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PROPRIOCEPTION DEFICITS;

FREQUENCY OF BALANCE AND PROPRIOCEPTION DEFICITS IN ELDERLY POPULATION OF OLD HOMES OF TWIN CITIES OF PAKISTAN

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ABSTRACT… Objectives: To investigate the frequency of balance and proprioception deficits in elderly population of old homes of Twin cities of Pakistan and to find which lower limb joint is most prone to proprioception loss. **Study Design:** Descriptive cross sectional design. **Setting:** Old homes of Rawalpindi and Islamabad. **Study Period:** September 1st 2016 to 30th December 2016. **Material and Methods:** A sample of 207 residents of old homes aged 60-85 years (mean 69 ± 6.673) with 104 males (50.2%) and 103 females (49.8%) was recruited for this study by Purposive, non-probability sampling technique. Short form 7-Item Berg Balance Scale, Romberg test, tandem walk test and forward reach test was used for balance assessment and Joint Position Matching tests was administered for proprioception. Data was analyzed on SPSS version 20. **Results:** Dizziness was a common risk factor of falls (21%) and next was the visual impairment (8.7%) in elderly population. Unmatched ratio in the Joint position matching was the highest in hip joints (R= 35.70%, L= 48.30%) irrespective of gender. Females had higher risk of fall than males. Ceiling effect in the scores of 7-item BBS was mostly noted in males. **Conclusion:** The study revealed that the frequency of balance problems amongst our elderly population is high with women being more vulnerable to fall risk. The most proprioception loss was observed in left lower limb and the joint affected was the hip joint.

Key words: Balance, Elderly, Fall, Proprioception, Postural instability.

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INTRODUCTION

Ageing is a universal phenomenon and is accompanied by a decline in the function of the systems that are responsible for the control of balance.[1] For people over the age of 60 years fall due to balance and proprioceptive impairment is the leading health concern. The number of falling people increases from 40% to 65% to 82% with each decade after age 65 years.[2]

Falls are considered as normal step in the process of ageing but in reality extrinsic and intrinsic factors are responsible for falls in old age population as they encounter many problems like gait or balance disorders, visual disorder, dizziness, confusion, cognitive deficits, weakness, arthritis, and environmental hazards etc. As ageing proceeds proprioceptive and balance system deteriorates which ultimately results in life threatening injuries.[3] One of the major risk factors and common cause of falls in the elderly is postural instability. As ageing progress adults lack both static and dynamic balance. Balance is achieved by a group of complex systems, namely the sensorimotor system of the body, its sensory input consists of three components; Vision, Proprioception and Vestibular system. All these work in association and failure in even one of them disturbs the system and cause fall. Most of these physiological causes are irreversible and they get worse over time[4] The loss of balance and proprioception with increasing age is central to a number of geriatric syndromes, in particular falls, yet it is relatively little considered in clinical practice. Proprioception is considered as the 6th sense of the body, with a contribution so fundamental to our body's functioning that it is often overlooked.[5] It is the ability of the body to control and sense our limbs without looking at them.[6] Many adults become less active as they get older, which exacerbates the physical effect of ageing, and accelerate loss of proprioceptive acuity and

thus would contribute to loss of functional independence.[7] Falls threaten the independence of elderly people and cause cascade of individual and socioeconomic consequences which in turn drastically declines the function and quality of life Through this research, we aim to determine about the prevalence of balance and proprioceptive deficits in our older population and to find which lower limb joint is most prone to proprioception loss.

METHODOLOGY

This was a cross sectional study conducted from September 1st 2016 to 30th December 2016. A sample of 207 participants was taken from old homes of Rawalpindi and Islamabad with informed consent, of which 117 were males and 90 were females. The participants were between the age brackets of 60 to 85, the basic criteria of selecting participants were physically independent person who can walk up to 6 meters independently without any assistive devices and major visual impairments. People with the history of musculoskeletal problems, total knee replacement, neurological or unstable cardiopulmonary problem, dizziness and lower limb fracture in past 12 months were excluded. Equipment required were a goniometer, stop watch and a ruler or other indicator of 2, 5, and 10 inches. Tests were performed on each individual. Balance was assessed through the approved short form of 7 steps Berg Balance Test, Functional Reach test, Single Limb Stance test, Romberg test and Tandem standing. The acuity of proprioception of the participant's lower limbs was checked by Joint Position Matching. The three joints; Ankle, knee and hip, were tested individually on both sides. The ankle and knee joints were tested using the Contralateral Matching and the Hip joint was measured through Ipsilateral Matching.

