

Assessment and Analysis of Postural Changes in Geriatric Subject

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ABSTRACT

Background:

Posture is defined as “the position or bearing of the body whether characteristic or assumed for a special purpose” in the Merriam- Webster dictionary. In other words, posture has been defined as the alignment of body segments at a particular time.⁴

Posture explains how one’s body is positioned while standing, sitting or lying down. Anatomically, posture is nothing but alignment of musculoskeletal system in a particular way so as to allow required range of motion (ROM) at each joint. Posture has a vital role to play in our daily life. By maintaining good posture, stress is properly distributed to the intended muscles and ligaments. Due to which the muscles are allowed to work efficiently and as intended, which in turn decreases wear and tear of joints.

Objectives:

The objectives of the present study were to determine significant affection of posture in elderly subjects.

Materials And Methods: 50 participants elderly subjects were included in the study. Participants were conveniently assigned and then posture assessment were done and analyzed.

Results:

The result of the study shows that the KL – 58%, RS – 28 % & BL – 10 % .

Conclusion:

Subjects having standing type of job in adulthood as compare to sitting type of job, and heavy load lifting job. Maximum patients having kypho lordotic postures seen in standing type of job.

Key Words: Posture, elderly population etc.

INTRODUCTION

Ageing is a natural and progressive biological process associated with structural, physiological, and functional changes in the human body. As individuals grow older, changes occur in the musculoskeletal, neurological, sensory, and cardiovascular systems, which may influence posture, balance, coordination, and mobility. These changes can affect the ability of older adults to maintain an upright position, perform daily activities independently, and participate in social and recreational activities. Therefore, the assessment and analysis of postural changes in geriatric subjects are important aspects of healthcare, particularly in physiotherapy and geriatric rehabilitation.

The geriatric population generally refers to older adults aged 60 years and above, although the age classification may vary according to the setting and population being studied. With increasing life expectancy and improvements in healthcare, the proportion of older adults in the population is growing worldwide. Ageing populations present important healthcare challenges because age-related physical changes may increase the risk of falls, functional limitations, musculoskeletal discomfort, and reduced quality of life. Understanding postural alterations in older adults can help healthcare professionals identify potential risk factors and develop appropriate preventive and rehabilitative strategies. Posture refers to the alignment and positioning of different body segments in relation to one another and to the line of gravity. Appropriate postural alignment helps distribute body weight efficiently, maintain balance, minimize unnecessary muscular effort, and facilitate coordinated movement. Normal posture depends on the interaction of the skeletal system, muscles, joints, sensory receptors, and central nervous system. The visual, vestibular, and somatosensory systems contribute to postural control by providing information about body position and movement. With advancing age, alterations in these systems may affect the ability to maintain postural stability, particularly during standing, walking, and changes in body position.

Postural changes are frequently observed in geriatric subjects due to age-related modifications in the musculoskeletal system. These changes may include increased thoracic kyphosis, forward head posture, rounded shoulders, alterations in lumbar curvature, pelvic tilting, hip and knee flexion, and changes in the alignment of the lower limbs. Reduced intervertebral disc height, degenerative changes in the vertebral joints, decreased muscle strength, and reduced flexibility may contribute to these alterations. However, the type and severity of postural changes vary among individuals and may also be influenced by physical activity, occupational history, nutritional status, previous injuries, and underlying medical conditions.

Thoracic kyphosis is one of the commonly observed postural alterations in older adults. An increase in thoracic curvature may shift the body's centre of mass and influence spinal mobility and balance. Similarly, forward head posture and rounded shoulders may be associated with changes in cervical and thoracic alignment, reduced upper-body mobility, and discomfort in some individuals. Alterations in lumbar curvature and pelvic alignment may affect weight distribution and the mechanical demands placed on the spine and lower-limb joints. These postural changes should be evaluated carefully because they may occur as part of normal ageing or in association with musculoskeletal disorders, vertebral fractures, osteoporosis, and other health conditions.

