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# Physical activity and social status in Early Bronze Age society: The Mokrin necropolis

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ABSTRACT

This paper investigates the social structure of an Early Bronze Age society whose members were buried at the necropolis of Mokrin (Serbia, Southeastern Europe), by comparative analysis of musculo-skeletal markers (MSM) of activity and social status as induced on the basis of grave contents. The main objective of the analysis is to determine whether quantitative and qualitative differences in activity are related to social status. Besides using an overall measure of activity, we attempted to isolate different qualitative aspects (facets) of activity through factor analysis of MSM scores. No correlation between social status and overall labor intensity was found. However, there are clues that social status and a single facet of activity are related. Positive correlation between vertical status and the intensity of use of upper arm and shoulder muscles was found among male individuals, while negative correlation between the aforementioned variables was found among the females. The general conclusion based on the results of this study is that there is no simple correlation between the overall labor intensity and social status.



## Introduction

The beginning of the Bronze Age in Europe is a very important milestone in the socio-cultural evolution of European societies. Despite various critiques of theories of social evolution, the structure and scale of European societies has clearly changed during the course of prehistory (Bintliff, 1984). What is evident is the increase in social complexity and scale through time. In this context, the most important question is: what is the scale and structure of Bronze Age societies?

What seems to be incontestable is that the rise of elites and aggrandizement of the few are the processes which were operating in the Bronze Age (Harding, 2000, p. 390). 'Chiefdom' (Earle, 1987, 1989, 1991; Service, 1971, 1975) and 'ranked society' (Fried, 1967; Wason, 1994) are commonly associated with the structure of Bronze Age society. One of the most important and most hotly debated topics in European Bronze Age archaeology is the appearance of social hierarchy (Gilman, 1981; Harding, 2000; Kristiansen, 1999; Shennan, 1986). The rise of elites and complex societies is a widely discussed topic on the general anthropological level as well (e.g. Earle, 1987, 1989; Fried, 1967; Johnson and Earle, 2000; Johnson, 1982; Kosse, 1990, 1994; Service, 1971, 1975). The most important problem, both in anthropological theory and in the study of Bronze Age societies, is the lack of an appropriate explanation as to why and how elites arose and how they managed to maintain their position in society.

The main issue is vertical differentiation or ranking as a strong correlate of complexity and an indicator of socio-cultural evolution. Fried (1967, p. 109) defined a ranked society as one in which positions of valued status are limited so that not all those of sufficient talent to occupy such statuses actually achieve them. In other words, ranking implies differential individual access to status and sometimes wealth (Wason, 1994).

Advances in archaeological science have allowed archaeologists to pursue an independent line of evidence in investigating mortuary variability in social terms. Physical anthropology provides a range of different methods and procedures for studying lives and lifestyles of past people (Buikstra and Beck, 2006; Katzenberg and Saunders, 2000; Larsen, 1997; Mays, 1998; Marchi, 2005, 2007; Ruff and Hayes, 1983a,b; Ruff et al., 2006). One promising technique for studying biological status is the analysis of musculo-skeletal markers (MSMs) of activity (al-Oumaoui et al., 2004; Capasso et al., 1999; Churchill and Morris, 1998; Hawkey and Merbs, 1995; Kennedy, 1998; Lieverse et al., 2009; Mariotti et al., 2007; Molnar, 2006; Robb, 1994, 1998; Robb et al., 2001; Rodrigues, 2005; Steen and Lane, 1998; Stefanović, 2006; Stirland, 1998; Weiss, 2003, 2004, 2007; Wilczak, 1998). This technique aims to recover data about the activities of the deceased by studying the morphology of muscular attachments. The basic assumption of MSM analysis is that muscle activity induces changes in the morphology of muscle attachments since it is known that bone generally adapts to mechanical stress by changing its morphology (Chen et al., 2007; Hamrick et al., 2006; Raab-Cullen et al., 1994;

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Zumwalt, 2005). It should be mentioned that activity patterns can be studied by other methods based on measuring bone modification such as cross-sectional geometry and similar techniques (Marchi, 2005, 2007; Marchi et al., 2006; Ruff and Hayes, 1983a,b; Ruff et al., 2006; Shaw and Stock, in press; Sládek et al., 2006, 2007; Sparacello and Marchi, 2008; Stock and Pfeiffer, 2001). However, we have decided to employ MSM based techniques because various studies have shown that MSM analysis can detect meaningful patterns and offer significant insights into activity patterns of past populations. For example, Molnar (2006) was successful in detecting particular activities such as archery and harpooning. Weiss (2007) managed to infer activities related to throwing in hunting and acts of interpersonal aggression amongst the Central California Amerind population. In the most recent study by Lieverse et al. (2009) differences in activity pattern between populations from two different periods were successfully investigated via MSM analysis. Additionally, researchers report low inter- and intra-observer error rates (Mariotti et al., 2007; Steen and Lane, 1998).

In contrast, Zumwalt (2005, 2006) questioned the assumption that activity has a direct effect on MSMs. Zumwalt (2006) found no evidence of a direct relationship between activity and muscle attachment morphology after 90 days of an experimental research with sheep. However, we share the view of Lieverse et al. (2009) that it is too early to draw any far reaching conclusions from Zumwalt's (2006) study, although it must be kept in mind that details of the relationship between activity and MSM morphology are not fully understood.

