

The objective of the presented dissertation was to indicate archaeological determinants of gender and age in the graves of Tarnobrzeg Lusatian Culture (hereinafter referred to as TLC) using statistical methods. So far, no community has been found that had not attempted to manifest those differences. And thus, it is assumed that such determinants must have existed in the TLC community as well. It should be noted that “revealing” such markers would objectify the analysis of an archaeologist, who currently is only a recipient of finished data.

In the source literature published so far, there are no comparable studies, not only for TLC, but also for other cultures from the circle of urn fields. This paper is therefore largely pioneering and required the development of own research methodology.

The individual aspects related to the subject of the dissertation were analysed in six chapters and the annex. In the first chapter, the methodological assumptions of the dissertation and its structure are discussed. The next one presents cemeteries used in the dissertation, discusses issues related to the funeral rites of the TLC and the current state of research on the issue we are interested in. Chapter 3 is a presentation of the archaeological and statistical methods used, as well as a criticism of anthropological analyses. Chapter 4 is the analytical part. The next one presents mathematical models developed within the framework of this paper. The closing chapter six is a summary of the conclusions. The dissertation is accompanied with a catalogue in the form of the annex, which consists of 9 parts concerning all the examined elements, such as the urn form and its decoration.

Source materials

Due to the fact that we are looking for links between age, gender and particular elements of the funeral rites, we could only base on necropolises for which anthropological analyses were carried out. In total, eleven cemeteries were used: Bachórz-Chodorówka 1, Chodaczów 2, Furmany 1, Grodzisko Dolne 1, Grzęska 1, Kłyżów 2, Knapy 6, Mokrzyszów 2, Pysznicza 1, Wierzawice 4 and Zbydniów 1, which constitute representative sample for the entire area inhabited by TLC. More than 3100 complexes came from these cemeteries, of which more than 2100 are marked with markings indicating at least the age of the deceased.

In the case of this cultural unit, we must note the very poor state of research into the issue of age and gender determinants that interests us. To a certain extent, Marcin S.

Przybyła's paper touched on this subject presenting general data on the TLC funeral rite. The subject matter was also included in Katarzyna Trybała-Zawiślak's two papers relating to the burial of children and the elderly. It is worth noting that the researcher noticed that only a part of children would be buried in the TLC cemeteries. As far as the elderly are concerned, the existence of objects attributed exclusively to persons in that age category has not been found. However, she noted a higher proportion of men in this range, which can be treated as a result of higher mortality among young women caused by postpartum complications. Also, Teresa Rysiewska's paper on family structures dealt with the issues in which we are interested. Katarzyna Trybała-Zawiślak and Dariusz Bobak's paper is also worth mentioning here. Those researchers analysed the statistical relationship between the grave complexes in the Kłyżów cemetery and the age and gender of the deceased. Unfortunately, they have not been able to indicate the existence of any dependencies. However, it should be noted that the author checked slightly different factors than researchers in the discussed paper and used different methods.

In terms of funeral rites, the TLC shows high homogeneity. Cremation urn rite is dominant. The urns were usually placed with a hole directed upwards, only in individual cases we note other positions. Skeletal graves appear rarely and only in the early stage of the development of TLC, probably as a result of the survival of TC traditions. Non-urn pit graves also appeared only in individual cases.

Also, in terms of equipment, TLC burials are homogeneous. The most common equipment especially in the first phase are lids (more than 1100 burials), which are attempted to identify themselves as attempts to mark a particular linear. Ceramic attachments appeared in 711 burials, including a larger series at cemeteries in Bachórz-Chodorówka, Furmany, Pysznica and Knapy. In the case of other necropolises, they appeared only in single graves. The interpretation of this type of objects is very broad, including attempts at marking family ties, sacrifices for deities or deceased, as well as the remains of feasts in honour of the deceased. Finally, metal objects appeared in 525 graves. It should be emphasized that these are usually small whorls, larger objects such as pins are in most cemeteries only individual cases. Other items worth mentioning include spindles, glass and ceramic spindles and bone decorations. These artefacts appeared only in individual cases and are of marginal importance for statistical analyses.

