

Creaking in the Cloisters: Observations on Prevalence and Distribution of Osteoarthritis in Monks from Medieval London

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Introduction

Monastic lifestyle in the medieval period differed somewhat from that of secular people. Cenobitic monks' day-to-day activities and the foods that they could consume were governed relatively strictly by the Rule of St. Benedict, although as time progressed, it is widely acknowledged that the Rule was interpreted somewhat more liberally. By the later Middle Ages, "monastic diet ... was a form of upper-class diet, the equivalent within the cloister of the diet of the nobility, gentry, or urban élites outside" (Harvey 1993, 34), regularly providing over 6000 calories a day. This paper presents the findings of the preliminary study for a research project investigating monastic lifestyle and in particular the notion of the 'obese medieval monk'. This particular phase (Patrick 2001) focusses on osteoarthritis, a joint disease which has been linked by some to lifestyle and occupational stresses.

The main focus of the pilot study was as follows:

- To establish whether there was a difference in the prevalence rates for osteoarthritis in monks compared with a secular control group.
- To establish whether there was a difference in the distribution of osteoarthritis throughout the skeleton.
- To explore whether there was a higher prevalence of types of osteoarthritis for which obesity has been cited as a potential causative agent.
- To establish scope and directions for future research into this issue.

Osteoarthritis

Osteoarthritis (OA) is a joint disease representing the gradual failure of synovial joints (the moving joints of the body). OA is the commonest joint disease both in present and past populations (Rogers/Waldron 1995, 32), and affects many people, especially later in life. OA has a multifactorial aetiology, and its development may be contributed to by such factors as genetics, body weight and trauma, such as fractures affecting the joint either directly or indirectly by causing increased stress on the joint, thus reducing its efficiency (Waldron 2001, 35). Occupation is also a possible causative factor, and it has been suggested by some that the anatomical distribution of the disease may give some insight into the stresses placed on joints by a sufferer's lifestyle. In the clinical literature, OA of the knee, the hip and the hand have been linked with obesity (Spector 1990). The aim of the research was to establish whether the prevalence and distribution of OA in skeletons from three monastic, one mixed and two secular cemeteries associated with medieval monastic sites in Greater London differed significantly.

OA (fig. 1) is the term given to joint failure occurring when the articular cartilage in joints is worn away. In modern medicine, it is generally diagnosed radiographically on the basis of features such as narrowing of the joint space and bony lipping around the edges of the joint (marginal osteophyte). Palaeopathologists have an advantage in that they may examine the joint surface directly and from all angles. The surface appearance of joints is of greater im-



Fig. 1: Osteoarthritis of the hip, showing eburnation, pitting of the joint surface, and alteration of the joint contour.

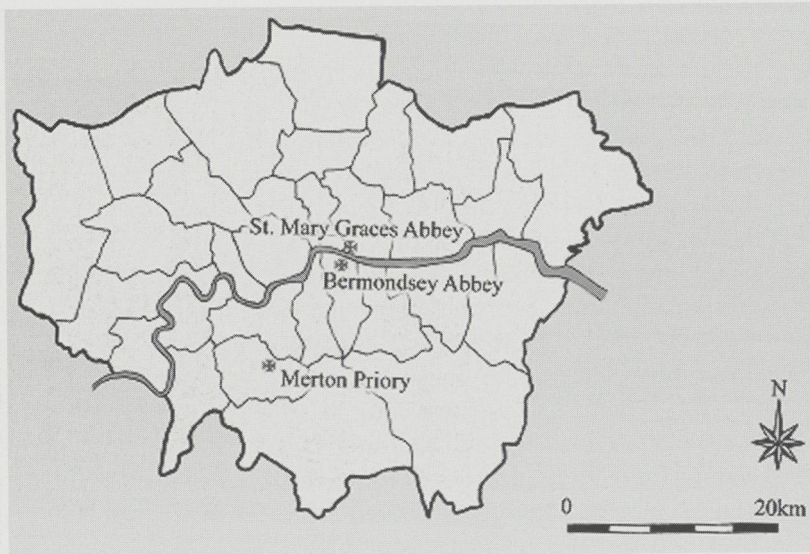


Fig. 2: Map of modern-day Greater London showing the location of the three sites studied (After Patrick 2001, 23).

