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Forensic Anthropology Population Data

A contemporary Colombian skeletal reference collection: A resource for the development of population specific standards

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ABSTRACT

Several authors who have discussed human variability and its impact on the forensic identification of bodies pose the need for regional studies documenting the global variation of the attributes analyzed osteological characteristics that aid in establishing biological profile (sex, ancestry, biological age and height). This is primarily accomplished by studying documented human skeletal collections in order to investigate secular trends in skeletal development and aging, among others in the Colombian population. The purpose of this paper is to disclose the details of the new “Contemporary Colombian Skeletal Reference Collection” that currently comprises 600 identified skeletons of both sexes, who died between 2005 and 2008; and which contain information about their cause of death. This collection has infinite potential for research, open to the national and international community, and still has pending opportunities to address a variety of topics such as studies on osteopathology, bone trauma and taphonomic studies.

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1. Introduction

Human evolution has been closely linked to the adaptive biological processes that have generated great variability in populations. This variability is of great importance in archeological contexts, as it provides information on past human groups, such as migration processes, diet, health and demography. In forensic settings, such variability is a key factor to the process of identifying bodies because it is the biological basis for identification, generating differences – phenotypic or genotypic – that aid to

distinguish one individual from another, which is very important for forensic identification.

Human variability is reflected in the frequency of genotypic or phenotypic traits of a population and may be established through the use of different methods and techniques. Given the aforementioned implications for the forensic identification process [1–3], there is an international consensus for the need for each local population to count on available standards to recognize their demographic information in skeletal and dental tissues during a forensic autopsy. This is done, in order to avoid the use of standards that belong to other populations, “... in such a way that the methods are highly reliable and quantifiable in order to ensure compliance with the rules of evidence admissibility and that the measurements of variation among populations are not statistical artifacts produced by methodology” [2]. The most appropriate methodology to achieve demographic standards (skeletal and dental) of a population is to assess both qualitatively and quantitatively its biomarkers in documented and statistically representative samples. This can be achieved by conducting longitudinal or transversal population studies, however the completion of the former is relatively complex, due inter alia, to the extensive periods (years) they require to complete the evaluation.

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For more than a century [4,5], physical and forensic anthropology have been conducting population-based studies from the study of human skeletal collections, since they are recognized as a valuable asset for research. Some of these collections that have been established in different countries are: The 21st century identified skeletal collection, Portugal (Coimbra) with 159 individuals [6]; UCM Identified Skeletal Collection, Spain (Madrid) with 119 individuals [7]; UAB Identified Skeletal Collection, Spain (Barcelona) with 31 individuals [8]; Granada Osteological Collection of Identified Infants and Young Children, Spain (Granada) with 230 individuals [9]; Athens Human Skeletal Reference Collection, Greece (Athens) with 225 individuals [10]; Crete Human Skeletal Reference Collection, Greece (Crete) with 178 individuals [11]; Sassari Collection, Italy (Bologna) with 606 individuals [12]; Coimbra Identified Skeletal Collection, Portugal (Coimbra) with 505 individuals [13]; Bocage Museum (NMNH) Identified Skeletal Collection, Portugal (Lisbon) with 1692 individuals [14] and the Brazilian Amazon Skeletal collection [15]. These collections are helpful for variables such as sex, age and stature that can vary from one population to another and can even switch between regions within the same country.

Forensic anthropology was incorporated into the Colombian forensic system in 1990 [16]. Forensic anthropology and archeology in Colombia are recent disciplines going back no more than 25 years. Both developed from the same educational tradition as cultural anthropology by anthropologists who have gained experience in judicial investigations and medicolegal autopsies from the daily casework [17]. Since then, like most Latin American countries, techniques for generating the biological profile (sex, ancestry, biological age and height) of unidentified bodies have come from foreign methods [18–22]. Those techniques have not been consistent with the global consensus to use local standards, which may be poorly represented in existing databases [3] with the risk of obtaining results with some level of bias.

In Colombia, as in most Latin American countries, the use of non-local secular trends in skeletal development, sex, ancestry, height and aging occurs due to the absence of documented local collections, which enable researchers to generate local parameters. In fact, the literature review only evidenced one skeletal collection in Argentina [23] and another one recently implemented in Colombia [24], which has 200 male and female identified individuals, deceased between 2003 and 2005. Such a collection is an important initiative to enrich knowledge about Colombian population variability because most bodies correspond to persons born in the department of Antioquia, Colombia, a geographic area different from that of the bodies that belong to the skeletal collection used in this study.

Since the beginning of the 1940s, Colombia has been permeated by internal armed conflict. This conflict has affected a large number of people and many have been reported missing due to kidnappings, armed clashes, landmines or extrajudicial executions. In this regard, data provided by the INMLCF (Table 1) can be considered an approximation of the reality of persons reported missing, but not necessarily related to the armed conflict, since they might be dead and buried in clandestine graves.

Table 1
Figures of enforced disappearance in Colombia (1995–2014).

Persons reported missing	Persons reported missing who were found dead	Persons reported missing who were found alive	Persons reported missing who are still missing
91.647	4.097	23.347	64.203

Source: INMLCF. National Missing Persons Registry as of 01/26/2015.

According to the approaches mentioned above, regarding population variability and with the aim of developing local skeletal and dental demographic standards, the implementation of “The Human Skeletal Reference Collection of Modern Colombian Population” began in 2009. The purpose of this paper is to show details of the new collection, which currently comprises 600 identified adult skeletons of both sexes, who died between 2005 and 2008, with information about their cause, mechanism and manner of death; the latter two variables are known in 206 autopsied individuals.

2. Brief history of the collection

“The Human Skeletal Reference Collection of Modern Colombian Population” is a project of the National Institute of Legal Medicine and Forensic Sciences (INMLCF is its acronym in Spanish) located in Bogota, Colombia. Its main objective is to solve the problem of not having local skeletal and dental secular trends that can be used during the forensic process of identifying unidentified complex corpses [2]. This project is comprised of a representative sample of modern Colombian corpses, recovered under controlled conditions and made up of individuals whose demographic data, death, and taphonomic aspects related to their known burial place and state of preservation when they were recovered.

The collection began following the signing of an agreement between the Special Administrative Unit of Public Services of the District (UAESP is its acronym in Spanish) and the INMLCF, in which the first entity donates identified bodies to the second, so that scientific research may be conducted. The bodies come from the four district or state cemeteries of Bogota and correspond to those who, by law, four years after having been buried must be exhumed and deposited in ossuaries or cremated incinerated. In the event that the family does not collect the body, the cemetery removes it from the crypt and cremates it. However, since 2009 and thanks to the aforementioned agreement, if a family requests the body at a date following four years of burial, the cemetery requests that INMLCF return the body and deliver it to the family. The project was approved by the Bioethics Committee of the National Institute of Legal Medicine and Forensic Sciences.

3. Methodology of collecting and preparing corpses

3.1. Administrative tasks

Administrative planning takes place between the curator of the collection and the directors of cemeteries. Date, time and place of delivery of the bodies are agreed upon and formalized by signing a written certificate that contains the data of each body (names and last names, number of crypt where it is buried).

3.2. Pickup

The bodies are deposited in vaults whose height from the floor varies between 0 and 6 m, built with bricks, covered with cement and sealed with a marble or metal tombstone. The first step is the removal of the coffin from the vaults and its transfer to the cemetery morgue; at this time and after signing a certificate, the director of the cemetery officially delivers the coffins and bodies to the curator of the collection.

3.3. Transportation of coffins and bodies

Remains are transported in a vehicle designed to transport corpses.

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