

ANTHROPOLOGICAL ANALYSIS OF HUMAN SKELETAL REMAINS FROM THE HALLSTATT PERIOD “VINKOVCI-NAMA” SITE

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Osteological data from a small (n=11) Hallstatt-period skeletal series provide insight into health, disease, and stress levels in Iron age continental Croatia. The sample was recovered from the “Vinkovci-NaMa” site during excavations in 1976 and 1977. The recovered remains were stored in the Vinkovci town museum in paper bags without grave numbers or other types of identification. Therefore, before analysis could begin it was necessary to reindividualize the skeletons and correlate them with specific grave units. This was done on the basis of osteological and taphonomical data in conjunction with data from the field diary.

The sample consists of 4 subadults and 7 adults (3 female and 4 male). The average age-at-death for the adults (males 51.0 years; females 38.0 years) is considerably higher than values recorded in continental Croatia during later periods - the Štrbinci site from the late Antique period (males 39.3 years; females 35.5 years), the early medieval Privlaka site (males 34.9 years; females 31.8 years), and the historic period Nova Rača site (males 34.1 years; females 29.9 years). It therefore seems likely that the values recorded in the Vinkovci-NaMa series are not a realistic reflection of the average life span in continental Croatia during the Iron age but are the result of random variation in a small sample.

Consistent with the relatively long average life spans are the high frequencies of dental disease - alveolar bone disease and carious lesions. Slightly less than a third (26.2%) of all adult tooth sockets exhibit evidence of alveolar bone disease and 11.6% of adult teeth exhibit carious lesions. Males were more susceptible to both conditions, possibly because of their longer average life span.

The series also shows relatively low frequencies of subadult stress and an old, well healed cutting fracture on the frontal bone of an adult male.

Key words: bioarchaeology, dental disease, trauma, Vinkovci, Iron age

Introduction

At the kind invitation of Professor N. Majnarić-Pandžić in March of 1999 I was given the opportunity to analyze the skeletal remains of individuals from the Hallstatt period “Vinkovci-Nama” site. The remains had been excavated in 1976 and 1977 and until recently had been stored in the Vinkovci town museum in paper bags without grave numbers or other types of identification. To further complicate the situation one

skeleton would typically be dispersed into two, three, or in one case even four different paper bags. Before any sort of analysis could be attempted it was therefore necessary to reindividualize the skeletons and to correlate the reassembled skeletons with specific grave units.

The reindividualization process was carried out using two types of data. The first is anthropological data: compatibility in sex, age-at-death, general skeletal morphology, and muscle crest development. The age and sex distribution (4 males, 3 females and 4 subadults)

in the sample facilitated this endeavor. The second type of data used was taphonomic characteristics: the state of preservation of the outer cortex of the bone; the coloring of the bone, and the presence of oxidation marks where bone had been in contact with metal (for instance from earrings, fibulae etc).

The reindividualized skeletons were then correlated to specific grave units based on data recorded in the field diary which noted: 1) the presence and location of metal grave goods which were then correlated with the oxidation marks present in the reindividualized skeletons, 2) the presence of other grave goods - for instance glass pearls noted in the field diary were found in one cranium and, 3) "in situ" measured femoral lengths which were correlated with anthropometric measurements from the reindividualized skeletons.

The reindividualized sample contains the remains of 11 individuals recovered from 8 graves. The majority of the remains were recovered from single primary inhumations. Three graves, however, contained two individuals. No consistent combination of individuals is apparent in these graves. The graves consist of an adult male who had a 2.5 -3.5 years old subadult placed over his legs (grave 2), a subadult and an adult female (grave 14), and an adult male with an adult female placed over him (grave 18). Of interest is the fact that besides human burials the cemetery contained three well preserved horse burials. Bone preservation and completeness of the recovered remains was good to very good. Artifacts recovered from the site date the use of the cemetery from the second half of the fifth century to the first half of the fourth century B.C. (Majnarić-Pandžić, 2000).