Another important consequence of ageing is the reduction in muscle strength and postural endurance. Sarcopenia, characterized by the progressive loss of skeletal muscle strength and mass associated with ageing, may contribute to reduced trunk stability and impaired functional mobility. Decreased ankle and hip muscle responses, reduced joint mobility, and changes in proprioception can further affect the ability to correct postural disturbances. As a result, some older adults may demonstrate increased postural sway, slower corrective movements, and difficulty maintaining balance during challenging activities. These impairments can increase the risk of falls, although postural changes alone do not determine an individual's fall risk.

The assessment of postural changes involves the systematic observation and measurement of body alignment in different positions, particularly standing and sitting. Clinical postural assessment may include examination of the head, shoulders, spine, pelvis, hips, knees, and ankles from anterior, posterior, and lateral views. Common assessment methods include visual postural observation, plumb-line assessment, photographic analysis, and angular measurements obtained using appropriate clinical tools. Digital photographic analysis and posture-assessment software may also be used to quantify selected postural parameters, allowing clinicians and researchers to document alignment and compare measurements across individuals or assessment sessions.

In addition to structural assessment, functional evaluation is important for understanding the clinical significance of postural changes in geriatric subjects. Measures of balance, gait, mobility, and functional independence can help

determine whether observed postural alterations are associated with difficulties in daily activities. Clinical tools such as the Timed Up and Go test, Berg Balance Scale, and other appropriate functional assessments may be used alongside postural measurements, depending on the objectives of the study. Combining postural and functional assessments provides a more comprehensive understanding of the physical status of older adults than relying on visual observation alone.

The assessment and analysis of postural changes are important for physiotherapy because early identification of significant alterations may help guide individualized intervention programmes. Depending on the findings, physiotherapy management may include postural correction exercises, strengthening of the trunk and lower-limb muscles, flexibility training, balance exercises, gait training, and education regarding safe movement and fall prevention. Regular physical activity and appropriate exercise programmes may help maintain strength, mobility, and functional independence in older adults. Nevertheless, interventions should be selected according to each individual's physical capacity, medical history, and specific postural and functional limitations.

Despite the importance of posture in maintaining balance and functional mobility, postural changes in geriatric subjects may vary considerably across individuals and populations. Differences in lifestyle, physical activity, nutritional status, occupation, and the prevalence of age-related disorders may influence the nature and extent of these changes. Systematic assessment can help identify common postural patterns, quantify deviations from expected alignment, and improve understanding of their possible relationship with functional performance. Such information may also support the planning of preventive physiotherapy programmes tailored to the needs of older adults.

Therefore, the present study, titled “Assessment and Analysis of Postural Changes in Geriatric Subjects,” aims to assess and analyse postural alterations among older adults using appropriate clinical assessment methods. The study may focus on identifying changes in spinal curvature, head and shoulder alignment, pelvic position, and lower-limb posture, according to the selected assessment protocol. The findings may contribute to a better understanding of age-associated postural changes and provide useful information for physiotherapists and other healthcare professionals involved in geriatric care. Ultimately, systematic postural assessment may support the early recognition of clinically significant abnormalities and inform strategies to promote better posture, balance, mobility, and quality of life among older adults.

METHODOLOGY

This observational study was conducted in subjects of elderly population fulfilling the criteria, from tertiary hospitals.

Inclusion criteria for the study were:

- Subjects were age group of 65 –70 years.
- Both genders.
- Subjects with musculoskeletal changes due to ageing.

Subjects were excluded if:

- Subjects with any neurological conditions like parkinsonism, hemiplegia etc.
- Subjects with trauma include postural as affections such as kyphosis due to thoracolumbar burst fracture, kyphosis due to chronic disease such as pots disease.

This study involved minimal equipment

1. Pen or marker
2. Plumb line
3. Data collection sheets
4. Inform consent form

PROCEDURE:

Prior to starting the procedure informed consent were obtained from participants of the study and detailed explanation about study and procedure were given to the participants. An elderly people were included in the study and screened out through inclusion and exclusion criteria.

Posture will be taken in anterior posterior and lateral view and noted down.

