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Research article

The epidemiology of rickets in the 17th–19th centuries: Some contributions from documentary sources and their value to palaeopathologists

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ABSTRACT

This article considers the nature of written sources on the epidemiology of rickets in the post-Mediaeval period, and examines the value of these sources for palaeopathologists. There is a progression from 17th–18th century sources, which generally make *ex cathedra*, qualitative statements on rickets frequency to, in the 19th century, semi-quantitative geographical surveys of its occurrence, through to reports of percentage prevalence in various groups. Of course, even these latter cannot be directly compared with prevalences calculated from excavated skeletal remains, but there are also considerable difficulties in comparing them with one another, and this effectively precludes synthesis to provide reliable information on geographic and temporal trends at anything more than a very broad-brush level. Their problematic nature mandates a cautious approach when using written sources to shed light on the epidemiology of rickets. For palaeopathologists, a useful way of incorporating these sources into a biocultural approach may be to use them in order to formulate hypotheses that can then be evaluated using skeletal evidence.

1. Introduction

The dominant paradigm in palaeopathology is currently the biocultural approach, in which skeletal data are harnessed to address questions of broad historical or archaeological interest (Roberts and Manchester, 1995: 1; Zuckermann and Armelagos, 2011). Biocultural study primarily involves integrating palaeopathological data with other skeletal data and/or other types of archaeological evidence. However, for the historic period, the potential insights offered by the biocultural approach may be most fully realised when historical sources are also integrated within it (Mitchell, in press). This is particularly true for the post-Mediaeval period, when written texts, including medico-historical sources, become more abundant. A biocultural approach in palaeopathology normally involves testing of hypotheses using statistical analyses of data. The focus is often on the study of disease frequencies in different populations, or in subgroups within a population, so palaeoepidemiology plays a key role. In this paper, I examine some 17th-19th century written sources on the palaeoepidemiology of rickets, and consider how they might be incorporated into a biocultural framework for understanding rickets in this period.

2. Written sources on the epidemiology of rickets

Rickets seems to have been recognised by the second century AD in ancient Rome (Jackson, 1988: 38), and by the 8th century in China (Lee, 1967), but the first substantial treatises on the disease come from the mid 17th century, when Daniel Whistler, Arnold Boot, John Mayow and (most influentially) Francis Glisson, provided clear clinical descriptions (Whistler, 1645; Boot, 1649; Glisson et al., 1650; Mayow, 1668). These were based on observations on cases in England; Boot also observed the disease in Ireland and France. As well as clinical descriptions, these authors also offered some epidemiological observations. Glisson and Whistler both suggest the disease began to be recognised in England in around 1620 (Glisson et al., 1651: 3–4; Whistler, 1950 [1645]: 401). They state that the disease was common at the time they were writing. Boot claimed it was common in Ireland as well as England (van Andel, 1927). Glisson stated that rickets had first been observed in Dorset and Somerset, but since then had spread to other parts of southern England, including London, but was rare in northern counties (Glisson et al., 1651: 4). Both Whistler and Glisson state that rickets was most often seen among the children of the wealthy, with the offspring of the poor being much less affected (Glisson et al., 1651: 121; Whistler, 1950 [1645]: 409).

Prior to the above medical treatises, there is evidence that non-medical writers were aware of rickets. For example, in Suffolk in 1636, Sir Simonds D'Ewes describes the death of his son, at a year and nine months old, of convulsions and "the rickets" (Halliwell, 1845: 123, 143–144). Folk remedies for rickets were also circulating at this time. The domestic receipt books (notes of culinary and medicinal recipes) of the Fairfax family from Yorkshire contain an entry dated 25th February

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1632 describing five remedies for "the rickets (in children)" (Wedell, 1890: 158). The herbalist John Parkinson describes a concoction for the treatment of children with rickets in his *Theatricum Botanicum*, published in 1640 (Parkinson, 1640: 980). Seven years later, the churchman, Thomas Fuller published his tract 'Good Thoughts in Worse Times', the second of a trilogy offering thoughts, primarily from a religious standpoint, upon the days in which he lived. In one of a series of entries giving 'meditations on the times', he uses the head and limb defomities seen in the "new disease" of rickets as a metaphor for the sickness he perceived in people's souls during the troubled times of the English Civil War (Fuller, 1863 [1647]: 140). That lay people attributed the suffering of their offspring to rickets, folk remedies for it had been devised, and that men such as Fuller expected that his readers would be familiar with it, supports the notion that rickets was well established in early 17th century England. Further evidence for this is provided by the London Bills of Mortality, where, beginning in 1634, rickets begins to be cited as a cause of death.

