



Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

Dental health, diet, and social transformations in the Bronze Age: Comparative analysis of pastoral populations in northern Kazakhstan

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ARTICLE INFO

Article history:

Available online xxx

ABSTRACT

Comparative analyses of human health and diet are often undertaken for consecutive periods of time which exhibit different social formations or material culture. The aim of this research was to test the link between social transformations and corollary shifts in health or diet. Therefore, oral health and dietary intake were examined in successive Bronze Age periods in central Eurasia with very different patterns of settlement and scales of interaction. Researchers have posited that these periods are evidence of an economic shift from agro-pastoral to pastoral patterns of subsistence. Populations from two sites in northern Kazakhstan (52°10'N, 64°32'E; 52°32'N, 62°23'E) were investigated in terms of dental caries, calculus, abscesses, ante-mortem tooth loss and periodontal disease. The results of this study indicate that the types of dental pathological conditions present stayed relatively uniform over time, suggesting similarities in dietary intake for populations at the sites of Bestamak (2032–1639 cal BC) and Lisakovsk (1860–1680 cal BC). The dietary intake of these communities is indicative of a noncariogenic diet with a high protein content and lack of carbohydrates. These findings conform to general patterns for pastoral societies and are consistent with stable carbon and nitrogen isotopic data. While they types of pathological conditions were similar, the severity of these lesions decreased in the later period. Comparatively more pronounced frequencies of pathological conditions during the earlier period are attributed to multiple etiologies including different patterns of consumption, dental cleaning behaviors, or stress. While the archaeological record indicates broad shifts in settlement patterns, demography, and mortuary rituals from the Middle to Late Bronze Ages, there was only a slight shift in dental health.

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1. Introduction

Discussions of prehistoric health and subsistence based on skeletal remains can be problematic, as there are recognized limitations of archaeological datasets (Wood et al., 1992). However, comparative research of dental pathological conditions in prehistoric populations may provide crucial understandings of diet and health, especially when interdisciplinary techniques are employed. Numerous studies have established the link between dental

paleopathological conditions and prehistoric diet (Lillie, 1996; Kaus and Tam, 2009; Šlaus et al., 2011; Murphy et al., 2013). Correlations between diet and oral health are poorly understood for the Eurasian steppe, as analyses of dental lesions are rarely undertaken on pastoral populations (for exceptions see Eng, 2007; Zubova, 2008a, 2008b; Machicek, 2011; Murphy et al., 2013) (Fig. 1). Comparative bioarchaeological projects which investigate dental health and diet often juxtapose consecutive periods of time when significant social change has occurred (Lillie, 1996; Kaus and Tam, 2009; Šlaus et al., 2011). These studies highlight that at times of social transformation there is periodically an associated shift in diet and health. Therefore, this paper investigates possible correlations between transitions in social and ritual landscapes with dental

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Fig. 1. Location of Bestamak and Lisakovsk study sites and other Eurasian steppe sites discussed in this paper: 1 – Kamennyi Ambar 5; 2 – Bol'shcheykaraganskogo/Arkaim; 3 – Yelovsky 2; 4 – Chernoozerye 1; 5 – Aymyrlyg; 6 – Ai-Dai.

health data through the examination of two consecutive periods of the Bronze Age in the central Eurasian steppe. Marked changes occurred in north central Kazakhstan at the transition from the Middle (2130–1630 cal BC) to Late Bronze Age (1700–1400 cal BC) (Fig. 2) (Hanks et al., 2007; Panyushkina et al., 2008; Logvin and Sevnina, 2013). These contiguous periods reflect an important transition in patterns of settlement, the demographic size of settlements, and mortuary rituals within the broader region. It has also been proposed that these periods reflect a shift in subsistence practices from a focus on agro-pastoral to pastoral consumption patterns, which can be investigated through the examination and interpretation of dental pathological conditions.

The Middle Bronze Age (2130–1630 cal BC) in central Eurasia (southern Urals Russia and north central Kazakhstan), is dominated by two archaeological cultures, the Sintashta and Petrovka. In terms of material culture, these groups differ only slightly and are presented together as they overlap at many sites (even

though in some locations the Sintashta development begins 100 years earlier). The Middle Bronze Age (MBA) is characterized by large aggregated settlements at sites such as Arkaim and Andreevskoye (Fig. 3) (Zdanovich and Batanina, 2002; Batanina and Hanks, 2013). Settlements have exterior enclosures and ditches, sometimes discussed as fortifications, and estimates of population size range from 200 to 700 individuals (Gening et al., 1992; Grigor'yev, 2000:258; Anthony, 2007; Kohl, 2007; Koryakova and Epimakhov, 2007). Cemeteries are often initially identified and delineated based on the presence of kurgan (mound) burials visible on the surface. Kurgan construction consists of planned circular mounds of either dirt or stone surrounded by a circular ditch that can contain from a single to multiple burials (Fig. 4). While kurgan burials dominate discussions of mortuary practices during the MBA, there is also evidence of unmarked, or flat, burials that are located outside of mounded structures at many cemeteries (Fig. 5). An estimated

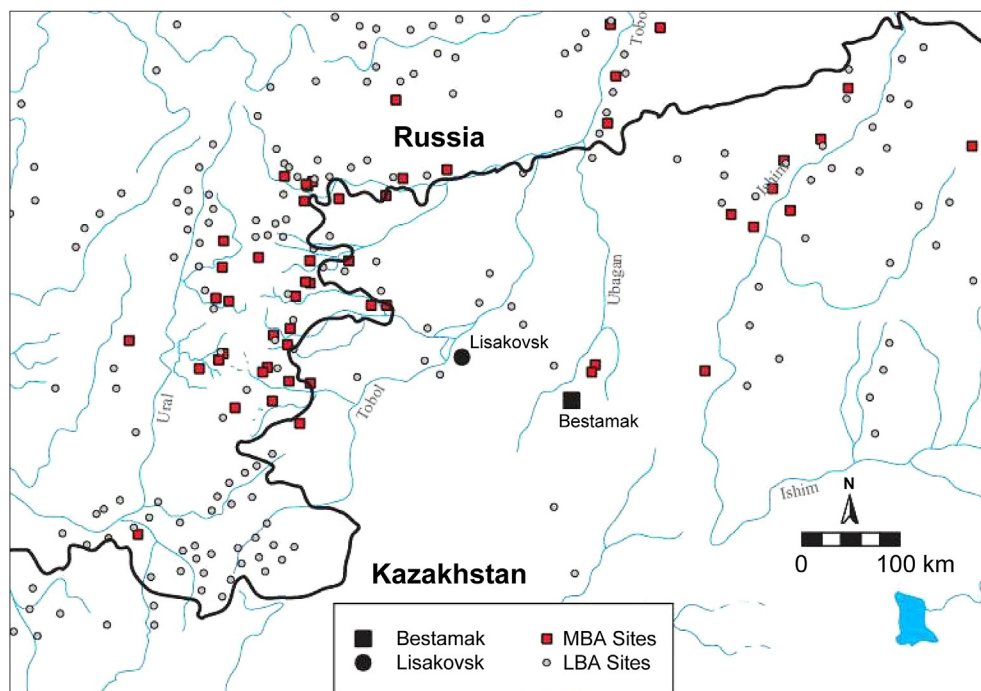


Fig. 2. Middle Bronze Age (MBA) to Late Bronze Age (LBA) settlement transition in central Eurasia.

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