

**EVALUATION OF NECK SHAFT ANGLE OF FEMUR ON DRY BONES**Radha Pujari <sup>1</sup>, Ravi Shankar G<sup>2</sup>, Naveen N. S<sup>3</sup>, Roopa C. R<sup>4</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: BACKGROUND:** Evaluation of the neck shaft angle of femur helps to understand clinical relevance in bio mechanics of the hip joint. It helps for the better treatment of different pathological conditions of hip and femur and also to design prosthesis. Femoral neck shaft angle is important to convey the information regarding the race to which they belong. Hence the present study was undertaken to determine the neck shaft angle of femur in humans. **OBJECTIVE:** 1. To correct the different types of deformity and to have a normal good walking Mechanism. 2. To know the recent methodology and attempt to evaluate the range of normal Angles of femora and their sex differences. **METHODS: ANTHROPOMETRIC:** 100 Adult dry bones were studied and analyzed. The neck shaft angle of femur was measured by tracing outlines of contours of all femora. **RESULTS:** The neck shaft angle of the femur have revealed that there is no much difference in between males and females. There was slightly higher 0.2° in females. **INTERPRETATION & CONCLUSION:** There was no significant gender difference in neck shaft angle. The Knowledge of knowing the neck shaft angle helps to understand the Biomechanics of the hip joint and also for better treatment of pathological condition of hip and femur.

**KEYWORDS:** Femur; neck shaft angle, femora.

**INTRODUCTION:** Evaluation of the neck-shaft angle of femur helps to understand clinical relevance in biomechanics of the hip joint. It helps for the better treatment of different pathological conditions of the hip and femur. The neck-shaft angle is defined as the angle between the femoral shaft axis and femoral neck axis.

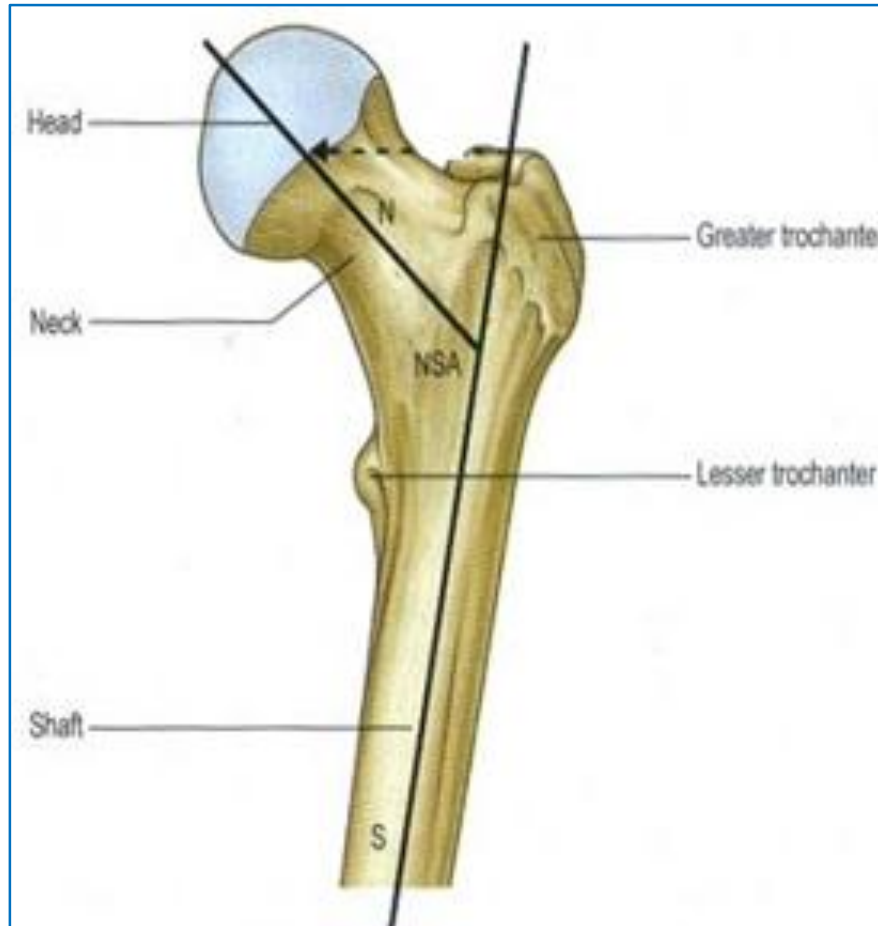
Axis means imaginary line through centre of an object around which the object turns. It is also named as Neck Shaft Angle (NSA), Angle of neck of femur, angle of inclination, collodiaphyseal angle, cervicodiaphyseal angle and collum diaphyseal angle. Normal neck shaft angle varies from 120°-140°. A decrease in the normal neck shaft angle is known as coxa vara. While if the angle is more than 140°. It is known as coxa valga.