MATERIALS AND METHODS

The reindividualized skeletons were aged and sexed, and analyzed for the presence of pathologies. Data for four specific disease categories were collected: 1) dental pathology - including caries and alveolar bone disease, 2) subadult stress indicators - including dental enamel hypoplasia and cribra orbitalia, 3) trauma - including skeletal evidence of fractures and dislocations, and 4) physical stress - including osteoarthritis on major joints and the spinal column, and the presence of Schmorl's depressions in vertebral bodies. These categories were chosen for two reasons. Firstly, the pathological conditions comprising these categories are common and leave relatively unambiguous traces in the skeleton. Second, when taken together, these categories create a composite profile of general health and quality of life.

Accurate determinations of sex, age and precise bone element baseline counts are, of course, essential for sample comparisons between different skeletal series. Cross-population interpretations of mortality trends and morbidity patterns are based on sound demographic

profiles established through careful consideration of applicable up-to-date morphological, metric, and multivariate criteria.

The criteria selected for determination of sex include pelvic (Phenice, 1969) and cranial morphology (Krogman and Iscan, 1986). These criteria generally provide accurate results. From a sample of skeletons of known sex, Meindl et al. (1985) report a 3% error rate when both the pelvis and skull were evaluated.

Adult age at death was estimated using as many methods as possible, including ectocranial suture fusion (Meindl and Lovejoy, 1985), pubic symphysis morphology (Brooks and Suchey, 1990; Gilbert and McKern, 1973; McKern and Stewart, 1957; Todd, 1920, 1921), auricular surface morphology (Lovejoy et al., 1985), and sternal rib end changes (Iscan et al., 1984, 1985). In subadults, age at death was estimated using epiphyseal fusion, diaphyseal lengths, and dental eruption criteria (McKern and Stewart, 1957; Bass, 1987; Fazekas and Kósa, 1978; Moorrees et al., 1963).

Detailed bone inventories were obtained for each skeleton. The coding format used in this procedure is designed for computer analysis and provides a comprehensive inventory of the entire skeleton. Detailed dental inventories were also completed for each skeleton. All teeth were coded for their presence. The presence of carious lesions and alveolar abscesses was also noted and scored.

As already noted, the specific disease categories analyzed include dental pathology, subadult stress indicators (dental enamel hypoplasia and cribra orbitalia), trauma, and physical stress.

Dental pathology data are tabulated for alveolar bone disease and caries. Dental caries is a complex infectious disease of the external surface of the tooth. Various bacteria, primarily *Streptococcus* spp., produce decalcifying acids, which, if left unchecked, cause dissolution of the enamel and dentin (Bhaskar, 1981). Physiological and possibly external environmental factors may be related to caries incidence (Hildebolt et al., 1988). Alveolar bone disease is, for the purpose of this report, defined as the presence of periodontal or periapical abscesses and antemortem tooth loss.

Dental enamel hypoplasia or chronological aplasia is generally defined as any macroscopic defect in the enamel surface (Pindborg, 1970, Sarnat and Schour, 1941, 1942). Hypoplastic defects can range from minor depressions in the enamel surface, with no dentin exposure, to a complete disruption of the enamel. These defects appear as bandlike depressions (linear enamel hypoplasia) or as pits. They result from a disturbance of the enamel development in the growing deciduous or permanent tooth bud (phase of amelogenesis). The causes of the hypoplastic defects are commonly attributed to a variety of factors including physiological stresses such as malnutrition, infectious disease, psychological or physical trauma, or other metabolic disruptions (Goodman et al., 1980; Goodman

and Rose, 1991; Kreshover, 1960). Hypoplasias remain visible until the affected enamel is worn away through dental attrition, providing a nearly permanent record of developmental arrest during infancy and early childhood. While the development of enamel hypoplastic defects cannot be attributed to a specific disease or episode in the life of a deceased individual, studies of living children document the association between higher frequencies of hypoplastic defects and poor nutrition and low socioeconomic status (Goodman et al., 1991, 1992).

Data on enamel hypoplasias were collected on the permanent maxillary central incisors and canines, and on the permanent mandibular canines. Only macroscopic, linear enamel defects - transverse grooves or rows of pits on the crown surface - are counted in these data. Other enamel defects such as circular pits in deciduous dentition, hyperplastic defects, and zones of discoloration were observed in the dental remains, but are not treated in this study.

Cribra orbitalia is recognized by the presence of sieve like lesions or pitting on the orbital roof. The etiology of this lesion is not fully established, and several diseases have been implicated (El-Najjar, 1976; Mensforth et al. 1978). Of these, iron deficiency anemia is the most often attributed cause (Stuart-Macadam, 1985).

