

Is tibiofemoral osteoarthritis in the knee joint a new disease?

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Abstract

Objectives—To compare the prevalence of osteoarthritis (OA) of the hip, tibiofemoral and patellofemoral joints in a skeletal population.

Methods—A total of 785 adult English skeletons (695 Saxon or Mediaeval origin) were examined for OA using established criteria.

Results—Twenty nine skeletons had hip OA, compared with 14 with patellofemoral joint OA, and only four tibiofemoral joint OA.

Conclusion—Tibiofemoral OA was far less prevalent in ancient skeletons than hip or patellofemoral disease. Tibiofemoral OA may be a 'new' disease.

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Osteoarthritis (OA) is common. Contemporary epidemiological studies, using radiological criteria for diagnosis, suggest that knee OA is approximately twice as prevalent as hip OA, affecting some 10% of the adult population.¹ OA is also a frequent finding in ancient skeletal material; it can be recognised by eburnation of bone or the combined presence of marginal osteophytosis and pitting of the articular surface.² However, little is known about the relative frequency of OA at different sites in ancient skeletons. Any large variation in the relative prevalence of OA of different joints might imply that there has been a change in risk factor exposure, and could have implications in the development of strategies for disease prevention. A large population of ancient skeletons has therefore been examined for the presence of hip and knee OA to examine the relative frequency of disease at these two joint sites in our ancestors.

Materials and methods

A total of 785 adult skeletons from three different English burial sites were examined.

All the skeletons included in the study had at least half of the skeleton, including both hips and knees available for examination. The male to female ratio was 1.3:1. It was not possible to define the precise age at death, although most skeletons in this study were aged over 35.

They were divided into two groups by historical period: Saxon/Mediaeval ($n = 695$), and Post Mediaeval ($n = 90$). Using the criteria described,² OA was diagnosed as present or absent at the hip and knee. In the knee joint, localisation of OA was recorded in the medial, lateral or patellofemoral compartments.

Results

The results are shown in the table. Overall, 29 skeletons had hip OA, 14 had patellofemoral compartment knee OA, and four had tibiofemoral knee OA. Twenty six joints from the early period (3.7%) had hip OA, compared with 13 (1.8%) with knee OA. In the later period the ratio of hip to knee disease was reversed, there being three hips with OA (3.3%), compared with five knees (5.5%). There was no significant difference of hip prevalence in the two historical periods, but there was a significant increase in prevalence of knee OA in the post Mediaeval group compared with the Saxon-Mediaeval period. The ratio of patellofemoral OA to tibiofemoral OA was the same for both periods.

Discussion

Contemporary radiographic data suggest that knee OA is more frequent than hip OA in European adults, and that tibiofemoral joint disease is about twice as prevalent as patellofemoral OA.^{1 4 5} From visual examination of English skeletons these data indicate that the relative frequency of OA of the hip and patellofemoral compartment of the knee joint in our ancestors was comparable to that seen today. In contrast, tibiofemoral knee joint OA was rare, hip OA being over six times as common.

Possible explanations for these findings include the different diagnostic criteria used (radiological *v* visual scoring) and an atypical age/sex distribution in the skeletal sample. However, it is unlikely that any of these factors would account for such a big difference in the ratio of hip to tibiofemoral knee OA between historical and contemporary populations. The bone changes are equivalent to those seen today in patients with advanced disease. The alterations, however, are visualised much more

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Prevalence and ratios of hip and knee OA

Period	Saxon/Mediaeval (695)		Post Mediaeval (90)		Difference between prevalence by historical period (Fisher's exact test)
	n	%	n	%	
Hip OA	26	3.7	3	3.3	$p = 1$
Knee OA	13	1.8	5	5.5	$p = 0.045$
(Ratio hip/knee)	2:1		0.6:1		
PFJ OA	10	1.4	4	4	
TFJ OA	3	0.04	1	1.1	
(Ratio PFJ/TFJ)	3.3:1		4:1		

TFJ = tibiofemoral joint; PFJ = patellofemoral joint.

sensitively on the bone than on x ray³ so that the overall identification rate of osteoarthritis in skeletal material is probably comparable to that of a contemporary radiological series. Furthermore, diagnostic issues are likely to apply to both sites equally. The overall ratio of male to female skeletons was 1.3:1 so there was no significant bias by gender. Although it is likely that the majority of the skeletons were from relatively young adults which would explain the fairly low overall prevalence of hip and knee OA, contemporary epidemiological data would indicate that this would only result in a small change in the ratio of knee and hip OA.^{5 6}

There is no contemporary data on the relative prevalence of OA in the different compartments of the knee joint in younger age groups. It is possible, however, that hip and patellofemoral knee OA were common in the younger age groups in the past. An alternative explanation, and the one that we consider more likely, is that tibiofemoral knee OA was uncommon in our ancestors. The most important risk factors for this disease include obesity and meniscectomy.^{5 6} Gross obesity can increase the risk of knee OA greatly, but is less

important for either hip or patellofemoral joint OA.^{5 6} Another potential risk factor that might have increased recently is impact loading from walking on hard surfaces.

These data suggest that tibiofemoral knee OA may be a disease of recent origin, perhaps due to its association with risk factors linked to a modern life style, such as obesity. If this is the case, it is also preventable.

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