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The stature in pre-protohistoric Central-Southern Italy

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In attempting to reconstruct the living conditions of ancient populations through the analysis of human skeletal remains from necropolises, it is advisable to consider skeletal indicators that reflect the physical conditions of the individual and that can be related to the nutritional state and thus the possibilities of access to resources. Stature can be particularly informative in this regard since it has been widely studied in relation to social conditions in recent populations. Using literature data and unpublished observations, we outline the trend of stature in central Italy from protohistory to the Middle Ages, identifying diachronic and regional differences probably due to different living conditions.

Stature is a parameter modulated by childhood living conditions (Eveleth & Tanner, 1990). Therefore, it has been widely analyzed in modern historical contexts in relation to socioeconomic conditions, mainly via measurements conducted on army conscripts (A'Hearn & Vecchi, 2011). The close correlation with economic conditions makes it ideal to provide information on the living conditions of past populations, particularly on the availability of resources for a balanced diet and on the presence of hygienic-sanitary conditions for optimal growth of the individuals (Steckel, 1995). For the earliest periods, the only source of information on stature consists of human skeletal remains recovered from necropolises. In these contexts, such information is essential to acquire knowledge of the lifestyles and health conditions of these populations, for which written sources are lacking prior to the 1st millennium BC.

Formulae to determine the stature from the skeleton, based on the lengths of the limb bones, were first calculated by Manouvrier (1893) and later by many others. However, a methodological problem is posed by the difficulty in applying the formulae to populations different from those on which the initial calculation is based, since the proportions of the limbs are different in various populations. In 1960, Fully & Pineau devised the "anatomical method" to resolve this problem; it used the sum of the measurements of the bones that determine stature (with a correction for the non-osseous elements). Nevertheless, the system was difficult to apply to the often degraded skeletal material deriving from archaeological contexts.

There have been discussions in the literature on the most accurate method for stature estimation (Formicola, 1993; Giannecchini & Moggi Cecchi, 2008). However, the application of different methods makes it impossible to summarize the trend of stature in Italy based on literature data. Studies on stature during the period from the Late Paleolithic to the Eneolithic-Bronze Age were carried out by Formicola (1983), who reported a decrease from the earlier phases to the Neolithic. From that period, the values remained substantially similar until the beginning of the Metals Age. Moreover, there was lower variability of female stature and sexual dimorphism similar to that recorded today. Giannecchini & Moggi Cecchi (2008) analyzed skeletal material from seven regions of peninsular Italy as far south as Campania dating from the Iron Age to the Middle Ages. They recorded a clear and statistically

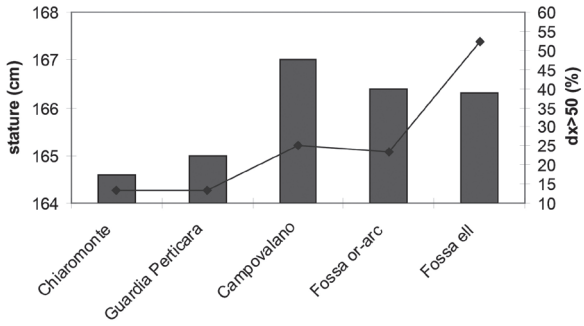

Fig. 1 - Stature and mortality in necropolises of central-southern Italy. Male sample.

significant decrease of the mean stature in the Roman period (M= 164.4 cm; F= 152.1 cm) for both sexes. The values for the Iron Age (M= 166.6 cm; F= 154.3 cm) and Middle Ages (M= 166.9 cm; F= 154.5 cm) were substantially similar. The authors did not carry out a geographical analysis because of the small sample sizes.

In the present study, we analyzed stature in remains from four necropolises dating to the 1st millennium BC in the present-day territory of Abruzzo and Basilicata in central-southern Italy. The Abruzzo sample consists of 87 individuals from the Campovalano necropolis in the Teramo area and the Fossa necropolis in the Aquila basin, for which we separately analyzed the remains belonging to two periods, Orientalizing-archaic (8th-4th century BC or-arc) and Hellenistic (3rd-1st century BC ell). The Basilicata sample consists of 41 individuals from the Oenotrian necropolises of Chiaromonte (9th-5th century BC) and Guardia Perticara (8th-5th century BC).

