MOSUL JOURNAL OF NURSING
Online ISSN: 2663-0311 - Print ISSN: 2311-8784
Website: https://mjn.mosuljournals.com

RESEARCH ARTICLE

Role of The Forensic Anthropology and Forensic Nursing to Estimation of Sex and Age of Kurdish Mass Grave in Hatra near Mosul (Nineveh) City

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ABSTRACT

Introduction: the importance of recognizing the unknown deceased individual have been well documented. However, generally long bones from sub adult cases are used to estimate age and sex, still in some cases, stature is also helpful or even critical for identification. In fact, few published regression equations are known for consultation in such cases.

Materials and methods: All measurements through present investigation were taken in Centimeters. Forearm length and the Maximum Femoral Length were estimated by distance from most proximal to the most distal point of left femur and Forearm bones.

Results: the left Femur length mean was 31.40 (SD± 11.91) cm, and 24.02 (SD± 9.12) cm these differences statistically significant (t-test, P< 0.001). In males, the femur length was 37.16 (SD± 10.82) cm. In females was 31.91 (SD± 10.20) cm. regarding forearm length, in males, length was 27.63 (SD± 7.84) cm. In females was 24.69 (SD± 8.59) cm.

Conclusions: current study is the first attempt to estimate the sex and age by depending only on long bones in Kurdistan even whole Iraq. Determination of sex, age and identification of human being of deceased person may be the study showed that possible and be practiced by using aforementioned Forensic bone procedures.

Keywords: Mass graves, forensic Anthropology, Forensic Medicine, skeletal remains, Administration and management.

Received: 16 March 2023, Revised: 15 May 2023, Accepted: 31 May 2023, Available online: 28 July 2023

 DOI: 10.33899/mjn.2023.182220

1- Introduction

Discriminant functions have long been used to classify individuals into groups according to the dimensions of their bones. Although lengths, widths, and diameters have been extensively used, the circumferences have not been adequately validated (Safont et al., 2000). For humanitarian reasons and criminal investigation, the identification of unknown deceased individuals is important. When a collection of bones is discovered, the first thing to do is to make sure whether any of the bones are of humans or animals. This is not easy for a lay-person to distinguish. From the forensic point of view, sex determination by using bones is important. The determination of sex by using skull generally depends upon traits and measurements of the bones. The assessment of sex by long bones is normally easier because the male long bones tend to be longer and more massive than those of the female, with more marked muscle attachments. However, teeth are also useful in determining gender by using different odonto metric techniques (Kumar et al., 2014).

Forensic nursing is one of the newest forms of forensic sciences. Forensics is scientific methods used to solve crimes and find out who committed them. Forensic Nursing is the application of forensic science, combined with clinical nursing practice as they are applied to public or legal proceedings in the law enforcement arena. It is the application of forensic aspects of health care combined with biopsychosocial education of the registered nurse in the scientific investigation and treatment of trauma, death, violent or criminal activity, and traumatic accidents within the clinical or community institution. Daily, nurses encounter the results of human behavior extremes: abused children, women, spouse, elderly, victims of neglect, self-inflicted injury, firearm injuries, knife wounds and other assaults. Victimization and violence is on the increase. Forensic nursing is a new and challenging field of practice for nurses. The scope of forensic nursing includes acute health care facilities, correctional institutions, law related agencies and courts etc.(wikipedia.org https://en.wikipedia.org › wiki › Forensic nursing)

The forensic medical examination of soft tissue injuries serves two purposes: (a) to direct the nursing care of the patient and (b) to identify any implications pertinent to the assessment findings (American Nurses Association & International Association of Forensic Nurses, 2017).