Skeletal evidence for trauma was determined by the presence of fractures, dislocations involving joints out of articulation or alignment as a result of force, and enthesophytes. The latter include bone spurs, heterotopic bone formations, and traumatic myositis ossificans. They form in response to torn ligaments or muscles, and other types of injury and biomechanical stress that result in calcification of inflamed tissue.

Several skeletal features were used to evaluate physical stress. These features are: degenerative osteoarthritis in major joints, vertebral degenerative changes, and the occurrence and frequency of Schmorl's depressions in vertebral bodies.

Degenerative osteoarthritis is characterized by the progressive formation of osteophytes around the edges of an articular joint surface. In advanced cases the normally smooth articular surface develops ossific nodules, porosis or eburnation. These changes are associated with the wear and tear of everyday activities and are distinguished from traumatic arthritis which is caused by disruption of the biomechanical functioning of a joint. Degenerative changes in spinal columns were assessed in the vertebral bodies (osteophytosis and osteoporosis of centra) and the articular surfaces of the posterior elements (osteoarthritis of facets).

Schmorl's depressions are lesions which result from herniation and displacement of intervertebral disc tissue into the adjacent vertebral body. The presence of Schmorl's depressions can be idiopathic, or related to a variety of reasons including among others certain diseases and congenital factors that produce a weakening of the subchondral bone and a disruption of the

cartilaginous end-plate, and strong compression caused by traumatic injury. However, the most common cause of Schmorl's depressions according to Schmorl and Junghanns (1971) are degenerative changes associated with ordinary stress on the vertebral column.

RESULTS

The results of anthropological analyses according to grave number are:

Vinkovci NaMa

Grave 1

Taphonomy and material recovered: the bones are well preserved, dark with slight postmortem damage to the cortex. The following elements are present: the frontal bone, both parietals, the occipital bone, both temporals, both zygomatics, both maxillae, both palatines, the mandible, the sternum, both scapulae, both clavicles, the right innominate, the sacrum, the left humerus, both femurs, both tibiae, 9 left and 8 right ribs, 7 cervical, 12 thoracic vertebrae and 5 lumbar vertebrae.

Sex: male based on the: 1) morphology of the innominate, 2) skull, 3) mandible, 4) length and robusticity of long bones.

Age at death: between 50 to 55 years based on the: 1) morphology of the pubic symphysis, 2) morphology of the sternal ribs, 3) morphology of the auricular surface of the ilium. The trabecular bone is sparse.

Pathological changes: mild healed cribra orbitalia is present in both orbits. Two interproximal caries are present in the mandible. All preserved tooth crowns exhibit significant abrasion.

Associated animal or material remains: not present in the recovered material.

Vinkovci NaMa

Grave 2

Person A

Taphonomy and material recovered: the bones are well preserved, light with no postmortem damage to the cortex. There is a small, irregularly shaped oxidation mark on the medial side of the left tibia. Basically, only the lower part of the individual is present. The following elements are present: the right innominate, right talus, both femurs, both tibiae, and both fibulae.

Sex: male based on the: 1) morphology of the innominate, 2) length and robusticity of long bones.

Age at death: between 40 to 45 years based on the: 1) morphology of the pubic symphysis, 2) morphology of the auricular surface of the ilium.

Pathological changes: not present in the recovered material.

Associated animal or material remains: not present in the recovered material.

Vinkovci NaMa

Grave 2

Person B

Taphonomy and material recovered: the bones are well preserved, light with slight postmortem damage to the cortex. The following elements are present: the right parietal bone, right humerus, both femurs, both tibiae, and both fibulae.

Sex: this is a subadult.

Age at death: between 2.5 and 3.5 years based on the: 1) length of the present long bones, 2) stage of union between epiphyses and diaphyses, 3) thickness of the cranial vault.

Pathological changes: not present in the recovered material.

Associated animal or material remains: not present in the recovered material.

Vinkovci NaMa

Grave 3

Taphonomy and material recovered: the bones are well preserved, dark with slight postmortem damage to the cortex. The following elements are present: the frontal bone, both parietals, the occipital bone, both temporals, the mandible, the sternum, both scapulae, both clavicles, the right innominate, the sacrum, both humeri, the left radius, both ulnae, both femurs, both tibiae, both fibulae, 7 left and 9 right ribs, 6 cervical, 9 thoracic vertebrae and 5 lumbar vertebrae.

