good internal validity.

Data analysis was done using IBM SPSS Statistics (software package used for statistical analysis 2015 version-Rev.) Descriptive statistics was done to determine the demographic characteristics of the subjects recruited in this study, t-test used. p-value used in hypothesis tests to help you decide whether to reject or fail to reject a null hypothesis. The p-value is the probability of obtaining a test statistic that is at least as extreme as the actual calculated value, if the null hypothesis is true. A commonly used cut-off value for the p-value is 0.05.

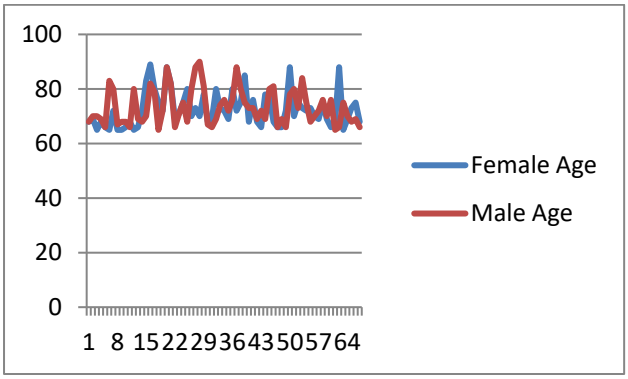
RESULT:



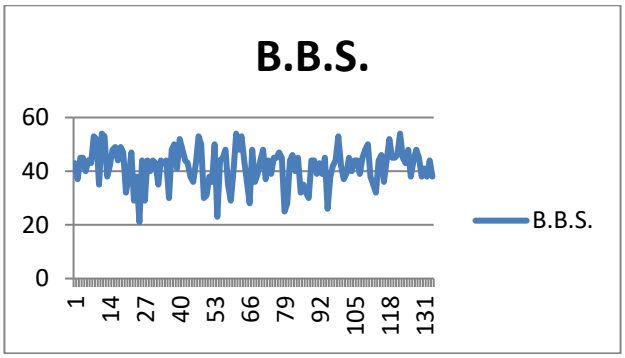
Graph-1: Represents the gender wise distribution of study subjects. A finding shows equal number of male subjects & female subjects i.e.67 & 67 respectively out of total 134 subjects.



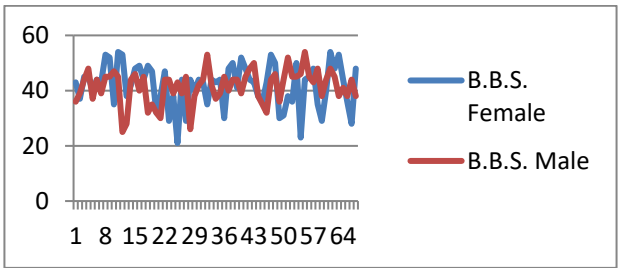
Graph-2: Represents the mean age (±SD) of all 134 study subjects, A finding shows mean age is 72.84 (±5.64) years.



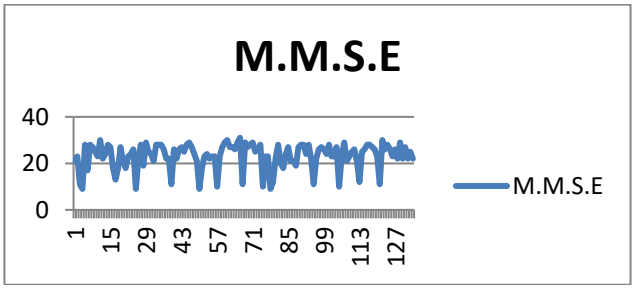
Graph-3: Represents the mean age (±SD) of female & male subject respectively, A finding shows mean age of female subjects 72.37 (±5.31) years and mean age of male subjects 73.31 (±4.91) years



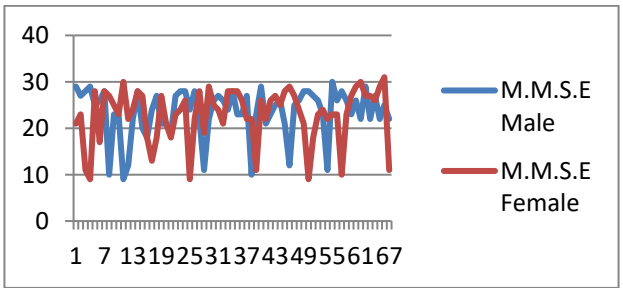
Graph-4: Represents the mean (±SD) of Berg Balance Scale (B.B.S.) for all 134 study subjects, A finding shows mean (±SD) of B.B.S. is 41.75 (±5.64).



