The Leprosarium of Saint Thomas d’Aizier: the cementochronological proof of the medieval decline of Hansen disease in Europe?

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INTRODUCTION

By counting cementum annulations to estimate individual age-at-death, palaeodemographers have at their disposal an incomparable tool to reconstruct the demographic history of past populations. Until now, osteo-archaeological collections from medieval leprosaria (Chichester and Naesvedt in particular) have never been precisely studied in a paleodemographic perspective thus keeping in the dark crucial parameters for our understanding of the demo-dynamique of leprosy in Medieval Europe.

Objective: To explore the interest of using cementochronology techniques to compare skeletal samples from a Northern France medieval population affected by Mycobacterium leprae and 20 samples not affected by leprosy.

MATERIAL AND METHODS

We compared adult median age-at-death and survival curves estimated through cementochronology analysis between two groups: 1) a pooled sample of 20 sites without leprosy (N individuals = 1550) dating from AD 450-1600 and 2) a sample from the leprosarium of Saint Thomas d’Aizier in Normandy (N individuals = 225) dating from AD 1250-1650. The possible bias of dental hygiene which might affect cementum has been minimized through cementochronology analysis between two groups: 1) a pooled sample of 20 sites without leprosy (N individuals = 1550) dating from AD 450-1600 and 2) a sample from the leprosarium of Saint Thomas d’Aizier in Normandy (N individuals = 225) dating from AD 1250-1650. The possible bias of dental hygiene which might affect cementum has been simultaneously analyzed and excluded.

SURVIVAL OF ADULT FEMALE GROUPS

Here we considered the survival of 6 female adult series with different social backgrounds:

- Lowest survival curve: Saint-Thomas d’Aizier (STA) medieval leprosarium
- Middle survival curves: different rural and urban female series from Antiquity to Middle Age, according to various levels of burial practices and grave goods
- Highest survival curve: Aristocratic runs from the monastery of Hamagne (7th to 11th c. AD)

ADULTS SURVIVAL AND GENDER

From 15 to 50 years of age, the female survival followed the same depressed curves in most of our series (Figure 6-7) when compared to males, though reaching statistical significance only for Saint-Thomas d’Aizier (Figure 8). Of note, a hiatus occurred ten years before menopause, then showing overlapping curves between genders.

ADULTS SURVIVAL IN 2 LATE MEDIEVAL SITES

- Comparison of survival curves from 83 adults with leprosy (STA) and 28 adults without leprosy (medieval Arras: 5 with TB lesions): no statistically significant difference was found, though the STA curve seemed pejorative (Figure 9).

ADULTS SURVIVAL IN 2 LATE MEDIEVAL SITES BY GENDER

- After stratification on gender, the survival rate of females from STA was significantly impaired, when compared to their male counterparts and to males and females from the medieval sample from Arras (Figure 10).

DISCUSSION

- We explored the interest of using cementochronology analysis in the field of bio-archaeology and more precisely paleo-epidemiology.
- Comparing a variety of leprosy-free sites to a French medieval leprosarium, survival rates of affected and not affected populations differed greatly, though this difference appeared to be statistically significant only for the leprosarium female sample.
- The impact of Hansen disease could indeed be perceptible, but other unassessed important factors may have affected this population survival. Further research is needed to identify relevant factors and describe how they interact to better explain the decline of the Hansen disease.
- Among other possible causes, we hypothesize that the low fecundity index in couples affected by leprosy could play a significant role.