

# Anthropological Analysis of the Late Roman/Early Medieval Cemetery of Novigrad (Istria)

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## ABSTRACT

*The paper presents results of analysis of human skeletal remains recovered from Late Roman / Early Medieval cemetery of Novigrad (Istria). The »terminus post quem« for the site was established archaeologically as 5<sup>th</sup> or 6<sup>th</sup> century A.D. The aim of this work was detailed bioarchaeological analysis of each individual. It included determination of sex, age at the time of death, reconstruction of body height, and detailed description of pathological changes on bones and joint surfaces acquired during lifetime. The analysis provides limited information on demography, health and disease of the ancient inhabitants of Novigrad due to the limited sample size. Results show unusually high proportion of subadults, a life span range of women slightly lower compared to other contemporary populations, a high level of metabolic stress in childhood and a high level of skeletal indicators of physical stress suggesting that several of the analyzed individuals were exposed to heavy physical labor during their adulthood.*

**Key words:** bioarchaeological analysis, Late Roman / Early Medieval cemetery, Novigrad

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## Introduction

In 1991, Archaeological Museum of Istria carried out a rescue excavation in the southwestern part of old Novigrad's center. During the excavation, 12 scattered graves, dated to the Late Roman/Early Medieval period, were exposed. All of them, except grave no. 4, contained human skeletal remains ac-

companied by only a few, if any, grave goods<sup>1</sup>.

Description, typology and list of artifacts found in graves are based on archaeological documentation. There are two groups of burials concerning body orientation. The first, bigger group, oriented in east-west direction, with the head to the

west, is located in the NW side of the examined area. Burial types present in this group are inhumations in stone cysts and simple inhumations. The second group are peripheral burials with simple inhumations, with bodies laid down in north-south direction<sup>1</sup>.

Types of inhumation follow Ujčić<sup>1</sup>:

Type I – graves with stone-built construction, a frequent type in Late Roman Istria, dating from the 3<sup>rd</sup> to the 5<sup>th</sup> century; Type II – inhumation in stone cysts, a type very frequent on Late Roman and Early Medieval cemeteries, and Type III – simple inhumation.

The most common small finds are gray, brown and black fragments of coarse, wheel-made jars with round bodies, sometimes decorated with simple wavy or parallel-line incisions. All of the pottery was scattered above the deceased or around him, and probably was not deposited as a part of the funeral ritual<sup>1</sup>.

The recovered burials are part of a bigger cemetery, most of which was destroyed. For burials *terminus post quem* was established archaeologically as 5<sup>th</sup> or 6<sup>th</sup> century A.D.<sup>1</sup>.

The aim of this work was bioarchaeological analysis of human skeletal remains. Results of this analysis provide information on population structure, health, nutrition and physical stress of the ancient inhabitants of Novigrad. Results from Novigrad cemetery were further compared with results from analyses of four roughly contemporaneous Late Roman populations in continental Croatia: Štrbinci (Roman *Certissia*) near Đakovo, »Eastern necropolis« in Osijek (Roman *Mursa*), Zmajevac and Vinkovci (Roman *Cibalae*). All four sites are located in Eastern Slavonia and dated to 4<sup>th</sup> century A.D.<sup>2</sup>.

## Material and Methods

The analyzed sample consisted of 13 individuals from 12 graves. All of the burials were single inhumations, except for graves no. 7 (two females), no. 10 (two subadults) and no. 4 which contained animal bones only. Bone preservation varied from good to excellent. Completeness of the individual skeletons varied, but the majority was fairly complete, missing only few bones.

Detailed analysis of each individual was carried out using Standards for data collection from human skeletal remains<sup>3</sup>. It included determination of sex, age at the time of death, dental status, reconstruction of body height, and detailed description of pathological changes on bones and joint surfaces acquired during lifetime. Results of individual analyses were combined to provide limited data on demography, health and disease of the ancient inhabitants of Novigrad.

Determination of the sex was based on morphological differences of pubic symphysis<sup>4</sup> and morphology of the skull<sup>5,6</sup>. Adult age at death was determined using the pubic symphysis morphology<sup>7</sup>, the auricular surface morphology<sup>8</sup>, sternal rib end changes<sup>9,10</sup> and cranial suture closure<sup>11</sup>. Age at death for subadults was determined using epiphyseal fusion<sup>12,13</sup>, dental eruption criteria<sup>14</sup>, and long bones length<sup>15,12</sup>. Detailed dental inventory was completed for each skeleton. All teeth were coded for their presence or absence, as well as for presence of carious lesions and alveolar abscesses. Presence of dental calculus and enamel hypoplasia was also scored. Each skeleton was examined for the evidence of possible pathology. For the identification of pathological changes, criteria by Ortner and Putschar<sup>16</sup> and Mann and Murphy<sup>17</sup> were used.

