Research Paper

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Comparative measurement of diameter of femoral head in population of western uttar paradesh

Medical Science

KEYWORDS : Femoral head , Vernier Caliper , Vertical diameter, Transverse diameter, Western U.P. region.

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ABSTRACT

Various diameter of head of femur have been used for comparative study in different region. Therefore we under took the study of head of femur in population of Western Uttar Pradesh .The present study addresses the question of estimating ancestry and comparative study in forensic and archaeological investigation of skeletal remain using measurement from head of femur. In this study we measured 140 dry adult human femora (84 male, 56 female) obtained from department of Anatomy, Subharti Medical college Meerut Uttar Pardesh. Mean values of femoral head obtained were 45.69 and 41.17mm vertical diameter male and female, 44.98 and 41.63mm for transverse diameter in male and female respectively.
Measurement done in our study and result obtained would provide a great help in performing orthopedic surgery like hip replacement.

Introduction:-
It is hypothesized that a set of variables that include measures of femoral head will show size and shape differences between pre industrial and industrial populations, males and females, and right and left sides. Additionally, the differences in morphology reflect the amount of mechanical load placed on the bone. Finally, what measurements are used to quantify the shape of the proximal femur and where they are taken in crucial for correctly distinguishing shape differences among populations. Femur is commonly used for anthropometric analysis in the cases of unidentified parts if available. Several studies include dimension of femoral head, to find out statistical and morphological dimensions to determine the sexual dimorphism. One of the most obvious sex differences in the long bones is that typically male bones are longer, more massive with more prominency of muscular markings than female bones. Krogman W.M. (1).

Dimension of femoral head varies according to races, heredity, climate and other geographical factor. The average dimension of the femoral head in both sexes will not only help in early detection of disputed sex by anatomist and by forensic experts but also will help orthopedic surgeon and prosthetics in hip replacement surgery and in construction of suitable prostheses Chauhan R & Paul S (2).

Comparative study of femoral head is used in the studies of several workers in all over populations : Akhtari Afroze, & M. Durrul Huda, in northern zone of Bangladesh, (3) P.S.Igbigbi & B.C. Msamati in adult black Malawians, (4) Taner Ziylan and Khalid Awadh Murshid in Anatolian human femur, (5) Pandya A. M. et al. in Gujarat region, (6) Gargi soni, Usha dhall and sudha chabra in northwest region of India, (7) Nirmala. P, Sundarapandianb. S et al. in south indian population, (8) Strecker , keppler P et al. for prosthetic surgeries, (9).

Acording to Krogman W.M. (1) standards of morphological and morphometric attributes in the skeleton may differ with the population sample involved and this is true with the reference to dimension and indices (average and range) and as a general rule standard should be used with references to group from which they are drawn and upon which they arenot interchangeable. So present study was carried out to ascertain values of maximum head diameter of femora from western U.P. region; and to evaluate its possible efficacy in comparative analysis.

Material and Methods:-
In this study 140 femora were collected from the Department of Anatomy; Subharti Medical College; Meerut. After collection bones were identified as Male or Female on the basis of weight, muscular markings & height of bones. Femora showing pathological abnormality or from the persons outside western U.P. region were not included in the study.

Instrument used were:
Digital Vernier caliper
Osteometric board

The parameters of the head of femur (vertical & transverse) were measured as following:

Vertical diameter of femoral head :- Vernier caliper was used to measure the vertical diameter of the femoral head .It was taken at right angle to the long axis of neck of femur which meant the straight distance between the most superior to the most inferior point of the femoral head in a vertical plane.

Transverse diameter of femoral head:- Vernier caliper was used to measure the transverse diameter of the femoral head .It was taken at right angle to the long axis of the neck of femur which meant the maximum distances of femoral head in the horizontal plane.

Subjective variation was avoided by measuring each parameter three times by the investigator and mean of the reading obtained was recorded.

Transverse diameter

Vertical Diameter

Result:- We measured 140 femora (vertical and transverse diameter). The data was tabulated and statistical analysis was done to take out the mean and standard deviation of right and left femora for vertical and transverse diameter of male and female femora.

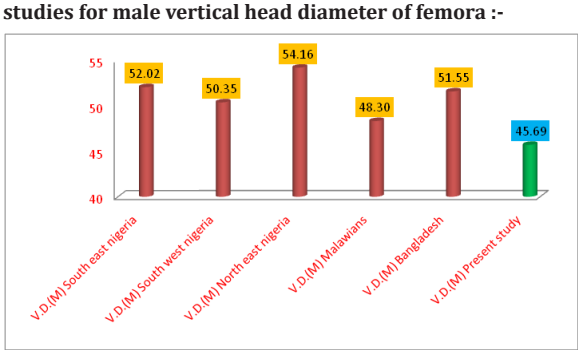
Table showing comparision of vertical & transverse diameter of male & female femora :-

