



Learning point

Chronic alcoholism and bone remodeling processes: Caveats and considerations for the forensic anthropologist

Amy R. Michael ^{a,*}, Jennifer D. Bengtson ^b^a Michigan State University, Department of Anthropology, 355 Baker Hall, East Lansing, MI 48824, USA^b Southeast Missouri State University, Department of Global Cultures and Languages, One University Plaza, MS 4120, Cape Girardeau, MO 63701, USA

ARTICLE INFO

Article history:

Received 8 July 2015

Received in revised form

25 October 2015

Accepted 29 November 2015

Available online 17 December 2015

Keywords:

Forensic anthropology

Age-at-death

Alcoholism

Histology

Biological profile

Trauma analysis

ABSTRACT

Clinical literature provides substantial information on the effects of chronic alcohol abuse on bone remodeling and related skeletal disease processes. This biomedical information is seldom considered in detail by forensic anthropologists, who often rely on normative macroscopic models of bone remodeling and traditional macroscopic age estimation methods in the creation of biological profiles. The case study presented here considers the ways that alcoholism disrupts normal bone remodeling processes, thus skewing estimations of age-at-death. Alcoholism affects bone macroscopically, resulting in a porous appearance and an older estimation of age, while simultaneously inhibiting osteoblastic activity and resulting in a younger microscopic appearance. Forensic anthropologists must also be cognizant of pathological remodeling stemming from alcoholism in cases where trauma analysis is critical to the reconstruction of events leading up to death, as fracture healing rates can be affected. Beyond the case study, we also consider how forensic anthropologists and practitioners can recognize and account for osteological signatures of alcoholism in medico-legal contexts. In order to best estimate age at death, a combined macroscopic and microscopic approach should be employed whenever possible alcohol and drug abuse is known or suspected.

© 2015 Elsevier Ltd and Faculty of Forensic and Legal Medicine. All rights reserved.

1. Introduction

A nuanced understanding of the effects of chronic alcohol use on the efficacy of the analytical methods used by forensic anthropologists is contingent upon a review of the relevant clinical research. Such a review is currently lacking in the forensic anthropology literature. In this article, we present a brief review of the clinical literature to highlight some of the skeletal manifestations of alcoholism that might be of concern to the forensic anthropologist when assessing age-at-death skeletal trauma. To illustrate the specific ways that alcoholism, as a biosocial phenomenon, might be expressed at certain points in a forensic anthropological investigation, a case study is presented in which traditional macroscopic and histological aging methods were compared to secure an estimate that best represented the decedent's chronological age. These methodologies produced disparate results, with neither method yielding an accurate age-at-death estimate. In publicizing these

discordant results, we suggest further forensic anthropological research on the effects of chronic alcohol consumption in the estimation of skeletal age at death.

2. Background

The efficacies of various specialized forensic anthropological analyses are contingent upon an understanding of normal bone remodeling processes. For example, histological aging methods based on quantification of bone remodeling rates have offered promising results for attaining accurate age estimations in adult remains compared to gross methods.^{1–8} Discrimination between antemortem and perimortem trauma and estimation of time since injury are also crucial components of forensic anthropological cases involving traumatic death and chronic abuse.⁹ The potentially confounding effects of chronic alcohol consumption on the bone remodeling processes – upon which both histological aging and trauma analyses are dependent – are sometimes briefly mentioned in review articles and reports. However, substantial detail regarding the manner in which the metabolic correlates of excessive alcohol consumption might obscure results of these analyses is

* Corresponding author. Tel.: +1 517 353 2950.

E-mail addresses: michae76@msu.edu (A.R. Michael), jbengtson@semo.edu (J.D. Bengtson).

conspicuously lacking in the forensic anthropology literature. Analytical models concerning the effects of alcohol on bone remodeling are wholly absent from the field.

Alcohol abuse and alcohol dependence (*alcoholism*) were considered distinct, but related illnesses until the most recent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) collapsed the two into a spectrum disorder – Alcohol Use Disorder (AUD) – with mild, moderate, and severe manifestations.¹⁰ Diagnosis is made with reference to 11 widely-recognized physical and mental symptoms (Table 1). Under DSM-V guidelines, the diagnostic approach was changed while the symptomatic criteria largely remained the same. Individuals experiencing two or three of 11 criteria are diagnosed with mild AUD. Those who experience four or five are diagnosed with moderate AUD, while those who experience five or more symptoms are considered to suffer from severe AUD. Under the older criteria, a pattern of alcohol use resulting in one or more interpersonally, socially, or legally disruptive or deviant behaviors warranted a diagnosis of alcohol abuse, while meeting of three or more additional biomedical and social criteria would result in a diagnosis of alcoholism (NIAA publication).

