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Association between dynamic balance and level of physical activity among community dwelling elderly

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ABSTRACT- Background: Aging is a gradual diminution in physiological capacity of various systems like musculoskeletal, cardiovascular, neuropsychiatry and immune. Balance is one of the major problems in the elderly. The objective of this study is to clarify the effects of community based, long term intervention in the elderly, in the form of comprehensive physical activity, on standing balance composed of static balance, dynamic balance and postural response.

Method: In this Survey based study, 100 elderly between age group 65-75 years were selected according to convenient sampling method. Patients who have undergone any recent spine or lower limb surgeries, who have neurological defect, cognitive dysfunction and who use assistive devices were excluded from the study. Balance was assessed using the Berg balance scale (BBS), Functional reach test (FRT), Time up and go test (TUG), Level of Physical Activity will be checked by using Physical activity scale for the elderly (PASE).

Result: Spearman coefficient correlation was used to evaluate correlation. On statistical analysis correlation between BBS and PASE (r=0.2768), FRT and PASE (r=0.4309), TUG and PASE (r= -0.3052) was found out between 100 elderly.

Conclusion: There is Positive correlation between BBS and PASE, FRT and PASE, Negative correlation between TUG and PASE.

Keywords: Dynamic Balance, Physical Activity, Berg Balance scale, functional reach test, time up and go test, Physical activity scale for the elderly, Correlation.

I. INTRODUCTION

Aging is an artificial concept that describes physiological changes that occur with advancing age.[1] It means predictable, progressive, universal deterioration in various physiological systems, mental and physical, behavioural and biomedical system. In India, persons above 60 are called aged/elderly. [2]As per the 1991 census, the population of the elderly in India was 57 million as compared with 20 million in 1951. There has been a sharp increase in the number of elderly persons between 1991 and 2001 and it has been projected that by the year 2050, the number of elderly people would rise to about 324 million. India has thus acquired the label of "an ageing nation" with 7.7% of its population being more than 60 years old. [2]

The problems faced by this segment of the population are numerous owing to the social and cultural changes that are taking place within the society. The major area of concern is the health of the elderly with multiple medical and psychological problems. Balance is one of the major problems in the elderly and are considered one of the "Geriatric Giants". Balance is an important cause of morbidity and mortality in the elderly and are a marker of poor physical and cognitive status. Following are the physiological changes according to the age. [3-6]

Balance is defined as the ability to maintain an upright posture during static and dynamic tasks which requires complex interactions between peripheral and central factors such as vision, somato sensation, vestibular sensation, motor output, and musculature.[7]Balancing is an interplay and integration of contributions from vision, vestibular sense working in conjunction with the cerebellum, proprioception, muscle strength and reaction time.[8]

Dynamic balance indicates the ability to control posture during active motion; i.e., keeping the center of pressure (COP) of the body mass within the allowable area of the base of support. In controlling dynamic balance, anticipatory postural adjustments are required. Anticipatory adjustments of the posture prepare a person's balance prior to or parallel to postural disturbance induced by any subsequent voluntary motion which follows. Thus, it is important to note that dynamic balance depends on an anticipatory feed-forward adjustment of the posture. [9-11] When the COP deviates beyond the allowable area in standing balance, the postural response of the whole body is elicited to return the COP to within the controllable

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area of the base of support.[12,13] When this postural response does not function adequately, falling is inevitable. The postural response is therefore the final response acting to prevent falls.

Prevailing community-based intervention in the form of physical activity for elderly persons usually consists of various exercises such as aerobic exercises, muscle strengthening exercises, stretching and balance exercises. Imposed exercise, as a form of intervention, is generally comprehensive rather than focal.[14] So it is important to precise the effect of such comprehensive exercises on various aspects of standing balance, a prime inner factor of falling in elderly persons. The objective of this study was to clarify the effects of community-based, long-term intervention in the elderly, in the form of comprehensive physical activity, on standing balance composed of static balance, dynamic balance and postural response.