Knowledge of normal asymmetry of right and left neck- shaft angle of femur may be a great value in evaluation of patients with known or assumed pathological conditions and in correctional osteotomies in cases of femoral fractures. The neck-shaft angle can be estimated from a proximal femoral fragment and the required size of the length of the neck can be determined to design prostheses for the restoration of normal neck-shaft angle.

**OBJECTIVES:** The principle objectives of the present study are: Knowledge of the angle of inclination is a valuable aid in the diagnosis & treatment of fractures of upper end of femur. To correct the different types of deformity and to have a normal good walking mechanism. To get acquainted with review of literature work pertaining to the neck shaft angle subject. To know the recent methodology & their by attempt to evaluate the range of normal angles of femora & their sex differences.

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**METHODOLOGY:** The present study was conducted 100 on dry femora. These bones were collected from the Department of Anatomy, Navodaya Medical College, Raichur. The study of neck shaft angle of femur started with the following material collection i.e 100 adult dry human femora, drawing sheets/white Sheets, sketch pen, pencil lead, scale & goniometer. Neck-shaft angle of femur is defined as the angle made by the long axis of the shaft and the long axis of the neck. This angle is measured by using goniometer. Anatomically the Neck shaft angle can be measured by different methods like directly on the bone & sharp shadow tracing. Anthropometric measurement using Martin's Dioptrographs & Reid's Osteometric board.



**Fig. 1: Measurement of neck shaft angle**

The neck-shaft angle of femur was measured by marking axis of shaft and axis of neck. The axis of the neck was drawn by taking two points one at the center of the head and other at the end of the midpoint of the narrowest part of the neck (Highest constriction at the neck). Then are two points were joined, thus the line drawn represents the axis of the neck. Then the axis of shaft was marked by taking two mid-points, one at the upper end of shaft, and other at the lower end of the shaft, the two points were joined and the same line was extended at the upper end, as such, to cut the axis of the neck. Then the angle was measured, using a goniometer and the angle was noted down.

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**Fig. 2: Measurement of neck shaft angle**

**OBSERVATIONS:** The neck-shaft angles of femora measured and recorded in 100 femurs. . Among these 62 were classified as male 38 as female. The minimum angle recorded is 113° and maximum angle is 142° in case of female bones, the angle is slightly greater than the males. The difference of angle between male and females bones is not significant.