portance, especially eburnation, the only true pathognomonic indicator of OA (Rogers 2000, 166). Eburnation is a polishing of the joint surface caused by total loss of articular cartilage and subsequent friction between the bony joint surfaces. It is recognisable as a highly smooth and polished, almost glassy appearance on

joint surfaces. In advanced cases there may be sufficient erosion to cause alteration of the joint contour, or directional grooving of the joint surface (particularly in joints which move on a single axis such as the knee and the interphalangeal joints of the fingers). Waldron/Rogers (1991, 53) state that eburnation is the most reliable indicator of OA, hence it was selected as the sole diagnostic criterion for the purposes of this study.

The sites

A total of one hundred and ninety skeletons of males aged 45 and over were studied from three sites excavated by the Museum of London between 1984 and 1988. The sites from which skeletal material was obtained (fig. 2) were St. Saviour's Abbey, Bermondsey (Cluniac; founded 1089; coded BA84, 24 skeletons), St. Mary's Priory, Merton (Augustinian; founded 1114; MPY86S, 32 skeletons), and the Royal Mint site, which yielded the architectural remains and cemeteries associated with St. Mary Graces Abbey, Tower Hill (Cistercian; founded 1350; MIN86C, 14 skeletons). Secular controls were derived from cemeteries interpreted as such at Merton (MPY86N, 87 skeletons) and the Royal Mint (MIN86L, 20 skeletons). A mixed assemblage was also studied from within the monastic church at Merton (MPY86C, 13 skeletons).

Prevalence rates for OA

Crude prevalence is a representation of the proportion of individuals in a particular assemblage showing evidence of disease. Prevalence is expressed as a percentage, and owing to the selection criteria used for this study, the rates presented here are age- and sex-linked, representing the rates of disease in males over 45. A variety of factors dictate that the actual observed prevalence of the disease in a skeletal assemblage is unlikely to accurately represent the actual rates in the living population that was buried in the cemetery. 95% confidence intervals are shown along with the prevalence rates for each assemblage. The confidence intervals serve to represent the range within which the true prevalence is likely to have fallen. The smaller an assemblage, the wider the confidence intervals are. Unfortunately the practical upshot of this is that the significance of trends may be blurred by wide confidence

intervals; a particular problem for comparisons between the monastic cemeteries in this study, which are all relatively small.

The prevalence of OA for each of the six assemblages is shown in figure 3. There is a significant difference (even after taking confidence intervals into consideration) between the high prevalences of OA in the three monastic assemblages and the very low prevalences seen in the secular assemblage from the Royal Mint site (MIN86L). However, the lay cemetery from Merton has a much higher prevalence, comparable with the monastic assemblages. The lowest monastic prevalence rates were from Merton, but the community seems to have been buried in a rather dispersed fashion. There was a higher prevalence in the assemblage from the church at Merton, which is believed to have incorporated high-status monastic and secular individuals. Furthermore, the priors of Merton were buried in the Chapter house, and unfortunately were not included in the pilot study.

Distribution of OA

Figure 4 represents the range of anatomical sites found to have been affected by OA in individuals from each assemblage, the affected areas have been shaded. Some forms of OA are more common than others, these include OA of the spine, shoulder and hand, which were affected in individuals from every assemblage. Likewise in the assemblages in which a wider distribution of OA was found, the spine, shoulder and hand were found to have by far the highest prevalence.

The assemblage showing the widest range of anatomical sites affected by OA was the secular assemblage from Merton, MPY86N. This is not particularly surprising, because this assemblage is much larger than any of the others were. Thus there is more scope for the less common forms of OA to be found. Conversely, it is possible that in a small assemblage very few cases of these rarer forms will arise. In sites where there is a low prevalence of osteoarthritis (such as MIN86L), it is unsurprising that the distribution of OA is not particularly wide, as so few individuals showed evidence of the disease.