Standing posture

a) Lateral view:

Lateral postural assessments should be performed from both sides to detect and rotational abnormalities that might go undetected if observed from only one lateral perspective. Ideally, the plumb line should pass through the ear lobe and shoulder joint

b) Posterior view:

In a posterior view examination, the plumb line divides the body into equal left and right halves.

c) Anterior view:

Relationship can be posturally assessed from the anterior view with the plumb line bisecting the body into equal left and right halves.

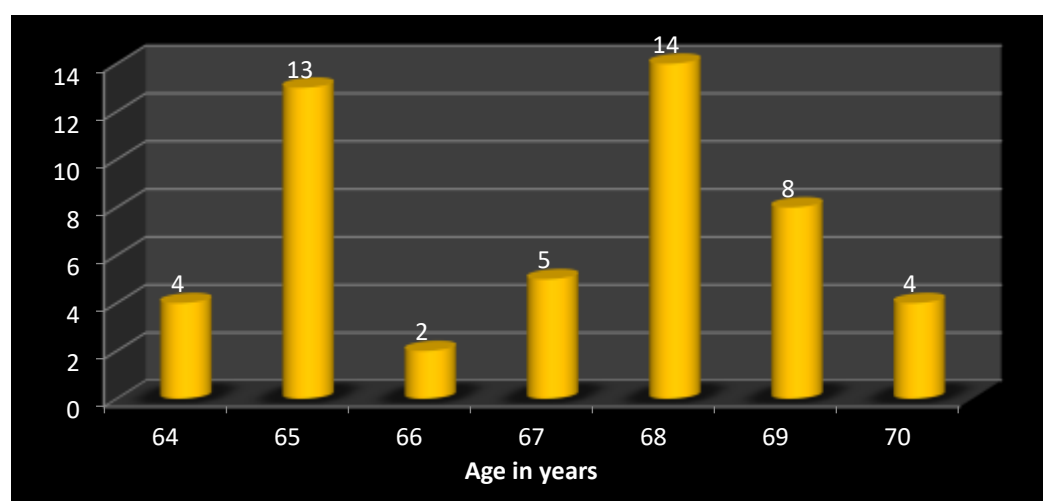
RESULTS

Distribution on the basis of age - Average age is 67.04 ± 1.87

Table 1 Age distribution

Age in years	Frequency	Percent
64.00	4	8.0
65.00	13	26.0
66.00	2	4.0
67.00	5	10.0
68.00	14	28.0
69.00	8	16.0
70.00	4	8.0
Total	50	100.0