Falling is the leading cause of injury-related deaths in older adults.[1,2] Furthermore, increasing age is correlated with an increased number and severity of falls[2]. Identifying an individual's risk for falling can be difficult because there are a variety of risk factors that must be assessed.

Inclusionand Exclusion Criteria

Inclusion Criteria: -

1. Elderly between the age of 65-75 years.
2. Gender- Both male & female.
3. Individuals who are able to understand simple commands.
4. Subjects who are willing to participate in the study.

Exclusion Criteria: -

1. Patients who have undergone any recent spine and lower limb surgeries.
2. Patients having any neurological defect.
3. Patients having cognitive dysfunction.
4. Patients who are using assistive device.

Outcome Measures

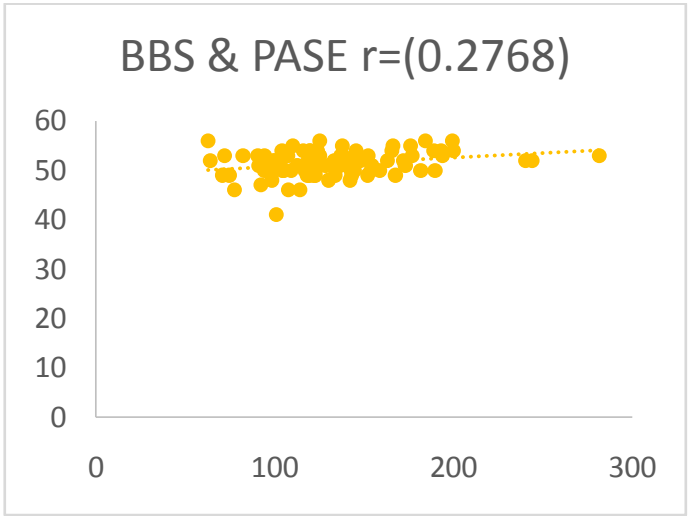
1.Berg balance scale (BBS)
2. Time Up & Go Test (TUG)
3.Functional reach test (FRT)
4. Physical Activity Scale for Elderly (PASE)

Objectives -

1. To assess static functional task using BBS.
2. To assess dynamic balance in community dwelling elderly using Time Up & Go Test (TUG) and Functional Reach Test (FRT).
3. To assess level of physical activity among community dwelling elderly using Physical Activity Scale for elderly.
4. To study association between dynamic balance and level of physical activity.

II. RESULT

Spearman coefficient correlation was used to evaluate correlation. On statistical analysis correlation between BBS and PASE (r=0.2768), FRT and PASE (r=0.4309), TUG and PASE (r= -0.3052) was found out between 100 elderly.



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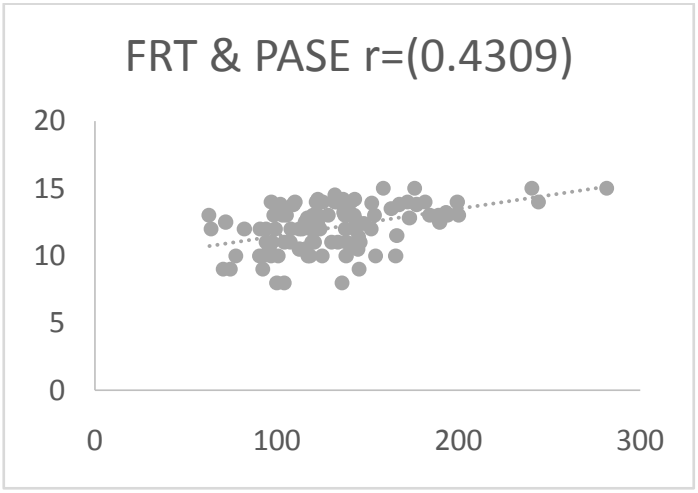