Role of The Forensic Anthropology and Forensic Nursing

Administration and Managing information. There will be a need to maintain information on available human resources and supplies, contact information for trained teams, and a database of the number of dead and their identities. Municipal leaders may be contacted with inquiries about specific persons; an individual or team should be assigned to manage such information. The best persons specific for the administration specialty. Leaders should appoint people to handle identification of the deceased; public information and communication; recovery, storage, and burial/cremation of bodies; support for families; and logistics (timely location and provision of needed supplies and resources). Identifying resources. Locate and arrange for the use of storage facilities and supplies before the pandemic arrives. Items you will need include body bags, protective clothing, tools, and communication equipment. Develop and maintain a roster of staff and volunteers. Implementing an action plan. Arrange for the management of dead bodies in collaboration with other agencies in your district or community. Disseminating information. Leaders must provide accurate information to families and the community regarding the identification of bodies. Logistics is the process of getting the correct supplies, equipment, and people to the correct place at the correct time. A logistics leader or team should be appointed to ensure smooth implementation of any plan. Transport of bodies from place of death to mortuary, storage facility, or burial site Transport of workers to work sites Secure communications equipment for field workers, site managers, and the headquarters or coordinating office Supplies and other resources, including coffins, body bags, labels, dry ice, portable sources of electricity, and water. Assistance from local and regional technical specialists such as morticians and funeral home directors. Equipment for the maintenance of records, such as log books, inventory lists, and cameras (to photograph unidentified bodies). (World Health Organization. Assessing the Outbreak Response and Improving Preparedness 2004).

One of the key goals of any forensic pathologist is to identify unknown skeletonized by creating a biological profile from their skeletal remains. Establishing the identity of unknown human remains is a common practice in forensic science. Many studies have focused on developing sex (Issa et al., 2016) and age (Okai et al., 2019) estimation criteria based on measurements taken from the long bones of the appendicular skeleton, rather than the more conventional skeletal remains of the pelvis and cranium. However, no systematic studies for estimating gender and height in adult in Iraq are currently available (Issa et al., 2016; Okai et al., 2019).

Smith (2007) stated that the estimation of stature in adult forensic cases with available long bones of the the limbs is routine, but such estimation is less common in sub adult cases. Long bones from sub adult cases are often used to estimate age, but in some instances, stature may be helpful or even critical for identification. A few published regression equations exist for consultation in such cases. Data from the longitudinal growth study conducted by the Child Research Council in Denver in the mid-1900s are utilized to produce dual-sex and single-sex regression equations for the six long bones of the limbs (humerus, radius, ulna, femur, tibia, and fibula) and for the combined femur plus tibia length.

The process of body management includes several steps, such as the search for bodies, inperson identification of the deceased, transfer to the morgue, return of the body to the family, and state assistance in burying or cremating the body, all in according to the wishes of the family and the cultural and religious norms of the community. Rescue workers, forensic medicine professionals, prosecutors, police, administrators, psychiatrists, support teams for the individuals immediately handling the corpses, representatives from NGOs and international organizations, and community volunteers are all needed. The State must oversee this endeavor with the greatest care and competence, taking into account every one of the aforementioned factors. Concerns regarding the potential epidemiological dangers associated with decomposing remains should be addressed by the health system, which should also priorities giving medical aid to victims' families (World Health Organization, 2010). Medical professionals, morticians, funeral directors, and anybody else who works regularly with decomposing remains should get the hepatitis B vaccine (Precautions for Handling and Disposal of Dead Bodies,2014).

The aim of the present study was to establish some methods and techniques for identifying individuals and estimating their age and sex throughout using deceased person long bones (limbs bones).

2- Material and Method

2.1- Study setting and design

This study was conducted on 342 Kurdish skeletonized found in mass graves in Hatra area near the mousle city that were brought to the Forensic Medicine Mortuary for pathological or medico-legal grounds between the years of 2005 and 2008. All of the skeletonized have intact uninjured Left forearms and femurs. Skeletonized suffering from extreme rigidity mutilation, extensive burning, and a burned or partial skeleton and advanced post-mortem alterations, as well as a history of fracture or upper and lower extremity abnormalities, as well as anonymous.

