

Correlation of Neck shaft angle of femur with Age: A Radiographic study

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ABSTRACT

BACKGROUND: The knowledge of the angle of inclination is a valuable aid in the diagnosis and treatment of the fractures of upper end of femur. Neck-shaft angle is defined as the angle formed by the neck axis and long axis of the shaft of femur. Normal neck-shaft angle varies from 120°-140°. A decrease in the normal neck-shaft angle is known as coxavera while if the angle is more than 140° it is known as coxa-valga. Pelvic radiograms were taken with 15-30 degrees of internal rotation of the hips in the supine position. 15 inch×12 inch films were used in this study. the present study we also divide the total population in different age groups as A (20-40 years), B (41-60years), C (61-80years) and compare the N.S.A related with each group. According the age group A, B, C the mean neck shaft angle of the right side was more than left side but not statistically significant. In present study the mean neck shaft angle in the total population of the right side was (130.22°) and on left side was (129.81°). In present study there was Low -ve correlation (-0.0156) between right side mean Neck shaft angle with Age and Low +ve correlation (0.026.)

Key Words: Neck shaft angle, coxa Vera, coxavalga n pelvic radiograms

INTRODUCTION

In bipeds, the hips have a great responsibility of transmitting the ground reaction against the body weight. To mechanically accommodate the postural changes, the head and neck of femur undergo angulations. The knowledge of the angle of inclination is a valuable aid in the diagnosis and treatment of the fractures of upper end of femur.

Neck Shaft Angle: The neck-shaft angle is defined as the angle formed by the neck axis and long axis of the shaft of femur. It is also named as neck-shaft angle (N.S.A), angle of neck of femur, angle of inclination, collodiaphyseal angle, cervicodiaphyseal angle. Normal neck-shaft angle varies from 120°-140°. A decrease in the normal neck-shaft angle is known as coxa vera while if the angle is more than 140° it is known as coxa-valga.

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Axis A-B : Axis of femoral neck
Axis C-D : Axis of shaft of femur
 α : Neck shaft angle



Fig.4 : The neck shaft angle between the long axis of the shaft and axis of the femoral neck

Need for the Study: Non availability of proper shaped and sized femur implant or improper selection of femur implant could create serious problems for patient in long run. Internal fixation of these fractures with implants is necessary for early mobilization and rehabilitation of the patients. Present study will help to analyze the proximal femoral geometry in Indian population. The data obtained can be

useful in the designing of appropriate implants.

AIMS AND OBJECTIVES

Aim of the present study is to find out the correlation between Neck shaft angle of femur in relation with Northern Rajasthan population.

MATERIAL AND METHOD

The present study is observational descriptive study with radiographic data collection where subjects will be selected from O.P.D Of Radiodiagnosis department, NIMS Medical college and Hospital, Jaipur, Rajasthan.

Total number of subjects were 100.

- Male- 50
- Female-50

Including both right and left sides of femur.

Inclusion Criteria: All individuals between 20 to 80 years of Age who underwent pelvic digital x-rays ,anteroposterior view with Radiologically normal x-rays were included in the study (having both right and left side femur) Age,sex and other data noted down by general interview by Radiologist.

Exclusion Criteria: The diseases which could modulate the outcome of the study, digital Radiographs of patients with osteoarthritis, (Injury of the study part of limb, Metabolic bone diseases, Malignancy, Renalfailure, Coxarthrosis).

Materials Used:

- 1. 100 x-ray images A.P view of pelvis showing both(Rt and Lt)N.S.A of femur.
- Protractor
- Instrument for (Radiological) measurement of N.S.A : Radiant dicom viewer

• **STATISTICAL ANALYSIS:** (a) Formula for calculation of mean is :

$$\text{Mean } (\bar{X}) = \frac{\text{Total or sum of the observation}}{\text{Number of observation}} \text{ or } (\bar{X}) = \frac{\sum X}{n}$$

• (b) **Standard deviation:** Defined as “Root- means- square- Deviation”.

$$SD = \frac{\sum (X - \bar{X})^2}{n - 1}$$

• **Coefficient Variation**

$$\text{Coefficient variation (Cv) : } \frac{100 \times SD\%}{\text{Mean}}$$

Methodology: Pelvic radiograms were taken with 15-30 degrees of internal rotation of the hips in the supine position. 15 inch×12 inch films were used in this study.

Measurement of neck shaft angle: Radiological measurement of (neck shaft angle) were used in Radiant dicom viewer that is recommended by most of Radiologists, It is a authentic medical software used in radiodignosis departments.

Radiant dicom viewer:



Procedure: 1 First we have to install the medical software (radiant dicom viewer)in our system from internet.