Obesity related OA

OA of the hip, which may potentially be associated with obesity, was found in two out of three

monastic assemblages (BA84 and MIN86C) and the secular sample MPY86N. OA of the knee, which clinical literature links fairly strongly with obesity, was found in all three monastic assemblages, as well as MPY86N. OA of the hand, although potentially linked with OA by the clinical literature, is found in all the assemblages. This highlights the problematic nature of hand OA: the joints of the hands are subject to comparatively heavy use, and high levels of stress. As such, OA of the hand may arise due to a very wide range of causative factors.

It was interesting however, that in terms of separate joints of the hand affected, 49% of cases of OA of the hand were derived from the three monastic assemblages, in spite of the fact that these three assemblages combined, incorporated a smaller number of individuals than MPY86N alone (Patrick 2001, 53). Also the distribution of these cases was different, in the monastic assemblages there is a tendency towards the distal interphalangeal joints (the tips of the fingers, the hand joint that is most strongly associated with obesity in the clinical literature); 66% of cases of distal interphalan-

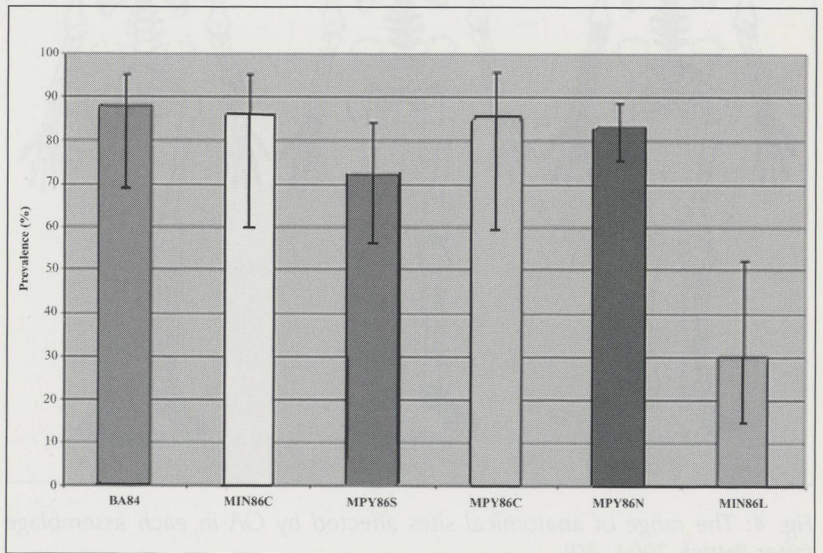


Fig. 3: Crude prevalence rates for osteoarthritis, showing 95% confidence intervals (after Patrick 2001, 29).

geal joint OA were in monastic individuals. Conversely, in MPY86C and MPY86N distribution focussed more on the carpals and metacarpals – the bones in the heel and palm of the hand (*ibid.*). This is an interesting difference in terms of distribution, and warrants further investigation in future.