Sex: male based on the: 1) morphology of the innominate, 2) skull, 3) mandible, 4) length and robusticity of long bones.

Age at death: between 60 to 65 years based on the: 1) morphology of the pubic symphysis, 2) morphology of the sternal ribs, 3) morphology of the auricular surface of the ilium. The trabecular bone is very coarse and sparse. There is considerable age-related bone loss on the mandible. The height of the mandible at the level of the mental foramen is, for instance, only 18 mm.

Pathological changes: mild degenerative osteoarthritic changes are present on the glenoid fossae of the right scapula and on the right distal femur. The appical ligament on C2 is ossified and there are also severe marginal osteophytes and surface porosity on the dens and articular facets of the second cervical vertebra. There is considerable ante-mortem tooth loss on the mandible.

Associated animal or material remains: two fragments of pottery are present.

Vinkovci NaMa

Grave 4

Taphonomy and material recovered: the bones are moderately well preserved, yellowish with slight

postmortem damage to the cortex. There are greenish oxidation marks on the inferior part of the middle of the left clavicle, the superior part of the left scapula and on the inferior part of the left first rib. The following elements are present: the frontal bone, both parietals, the occipital bone, both temporals, both zygomatics, both maxillae, both palatines, the mandible, the sternum, both scapulae, both clavicles, both innominates, the sacrum, the right patella, both talii, both calcanei, both humeri, both radii, both ulnae, both femurs, both tibiae, both fibulae, 7 left and 7 right ribs, 2 cervical, 10 thoracic and 5 lumbar vertebrae.

Sex: female based on the: 1) morphology of the innominate, 2) skull, 3) mandible, 4) length and robusticity of long bones.

Age at death: between 30 to 35 years based on the: 1) morphology of the pubic symphysis, 2) morphology of the sternal ribs, 3) morphology of the auricular surface of the ilium. The trabecular bone is fine and dense.

Pathological changes: there are mild compression fractures of the superior end plates of L1, L2 and L3. There is, however, no bony ankylosis between the vertebra. Two shallow linear hypoplastic defects are present on the crowns of maxillary I1 and I2. Three buccal and 1 interproximal caries are also present.

Associated animal or material remains: none are present in the recovered assemblage.

Vinkovci NaMa

Grave 5

Taphonomy and material recovered: the bones are moderately well preserved, light with slight postmortem damage to the cortex. Only the skull is present. The following elements are preserved: the frontal bone, both parietals, the occipital, both temporals, the right maxilla and palatine.

Sex: this is a subadult.

Age at death: between 2.5 and 3.5 years based on the chronology of formation and eruption of teeth.

Pathological changes: mild, healed cribra orbitalia is present.

Associated animal or material remains: not present in the recovered material.

Vinkovci NaMa

Grave 14

Person A

Taphonomy and material recovered: the bones are moderately well preserved, robust, yellowish in colour with slight postmortem damage to the cortex. The following elements are present: the right innominate, both patellae, both talii, both calcanei, both humeri, both radii, both ulnae, both femurs, both tibiae, and both fibulae.

Sex: female based on the: 1) morphology of the innominate, 2) length and robusticity of long bones.

Age at death: between 45 to 50 years based on the: 1) morphology of the pubic symphysis, 2) morphology of the auricular surface of the ilium.

Pathological changes: moderate, healed, localized periostitis is present on the medial side of the left tibia. Linear hypoplastic defects are present on the crowns of the mandibular canines. All recovered bones exhibit mild osteoporosis.

Associated animal or material remains: none are present in the recovered assemblage.

Vinkovci NaMa

Grave 14

Person B

Taphonomy and material recovered: the bones are well preserved, darkish, with slight postmortem damage to the cortex. The following elements are present: both parietals, the occipital, both temporals, both zygomatics, both maxillae, both palatines, the mandible, both scapulae, both clavicles, both innominates, both humerii, both radii, right ulna, both femurs, both tibiae, both fibulae, 1 cervical vertebrae, 12 thoracic and 1 lumbar vertebrae.

Sex: this is a subadult.