PARAMETERS	Male (84)				Female (56)			
	Vertical Diameter(mm)		Transverse Diameter(mm)		Vertical Diameter(mm)		Transverse Diameter(mm)	
Ref. value	Right 43-51	Left 44-56	Right 41-48	Left 41-49	Right 37-45	Left 37-46	Right 36-41	Left 37-43
Mean ±S.D.	45.21 ±1.87	46.18 ±1.88	45.60 ±1.72	46.37 ±2.21	40.79 ±2.11	41.55 ±2.15	41.27 ±1.96	41.99 ±2.00

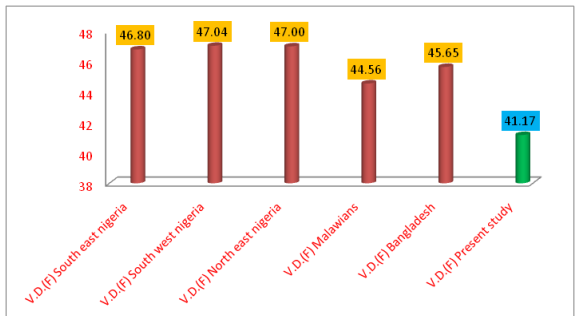
A comparative table showing comparison of present study with others :-

	Vertical diameter(mm) Male	Female	Transverse diameter (mm) Male	Female
Southeast (Nigeria) (Singh 1986)	52.02	46.80	54.16	48.33
Southwest (Nigeria) (Nwoha 1990)	50.35	47.04	50.75	45.50
Northeast (Nigeria) (Asala 1998)	54.16	47.00	49.90	43.09
Malawians (P.s.igbigbi 2000)	48.30	44.56	50.51	46.52
Bangladesh (Akhtari afroze 2005)	51.55	45.65	42.20	37.50
In present study (2012)	45.69	41.17	45.98	41.63

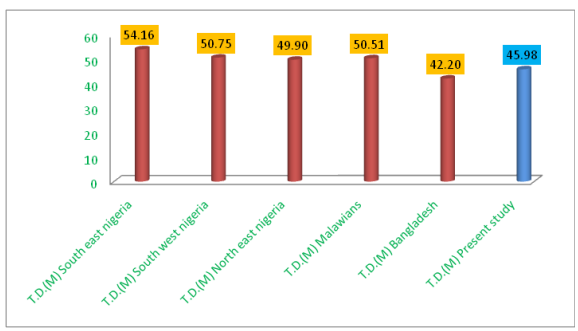
Graph showing comparison of present study with other studies for male vertical head diameter of femora :-



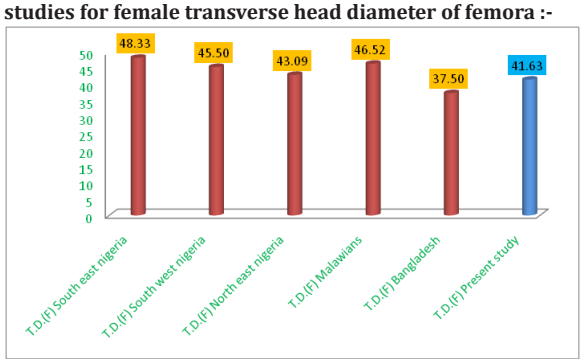
Graph showing comparison of present study with other studies for female vertical head diameter of femora :-



Graph showing comparison of present study with other studies for male transverse head diameter of femora :-



Graph showing comparison of present study with other studies for female transverse head diameter of femora :-



In our study the vertical & transverse diameter of male and female heads of femora were found to be less as compared to other studies done in Nigeria, Malawains. However in our study the transverse diameter of male & female femoral head were found to be greater as compared to the study done by Akhtari Afroze et al in Bangladesh.

Discussion:-

Femur has always been the most reliable bone for anthropometry. S.P. Singh (10), Krogman W.M. (1), TD steward (11) said that racial difference have been shown to exist in the dimensions of femoral head.

Felts W. (12) believe that the gross shape of long bones was caused by intrinsic factors, while the specific details were determined by the adaptation of bone to the functional environment. It is therefore likely that heredity is a major factor in the formation of shape of long bones due to its different functions in different races.

Hasimoto M. (13) using the antero-posterior diameter for measurement of femoral head reported an average of 46.80mm for Chinese femora.

Conclusion:-

On comparing our study with the previous literature it was found that the vertical head diameter of north east (Nigeria)

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was found to be largest among all comparative studies that is vertical mean diameter in male was 54.16 mm however for south west Nigeria it was 50.35mm and for Malawians it was 48.30mm.

In our study the vertical head diameter for male was 45.69 & female were 41.17mm, however the transverse diameter for male were 45.98 & for the female it were 41.63mm; which was more as compare to smallest value of Bangladeshian.

Measurement done in our study & the results obtained would provide a great help in performing orthopedic surgery like hip replacement. Not only this but in cases of unidentified bodies it will help in identification of races.

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