- Then we have to export all the x-ray images (our samples) as dicom images in file folder of radiant dicom viewer.
- Then we have to open an image and angle was measured.
- There is an option for angle measurement in dicom viewer, first we have to click on it.
- Dicom viewer automatically read the angles.
- Three readings were taken and average value was recorded. This was done for both right and left sides.

OBSERVATION & RESULTS

Table 1: Comparison of neck shaft angle in total subjects

Parameter	Side	N	Mean	Std. Deviation	P value
Neck shaft angle	Right	100	130.22°	6.26	>0.05
	Left	100	129.81°	6.87	

Graph 1:

Sidewise Comparison in Total Population



Table 2: Sidewise comparison in age group (20-40 years) age group population

Parameters	side	N	Mean	S.D.	P value
NSA	Right	71	130.71°	5.90	>0.05
	Left	71	129.81°	7.09	

Graph 2:

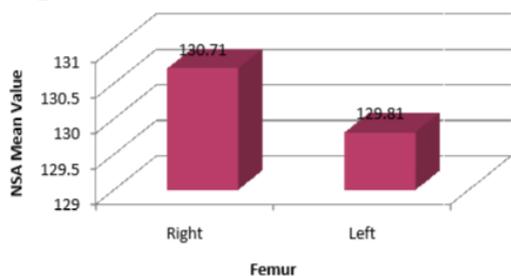


Table 3: Sidewise comparison in age group (40-60 years) age group population

Parameters	side	N	Mean	S.D.	P value
NSA	right	20	128.7°	6.60	>0.05
	left	20	127.35°	6.00	

Graph 3:

Sidewise Comparison in Age Group 41-60 years Population

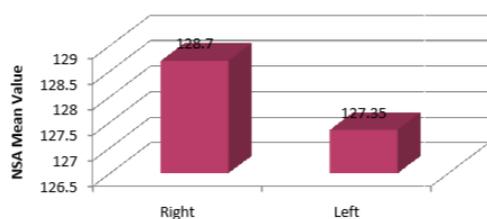


Table 4: Sidewise comparison in age group (60-80 years) age group population

Parameter	Side	N	Mean	S.D.	P value
NSA	Right	9	132.66°	6.21	>0.05
	Left	9	132.22°	6.31	

Graph 4:

Sidewise Comparison in Age Group 61-80 years Population

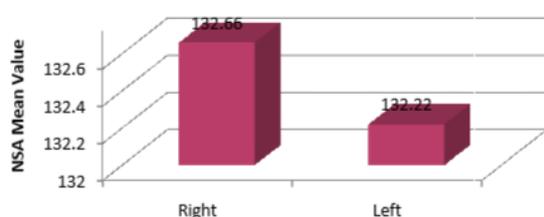


Table 5: Correlation between Age and right & left Femoral N.S.A

Parameter	N	Mean	S.D.	Correlation Coefficient
Age	100	36.7yrs	13.59	-0.0156 Low -vecorre
Right femur neck shaft angel	100	130.22°	6.26	
Left femur neck shaft angel	100	129.88°	6.86	0.026 Low +vecorre

RESULT & DISCUSSION

The present Radiological study aimed to find out the correlation of neck shaft angle of femur with age in Northern Rajasthan population. The femoral N.S.A has been studied by several authors and most authors agreed that there is considerable individual variation & wide standard deviation in this angle.

In the present study we also divide the total population in different age groups as A (20-40 years), B (41-60years), C (61-80years) and compare the N.S.A related with each group. According the age group A, B, C the mean neck shaft angle of the right side was more than left side but not statistically significant.

In present study the mean neck shaft angle in the total population of the right side was (130.22°) and on left side was (129.81°). The present study is correlated with the study of irdesel et al(2006)who found the value of Mean N.S.A :131.5°, nissen et al(2005)who obtained the value of Mean N.S.A For (males) :131±5°, for (females)129±5.

The present study also correlated with the study of Singh (Indian) who obtained the mean value of N.S.A: 131.10°, A.K Mishra (Nepal) also obtained the Mean value of N.S.A :132.26°, Anusuya shrestha, nirju ranjit, rajani shrestha (Nepal)obtained the mean N.S.A For right side:128.46° and for left side: 126.97°. Ravi Shankar G,Naveen N.S, Roopa C.R according their study the N.S.A at random were found to be from 113°-142° & mean value of N.S.A was 127.55 where as in our study the mean N.S.A for right side was: 130.22° and for left side was: 129.81° (ranged from 108°-147.3°).

Hossain sahib (2014) south india their results for mean N.S.A was 137.1° for right side: 137.3° and for left side : 136.9°which is more than our study. The average value N.S.A in study of Isaac et al was 126.7° and R.C Siwach study was: 123.5°, which is far less than our study.

In present study there was Low -ve correlation (-0.0156) between right side mean Neck shaft angle with Age and Low +ve correlation (0.026.) between left side mean Neck shaft angle.

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