Figure 1 Age distribution

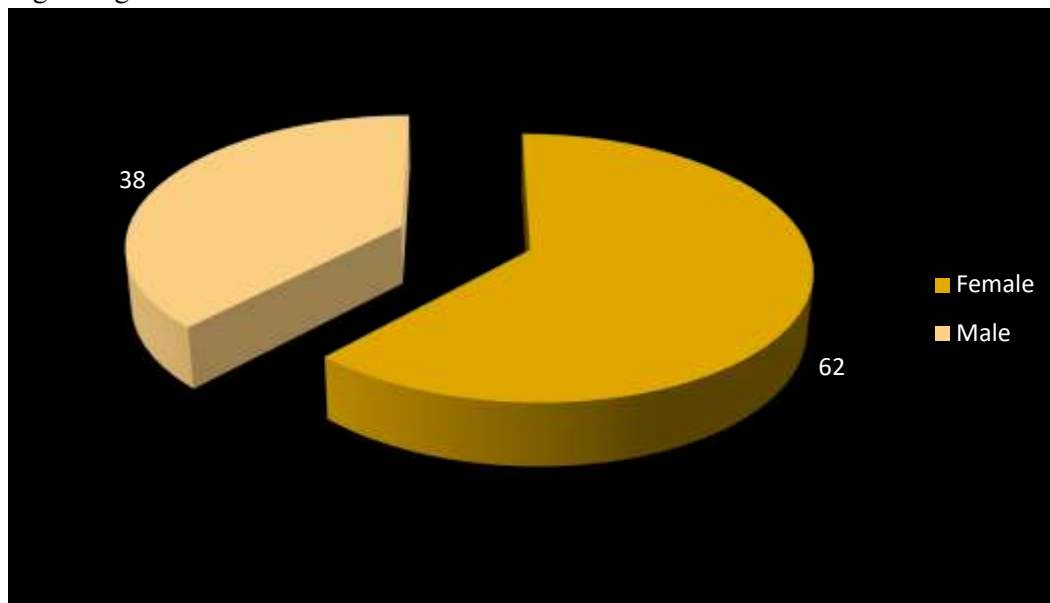


Gender

Table.2 gender distribution

		Frequency	Percent
	Female	31	62.0
	Male	19	38.0
	Total	50	100.0

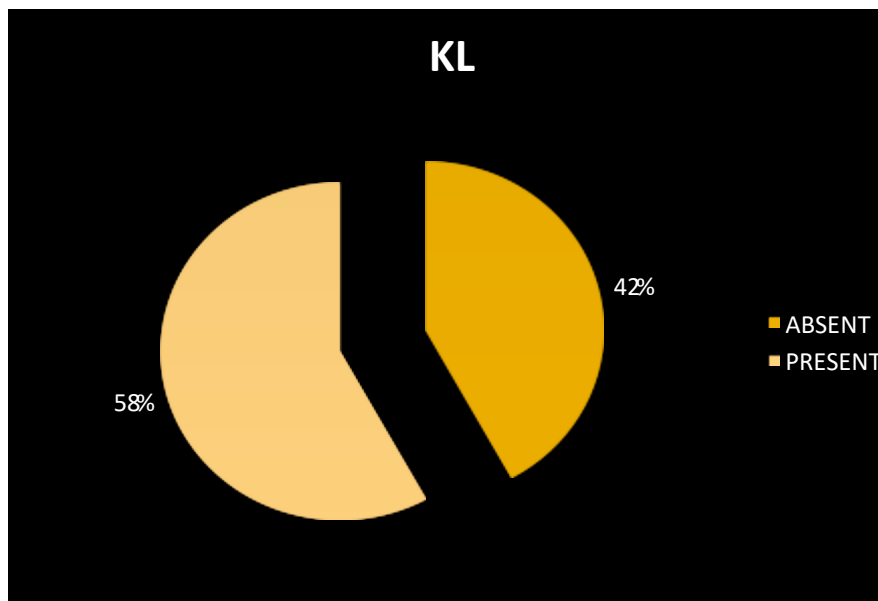
Figure 2 gender distribution



KL posture
Table 3 KL Posture

		Frequency	Percent
	ABSENT	21	42.0
	PRESENT	29	58.0
	Total	50	100.0

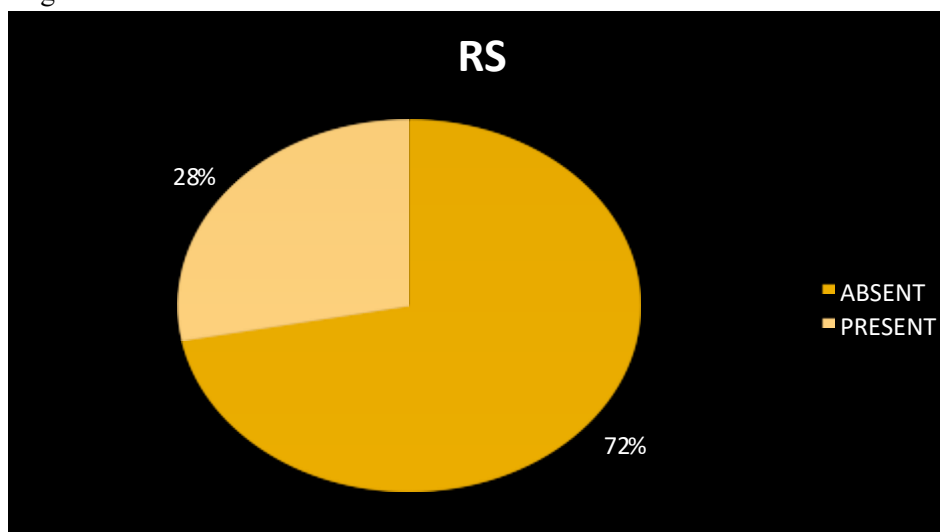
Figure 3 KL Posture



RS posture
Table 4 RS Posture

		Frequency	Percent
Valid	ABSENT	36	72.0
	PRESENT	14	28.0
	Total	50	100.0

Figure 4 RS Posture

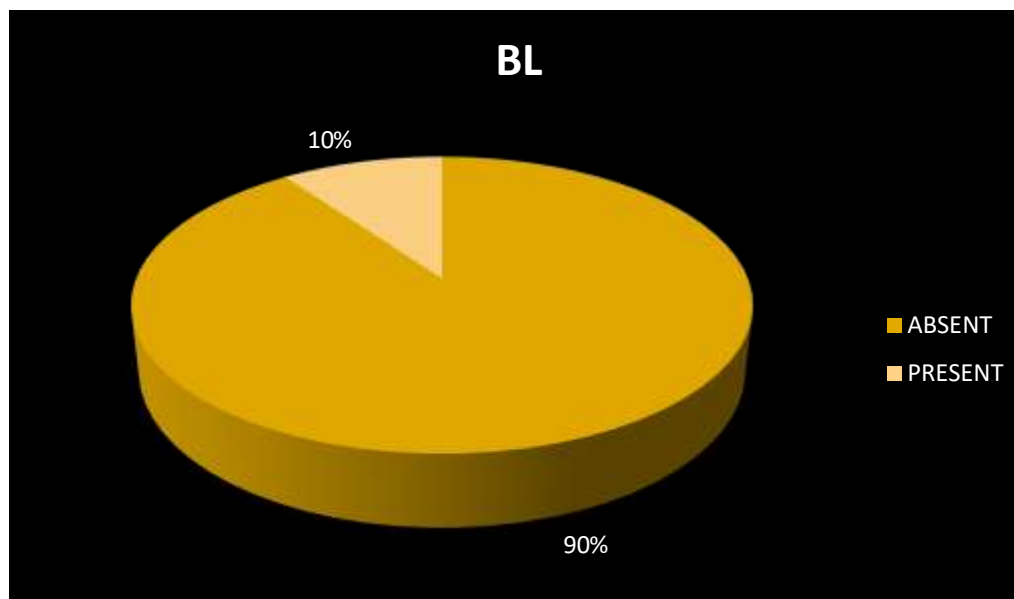


BL posture

Table 5 BL Posture

		Frequency	Percent
Valid	ABSENT	45	90.0
	PRESENT	5	10.0
	Total	50	100.0

Figure 5 BL Posture



Age Distribution (Table 1 and Figure 1)

The age distribution of the 50 geriatric subjects showed that the average age was reported as 67.04 ± 1.87 years. The highest proportion of participants belonged to the 68-year age group, comprising 14 subjects (28%), followed by 13 subjects (26%) aged 65 years and 8 subjects (16%) aged 69 years. Five participants (10%) were aged 67 years, while 4 participants (8%) each were aged 64 and 70 years. The smallest age group consisted of 2 participants (4%) aged 66 years. Overall, the participants were concentrated within the 65–69-year age range, indicating that the study primarily represented older adults in their mid-to-late sixties.

Gender Distribution (Table 2 and Figure 2)

The gender distribution showed that out of 50 participants, 31 (62%) were female and 19 (38%) were male. Females constituted the majority of the study population, exceeding males by 24 percentage points. This indicates that women were more frequently represented than men in the selected sample. However, the gender distribution alone does not establish whether postural changes were more prevalent in females, as this would require a separate analysis of posture according to gender.

KL Posture (Table 3 and Figure 3)

The assessment of KL posture revealed that postural changes were present in 29 participants (58%), whereas 21 participants (42%) did not demonstrate the specified postural alteration. Thus, more than half of the study population presented with KL posture. This finding suggests that the assessed postural feature was relatively common among the geriatric subjects included in the study. However, the clinical interpretation depends on the precise definition of KL posture and the assessment criteria used.

