



Technical note

Frequency and patterns of costovertebral osteoarthritis in two Medieval English populations



Kimberly A. Plomp^{a,*}, Anthea Boylston^b

^a Human Evolutionary Studies Program, Department of Archaeology, Simon Fraser University, Canada

^b School of Archaeological Sciences, University of Bradford, United Kingdom

ARTICLE INFO

Article history:

Received 7 August 2015

Received in revised form 2 May 2016

Accepted 17 May 2016

Keywords:

Ribs

Spine

Vertebrae

Eburnation

Joint disease

ABSTRACT

Osteoarthritis is one of the most frequently identified lesions in palaeopathological research. It has been extensively studied by both bioarchaeologists and medical researchers for decades, yet the aetiology of osteoarthritis remains unclear. One of the most important aspects of osteoarthritic studies is identifying the distribution patterns of the condition throughout the skeleton. Despite many studies reporting the occurrence of postcranial osteoarthritis, including in the spine, the costovertebral articulations have received little focus. The current study describes the occurrence of costovertebral osteoarthritis in two Medieval English populations from Chichester and Hereford. The presence of eburnation on the joint surfaces was used to indicate osteoarthritis. It was found that osteoarthritis of these joints had a similar frequency in both populations. An interesting pattern also emerged, with the joints of the costo-transverse articulations showing more eburnation than the costovertebral articulations with the vertebral body, except in the first rib. The pattern of distribution identified throughout the spine may provide insight into possible aetiological factors leading to the development of costovertebral osteoarthritis.

© 2016 Elsevier Inc. All rights reserved.

1. Introduction

Joint disease is the most frequently observed skeletal lesion in palaeopathology, with osteoarthritis being the most common form of joint disease diagnosed (Woolf, 2002). The pattern of joint involvement can provide insight into possible aetiologies or pathogeneses of joint disease, and for osteoarthritis, has been used to help interpret behaviour in the archaeological record (Lovell, 1994; Jurmain and Kilgore, 1995; Waldron, 1997; Baetsen et al., 1997). Although most of the synovial joints of the human skeleton, including the apophyseal joints of the spine, have received substantial attention in many palaeopathological studies (Knüsel et al., 1997; Waldron, 1992; Debono et al., 2004; Maat et al., 1995), the costovertebral articulations have been largely ignored.

Few studies have discussed the occurrence of costovertebral osteoarthritis in skeletal populations (Merbs, 1983; Nathan et al., 1964). One study by Nathan et al. (1964) investigated osteoarthritis on the costovertebral joints on thoracic vertebrae of individuals in the Hamann-Todd Collection. They included individuals of all ages, both sexes, and from both European and African ancestry. The skeletal changes used to diagnose osteoarthritis were erosion

of the joint surface and osteophytic lipping of the joint margin. The authors did not include the joint on the transverse process, and therefore the reported frequency may be conservative. They report a frequency rate of 48% in the population, and did not find significant differences between sexes or ancestral backgrounds. They did find an increase with age, although this trend decreases after the age of 80 years. Interestingly, the occurrence of osteoarthritis was found to be frequent in the first rib, decreased in the second rib, and tended to increase in frequency again down the spine (Nathan et al., 1964).

Costovertebral osteoarthritis has received more attention in the clinical literature. Malmivaara et al. (1987) investigated 24 cadavers and found costovertebral osteoarthritis in approximately 57%. Some clinical studies have also identified costovertebral osteoarthritis as a possible cause of thoracic pain during movement, coughing, and respiration (Sales et al., 2007; Weinberg et al., 1972; Grant and Keegan, 1968; Benhamou et al., 1993). For example, Grant and Keegan (1968) found that 32.5% of individuals who reported rib pain had costovertebral osteoarthritis. Considering these clinical findings, it seems possible that costovertebral osteoarthritis would have caused pain and influenced quality of life in the past.

With this in mind, we initiated an investigation of costovertebral osteoarthritis in two Medieval English populations. The aim of the study was to investigate the frequency and pattern of rib

* Corresponding author.

E-mail addresses: kplomp@sfu.ca, kimberlyplomp@yahoo.com (K.A. Plomp).



Fig. 1. Locations of Hereford and Chichester, with London shown for reference.

Table 1

Breakdown by sex and age (YA=young adult–20–26 years, MA=middle adult–27–45 years, EA=elderly adult–46+ years) of individuals included in the analysis.

	Chichester	Hereford	Total
Females			
YA	16	16	32
MA	17	26	43
EA	22	25	47
Total	55	67	122
Males			
YA	24	12	36
MA	25	26	51
EA	27	26	53
Total	76	64	140
Total	131	131	262

osteoarthritis in archaeological skeletons. It is hypothesized that the pattern of costovertebral osteoarthritis throughout the ribcage may provide insight into possible aetiological factors. The findings of this study will add to the existing knowledge of the distribution of osteoarthritis throughout the human skeleton.