For comparative purposes, the stature was calculated using the formulae of Pearson (1899), according to the indications of Giannecchini & Moggi Cecchi (2008) who analyzed an extensive Italian sample from the Iron Age to the Middle Ages and found that this methodology was one of the most suitable in this geographical and chronological context. Because of the small sample sizes, we did not conduct a statistical assessment of the differences/similarities among the analyzed groups.

The males and females of the Abruzzo sample, with mean stature of 166.5 and 154.6 cm respectively, are in line with the mean values calculated by Giannecchini & Moggi Cecchi (2008) for the Iron Age (M= 166.6 cm; F= 154.3 cm). However, the mean values in the Basilicata sample are lower in both sexes (M= 164.8 cm; F= 153.6 cm) with respect to the mean values of the samples from the corresponding period. Moreover, the Basilicata males show the lowest value compared with the single necropolises examined by Giannecchini & Moggi Cecchi (2008); there is a smaller difference for the female sample, whose mean value coincides with that of the Osteria dell'Osa necropolis.

The availability of demographic data for our samples, including the percentage mortality after age 50 (dx), allowed us to compare the trends of the two parameters, both related to the living and health conditions (Figs. 1 and 2).

For males (Fig. 1), there is a clear difference between the two geographical areas, since the Oenotrian samples of Basilicata present lower stature than the Abruzzo samples, as well as lower mortality after age 50. The stature discrepancy is less clear in females (Fig. 2), with the Guardia Perticara necropolis having higher values than that of Campovalano, whereas the clear differences in mortality after age 50 remain. The greater constancy of female stature in time (Formicola, 1983) also seems to have a geographical connotation in this case. The data for the Fossa necropolis in Abruzzo show values that are almost identical in males, with a difference between the two periods of 0.1 cm, and a slightly larger difference between the female samples (0.6

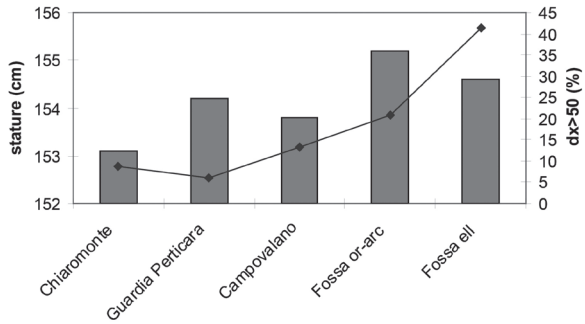

Fig. 2 - Stature and mortality in necropolises of central-southern Italy. Female sample.

cm). This maintenance of stature values, accompanied by the clear increase of mortality after age 50 in the two sexes, indicates that the living conditions in the period of Romanization of the region (3rd century BC) showed signs of improvement. This population was probably favored by the late development of urban settlements on the Adriatic side of the Apennines and thus did not suffer the consequences of hygienic-sanitary problems and poor food supply related to high population densities in the territory of the older cities, problems not alleviated by the presence of adequate services (Levi, 1989).

There are a number of problems with the evaluation and use of stature in the reconstruction of living conditions of past populations for which we do not have written information.

1 - The choice of the best regression equations for the skeletal series to analyze, i.e. the search for results as close to reality as possible.

In skeletal biology, this problem is shared by all methods devised using samples of populations different from the one under study. In almost all cases, the reference samples are more recent, since it is necessary to know the characteristics of the parameter being analyzed (stature, age at death, etc.) in living individuals in order to devise the data collection methods. A further complication is the geographical distance between the reference sample and the one being analyzed and thus the possible marked genetic difference between the populations (e.g. the reference sample comes from the Americas and the group under study is European, or vice versa). Nevertheless, this problem can be obviated in studies on the trend of stature in ancient populations by application of the same measurement methods: even if the resulting estimations do not coincide with the original values of the living individuals, it is still possible to record variations among the populations which, because of the ecosensitivity of this indicator, will reflect different living and health conditions.

2 - The state of preservation of the skeletal material affects the availability of a suitable quantity of data necessary for the analyses.