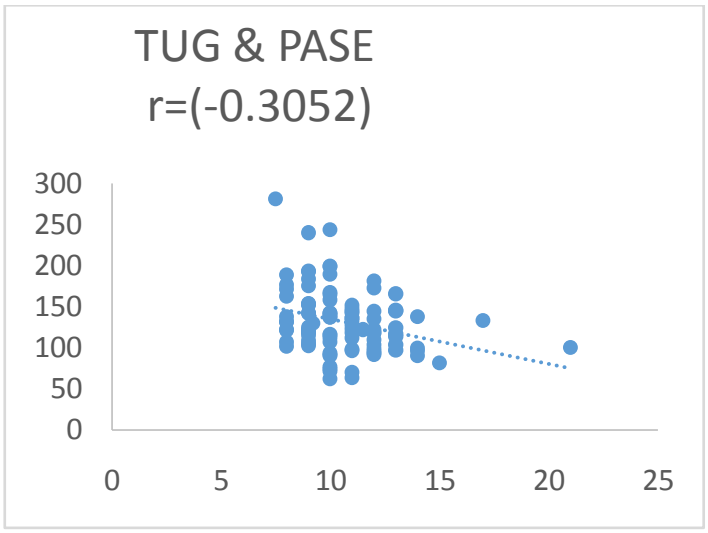

III. DISCUSSION

The physiological decay of the elderly may lead to a reduction in the ability to balance and an increased risk of falls becoming an important issue among the elderly. The ability to control balance is based on the integration of sensory information from the somatosensory, vestibular, and visual systems, which work together with the nervous-muscular system to control body alignment with respect to the environment and to stabilize the body's center of mass during perturbations, with subsequent motor output. Having good balance means being able to control and maintain your body's position, whether you are moving or remaining still. Balance is considered a key component in many activities of daily living, from simple activities such as quiet standing, to more complex activities such as walking while talking or while changing directions. These different tasks require different components of balance ability, which are usually divided into two types of balance: static and dynamic. Static balance is defined as the ability to maintain an upright posture and to keep the line of gravity within the limits of the base of support (i.e., quiet standing). Dynamic balance is defined as the ability to maintain stability during weight shifting, often while changing the base of support. Dynamic balance indicates the ability to control posture during active motion; i.e., keeping the center of pressure (COP) of the body mass within the allowable area of the base of support. In controlling dynamic balance, anticipatory postural adjustments are required.

The present study was done to find out co-relation between dynamic balance and level of

physical activity in community dwelling elderly. Of age group 65-75 years. Dynamic balance was assessed by using (FRT) & (TUG) scale, Functional balance was assessed by using (BBS) scale and level of physical activity was assessed by using (PASE).

In this study the outcome measures used are TUG (validity=0.75, reliability=0.99), F5RT (validity=0.71, reliability=0.89), BBS (validity=0.96, reliability=0.98) and PASE (validity=0.48, reliability=0.75)

There was a study done by Ankur D et.al (2010) on Relationship Between Dynamic Balance Measures and Functional Performance in Community-Dwelling Elderly People concluded that TUG can be recommended as measures to identify community-dwelling elderly people who are at risk of falling, And BBS includes multiple tasks that target both predictive and unpredictive aspects of balance control.

There was Positive correlation between BBS and PASE (R=0.2768) And FRT and PASE (r=0.4309). There was Negative correlation between TUG and PASE (r= -0.3052)

A Study done by Barbara J Jefferis et.al (2014) on Falls and fear of falling associated with measured physical activity in community dwelling elderly. Concluded that fear of falling and impaired balance are important barriers to elderly people.

As correlation between BBS and PASE, FRT and PASE is positive there is Low to Medium fall risk and Frail Elderly. As correlation between TUG and PASE is negative that means the elderly can walk 3m (10ft). With minimal risk of fall.

IV. CONCLUSION

The study concluded that the dynamic balance is impaired amongst the community dwelling elderly. And the level of physical activity is low.

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