INTRODUCTION

Cribra orbitalia refers to a pathological condition observed as small foramina in the roof of the eye orbits as a result of the expansion of the bone marrow and subsequent thinning of the bone cortex. The lesion’s aetiology is heavily debated in osteoarchaeology, but is often linked with nutritional stress. Previously, cribra orbitalia was thought to be a consequence of an iron deficiency anaemia (e.g. Carlson et al. 1974). In contrast, a vitamin B12 or vitamin B9 (folic acid) deficiency has been proposed as the most likely cause for cribra orbitalia by Walker et al. in 2009. However, Oxenham and Cavill (2010) argue that iron deficiency anaemia can still be a viable explanation for cribra orbitalia. Recently, malaria has been proposed as a cause of cribra orbitalia (Gowland and Western 2012). A malarial infection result in haemolytic anaemia causing marrow hypertrophy causing cribra orbitalia. Gowland and Western (2012) demonstrate a correlation between marshy areas, which would have harbour malaria transmitting mosquitos, and cribra orbitalia. There appears to have been no correlation with another stress-marker, enamel hypoplasia, and likely mosquito infested areas. This suggests that cribra orbitalia can be a marker for malaria in marshy areas. (Gowland and Western 2012).

CRIBRA ORBITALIA IN ALKMAAR

The Late Medieval skeletal collection of the city of Alkmaar has a very high prevalence of cribra orbitalia (18%) in comparison with other Dutch urban skeletal collections from the Late Medieval period (~5%). Considering that malaria was endemic in the North of the Netherlands during this time period, it is possible that the cribra orbitalia in this collection is caused by malaria infections. However, in the Alkmaar collection the prevalence of enamel hypoplasia is also very high (53% of the individuals) compared with other collections. This does not fit the model proposed by Gowland and Western (2012). They noticed similar enamel hypoplasia prevalence across marshy and non-marshy sites. To elucidate the most probable cause of cribra orbitalia in the Alkmaar collection, the prevalence of the lesions is compared to the prevalence in the skeletal remains from the Blokhuizen assemblage. This small rural village was located adjacent to Alkmaar (see figure 1) and is considered to be marshier than Alkmaar. Therefore, if the cribra orbitalia in Alkmaar is indeed completely or partially caused by malaria, it is expected that the prevalence in Blokhuizen would be similar or higher. As enamel hypoplasia is not correlated with marshy areas, the prevalence in Blokhuizen should be similar across sites, as is suggested by Gowland and Western (2012). If a lower prevalence of cribra orbitalia is observed in Blokhuizen, it is possible that malaria parasites were not an important causative agent suggesting that other types of physiological stress are responsible for the cribra orbitalia.

RESULTS

The prevalence of cribra orbitalia is significantly higher in the Blokhuizen collection, 39% versus 18% in Alkmaar. However, the enamel hypoplasia prevalence is much higher in the Alkmaar collection (53%), whereas only 21% of the individuals in the Blokhuizen collection had enamel hypoplasia. This is comparable to prevalence observed in other skeletal collections from The Netherlands. A summary of the results can be found in figure 2.

DISCUSSION AND CONCLUSION

The high prevalence of cribra orbitalia in Blokhuizen and the low prevalence of enamel hypoplasia suggest that malaria is an important causative agent. This also suggests that malaria mosquitos were probably present in Alkmaar and that malaria may have been responsible for the cribra orbitalia. However, the exceptionally high prevalence of enamel hypoplasia in Alkmaar suggests that something in addition to malaria was causing stress in young individuals such as disease or nutritional stress.

Concluding: the cribra orbitalia in Alkmaar remains difficult to interpret. The comparison with Blokhuizen and other skeletal assemblages from non-marshy areas suggests that malaria was probably an important causative agent in this region. However, considering the high prevalence of enamel hypoplasia, it is unlikely that malaria infections were the sole agent causing cribra orbitalia in Alkmaar.

REFERENCES CITED


Background image after Nunah / Fotolia