Research methods

For the size of vessels, a method was adopted which consists in summing up the values of four indicators: spout, belly and bottom diameter and height of the vessel. The result was divided by 4. This system allows you to quickly test large series of vessels. To verify its correctness, the volume of vessels from the cemeteries in Kłyżów and Pysznica was calculated, and then the results were compared with the method used. The result is similar data showing that the method adopted is as reliable as possible.

When evaluating the wealth of burials, a system was adopted where each object in the grave is one point, and in addition a multiplier was introduced by the number of objects made of different materials. This system was adopted assuming that the diversity of equipment was indicative of the higher status of the buried person.

Another point concerns the description of the vessels. Their characteristics included the shape of the spout, the form of the neck and the shape of the belly. In the case of the belly, due to the fact that it could be defined by more than one feature, the relationship between the number of these elements and age and gender was also examined. When analysing bowls and buckets, the shape of the bottom was also considered, and in the case of the former, whether they were deep or shallow, and the relationship between the diameter of the spout and the belly. Using the above features and the form of a vessel (e.g. so-called San vase, Zbydniów bowl), groups of vessels closest to each other were created. It is worth noting here that for each of the cemeteries a separate set of groups of vessels was created, which resulted from a strong diversity of sources.

In the analysis of metal objects, their form was considered. Only for pins and whorls, for which we had a slightly larger series, it was decided to introduce detailed divisions. The value of evaluating bronze objects in terms of the amount of raw material used in their production is controversial. Using the weight of objects would be the simplest solution. However, these data are usually not presented in the studies. Therefore, for the purposes of this paper, the system of rankings of the richness of burials presented by Marcin Przybyła was adapted, considering the difficulty and material consumption of the execution of a given item.

One of the elementary methods on which this paper is based is the χ^2 test. This tool is one of the most important non-parametric tests. It makes possible to check whether the data contained in a contingency table provides evidence of the interrelationship of variables. Another method is the U Mann Whitney test. It is used for two independent trials and is intended to check the null hypothesis that the selected samples come from two populations

with equal median intervals. If we have more than two samples (the grouping variable takes more than two values), we use the Kruskal-Wallis test to check the null hypothesis of whether they come from a population with equal median intervals. The so-called ROC curve has been widely used. It is used to determine the optimal cut-off point and to evaluate the quality of the classifier. We achieved very interesting results thanks to the odds ratio. It is used to determine the chances of a given phenomenon occurring in group A in relation to the occurrence of the same event in the compared group B. Other tools used in this paper were research on the dependence of characteristics using different types of correlation coefficients. It is used to determine the statistical significance of the influence of one characteristic on another. We also used two correlation coefficients: Pearson (describing a linear relationship between variables) and Spearman correlation coefficient (describing a ranking relationship). While comparing cemeteries, we used correspondence analysis and cluster analysis. Finally, the crowning achievement of the above methods are mathematical logit models and discriminatory models. Their aim is to create a formula (mathematical formula) based on empirical research results, which will describe a dependent variable, e.g. gender or age, using independent variables (e.g. vessel size, number of bone remains, independent vessel elements). On the basis of such a formula, it is possible to indicate the age and gender of the deceased with a certain probability.

Final conclusions

Unfortunately, as in the case of statistical methods, it is difficult to briefly describe all the most important conclusions from the dissertation presented here. Suffice to note that the conclusions of the analytical section are included in as many as 53 points. The most important final conclusions were indication of the relation between the size of urns and lids and the age of the deceased. The relationship between the amount of remains and gender and age has been confirmed. The forms of urns associated with age were also indicated. As far as the urn ornamentation is concerned, a stronger connection between the San River ornamentation with adults and nubs with children and women has been noticed. Finally, the dimensions of the whorls and the pin were related to the age. In addition, adults were found to have a larger range of decorations and larger amount of raw material in their graves than children. Undoubtedly, the greatest achievement was the creation of mathematical models which, on the basis of some variables, are able to determine the age and gender of the deceased with a very high degree of probability.