Theoretically, the qualitative and quantitative aspects of activity are the most important variables when considering a person's vertical and/or horizontal status, as it is through specific activities that the role (or the agency) of the individual in society is most clearly expressed. The relationship between activity and social status has not been analyzed intensively so far (but see Robb et al., 2001; Rodrigues, 2005), and this paper represents an attempt to link various aspects of activity with social status through a case study analysis of an Early Bronze Age necropolis. Studying activity is very important, since the actions of an individual are inevitably influenced by the social environment and vice versa – actions themselves produce consequences in the social realm. What we do as individuals depends upon our position in the social network, but our position in the social network is determined or influenced by what we do.

As the social system becomes more complex, more kinds of "lifestyles" are possible for the people who participate in it. If we are to equate complexity with increasing differentiation of the social system, then it could be argued that complexity includes the differentiation of activities and behaviors, as well. A Marxist might recognize a 'division of labor' concept. The *qualitative* differentiation of activities is not related exclusively to vertical distinctions, but horizontal (such as gender and age), as well. The appearance of labor specialization into distinct professions (e.g. soldiers, craftsmen, herders etc.) is a correlate of complexity.

Even though extensive middle-range research (*sensu* Binford, 1977, 1981, 1983, 1987) is not yet available, the conventional premise is that hierarchical social groups (e.g. social ranks or social strata) should differ significantly in terms of nutrition, health, activity and stress – or as phrased by Robb et al. (2001, p. 213): "life is hard for the poor".

Since most theories predict that the 'way of life' in its widest sense should be different for people from different social ranks or strata, archaeologists have used independent data provided by physical anthropology and compared this against the traditional archaeological evidence (*e.g.* Parker Pearson, 2003, p. 80–83; Pechenkina and Delgado, 2006; Rega, 1995; Robb et al., 2001; Rodrigues, 2005). Results of such studies have often been negative in the sense that no simple correlation existed between the biological and the social status, even though in many cases some of the social and biological variables were associated in a way predicted by most of the theories (Jankauskas, 2003; Parker Pearson, 2003, p. 80–83; Pechenkina and Delgado, 2006; Rega, 1995; Robb et al., 2001; Rodrigues, 2005; Shimada et al., 2004; Walker and Hewlett, 1990). With the benefit of hindsight, it would be somewhat simplistic to expect that clear-cut correlations should emerge so that all low status burials should bear signs of pathology, malnutrition, and injuries, and in contrast, all rich burials should be healthy and well-nourished. There are many potential confounding factors. For example, injuries might be related to activities performed by members of higher social strata such as leading an army into battle or hunting, to name but two. Pathological conditions may arise as a consequence of an epidemic or of sexually transmitted diseases, neither of which are exclusive to those of low status. As various studies have shown, differences in diet may or may not exist between 'commoners' and 'elite' (Parker Pearson, 2003, p. 82).

When the 'life-is-hard-for-the-poor' hypothesis is transposed into the domain of activity research it could be rephrased like this: life is laborious for the poor. Practically, this would mean that high ranking individuals should have a "better" life which, among other things, means that they generally perform less laborious and physically demanding activities than the commoners. It should be stated that this hypothesis has never been tested systematically through middle-range research. Archaeological case studies have offered only limited evidence in support of this hypothesis. Rodrigues (2005, p. 419) found that high status individuals showed a lower workload in comparison to low status individuals, but the differences were not statistically significant. Pechenkina and Delgado (2006, p. 231) found that males of higher status "appear to have enjoyed less strenuous workloads". They also stated that the considerable variation in the total pattern of health markers (including activity) which persisted within each inferred status group was probably due to the limited degree of stratification (Pechenkina and Delgado, 2006, p. 232).

To summarize, the hypothesized negative correlation between overall labor intensity and vertical social status in complex societies has not been systematically tested.

On the other hand, in their study of skeletal material from Pontecagnano, Robb et al. (2001) found that males with grave goods showed more variability and more extreme scores in their upper limb, interpreting this as a result of the more generalized manual labor performed by males without grave goods in contrast to specialized or skilled tasks performed by males with grave goods. The conclusion of this study was that the relationship between health, activity and social status as expressed in grave goods is complex.

It could be argued that the complexity of this relationship stems from the fact that the most important differences between statuses, whether horizontal or vertical, should be more related to qualitative rather than quantitative aspects such as overall labor. This is why it is necessary to investigate this issue using methods that take into account the various qualitative facets of activity.

Additionally, a simultaneous and comparative analysis of skeletal and archaeological data should provide a powerful methodology for studying the social aspects of a community (Robb et al., 2001).

In this paper we investigate the social structure of the Early Bronze Age necropolis of Mokrin, a part of the Maros culture. The archaeological analysis of the social structure of Maros culture, as well as of the Mokrin cemetery, has been thoroughly conducted by O'Shea (1996) while skeletal data have been analyzed by Farkas and Liptak (1971), Rega (1995) and Stefanović (2006) – whose analysis of musculo-skeletal markers of stress was used in this study.

We combine two lines of evidence, archaeological and biological, in order to perform a simultaneous analysis of the biological