To reconstruct stature, it is necessary to measure the lengths of the main limb bones. The poor preservation state of the skeletal material often prevents this, making the number of available data insufficient. Biotic and abiotic factors combine to determine the preservation conditions of a skeleton (Nawrocki, 1995). Biotic factors include the action of living organisms such as fungi, bacteria, necrophagous insects and rodents. The activity of plants, especially of their root systems, can have remarkable effects on the preservation, e.g. large roots that find their way inside the cavities of long bones. "Abiotic" factors include temperature, exposure to water and soil PH. Exposure to water is a common occurrence in graves and, in addition to the loss of anatomical connection, there can be tissue damage since water carries polluting substances such as acids and other chemical compounds. This agent has been feared since antiquity, as it is common to find beds of pebbles in graves for drainage purposes.

Tab. 1 – Sample size, mean values of stature (cm), standard deviation and coefficient of variation.

	N	MEAN	SD	CV
Chiaromonte M	13	164.6	3.9	2.4
Chiaromonte F	9	153.1	2.8	1.8
Guardia Perticara M	12	165.0	3.8	2.3
Guardia Perticara F	7	154.2	4.3	2.8
Campovalano M	9	167.0	4.3	2.6
Campovalano F	5	153.8	1.6	1.0
Fossa or-arc M	22	166.4	4.0	2.4
Fossa or-arc F	7	155.2	5.8	3.7
Fossa ell M	25	166.3	4.7	2.8
Fossa ell F	19	154.6	3.3	2.1

"Individual factors" also play a decisive role in preservation: different bones of the body, or portions of them, have different structures and can react differently to physico-chemical agents in the ground. With regard to the calculation of stature, although the shaft of long bones is strong, the epiphyses, covered by a thin layer of compact bone, are very fragile and degrade easily. Therefore, when conditions allow it, the measurements should also be taken during the excavation since the specimen may be broken and difficult to reassemble after being removed from the ground.

"Cultural factors" can also affect preservation. The types of graves can have a strong influence on the state of skeletal remains. The "anatomical method" of Fully & Pineau (1960) has mainly been applied to prehistoric samples, in which the preservation conditions of the skeletal material, often buried in underground structures, are better (Formicola, 1993).

3 - The advisability of evaluating several parameters that indicate the same phenomena.

Given the methodological problems and the low number of observations, it is advisable to analyze other eco-sensitive indicators as well as the trend of stature, such as pathologies, stresses and mortality. This can provide a picture of the living conditions via the analysis of different classes of data that indicate similar phenomena.

References

A'Hearn B. & Vecchi G. 2011. Statura. In G. Vecchi (ed): *In ricchezza e in povertà. Il benessere degli italiani dall'Unità a oggi,* pp. 37-72. Il Mulino, Bologna.

Eveleth P.B. & Tanner J.M. 1990. *Worldwide Variation in Human Growth. Cambridge* University Press, Cambridge.

Formicola V. 1983. Stature in Italian prehistoric samples, with particular reference to methodological problems. *Homo*, 34: 33-47.

Formicola V. 1993. Stature reconstruction from long bones in ancient population samples: an approach to the problem of its reliability. *Am. J. Phys. Anthropol.*, 90: 351-358.

Fully G. & Pineau H. 1960. Determination de la stature au moyen du squelette. *Ann. Méd. Légale,* 40: 145–153.

Giannecchini M. & Moggi-Cecchi J. 2008. Stature in archeological samples from central Italy: methodological issues and diachronic changes. *Am. J. Phys. Anthropol.*, 135: 284-292.

Levi A.M. 1989. *La città antica*. "L'Erma" di Bretschneider, Roma.

Nawrocki S.P. 1995. Taphonomic processes in historic cemeteries. In Grauer A.L. (ed): *Bodies of Evidence. Reconstructing History through Skeletal Analysis*, pp. 49-66. Wiley-Liss, New York.

Pearson K. 1899. Mathematical contribution to the theory of evolution. On the reconstruction of the stature of prehistoric races. *Phil. Trans. R. Soc. London* , 192: 169-244.

Steckel R.H. 1995. Stature and the standard of living. *J. Econ. Lit.*, 33, 4: 1903-1940.

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