Age at death: between 0.5 and 1.0 years based on the: 1) chronology of the formation and eruption of teeth, 2) length of the present long bones, 3) thickness of the cranial vault.

Pathological changes: bilateral, severe, generalized periostitis on the tibiae.

Associated animal or material remains: several bird bones belonging to a young grouse and a small piece of glass were present in the recovered assemblage.

Vinkovci NaMa

Grave 18

Person A

Taphonomy and material recovered: the bones are well preserved, dark with slight postmortem damage to the cortex. The following elements are present: the frontal bone, both parietals, both temporals, the left maxilla and palatine, the mandible, the right humerus, right radius, both femurs, both tibiae, both fibulae, and one cervical vertebra.

Sex: male based on the: 1) morphology of the skull, 2) mandible, 3) length and robusticity of long bones.

Age at death: between 40 to 45 years based on the: 1) obliteration of cranial and palatine sutures, 2) presence of slight degenerative changes.

Pathological changes: There is an old, well healed cutting fracture to the frontal bone, approximately 45 mm superior of nasion. The fracture did not penetrate the inner table of the skull and is recognized by the

presence of a 26 mm long, partially obliterated fracture line. There is no evidence of infection. The gross morphology suggest an old wound suffered many years before death. Mild degenerative osteoarthritic changes are present on both distal femurs. Two interproximal caries are present on the mandible as well as a large abscess on the right first molar. The left maxillary I1 has a deep hypoplastic defect.

Associated animal or material remains: not present in the recovered material.

Vinkovci NaMa

Grave 18

Person B

Taphonomy and material recovered: the bones are well preserved, gracile, yellowish with slight postmortem damage to the cortex. The following elements are present: the frontal bone, both parietals, the occipital, both temporals, both zygomatics, both maxillae, both palatines, the mandible, the sternum, both clavicles, the right innominate, the sacrum, the right talus, both humerii, both radii, both ulnae, both femurs, both tibiae, both fibulae, 4 left and 4 right ribs, 4 cervical, 12 thoracic and 4 lumbar vertebrae.

Sex: female based on the: 1) morphology of the innominate, 2) mandible, 3) length and robusticity of long bones.

Age at death: between 30 to 35 years based on the: 1) morphology of the pubic symphysis, 2) morphology of the sternal ribs, 3) morphology of the auricular surface of the ilium. The trabecular bone is fine and dense.

Pathological changes: this individual suffered from a marked over-bite which reflects in a well defined pattern of abrasion on the maxillary and mandibular incisors and canines.

Associated animal or material remains: six glass beads, two of them colored were recovered from the cranial vault.

Vinkovci NaMa

Grave 19

Taphonomy and material recovered: the bones are moderately well preserved, light with moderate postmortem damage to the cortex. The following elements are present: the frontal bone, both parietals, the right temporal, both maxillae, both palatines, the mandible, the right scapula, right clavicle, left innominate, right humerus, both femurs, 9 right ribs and 8 thoracic vertebrae.

Sex: this is a subadult.

Age at death: between 4.5 and 5.5 years based on the: 1) chronology of the formation and eruption of teeth, 2) length of the present long bones, 3) stage of union between epiphyses and diaphyses.

Pathological changes: not present in the recovered remains.

Associated animal or material remains: not present in the recovered remains.

The sex and age distribution of the series is presented in Table 1. The series is characterized by relative longevity. The mean age at death for adult males is 51.0 years (SD = 9.0), for adult females 38.0 years (SD = 7.1).

higher frequencies of carious lesions (Table 3), although in this case the difference is not statistically significant. In both males and females the observed carious lesions are slight to moderate in expression (ranging from a small pit or fissure on the surface of the tooth to more than a pit, but less than half of the surface destroyed). All of the carious lesions observed in males are located interproximally. In females, 3 of the 4 recorded lesions are located buccally, while one is located interproximally.