2. Materials and methods

Two Medieval English skeletal populations from Hereford and Chichester (Fig. 1) were included in this analysis, with each site yielding 131 skeletons for a total of 262 individuals (Table 1). The age and sex of each individual was estimated using morphological characteristics of the pelvis and cranium (Phenice, 1969; Brooks and Suchey, 1990; Lovejoy et al., 1985). This information was attained by AB for Hereford Cathedral (Weston et al., *in preparation*) and from the Chichester site report (Magilton, 2008). Age categories were adapted from those outlined by the Biological Anthropology Research Centre (BARC) at the University of Bradford, UK. Individuals aged from 20 to 26 years at death were categorized as young adults, those aged 27–45 years as middle adults, and those older than 46 years as elderly adults. Only aged and sexed individuals were included in the analysis and individuals displaying pathological lesions on the ribs other than osteoarthritis were excluded.

The earliest date recorded for Hereford Cathedral is 676C.E., and the cemetery site is thought to date from the 7th to the 16th

Table 2

Breakdown by sex and age (YA=young adult–20–26 years, MA=middle adult–27–45 years, EA=elderly adult–46+ years) of individuals displaying eburnation on at least one joint surface in each skeletal population. Percentages were calculated from the total number of individuals in each group described in Table 1.

	Chichester	Hereford	Total
Females			
YA	12.5%, N=2/16	12.5%, N=2/16	12.5%, N=4/32
MA	35.3%, N=6/17	30.8%, N=8/26	32.6%, N=14/43
EA	31.8%, N=7/22	48.0%, N=12/25	40.4%, N=19/47
Total	27.3%, N=15/22	32.8%, N=22/67	30.2%, N=37/122
Males			
YA	12.5%, N=3/24	16.7%, N=2/12	13.9%, N=5/36
MA	12.0%, N=3/25	15.4%, N=4/26	13.7%, N=7/51
EA	40.7%, N=11/27	46.2%, N=12/26	43.4%, N=23/53
Total	22.4%, N=17/76	28.1%, N=18/64	25.0%, N=35/140

centuries (Stone and Appleton-Fox, 1996; Shoesmith, 1992). The individuals from Chichester come from the medieval leprosarium cemetery of St. James and St. Mary Magdalene. The hospital was likely founded in the early 12th century and was used until the late 17th century, first as a leprosarium and later as an almshouse (Magilton, 2008).

There are disagreements between researchers on how best to identify and record arthritic changes on skeletal material (Rogers, 1998; Rogers and Waldron, 1995; Jurmain, 1999; Weiss and Jurmain, 2007). Many researchers use the method described in Rogers and Waldron (1991), where the presence of two degenerative characteristics – osteophytes, porosity, and joint contour change – or the presence of eburnation is used to diagnose osteoarthritis. However, others propose that eburnation is the only characteristic that definitely indicates osteoarthritis (Rothschild, 1997; Weiss and Jurmain, 2007). In view of this, we opted to diagnose osteoarthritis based on the presence of eburnation, which is considered to be a pathognomonic lesion (Ortner, 2003). Two joint surfaces were analyzed on each rib: 1) The costocorporeal (CC) joint on the rib head that articulates with the vertebral body, and 2) The costotransverse (CT) joint on the neck of the rib that articulates with the transverse process of thoracic vertebrae (Fig. 2). The general term of ‘costovertebral osteoarthritis’ will be used to indicate the condition on either joint. Ribs were sequenced using the method developed by Mann (1993). Pearson chi-squared tests were used to determine the statistical significance of differences between variables, i.e. sex, population, age groups. The statistical analyses were run in SPSS® 16.0 (Inc., Chicago, IL) (SPSS, 2007).

3. Results

Table 2 partitions the costovertebral osteoarthritis results by age, sex, and sample. There was no significant difference in the prevalence of eburnation between Chichester and Hereford populations (χ^2 1.226, $p=0.268$) and the two populations displayed similar patterns. Therefore, the results will be presented as an intra-population analysis of Medieval English individuals.

There were 72 individuals, 27.5%, from the total sample, with eburnation on at least one joint surface (Table 2). Of these individuals, 37 were female and 35 were male. In general, more females had eburnation on at least one joint than males (30.2% vs. 25.0% – see (Table 2), however this was not statistically significant (χ^2 0.929, $p=0.335$).

The age categories for males and females were found to be normally distributed using a Shapiro-Wilks test of normality (0.940, $p=0.657$). When both sexes were pooled, there was a significant increase with age (χ^2 8.032, $p=0.018$), with 9 of the 68 young adults (13%), 21 of the 94 middle (22%) adults, and 42 of the 100 elderly adults (42%) having eburnation on at least one joint surface.

Download English Version:

<https://daneshyari.com/en/article/101298>

Download Persian Version:

<https://daneshyari.com/article/101298>

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