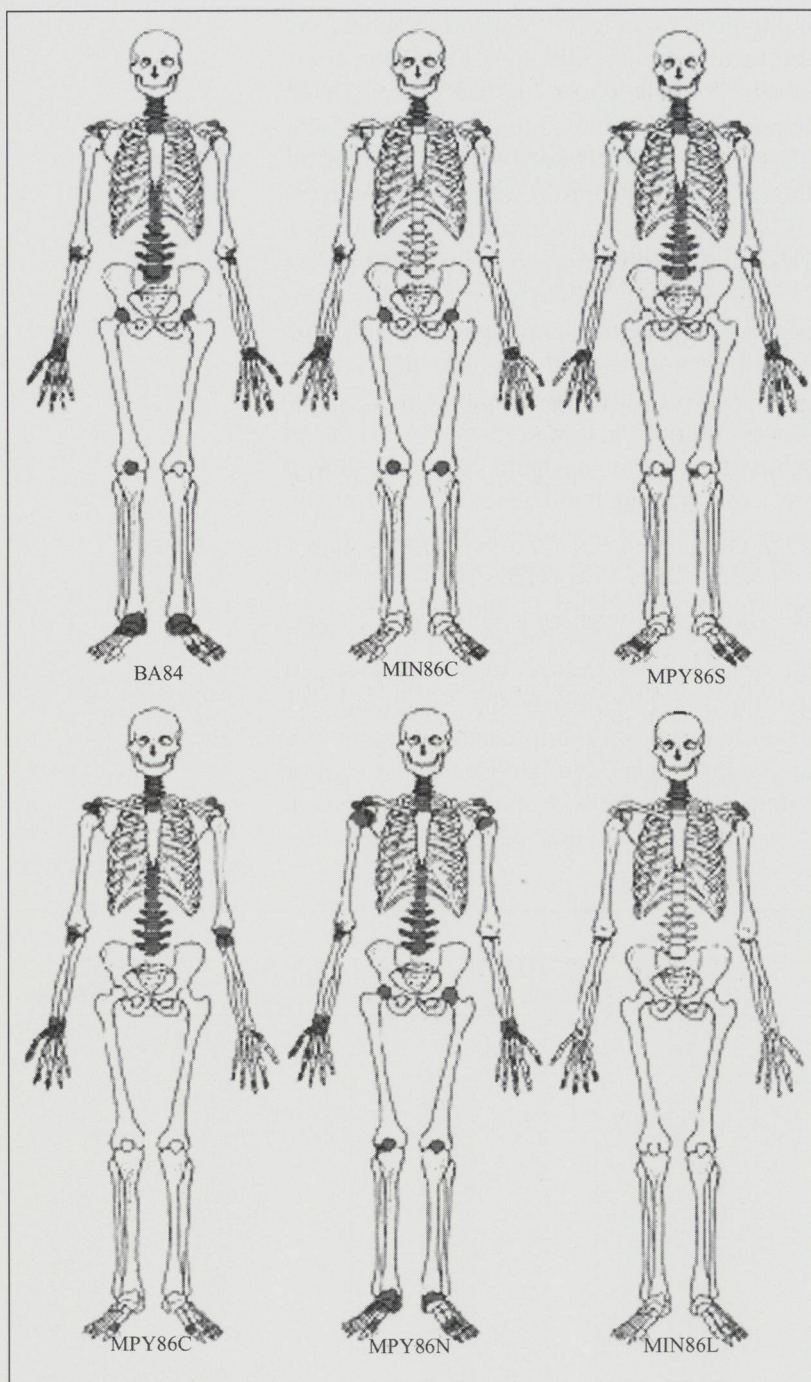


Fig. 4: The range of anatomical sites affected by OA in each assemblage (after Patrick 2001, 30).

Directions for future research

This research was a small-scale pilot study for a wider-reaching project looking at obesity and medieval monasticism. The outcome of this study is certainly positive, in that it shows interesting trends in the monastic assemblages, however in some respects the study poses more questions than it answers. For example the gulf of difference between the two secular

samples is in need of reconciliation. Thus in the second phase of the project, a much larger secular assemblage, namely the Black Death cemetery of Holy Trinity, East Smithfield (also part of the Royal Mint site) will be incorporated into the study, to complement the existing secular material.

The project will be widened to investigate another important obesity related joint disease; diffuse idiopathic skeletal hyperostosis (DISH), thought to be a linked to late onset (type II) diabetes and is characterised in the skeleton by single-sided fusion of the thoracic (chest region) vertebrae. In a number of cases, high prevalence rates have been found for DISH in monks (Rogers/Waldron 2001). Waldron (1985) suggested that DISH might be classed an 'occupational disease' of monasticism, resulting from their diet and lifestyle.

There are a variety of measurements that may be applied to skeletons in order to calculate the individuals approximate stature and body weight. These will allow the physique of individuals to be established. This itself may give an interesting insight, as the development of 'obesity-related' pathologies is not a certainty, even if someone has a high body weight; other factors such as genetic susceptibility to such diseases also have an important role to play. The problems of relying upon prevalence rates alone have been highlighted by this study, and so epidemiological analyses such as case-control studies will be employed to link together evidence for physique and evidence for obesity-related disease in order to gain further insights into monastic physique and lifestyle.

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