Written consents were acquired and ethical guidelines were followed in the preparation of the samples. The Skeletonized placed on the autopsy

table in a supine position with full extension, and their stature was measured with a steel tape with mill metric divisions. The body length was calculated by subtracting the sum of the heel-table and vertex-table distances from the autopsy table length, using wooden wedges to touch the cranial vertex and heels. On the forearm and wrist, cross incisions were made, soft tissues were removed, and the neighboring joints were exposed.

2.2- Osteological analysis

The forearm measurements taken where the radial head and styloid process were marked, as well as the ulnar styloid process and olecranon process. A straight-line distance was measured from the most entire -proximal point of the head to the most distal end of the styloid process of the radius bone to determine the left radial length. The left ulnar length was calculated as a straight-line distance between the olecranon's most posterior-proximal point and the ulna's most distal end of the styloid process. A Vernier caliper (set to 0.05 mm) was used to take measurements. Regarding the Maximum Femoral Length (MFL), the measurements were taken by distance from most proximal point of head of the femur to the most distal point of medial condyle (Khanal et al., 2017).

2.3- The management of dead bod

For collecting the skeleton from the sight, the following procedure were followed:

1-Seizure of all criminal evidence and features

2-Conducting a full disclosure of all remains inside the crime scene, including whether the remains are complete or incomplete and the condition of the skull is crushed or correct.

3-A label was placed with each burial bag bearing the name of the cemetery, its symbol, the city, and the date.

4-Sending the remaining of the skeleton to the Forensic Medical Institute.

5- The Estimation of the sex and age will be conducted by taking all the measurement of the different parts of the skeleton such as forearm and femur.

The measured values in centimeters were first entered into the Microsoft Excel (2019) then transferred to the SPSS version 22 for statistical analysis. To fulfill the assumptions made for using the parametric test, normality of data was tested by Kolmogorov-Smirnov test (K-S test). After the data met the normality test, descriptive statistics was done to calculate, mean, standard deviation and proportion of segmental measurements with the MFL and Forearm length for left side. After that, inferential statistical test was done by using parametric test (unpaired t-test) to compare the value of segmental measurements between femurs and forearms. A p-value smaller than 0.05 were taken as statistically significant change between two groups.

 DOI: 10.33899/mjn.2023.182220

3- Results

Total cases that enrolled in this study were 342 cases. In this research, age and sex of the skeletonized were identified. As shown in the Table 1, the mean of left Femur length and forearm length were 31.40 (SD± 11.91) cm and 24.02 (SD± 9.12) cm respectively. There were statically significant differences (P< 0.001) between the means. The study revealed that out of 342 cases, 146 (42.69%) cases were male while 196 (57.30%) were female. Regarding the age of cases, most of the study cases 199 (58.18%) were Child. Furthermore, while 139 (40.6%) of cases were adults, only 4 (1.2%) cases were Fetus.

Table 1: showing mean length of the cases left Femur and Forearm bones.

	Minimum	Maximum	Mean	Std. Deviation	P Value
Femur Length (cm)	2.50	57.00	31.4063	11.91893	<0.001
Forearm Length (cm)	2.00	42.00	24.0224	9.12662	

Std: Standard deviation

3.1- Femur length among male and female

The mean differences of femur length among study cases were Shown in table 2. It can be seen that the femur length was greater in males than females. In males, the mean of femur length was 37.16 (SD± 10.82) cm with maximum length of 57 cm and a minimum femur length of 12 cm. Moreover, in females, the mean was 31.91 (SD± 10.20) cm. The maximum femur length was 48 cm, while the minimum length fell to 6 cm in case of Fetus. The results revealed that differences of femur length among genders was statistically significant (P< 0.001).

Table 2:femur length among genders.

	Gender	Mean (cm)	Std. Deviation	Mean Difference	95% Confidence Interval of the Difference		P-Value
					Lower	Upper	
Femur Length (cm)							
	Male	37.1636	10.82600	5.24854	2.69439	7.80270	<0.001
	Female	31.9151	10.20040	5.24854	2.66430	7.83279	

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3.2- Forearm length among male and female

The results in table 3 indicated that the forearm length was greater in males than females. In males, the mean length of forearm was 27.63 (SD± 7.84) cm. while the maximum recorded length of forearm was 41 cm, the minimum femur length was only 9 cm. The mean length of in females was 24.69 (SD± 8.59) cm with maximum femur length of 42 cm, the minimum recorded length of was only 5.50 cm in a fetus. It is found that differences among mean genders were statistically significant (P= 0.004).