Age category	Subadult		Female		Male		Total	
	N ¹	% ²	N	%	N	%	N	%
Birth -1	1	25.0					1	9.1
2- 5	3	75.0					3	27.2
6-10	0						0	
11-15	0						0	
16-20			0		0		0	
21-25			0		0		0	
26-30			0		0		0	
31-35			2	66.7	0		2	18.2
36-40			0		0		0	
41-45			0		2	50.0	2	18.2
46-50			1	33.3	0		1	9.1
51-55			0		1	25.0	1	9.1
56-60			0		0		0	
60+			0		1	25.0	1	9.1
Total	4	100.0	3	100.0	4	100.0	11	100.0
Mean age at death ³			x = 38.0		x = 51.0			
			sd = 8.66		sd = 10.45			

¹ N = number of individuals dying.

² % = % of individuals dying.

³ Mean age at death is calculated using median values of each age category (for example, 23 for the age category 21-25), and 65 for the age category 60+.

TABLE 1: Age and sex distribution in the Vinkovci-NaMa Iron Age series

Alveolar bone disease frequencies are summarized in Table 2. In this small series males exhibit considerably higher frequencies of alveolar bone disease (43.5%) than females (5.2%). This difference is statistically significant ($\chi^2 = 13.0$, $P < 0.01$). Males also exhibit

Only 3 maxillary central incisors, 3 maxillary canines and 3 mandibular canines were available for analyzing hypoplasia frequencies. Of these, one incisor (from an adult male) and one mandibular canine (from an adult female) exhibit hypoplastic defects.

Age category	Subadult		Female		Male	
	A ¹ /O ²	% ³	A/O	%	A/O	%
Young adult ⁴			3/57	5.2	0/0	0.0
Old adult			0/0	0.0	30/69	43.5
Total	0/33	0.0	3/57	5.2	30/69	43.5

¹ A = number of tooth sockets with periodontal or periapical abscess, or antemortem tooth loss.

² O = number of tooth sockets observed.

³ % = % of tooth sockets with periodontal or periapical abscess, or antemortem tooth loss.

⁴ Young adult = individuals aged between 16 to 35 years; Old adult = individuals older than 36 years.

TABLE 2: Frequency of alveolar bone disease in the Vinkovci-NaMa Iron Age series

Cribrra orbitalia is present in one of two subadult crania with intact orbits (moderate in expression and active at time of death), and in 1 of 5 adult crania (an adult male, the lesion was healed at time of death).

Two individuals exhibit skeletal evidence of infectious disease. One subadult exhibits bilateral, generalized, severe periostitis, active at time of death on the tibiae. One female exhibits mild, localized, healed periostitis on the distal third of the diaphysis of the left tibia.

Two individuals also exhibit skeletal evidence of trauma. One male exhibits an old, well healed transverse

fracture, 26 mm long, on the frontal bone approximately 45 mm superior of nasion. The fracture did not penetrate the inner table of the skull and the smooth margins of the fracture indicate that the trauma occurred many months before death. One female has a compression fracture of the superior end plate of the first lumbar vertebra that resulted in moderate kyphosis.

Physical stress frequencies are low in this series. Osteoarthritis is not present in any of the major joints in adults from this series. The frequencies of vertebral osteoarthritis are very low, and confined to females (Table 4). None of the thoracic or lumbar vertebrae in the series exhibits Schmorl's defects.

Age category	Subadult		Female		Male	
	A ¹ /O ²	% ³	A/O	%	A/O	%
Young adult ⁴			4/39	10.3	0/0	0.0
Old adult			0/3	0.0	4/27	14.8
Total	0/21	0.0	4/42	9.5	4/27	14.8

¹ A = number of teeth with carious lesions.

² O = number of teeth observed.

³ % = % of teeth with carious lesions.

⁴ Young adult = individuals aged between 16 to 35 years; Old adult = individuals older than 36 years.

TABLE 3: Frequency of carious lesions in the Vinkovci-NaMa Iron Age series

Age category	<u>Cervical</u>		<u>Thoracic</u>		<u>Lumbar</u>		<u>Total</u>	
	A ¹ /O ²	%	A/O	%	A/O	%	A/O	%
<u>Female</u>								
Young adult ³	1/5	20.0	0/22	0.0	0/9	0.0	1/36	2.8
Old adult	0/0	0.0	0/0	0.0	0/0	0.0	0/0	0.0
Total	1/5	20.0	0/22	0.0	0/9	0.0	1/36	2.8
<u>Male</u>								
Young adult	0/0	0.0	0/0	0.0	0/0	0.0	0/0	0.0
Old adult	0/14	0.0	0/21	0.0	0/10	0.0	0/45	0.0
Total	0/14	0.0	0/21	0.0	0/10	0.0	0/45	0.0

¹ A = number of vertebrae affected with osteoarthritis or osteophytosis.