RESULTS

Data was analyzed through SPSS 20. Demographic data of study population was evaluated by descriptive analysis. Continuous variables like age and risk factors were expressed as mean ± standard deviation (SD) whereas frequency and percentages of other variables were evaluated. The overall mean age of participants was 69 ± 6.673 (range 60-85 years) with 104 males (50.2%) and 103 females (49.8%).The most common risk factor reported for fall was dizziness (21.7%) and it was more prevalent in females(12.56%). Pearson Chi-Square was used to observe relationship between variables and p- value was founded to be significant and it is shown in Table-I below:

	Age Vs. Variables	Pearson Chi-Square
Risk Factors	Visual Impairment	0.021
	Dizziness History	0.0143
	Fracture History	0.023
Pro-prioception Loss		0.228
	Right ankle Dorsiflexion	
	Left ankle Dorsiflexion	0.001
	Right Knee Extension	0.379
	Left Knee Extension	0.052
	Right Hip Extension	0.550
	Left Hip Flexion	0.001
Balance Tests		0.001
	Romberg Test	
	Forward Reach Test	0.005
	Single Leg Stance Test	0.001
	Tandem Walk Test	0.001
	7 point Berg Balance Test	0.001

Table-I. Shows pearson chi-square values of different variables

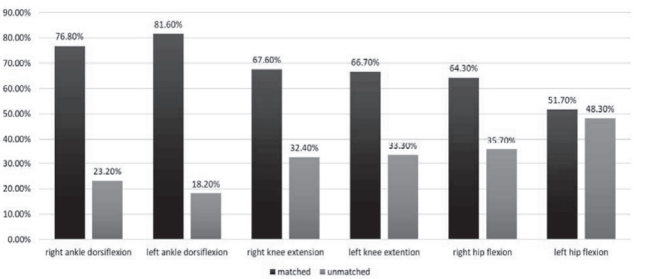

Figure-1. Shows the overall percentage of matched and unmatched proprioception loss according to positioning, regardless of gender.

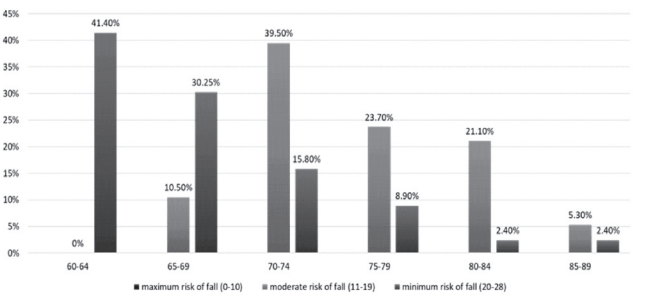

Figure-2. Shows BBS-SF Cut-Off scores according to Gender

DISCUSSION

It has widely been reported that with ageing balance and proprioception loss tremendously increases. Those individuals who remain engage in regular physical activity encounter less balance and fall problems. This study indicated that 18.3% of the elderly participant were at high risk of fall and scored between 11-19 scores on short form of Berg Balance scale. Another cut off score which is used for the original 14-item berg balance scale suggests that people who score below 45 are at a risk of falls. According to this, if we make the cut off score 23 for the 7 item BBS, 50% of the participants have a high fall risk.[8] A study conducted on balance problems in geriatric population showed that prevalence of fall is high in elderly with associated risk factors and balance impairments.[9]

Similar findings were reported in a survey conducted on fall risks in elderly which indicates 44.6% of the old age population was at high risk of fall. One of the key findings of this study was females were more prone to fall as compared to male population, which are according to literature. It was noted that participants had difficulty in performing tandem walk test due to proprioceptive and balance issue. In elderly difficulty in tandem standing was also associated with weakness of lower limb muscles and inability to maintain center of gravity within base of support.[10] Fall and concomitant instability are markers of poor health and declining function of vestibular, proprioception and vision. Along with that psychological impact of fall often results in falling and increased restriction of activities in geriatric population.[11] Fall, imbalance and increased dependence level in elderly population is a growing problem in both developing and under developed countries.

Safe mobility is evidently based on the integration of vision, proprioceptive and vestibular inputs in old age.[12] Results of Romberg and single leg stance test scores were high in female participants, this shows that with ageing females are more vulnerable to fall due to frailty, poor balance and health related problems.[13] Male members showed better results on single leg stance and Romberg due to better health conditions.[14] Thus proprioceptive control would emerge as the real critical element in managing single stance stability and very low proprioceptive control would result in more postural instability and will enhance fall frequency. Along with balance and proprioception loss results of this study showed that most participants reported fall due to dizziness as a major risk factor. Although the etiologies of dizziness are multifactorial but most frequent cause is vestibular dysfunction in elderly.[15] This study also reported that along with intrinsic factors various extrinsic factors also contribute in fall like poor lightning, obstacles, stairs etc.

Joint position matching showed different result almost in every joint but overall weakness was seen in left side while it was seen that Male participants had more unmatched joint position ratio than the female participants.[16] Lower limb joint position and movement sense deteriorates with ageing and contribute to fall in elderly.[17] The current results highlighted that frequency of balance problem in our elderly population is high, so strong emphasis should be made on indulging elder individuals in physical related activities like balance and sensorimotor training. Optimal approaches should be incorporated with involvement of interdisciplinary collaboration in assessment, interventions particularly exercise, attention to co-existing medical conditions and environmental inspection and hazard abatement.

CONCLUSION

This study concluded that among healthy community dwelling older adults, females were more vulnerable to fall due to balance and proprioceptive deficits. Functional balance task was found to be the most difficult to perform. Joints of the left lower limb showed more proprioception loss than the right, and hip joint was the most affected joint.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Izza Anjum	Manuscript writing, Data collection, Statistical analysis of data.	
3	Maria Zafar	Manuscript writing, Data collection, Statistical analysis of data.	
4	Aruba Saeed	Study concept & design, Supervision of research, Revision of manuscript.	
5	Misbah Ghous	Critical proof reading and revision, Final draft.