Epidemiological analyses based on new definitions of AUD are not widely available, complicating the incorporation of these new diagnostic criteria and terminology into the current literature review. Because they are the terms most frequently encountered in the reviewed clinical literature, we retain the somewhat outdated terms *alcohol abuse* and *alcoholism* in this paper. Both alcohol abuse and alcohol dependence involve overuse of alcoholic beverages. Alcohol abuse is a pattern of drinking resulting in harm to one's health, interpersonal relationships, or ability to work. Alcoholism – also referred to as *alcohol addiction* or *alcohol dependence* – is a chronic disease in which the person experiences intense cravings for alcohol, an inability to limit consumption, and a continuation of consumption despite negative legal, professional, interpersonal, and physical consequences.¹¹ Regardless of which DSM model is used, it is crucial to note that alcohol-related illnesses are a biosocial disorder, characterized by both psychosocial and biomedical manifestations.

Analyses utilizing DSM-IV criteria for alcohol abuse and alcohol dependence indicate both are prevalent in the United States. Alcohol abuse afflicts up to 17.8% of the American adult population, while alcohol dependence afflicts up to 12.5%, with prevalence of each disorder higher among white males compared to other demographic groups.¹² Prevalence statistics bolster an argument that forensic practitioners should be cognizant of the ways that chronic alcohol use might disrupt physiological processes in living individuals and thus affect the accuracy of certain forensic anthropological methods.

3. Materials and methods

In order to demonstrate a scenario in which the results of skeletal age estimations might be obscured by lack of recognition of the osteological effects of chronic alcohol abuse and alcoholism, we revisit a closed case from the Michigan State University Forensic Anthropology Laboratory (MSUFAL). During October 2000, the nearly complete skeleton of an adult male was discovered by a hunter exiting a wooded area near Wayland, Michigan. This portion of the state is sparsely populated and police quickly acquired information and medical records for a local missing person. Upon investigating and closing the case, the skeletal remains were donated to the MSUFAL for education and forensic research purposes. Friends and family reported the decedent suffered from alcoholism throughout much of his life, and this information was retained in the case file.

As part of a graduate project and without reviewing the associated case file, we created a biological profile against which to compare antemortem records of the decedent that involved both macroscopic and histological approaches to age estimation. Kerley's³ original histological aging method, along with the truncated version including correction factors,⁵ was employed because this technique has been shown to be the most reliable method for middle-aged individuals.^{13–15} Because Kerley³ noted that the area around the femoral midshaft was uniform in structure, all thin sections were prepared from this region of the bone. Thin sections were taken only from the left femur due to localized trauma-

Table 1

Criteria for alcohol use dependence (AUD) (adapted from DSM-V, 2013 and <http://pubs.niaaa.nih.gov/publications/dsmfactsheet/dsmfact.pdf>).⁴⁷

<p>Symptoms of AUD</p> <ol style="list-style-type: none"> 1) Alcohol is often taken in larger amounts or over a longer period than was intended. 2) There is a persistent desire or unsuccessful efforts to cut down or control alcohol use. 3) A great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects. 4) Craving, or a strong desire or urge to use alcohol. 5) Recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, or home. 6) Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol. 7) Important social, occupational, or recreational activities are given up or reduced because of alcohol use. 8) Recurrent alcohol use in situations in which it is physically hazardous. 9) Alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol. 10) Tolerance as defined by either of the following: <ol style="list-style-type: none"> a) A need for markedly increased amounts of alcohol to achieve intoxication or desired effect. b) A markedly diminished effect with continued use of the same alcohol. 11) Withdrawal, as manifested by either of the following: <ol style="list-style-type: none"> a) The characteristic withdrawal syndrome for alcohol (refer to criteria A and B of the criteria set for alcohol withdrawal). b) Alcohol (or a closely related substance, such as a benzodiazepine) is taken to relieve or avoid withdrawal symptoms. 	<p>The presence of two or more of these symptoms indicates an Alcohol Use Disorder.</p> <p>The severity of the AUD is defined by the following ranges: MILD: The presence of 2–3 symptoms. MODERATE: The presence of 4–5 symptoms. SEVERE: The presence of 6 or more symptoms.</p>
---	---

Download English Version:

<https://daneshyari.com/en/article/101736>

Download Persian Version:

<https://daneshyari.com/article/101736>

[Daneshyari.com](https://daneshyari.com)