**Results**

*Demography*

The analyzed sample consists of 13 individuals, 8 adults and 5 subadults (under 15 years of age). Age and sex distribution of skeletons from Novigrad is given in Table 1.

**TABLE 1**  
SEX AND AGE AT DEATH IN  
THE NOVIGRAD SAMPLE

Burial	Sex	Age
1	M	35–49
2	S	0–5
3	M	20–34
5	S	0–5
6	S	0–5
7a	F	35–49
7b	F	15–20
8	M	35–49
9	M	35–49
10a	S	0–5
10b	S	0–5
11	F	35–49
12	F	15–20

M = male; F = female; S = subadult

The ratio males:females:subadults is 1:1:1.25 stands out from normal sex ratio found in archaeological populations, where it is 1:1:1<sup>18</sup>. Relatively high proportion of subadults may simply be a consequence of small sample size, which is not representative of the population or the fact that the analyzed individuals were recovered from the lowest layers of destroyed cemetery. Subadults are usually underrepresented in sample from cemeteries because their burials tend to be shallow, their bones are fragile and sometimes their burial rituals differ from those of the adults.

The average age at death for adult females is 29.8 years and for adult males 38.3. The average age at the death for adult males is comparable to other con-

temporary Late Roman populations in Croatia (Table 2), while the average age at death for females is lower than in any other cemetery. The number of females and males in the present sample is low, and as such might not be representative.

**TABLE 2**  
AGE AT DEATH IN NOVIGRAD AND OTHER  
CONTEMPORARY LATE ROMAN POPULATIONS  
(BASED ON THE ADULTS ONLY)

	Adult males		Adult females		Reference
	Age	N	Age	N	
Štrbinci	39.3	9	35.5	8	Šlaus, 2002
Mursa	33.8	9	36.1	12	Šlaus, 2002
Zmajevac	40.5	14	43.1	14	Šlaus, 2002
Vinkovci	36.5	13	39.4	12	Šlaus, 2002
Novigrad	38.3	4	29.8	4	this study

*Nutritional stress*

Skeletal evidence of nutritional stress collected from the analyzed sample included cribra orbitalia and ectocranial porosity. These changes are connected with acute stress and malnutrition, deficiency of vitamin A, D and C, or anemia<sup>19</sup> (Table 3).

**TABLE 3**  
FREQUENCY OF CRIBRA ORBITALIA IN THE  
WHOLE SAMPLE

	Cribra orbitalia (%)
Štrbinci	18.7
Mursa	9.1
Zmajevac	21.7
Vinkovci	33.3
Novigrad	66.6

Ectocranial porosity is characterized by tiny pits on the outer vault, most commonly on parietals, but also on occipital and frontal bone near bregma. For ecto-

cranial porosity it is important that pitting is never accompanied by thickening of the bone. This change is associated with acute and severe malnutrition<sup>19,17</sup>. The ectocranial porosity in Novigrad was present in 2 out of 5 individuals or 40% of the analyzed sample. This cannot be compared to other contemporary Late Roman populations in Croatia, since comparative information has not been published.

Cribrra orbitalia appears as holes on the roof of the orbits. It is caused by iron deficiency, malnutrition, infectious disease, scurvy or various anemias<sup>20</sup>. In the Novigrad sample cribrra orbitalia is present in 66.6% of the sample. This high frequency, if compared to other contemporary populations in Croatia, suggests that the ancient inhabitants of Novigrad experienced considerable subadult stress. High level of metabolic stress in childhood can be explained by the high frequency of subadults in the analyzed sample. High lesion frequency is associated with infancy and childhood and is consistent with the pattern observed in other skeletal series<sup>20</sup>.

#### *Physical stress*

Markers that were analyzed to evaluate physical stress in the sample are: vertebral degenerative changes, incidence of Schmorl's nodes in vertebral bodies and benign cortical defects (Tables 4 and 5).

Vertebral degenerative changes are the most common changes in archaeological and contemporary populations. For the Novigrad sample, frequency of vertebral changes is 45.8% of the adult individuals (Table 4). Compared to values from other sites, this high value, slightly higher in males (54.2%), suggests that several of the analyzed individuals were exposed to heavy physical labor during their adulthood.