RS Posture (Table 4 and Figure 4)

The distribution of RS posture showed that 14 participants (28%) presented with the assessed postural alteration, while 36 participants (72%) did not demonstrate it. Therefore, RS posture was less frequently observed than KL posture in the study population. These findings indicate that the specified RS postural change affected slightly more than one-quarter of the participants, while the majority did not exhibit the alteration according to the study's assessment criteria.

BL Posture (Table 5 and Figure 5)

The assessment of BL posture demonstrated that 5 participants (10%) presented with the specified postural alteration, whereas 45 participants (90%) did not show its presence. This indicates that BL posture was the least frequently observed of the three postural features assessed. The findings suggest that the specified BL postural change was relatively uncommon in the study population compared with KL and RS posture.

Overall Interpretation

The findings from the assessment of 50 geriatric subjects indicate that the study population had a mean reported age of 67.04 ± 1.87 years and consisted predominantly of females (62%). Among the three assessed postural features, KL posture was the most frequently observed, affecting 58% of participants, followed by RS posture in 28% and BL posture in 10%. These results demonstrate variation in the prevalence of the assessed postural alterations among the participants. KL posture was present in more than half of the sample, whereas the majority of participants did not exhibit RS or BL posture. These findings provide a descriptive overview of postural changes in the selected geriatric population. However, because the results are descriptive, they do not establish an association between age, gender, and postural changes or demonstrate statistical significance. Further analysis, such as a chi-square test for associations between gender and posture, would be required to investigate these relationships.

DISCUSSION

The no. of elderly persons is increasing in our society as result of life expectancy which is a blessing of modern medicine. Therefore, effect of ageing are seen in various system such as bones, muscle, blood cells, nerve, cells etc. in the same way postural instability is a common problem in elderly population.

There are numerous causes for same:

With increasing age, there is increase probability of elderly individuals for developing specific pathologies which lead to accelerated degeneration and/or musculoskeletal system. E.g. Osteoporosis, osteoarthritis.

Deforming forces on weight bearing joint such as lower limb shows variations/alteration in normal posture.

E.g. Bow legs in osteoarthritis of knee.

A relatively inactive lifestyle may also result in disuse changes in neuromuscular system including muscle weakness & slowed response time.

Also one of the important causes is malnutrition is that a state of nutrition in a deficiency, excess or imbalance of energy, protein and other nutrients causes adverse effect on body form, function and clinical outcome.

Type of job/occupation done in adulthood also contributes to postural changes in old age. Degeneration has already started old age. So many structural alteration in musculoskeletal system causes alteration in posture of which in geriatric age group, kypholordotic posture.

LIMITATIONS:

- Sampled size is limited.
- Other comprehensive measures for postural assessment were not included.

SUGGESTIONS:

- Other intensive studies should be conducted.
- Taking wider sample size and detailed postural assessment

Ergonomics Advice

As the person is getting older there is various degeneration changes occurred in various System of body So that some exercises are given to patients which prevents them from Causing any type of further complication due to postural deformities and also for improving quality of life.

1. Static neck exercises for neck flexors, extensors, side flexors, and rotators.
2. Shoulder bracing exercises.
3. Avoid pillow under head. Instead of this patient can use a small roll of towel under neck.
4. Bed is not too soft or not too firm.
5. Prone lying position is suggested and prone on elbows or hands posture is maintained for postural correction.
6. For bow legs knee caps should be used.
7. Exercise like touching of forehead to knee in long sitting position and knee to chest in supine lying position.

CONCLUSION

- From all the graphs we can conclude that 44% have kypholordotic Posture.
- 20% of patient has rounded shoulder
- 10% of patient has bow legs
- Subjects having standing type of job in adulthood as compare to sitting type of job, and heavy load lifting job. Maximum patients having kypholordotic postures seen in standing type of job.
- This conclusion and results is important for programmed intervention awareness in people & clinical application & modification for same.

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