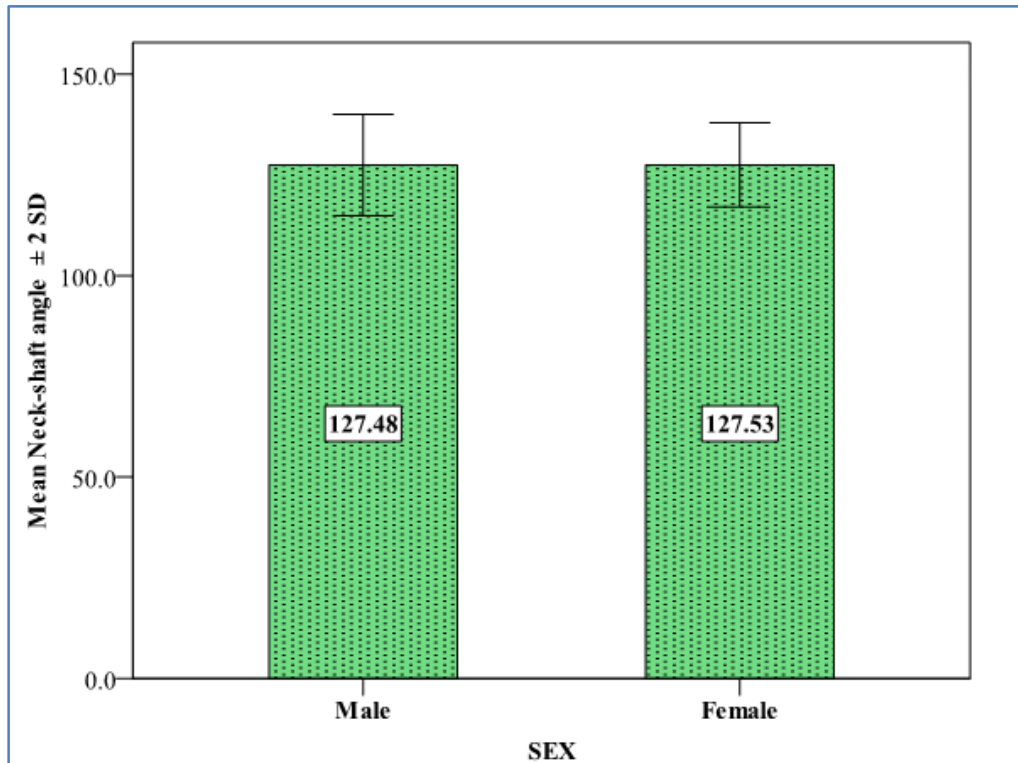
	N	Minimum	Maximum	Mean	Std. Deviation
Neck-shaft angle	100	113.00	142.00	127.5000	5.87496

**Table 1: Descriptive statistics showing mean and standard deviation parameters used in study**

	SEX	N	Mean	Std. Deviation	Std. Error Mean
Neck-shaft angle	Male	62	127.4839	6.28227	.79785
	Female	38	127.5263	5.22332	.84733

**Table 2: Comparison of mean and standard deviation of neck shaft angle between male and female**

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**Graph 1: Showing mean neck shaft angle**

**DISCUSSION:** Age, sex and race showed so many variations during the study of neck-shaft angle of femur.

The neck-shaft angle of femur in early foetal life highest (Humphery 1889 and Friend Langer 1901). The head and neck deviate from the shaft very early during development (Strager 1943). The angle varies up to 160° in the child, 125° in the adult (Callender) and is widest at birth and diminishes steadily until the adult condition is reached (Gray's Anatomy).<sup>1</sup>

The angle in the new born is nearly equal to the adult. The average being 126.5° and range being 106°-151° according to Kate.<sup>2</sup> (1967).

According to the present study the neck-shaft angles at random were found to be from 113° to 142° and average being 127.55°. Hyrtl and Charpy.<sup>3</sup> (1884) observed that the angle was similar in degree in both the sexes i.e., 127°.

The neck-shaft angle is of no value to determine sex (Parson 1914).<sup>4</sup> and female bones there is no difference in the angle due to the presence of either long or short necks.

Lofgran.<sup>5</sup> 1956 stated that the mean value of the femoral neck angle in the female was 125.1° and male 125.2° being almost same in both the sexes.

The angle is greater in females than males (Lavillac 1974).<sup>6</sup>

The angle is less in the female than in the male due to the increased breadth of the lesser pelvis and greater obliquity of the femur (Gray's Anatomy).

In the present study the angle in the female was slightly greater than male. The difference in between male and female is 0.2 of neck shaft angle i.e. negligible. Total average is 127.55°.

**REFERENCES:**

1. Gray's Anatomy-William's & Roger Warmick 36th Edn.1980.
2. The Angle of femoral neck in Indians- KATE B.R. 1967 Eastern Anthropologist, Vol.XX.No.1, 54-60.
3. Bull, De, La Soc, D' Anthrop (Lyon) - CHARPY 1884 Quoted by Walmsley, 1917.
4. Characteristics of English Thigh Bone-PARSONS PG 1914. J. of Anatomy and Physiology. 48,238-267.
5. Some anthropometric Anatomical measurement of the femur of finns from the view point of surgery- LOFGREN L 1956.
6. An analysis of human femur – CHRIST LAVELLE 1974 American Journal of Anatomy, 141:3:415-426.

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