Table [1]: Forearm length among genders.

	Gender	Mean	Std. Deviation	Mean Difference	95% Confidence Interval of the Difference		P-value
					Lower	Upper	
Forearm Length (cm)							
	Male	27.6351	7.84971	2.93826	.91988	4.95664	0.004
	Female	24.6969	8.59631	2.93826	.95211	4.92441	

Table 4: Femur length among cases age.

Age	Mean of Femur length (cm)	Std. Deviation	Minimum	Maximum	P-Value
Adult	42.8566	4.13428	27.50	57.00	
Child	23.7995	8.16844	7.50	40.00	0.0001*
Fetus	5.1250	1.93111	2.50	7.00	

***ANOVA T-Test.**

1.3- Femur length among cases age

The result in Table 4 indicated that the mean of femur length was greater in adults 42.85 (SD± 4.13) cm compared to mean femur length in children 23.79 (SD±8.16). Furthermore, in fetus, the mean of the femur length was 5.12 (SD±1.93) cm. These

differences were statistically significant (P< 0.001).

3.4- Forearm length among cases age

Table 5 exhibits the results of forearm length among ages. The results of the present investigation show that the forearm length was greater in adults than others. In adults, the mean of the forearm length was 32.69 (SD± 3.57) cm and the maximum recorded length in adults was 42 cm, while the minimum forearm length was 19.50 cm. In children on the other hand, the mean of forearm length was 18.3 (SD± 6.35) cm and the maximum forearm length was 33 cm, while the minimum recorded length was 6.50 cm. Finally, in fetus, the recoded forearm length was 4.5 (SD± 1.77) cm. The mean differences among genders were statistically significant (P< 0.001).

Table 5: Forearm length among cases age.

Age	Mean of Forearm Length (cm)	Std. Deviation	Minimum	Maximum	P-Value
Adult	32.6985	3.57423	19.50	42.00	
Child	18.3091	6.35970	6.50	33.00	0.0001*
Fetus	4.5000	1.77951	2.00	6.00	

***ANOVA T-Test.**

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4- Discussion

Long bones are significant in determining sex. It is often simple to determine their sex from a general examination of these—male bones tend to be longer and more massive than female bones, with more distinct muscle attachments—but there is a great deal of variation and overlap, whenever sex determination had based solely on examination of long bones then it can be very unreliable. some researchers reported that the length of the femur was the one of most accurate in sex estimation. The study revealed that there are significant differences between the femur in male and female. The femur was taller in male compared to female. Similar results were also reported by Monisha, & Karpagam, (2016). This might be because of inconstant lifestyle and differential labor expected in male than in females.

It is widely agreed that population-specific studies are required in order develop equations for estimating height and predicting sex from various anthropometric factors. To that purpose, the current study was conducted in Iraqi population where information on such studies is scarce. The current study was set out to find out if forearm lengths might predict sex in sampled population. It was found that males were generally taller and had longer forearm than females. This is comes in accordance to many other investigations in various parts of the world (Ansah et al., 2017; Gaur et al., 2016; Ghanbaril et al., 2016). The reason behind such differences can be related to hormonal influence which is assumed to be responsible for the difference in bone development between males and females, as seen by males' higher height and bone length compared to females (Garrett et al., 2011; Kumar et al., 2014).

5- Conclusion

Estimation of sex and age on the bases of long bones were carried out for the first time in Iraq throughout current study. It was found that Forearm and Femur bone length is a suitable parameter for sex prediction and age estimation. Then often it may well help in identification of deceased person. This study's criteria may be utilized to determine the gender based on femur bone characteristics.

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