Graph-5: Represents the mean (±SD) of Berg Balance Scale (B.B.S.) for female and male subjects respectively, A finding shows mean (±SD) of B.B.S. for female subjects is 41.97 (±5.03) and for male subjects 41.54 (±5.11) respectively.



Graph-6: Represents the mean (±SD) of Mini-Mental State Examination Scale (M.M.S.E.S. for all 134 study subjects, A finding shows mean (±SD) of M.M.S.E.S. is 23.25 (±3.14).



Graph-7: Represents the mean (±SD) of Mini-Mental State Examination Scale (M.M.S.E.S.) for female and male subjects respectively, A finding shows mean (±SD)

of M.M.S.E.S. for female subjects is 22.99 (±3.03) and for male subjects 23.51 (±3.11) respectively.

Berg Balance Scale (B.B.S.): Interpretation of result

Total subjects participated =134

Balance level	Standard Score	Subjects	% out of total subjects
Wheelchair user	Less than 20	Zero	0%
Walking with assistance	More than 20 less than 40	52	38.81%
Independent	More than 40 less than 56	82	61.19%

Berg Balance Scale (B.B.S.) is gold standard for static & dynamic balance abilities, the results shows interpretation of B.B.S. out of 134 study subjects, Mean score of all subjects (±SD) is 41.75 (±5.64), which is more than 40 BBS standard Score so it represents independent balance level of all subjects in general. A finding also represents mean (±SD) of B.B.S. for female subjects is 41.97 (±5.03) and for male subjects 41.54 (±5.11) respectively.

Out of 134 subjects none subject score less than 20 BBS standard score so having zero percentage of wheelchair users among urban elderly population. Out of 134 subjects 52 subjects score more than 20 less than 40 BBS standard score with having 38.81% of walking with assistance user among urban elderly population.

Out of 134 subjects 82 subjects score more than 40 less than 56 BBS standard score with having 61.19% of an independent user among urban elderly population. The p-value is <0.030.

Mini-Mental State Examination Scale (M.M.S.E.S.): Interpretation of result

Total subjects participated =134

Cognition level	Standard Score	Subjects	%
Severe Cognitive impairment	Less than 9	04	02.99%
Moderate Cognitive impairment	More than 10 less than 18	17	12.68%
Mild Cognitive impairment	More than 19 less than 23	39	29.10%
Normal Cognition	More than 24 less than 30	74	55.22%

Mini-Mental State Examination Scale (M.M.S.E.S.) is used test for cognitive function among the elderly; it includes tests of orientation, attention, memory, language & visual-spatial skills. The results represents interpretation of M.M.S.E.S. out of 134 study subjects, Mean score of all subjects (±SD) is 23.25 (±3.14), which is slightly more than 23 standard Score so it represents normal cognition of all subjects in general. A finding also represents mean (±SD) of M.M.S.E.S. for female subjects is 22.99 (±3.03) with mild cognitive impairment to normal cognition, and for male subjects 23.51 (±3.11) with normal cognition respectively.

Out of 134 subjects only 04 subjects score less than 09 MMSES standard score with 02.99% subjects representing severe cognitive impairment among urban elderly population.

Out of 134 subjects 17 subjects score more than 10 & less than 18 MMSES standard score with 12.68% subjects representing moderate cognitive impairment among urban elderly population.

Out of 134 subjects 39 subjects score more than 19 & less than 23 MMSES standard score with 29.10% subjects representing mild cognitive impairment among urban elderly population.

Out of 134 subjects 74 subjects score more than 24 & less than 30 MMSES standard score (as 30 is maximum score) with 55.22% subjects representing normal cognition among urban elderly population. Thep-valueis<0.33.