The London Bills of Mortality recorded deaths in parishes in London (Graunt, 1662). They began to be compiled in the 16th century, and their prime purpose was to help provide warning of plague outbreaks in the city (Greenberg, 1997). From 1629, cause of death consistently began to be recorded. The details of deaths were gathered by 'searchers'. These were elderly women of the parish who had no formal medical or other scientific training. They would deduce cause of death from the general appearance of the corpse and from talking to the family of the deceased. They would convey this and other information to the Parish Clerk who was responsible for compiling the Bills of Mortality for his parish. Deaths attributed to rickets peaked at about 3.5% of the total in the period 1650–60, and declined thereafter, so that by the mid 18th century they were only 0.4%. Although rickets is not a lethal disease, its presence increases vulnerability to life-threatening infections, particularly of the respiratory tract (Hess, 1930: 290; Basit, 2003), hence its appearance in dead infants and children is unsurprising. The London Bills are a record of how causes of death were perceived by lay persons rather than providing a reliable source of epidemiological data. Comparisons between different parishes suggest that use of rickets as a cause of death descriptor was inconsistent, searchers in some parishes using it and others not (Newton, 2012). The decline in the frequency with which rickets was entered as a cause of death from about 1660 onward cannot be taken as evidence for a decline in the frequency with which the disease was present in dead infants and children. It is inherently improbable that a disease directly linked to sunlight exposure should decline at a time when industrial pollution and urban crowding were growing problems. It is more likely that, for reasons that are obscure, rickets simply passed out of common usage as a cause of death descriptor during the 18th century (Newton, 2012).

Indeed, in contrast to the evidence of the London Bills, a number of 18th century sources describe rickets as being frequent in London and elsewhere. In the third quarter of the 18th century, James Nelson, a London apothecary, recorded that rickets was extremely common in the capital (Nelson, 1763: 96). Ten years later William Farrar also made this point (Farrar, 1773: 19), and additionally noted that the disease could be severe enough to cause pelvic deformity that could lead to obstetric problems for women in later life (Farrar, 1773: 45–6). Writing at about the same time, William Fordyce, a physician based in Westminster, asserted that there must have been more than 20,000 children in London and its suburbs with the 'Hectic Fever' (which, from his description, clearly denotes rickets) (Fordyce, 1777: 207). By contrast, George Armstrong, a physician based in Hampstead, then a village outside London, stated that rickets was rarely met with where he lived unless it was in those coming out from London who already had the disease (Armstrong, 1767: 96). Rickets was also held to be common elsewhere. For example, in the early 18th century, Thomas Floyer, a physician based in Lichfield, a market town in the English Midlands, stated that no disease was more frequent in infants than the rickets (Floyer, 1715: 76). In 1789, Michael Underwood noted a general rise in rickets which he ascribed to the increase in manufacturing industry drawing more people into towns (Underwood, 1789: 314).

In contrast to the London Bills of Mortality, from the 18th century onward, most statements on rickets and its frequency tended to come from physicians rather than lay people. Nevertheless, difficulties remain concerning the reliability with which the disease was recognised. Some of the most important bony signs of rickets (e.g. enlargement of sternal rib-ends and long-bone metaphyses, and bowing of long-bones) had been described by mid 17th century writers (Whistler, 1950 [1645]; Glisson et al., 1651; Mayow, 1926 [1668]), and continued to be considered key to recognising the disease during the centuries that followed. However, these early writers also erroneously ascribed a variety of other features (for example cough, diarrhoea) to rickets. In later centuries, these, and a variety of further clinical features, such as fever and loss of appetite, which are likewise not a reflection of vitamin D deficiency *per se* but rather of co-occurrent diseases to which the rickety infant is prey (e.g. respiratory tract and other infections), were also commonly associated with rickets (Brent and Mitchell, 2008). This confusion persisted well into the 19th century, and is a serious obstacle in interpreting epidemiological evidence; it was only in the later decades of that century that descriptions became more accurate (Brent and Mitchell, 2008).

The nineteenth century witnessed a growing interest in the epidemiology of rickets, in particular its geographical distribution, mainly for the light it might shed on the causes of the disease, which at the time remained mysterious. In 1855 Augustus Merei, a Hungarian physician working in Manchester, England, instigated what was perhaps the first attempt to collate data from different locations to examine the geographic distribution of rickets. He used his own experience in the north of England, plus information obtained by letter from practitioners in other British locations, in order to study the frequency of rickets in different places (Merei, 1855: 159–186). Some of the results, classified according to whether Merei's correspondants felt rickets was rare or common in their districts are presented in Table 1. The data seem to indicate that, although many of Merei's correspondants in urban areas felt the disease to be rare, when it was common it was generally the urban poor that were affected. The finding whereby the disease more

Table 1
Rickets prevalence at various locations in Britain according to Merei (1855). Letters in parentheses denote whether the location was coloured Blue (denoted B, rickets common) or Red (denoted R, rickets rare) in the BMA's 1889 maps (see text).

Rickets	
Common	Rare
Bath (poor) (B)	Aberdeen (B)
Birmingham (B)	Bath (wealthy)
London (poor) (B)	Blackpool (B)
Manchester (B)	Bradford (B)
Newcastle (poor) (B)	Bristol (B)
Stockport (B)	Cambridge (B)
	Cork & SW Ireland (R)
	Dublin (B)
	Edinburgh (B)
	Glasgow (B)
	Inverness (R)
	Limerick (R)
	Liverpool (B)
	London (wealthy) (R)
	Montrose (R)
	Norwich (B)
	Perthshire (R)
	Scarborough (R)
	Scottish Highlands (R)
	Southport (R)
	Thirsk (R)