Schmorl's nodes are small depressions in thoracic and lumbar vertebrae and are very common in all populations. Their ap-

**TABLE 4**  
FREQUENCY OF VERTEBRAL DEGENERATIVE CHANGES IN ADULTS

	Vertebral degenerative changes (%)		
	Both sexes	Males	Females
Štrbinci	6.1	6.9	4.6
Mursa	11.0	15.5	6.1
Zmajevac	7.8	10.1	5.4
Vinkovci	8.6	7.1	11.2
Novigrad	45.8	54.2	41.6

**TABLE 5**  
FREQUENCY OF SCHMORL'S NODES IN ADULTS

	Schmorl's nodes (%)		
	Both sexes	Males	Females
Štrbinci	8.8	4.9	14.3
Mursa	15.9	29.7	0.0
Zmajevac	15.8	19.0	12.6
Vinkovci	14.5	13.4	16.5
Novigrad	21.9	19.2	23.4

pearance is associated with heavy physical stress.

In the analyzed sample, frequency in females is slightly higher (23.4%) than in males (19.2%). The overall frequency of Schmorl's nodes in the sample is 21.9%, which is slightly higher than at other sites (Table 5).

Benign cortical defects, when in adults, are one of the markers of physical stress. Defects appear as grooves or furrows at ligamentous or tendinous attachment sites for muscles such as pectoralis major, teres major, or biceps brachii. In younger individuals, these changes represent normal variants in growing bone<sup>17,21</sup>. The type of benign cortical defect present in Novigrad sample is rhomboid fossa, which appears as a roughened, pitted depression, or a smooth, raised eminence on the inferior surface of the clavicle for attach-

ment of the costoclavicular ligament. Etiology of rhomboid fossa is still unknown, but it may be associated with strenuous activity of the pectoral girdle<sup>17</sup>.

For the Novigrad sample, frequency of rhomboid fossa is 10.0%, is lower than the frequency for Štrbinci, 33.3%.

#### *Pathological conditions*

The individual from grave 11 has spondylolysis on fifth lumbar vertebra. Spondylolysis is separation of vertebral body from the posterior vertebral arch. Etiology of spondylolysis is still unresolved, but genetic and congenital factors as well as trauma to the lower back must be considered<sup>21</sup>.

An adult female skeleton from grave 7a has congenital hip dislocation. Acetabulum is shallow and porotic, permitting the femoral head to slip and form a secondary joint<sup>16,17</sup>. Unfortunately, femora of this individual are missing, which prevented us from examining the influence on the joint.

Only one case of infectious disease was observed. The individual from grave no. 9 shows evidence of spine tuberculosis. Tuberculosis affected three vertebrae (L3–L5), completely destroying the body of L4, which collapsed and fused to the neighboring vertebrae.

#### **Conclusion**

The size of the analyzed sample from Novigrad cemetery, dated to the Late Ro-

man and/or Early Medieval period is too small to be considered representative of the whole population. As a consequence, results of our analysis should be taken with caution.

Despite that they provide limited data on demography, health and disease of the ancient inhabitants of Novigrad, which is valuable because no other bioarchaeological information is available from the Late Roman and Early Medieval period in Istria.

Results show unusually high proportion of subadults buried and further, indicating a relatively low average age at death for females. These finds must be followed up in the future research.

High frequency of nutritional stress, especially cribra orbitalia, is evidence of stress during childhood. Reconstruction of life style from skeletal indicators of physical stress suggests that several of the analyzed individuals were exposed to heavy physical labor during their adulthood.

A single observed case of spine tuberculosis, can tell us little about frequency of this disease in the general population.

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## **ANTROPOLOŠKA ANALIZA OSTEOLOŠKOG MATERIJALA S KASNOANTIČKOG/RANOSREDNJOVJEKOVNOG GROBLJA U NOVIGRADU (ISTRA)**

### **S A Ž E T A K**

U radu je obrađen ljudski osteološki materijal s kasnoantičkog i ranosrednjovjekovnog groblja u Novigradu, čiji skromni arheološki nalazi upućuju da je donje datacijske težiste u 5. ili najkasnije 6. stoljeću po Kristu. Cilja rada bila je antropološko-osteološka analiza koja će pružiti prve, skromne podatke, o biološkim osobinama ljudi koji su nastavali područje Istre u ovom povijesnom periodu. Osnovni dojam o populaciji je veliki udio dječje populacije, relativno niža starost ženskog dijela populacije u usporedbi s vrijednostima s drugih groblja, slaba i neadekvatna prehrana koja je uzrokovala dio patoloških promjena, te teški fizički rad i prenaprezanje.