² O = number of vertebrae observed.

³ Young adult = individuals aged between 16 to 35 years; Old adult = individuals older than 36 years.

TABLE 4: Frequency of occurrence of vertebral osteoarthritis in the Vinkovci- NaMa Iron Age series

DISCUSSION

This is one of the very rare prehistoric skeletal series from continental Croatia that has become available for analysis. The other series are the Vukovar High School skeletal series dated to the Neolithic Starčevo culture, the Vukovar Vučedol skeletal series dated to the eneolithic Vučedol culture, and the Bezdanjača skeletal series dated to the middle and late Bronze age periods. The total number of recovered skeletons from these series is 58. As is evident from these numbers the prehistoric period in continental Croatia is poorly represented in terms of preserved human skeletal remains. The reason for this is twofold. Firstly, at present, there is an absence of defined cemeteries belonging to the Neolithic and Eneolithic cultures from continental Croatia. In both the Neolithic Starčevo, and the Eneolithic Vučedol cultures skeletal remains were recovered either as individual burials or in small possibly family units in the vicinity of subterranean dwellings (Starčevo culture), or else in abandoned cellars or pits in recognized settlements (Vučedol culture). The second reason is the practice of secondary inhumation in the Bronze Age series from Bezdanjača. This large series consists only of crania with, or in some cases without, adjoining mandibles. The Iron age Vinkovci-NaMa series is the first Hallstatt-era skeletal series from continental Croatia. The series is,

however, very small and the results obtained require cautious interpretation.

The sample is characterized by relative longevity. The mean ages at death for adult males (51.0 years) and adult females (38.0 years) are relatively high. These values are considerably higher than the mean ages at death recorded in continental Croatia during later periods. For instance, the mean ages at death in the late antique Štrbinci series is 39.3 years for males and 35.5 years for females (Šlaus, 2001), in the early medieval Privlaka cemetery 34.9 and 31.8 years respectively (Šlaus, 1996), and in the historic period Nova Rača cemetery 34.1 and 29.9 years respectively (Šlaus, 2000). The same difference is noted when the values from the Vinkovci-NaMa series are compared with larger series. The mean values for age at death for the early medieval period (6th-9th century) in continental Croatia, based on an analysis of 277 skeletons from 3 sites is 38.5 years for males and 37.9 years for females (Šlaus et al, 2002). Analysis of the late medieval period (10th-13th century) based on the examination of 175 skeletons from 6 sites shows that the average age at death for males was 35.2 years, for females 35.6 years (Šlaus et al, 2002). The Vinkovci-NaMa results, therefore, most likely do not represent a realistic reflection of the average life span in continental Croatia during the Iron age but are the result of random variation in a small sample.

Compatible with these relatively advanced ages are the skeletal changes seen in some individuals: severe marginal osteophytes and surface porosity on the dens and articular facets of the second cervical vertebra in the male from grave 3, bilateral osteoarthritic changes in the knees of the male from grave 18, and mild, generalized osteoporosis in the female from grave 14. Muscle crest development also reflects advanced ages and probably a vigorous life style. All of the males show well developed muscle attachment sites frequently with marked enthesophyte build up particularly at the attachment sites of the pectoralis major, teres major and deltoid muscles in the upper humerus, the biceps brachii on the proximal radius and the triceps brachii on the proximal ulna. In view of the three horse burials it is interesting to note that none of the recovered individuals show even mildly developed adductor tubercles on the distal femora. Hypertrophy of the adductor tubercle has been linked to horseback riding (Smokvina, 1959).

The frequencies of dental disease - alveolar bone disease and carious lesions, also reflect the relatively long average life spans. As shown in Tables 2 and 3, 26.2% of all adult tooth sockets exhibit evidence of alveolar bone disease and 11.6% of adult teeth exhibit carious lesions. Males were more susceptible to both conditions, possibly because of their longer average life span.

