



The Reliability of Carpenter's Trisquare Measure for Assessment of Postural Impairments in Independent Older Adults- an Observational Study

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ABSTRACT

Introduction: Definition of the Elder is the frequent presence of multiple pathology and the atypical way in which illness can present with confusion, falls and loss of mobility and day-to-day functioning. Posture, defined as the relative arrangement of body parts, can be influenced by intrinsic and extrinsic factors, such as physiologic alterations due to human growth and development. Aim: The aim of the study was to find out reliability of carpenter's trisquare measure for assessment of postural impairments in Independent older adults. Study Settings And Design: An observation study was carried out in old age homes and societies. Method and Material: For measure Intra and Inter rater reliability of carpenter's trisquare(CTM) for 53 independent older adults should be taken. All measurements were taken for 3 times by both rater and the mean values of 3 tests were calculated. The CTM tool was used twice by same rater (Rater A1 and Rater A2) at different time (after 24 hours of duration) and at first day used for once by rater B. Statistical Analysis: Data was analysed by using SPSS Version 20. Intra and Inter rater reliability of CT were assessed by Pearson's correlation coefficient. Results: Pearson's correlation coefficient value for Inter and Intra rater reliability is show good to moderately positive correlation of carpenter's trisquare measures. Conclusion: Carpenter's trisquare measure appears to be reliable tool for assessment of postural impairments in 53 independent older adults. carpenter's trisquare tool for measuring postural impairments in less time, easy to access with periodically with more precisely.

Keywords: Carpenter's trisquare measure (CTM), Independent older adults, Forward head position(FH), Reliability, postural impairments

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INTRODUCTION

Definition of the Elder is the frequent presence of multiple pathology and the atypical way in which illness can present with confusion, falls and loss of mobility and day-to-day functioning[1]. In three division of elder are; Young-old group consists of the population between 65 to 75, in Middle-old group consists between 75 to 85 and old-old group consists between older than 85 years of age.¹ The number of persons those have the age of 60 years and above are fast growing, especially in India. India as the second most populous country in the world has 76.6 million people at or over the age of 60 constituting above 7.7% of total population.[2] Measuring postural deviation and determining its relevance to the client's condition is a challenge for physical therapist. There is some support for a relationship between postural deviation to spinal pain, functional loss, risk of falling and decreased risk of fracture in women.[3].

Improve postural alignment may also have a positive impact on balance reactions, thus decreasing the risk of hip fracture from falling. Approximately 90% of hip fractures in older adults occur as a result of a fall and current trends suggest that the incidence of hip fractures will increase six fold by the year 2050[4]. Physical therapists generally rely on subjective observations or less frequently, tools such as the flexicurve ruler, plumb line, kyphometer, goniometer or ruler to evaluate postural deviation. C.M. Arnold did study on reliability of five clinical postural alignment measures for women with osteoporosis and concluded that standard measurement tools such as flexi curve ruler, carpenter's trisquare, posture rating scale, height and forward head position and posture classification are reliable tool for measuring postural

alignment in osteoporosis women.[3]. Posture, defined as the relative arrangement of body parts, can be influenced by intrinsic and extrinsic factors, such as physiologic alterations due to human growth and development[5].

CARPENTER'S TRI-SQUARE MEASURE a similar procedure as described by Harrison Barry-Greb & Wojowicz was used. To ensure that the back board (wall) was level. Distance measurements were taken from 6 standard points on the back board to a plumb line suspended from the ceiling or following surface landmarks were located and marked on the right side of the body: The most posterior aspect of occiput for forward head position (FH), the most posterior aspects of the tragus of the ear (CTE), two centimetres below the tip of the acromion (CTSh.), the most superior aspect of the greater trochanter (CTH), the midpoint of the lateral aspect of the knee joint line (CTK) and 1.5cm anterior to the most posterior aspect of the lateral malleolus (CTAn).[3]

NEED FOR THE STUDY

There are less study on tool for measuring postural impairments in less time, easy to access with periodically at clinic with more precisely. So this carpenter tri-square tool may use for measuring postural impairments in Independent older adults. Study interpretation may helpful for making treatment protocol in this population. There are no studies which find reliability of Carpenter's Tri-square for postural impairments in Independent older adults. The purpose of this study is to find reliability of carpenter's trisquare measure for assessment of postural impairments in Independent older adults. The aim of the study was to find out reliability of carpenter's trisquare measure for assessment of postural impairments in Independent older adults.

MATERIAL AND METHODS

STUDY SETTING: Old age homes, Societies

STUDY DESIGN: An Observational study

METHOD OF COLLECTION OF DATA:

STUDY POPULATION: Independent older adults.

SAMPLING METHOD: Purposive sampling

SAMPLE SIZE: 53 subjects

MATERIALS TO BE USED:

Consent form, paper, Mini Mental Status Examination Scale, Pencil and Pen, Back Board (wall), Carpenter's Tri-square tool (CTM).



FIG: (1) Material (Carpenter's Tri-square) used in the study

CRITERIA FOR SELECTION:

INCLUSION CRITERIA:

Age - 65 to 85 years, Gender: both males and females, Subjects with normal cognitive function (MMSE >23), Independently Ambulatory older without use of assistance device

EXCLUSION CRITERIA:

Subjects with history of any recent musculoskeletal injuries like fractures, dislocation, postural deformity, joint instability or any soft tissue injuries no with other form of neurological impairments. Hemodynamically unstable patients. Uncooperative patients or patient who is not willing to participate.