DISCUSSION:

Old age refers to ages nearing or surpassing the life expectancy of human beings, and is thus the end of the human life cycle so old or elderly population often have limited regenerative abilities and more susceptible to disease, syndromes, injuries, impairments & sickness than younger adults.(19)

Cognitive impairment is when a person has trouble remembering, learning new things, concentrating or making decisions that affect their everyday life, Mini-Mental State Examination scale (M.M.S.E.S.) also called as Folstein test was used to find out the cognitive impairment level.(24)

Balance is an ability to maintain the line of gravity (vertical line from centre of mass) of a body within the base of support with minimal postural sway. Berg balance scale (B.B.S.) was used as a multi-level tool & considered as gold standard for static and dynamic balance abilities so its functional balance test.(21)

For our designed cross sectional survey we selected 134 subjects on systematic random sampling based on inclusion and exclusion criteria from the city of Kanpur.

Haider Darain et al (2016) in his study Balance Problems in Geriatric Population: A Population Based Survey concluded that frequency of balance problems among elderly population was found high and more in women than men. Balance impairments may result in falls and may result in increased morbidity in these cases; in our study we also support above statement as the mean (±SD)of B.B.S. for female subjects is 41.97 (±5.03) and for male subjects 41.54 (±5.11) respectively.

Mohm Maroof (2016) in their study Prevalence and determinants of cognitive impairment among rural elderly population of Aligarh conclude that Berg Balance Scale (B.B.S.) can be used as a multi-level tool with the risk of multiple falls increasing below a score of 45 & a significant increase below 40. Berg Balance Scale (B.B.S.) is gold standard for static & dynamic balance abilities, the results of our study shows interpretation of B.B.S. out of 134 study subjects, Mean score of all subjects (±SD) is 41.75 (±5.64), which is more than 40 BBS standard Score so it represents independent balance level of all subjects in general. A finding also represents mean (±SD) of B.B.S. for female subjects is 41.97 (±5.03) and for male subjects 41.54(±5.11) respectively.

Out of 134 subjects none subject score less than 20 BBS standard score so having zero percentage of wheelchair users among urban elderly population.

Out of 134 subjects 52 subjects score more than 20 less than 40 BBS standard score with having 38.81% of walking with assistance user among urban elderly population.

Out of 134 subjects 82 subjects score more than 40 less than 56 BBS standard score with having 61.19% of an independent user among urban elderly population.

Dr. Jenyz M. Mundodan (2018) in their study "Nutritional status and cognitive impairment in elderly population in a rural area of this district, Kerala" concluded Mini-Mental State Examination Scale (M.M.S.E.S.) is used test for cognitive function among the elderly; it includes tests of orientation, attention, memory, language & visual-spatial skills.

The results of our study represents interpretation of M.M.S.E.S. out of 134 study subjects, Mean score of all subjects (±SD) is 23.25 (±3.14), which is slightly more than 23 standard Score so it represents normal cognition of all subjects in general. A finding also represents mean (±SD) of M.M.S.E.S. for female subjects is 22.99 (±3.03) with mild cognitive impairment to normal cognition, and for male subjects 23.51 (±3.11) with normal cognition respectively.

Out of 134 subjects only 04 subjects score less than 09 MMSES standard score with 02.99% subjects representing severe cognitive impairment among urban elderly population.

Out of 134 subjects 17 subjects score more than 10 & less than 18 MMSES standard score with 12.68% subjects representing moderate cognitive impairment among urban elderly population.

Out of 134 subjects 39 subjects score more than 19 & less than 23 MMSES standard score with 29.10% subjects representing mild cognitive impairment among urban elderly population.

Out of 134 subjects 74 subjects score more than 24 & less than 30 MMSES standard score (as 30 is maximum score) with 55.22% subjects representing normal cognition among urban elderly population.

CONCLUSION:

There is significant effect of cognitive impairment and balance impairment among urban elderly population of Kanpur as around 38.81% of all subjects must require assistance to mobility while 61.91% were independent to walk without any assistance & around 44.78% found cognitive impairment while 55.22% are having good cognition, so p-value <0.30 hence null hypothesis accepted & alternative hypothesis rejected.

LIMITATION:

There was some limitation to our study-

The small sample size of community dwelling, mobility impair elders is a distinct limitation.

Various other risk factors and their association with the cognitive impairment were not studied

FUTURE STUDY

A larger population and with a control group design will be necessary to confirm more precise results.

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