Pathological conditions present in the sample include the presence of cribra orbitalia in individuals from grave 1 (adult male) and grave 5 (subadult). In both cases the lesion was healed and mild in expression. The subadult from grave 14a exhibits bilateral generalized, severe periostitis on the tibiae. The adult male from grave 18a exhibits an old, well healed cutting fracture, 26 mm long, on the frontal bone approximately 45 mm superior of nasion. The fracture did not penetrate the inner table of the skull. The female from grave 4 suffered mild compression fractures of the superior end plates of L1, L2 and L3 that

resulted in mild kyphosis. This individual is interesting because she was buried with a number of artifacts (some of which left oxidation marks on her clavicle, scapula and rib) including a relatively rare artifact which has been identified as a scepter. From the osteological point of view this individual is interesting because she is one of the very few female skeletons from archaeological series, and the only one from the prehistoric series from continental Croatia, that does not exhibit preauricular sulci. The preauricular sulcus is located slightly anterior of the auricular surface of the ilium. The presence of a well defined preauricular sulcus with discrete or coalesced pits or craters within the groove is often attributed to the result of pulling stresses of the ventral sacroiliac ligament and subsequent inflammation (bleeding) associated with childbirth (Mann and Murphy, 1990). The absence of preauricular sulci in the female from grave 4 implies that she did not bear children. Together, the abundant and rare artifacts and the fact that this woman did not bear children tentatively suggest a religious or cult function.

In conclusion, examination of the Vinkovci-NaMa Iron age skeletal series provides a rare opportunity to address questions concerning health, disease and stress in prehistoric continental Croatia. There is, as already noted, very little comparable bioarchaeological information from this time period. Hence, the biological and pathological data collected provides an important data base for future anthropological research.

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SAŽETAK

ANTROPOLOŠKA ANALIZA LJUDSKOG OSTEOLOŠKOG MATERIJALA S ARHEOLOŠKOG NALAZIŠTA "VINKOVCI-NAMA"

Ključne riječi: bioarheologija, dentalna oboljenja, trauma, Vinkovci, željezno doba

U radu su prikazani rezultati osteoloških analiza provedenih na 11 kostura s nalazišta "Vinkovci-Nama" koje se datira u razdoblje od druge polovice petog do prve polovice četvrtog stoljeća prije naše ere. Osteološki materijal otkopan je tijekom istraživanja vođenih 1976. i 1977. godine i do 1999. godine bio je pohranjen u depoima Gradskog muzeja Vinkovci. U analiziranom uzorku prisutni su ostaci 4 djece i 7 odraslih osoba (3 žene i 4 muškarca). Prosječne doživljene starosti odraslih osoba (muškarci 51,0 godinu; žene 38,0 godina) znakovito su više od vrijednosti registriranih na kasnijim nalazištima iz kontinentalne Hrvatske. Usporedbe radi prosječne doživljene starosti na kasnoantičkom nalazištu Štrbinci su 39,3 godina za muškarce i 35,5 godina za žene, na ranosrednjovjekovnom nalazištu Privlaka 34,9 godina za muškarce i 31,8 godina za žene, dok su na nalazištu Nova Rača kraj Bjelovara koje se datira u razdoblje od 14. do 18. stoljeća muškarci u prosjeku

živjeli 34,1 godinu, a žene 29,9 godina. Vrijednosti evidentirane na nalazištu Vinkovci-Nama stoga najvjerojatnije nisu objektivni pokazatelj duljine prosječnog života u kontinentalnoj Hrvatskoj tijekom željeznog doba, nego rezultat slučajnih varijacija unutar malog uzorka.

Visoke učestalosti dentalnih oboljenja (alveolarnih apcesa i karijesa) u uzorku konzistentne su s relativno visokim doživljenim starostima. Kod odraslih osoba nešto više od jedne četvrtine (26,2%) svih zubnih alveola pokazuju znakove alveolarnih bolesti a 11,6% svih zubiju imaju karijese. Oba oboljenja češće se očituju kod muškaraca što može biti posljedica njihova nešto dužeg prosječnog životnog vijeka.

Učestalosti pokazatelja subadultnog stresa (cribra orbitalia i hipoplazija zubne cakline) niske su u uzorku.

U uzorku je prisutna jedna stara dobro zarasla trauma. Radi se o posjekotini dugačkoj oko 26 mm na sredini frontalne kosti. Trauma nije probila svod lubanje i ne pokazuje znakove infekcije.