MEASUREMENT PROCEDURE:

The subjects have been selected on the basis of inclusion and exclusion criteria.

Before starting the study, brief assessment has been done by Mini Mental State Examination and written consent was taken from the subjects. Subjects were then explained about the CTM tool and procedure to be conducted to check postural impairments in independent older adults.

Ask to subjects for proper position on back board (wall) was level and distance measurements were taken from 6 standard points to the back board.



Fig (2a): CT Ear

Fig (2b): CT Shoulder

Fig (2c): CT Knee

Fig (2) (a, b and c): CT Ear, CT Shoulder and CT Knee assess with the carpenter's tri-square POSTURAL IMPAIRMENTS ASSESS WITH THE CARPENTER'S TRI-SQUARE (PARAMETERS) WERE[3]:

Forward head position (FH)- Distance from backboard to surface mark (most Posterior aspect of the occiput)

CT ear- Distance from backboard to surface mark(tragus) of ear

CT Shoulder- Distance from backboard to surface mark(tip of the acromion) of shoulder

CT hip- Distance from backboard to surface mark(greater trochanter) of hip

CT knee- Distance from backboard to surface mark(midpoint of the lateral aspect) of knee

CT ankle- Distance from backboard to surface mark(lateral malleolus) of ankle

All measurements were taken for 3 times by both rater and the mean values of 3 tests were calculated.

The CTM tool was used twice by same rater (Rater A1 and Rater A2) at different time (after 24 hours of duration) and at first day used for once by rater B.

RESULTS

All the statistical analysis was done by Statistical Package for the Social Sciences (SPSS) statistical software version 20.0 for windows. Intra rater and Inter rater reliability of CTM were assessed by Pearson's correlation coefficient. Level of significance (p value) was set to 0.05level. Total 53 participants included in study and 6 subjects excluded due to they had not completed in criteria.

TABLE 1 - AGE DISTRIBUTION OF OLDER ADULTS (YEARS)

AGE GROUP (YEARS)	NUMBER OF SUBJECTS
65-70	29
71-75	16
76-80	8
81-85	0
Total	53

TABLE-2: MEAN VALUE AND STANDARD DEVIATION OF CARPENTER'S TRI-SQUARE MEASURES (CTM)

CTM		Rater A1	Rater A2	Rater B1
FH	Mean	7.62	7.2	7.63
	SD	1.46	1.45	1.47
CTE	Mean	16.07	15.54	16.37
	SD	1.88	1.81	1.88
CTSh	Mean	15.50	16.56	15.58
	SD	1.71	1.61	2.71
CTH	Mean	21.25	22.45	20.38
	SD	1.97	2.98	1.97
CTK	Mean	21.25	23.08	21.33
	SD	2.24	1.50	1.20
CTAn	Mean	20.10	20.16	20.16
	SD	1.38	1.48	1.28

TABLE 3:- PEARSON'S CORRELATION COEFFICIENT SHOWS INTRA RATER AND INTER RATER RELIABILITY OF CTM

CTM		Intra rater	Inter rater
FH	r value	0.959	0.97
	p value	0.000	0.000
CTE	r value	0.87	0.96
	p value	0.000	0.000
CTSh	r value	0.84	0.83
	p value	0.000	0.000
CTH	r value	0.75	0.84
	p value	0.000	0.000
CTK	r value	0.937	0.987
	p value	0.000	0.000
CTAn	r value	0.94	0.948
	p value	0.000	0.000

INTERPRETATION: table shows positive correlation of Intra and Inter rater reliability for CTM.

DISCUSSION

This study was conducted to check Inter and Intra rater reliability of carpenter's trisquare measure for assessment of postural impairments in independent older adults. In the above study the results for intra and inter rater reliability suggested moderate positive correlation with Rater A1, Rater A2 and rater B which suggest that assessment of postural impairments in independent older adults by carpenter's trisquare tool. Result of present study suggested that CTM tool is reliable tool to assess postural impairments in independent older adults and this is supported by a study done by C.M. Arnold on reliability of five clinical postural alignment measures for women with osteoporosis and concluded that standard measurement tools such as flexicurve ruler, carpenter's trisquare, posture rating scale, height and forward head position and posture classification are reliable tool for measuring postural alignment in osteoporosis women.[3] Correlations between all measures FH (forward head position), CTE, CTSh, CTH, CTK and CTAn were good to moderate positive correlations. That suggesting that this is simple method for measure forward head position, protracted shoulder, flexion of knee and outward foot position in independent older adults. In additional findings were difficulty noted that both raters got little variations in identification of surface mark in body and Postural changes noticeable at level of head and knee. In this study intra rater measures had more variations may due to measure at next day and participants more active due to previous experience. Physiotherapy treatment for women over the age of 60 years should involve strengthening of the erector spinae muscles and controlling body posture with the aim of reducing trunk inclination, deepening of thoracic kyphosis and lumbar lordosis should be performed to prevent its flattening.[6]The present study finding suggests that carpenter's trisquare tool is reliable tool for assessment of postural impairments in independent older adults.

CONCLUSION

Carpenter's trisquare measure appears to be reliable tool for assessment of postural impairments in independent older adults. Carpenter's trisquare tool for measuring postural impairments in less time, easy to access with periodically, more precisely and also use for clinically.

LIMITATION OF THE STUDY:

Small sample size, specific age criteria for independent older adults.

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ETHICAL CLEARANCE

Institutional ethics committee of Nootan College of Physiotherapy, Visnagar.

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