TRAUMA ANALYSIS IN ROMAN ERA SKELETAL SAMPLE FROM ZADAR – RELJA

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Figure 1. The geographical location of Zadar.

Introduction

Zadar is situated on the eastern Adriatic coast in contemporary Croatia (Figure 1). It was founded as a Roman colony (*Iader*) possibly by Caesar or by the emperor Augustus and during the Antique period it was one of the largest urban centres on the eastern Adriatic coast. Because of urban construction, rescue excavations of Roman necropolis were carried out in 1989/1990 and 2005/2006 in the city district Relja. Over 1000 graves (skeletal and incinerated) were excavated. Grave goods (coins, pottery, pins, *fibulae*, glass vessels etc.) date the use of Roman necropolis between 1st and 4th century AD (Brusić & Gluščević, 1990) (Figure 2).

Figure 2. Archaeological artefacts found in graves from Zadar – Relja.

Materials and Methods

The age and sex of skeletal remains from Zadar-Relja was determined using conventional osteological methodologies (Krogman & İºcan, 1986; Bass, 1987) and, when necessary, discriminant functions for the femur (Šlaus, 1997). An analysis of cranial traumas was carried out on crania that have been preserved to more than 50% of their volume, while the analysis of the postcranial skeleton took into consideration the following bones: clavicle, humerus, radius, ulna, femur, tibia and fibula. Only bones preserved to an extent of more than 50% of their surface were analysed. The presence of trauma was determined by macroscopic analysis which included checking for bilateral bone asymmetry, angular deformities and the presence of bone callus. The frequency of traumas was calculated separately for each analysed bone.

Age at death	Subadults	Females	Males
0-0,9	3		
1-5	15		
6-10	19		
11-15	18		
16-20		4	8
21-25		13	16
26-30		14	18
31-35		22	62
36-40		13	52
41-45		13	31
46-50		8	11
51-55		7	4
56-60		1	4
60+		0	0
Total	**55**	**95**	**206**
Mean age at death[1]		x = 35.3 (sd=9.7)	x = 35.6 (sd=8.1)

[1] The average age at death was calculated on the basis of the median value for each age group (eg. 38 years for the age group 36-40) and the 65 years for the age group 60+.

Figure 3. The age and sex distribution in the skeletal sample from Zadar – Relja.

Results

Bioarchaeological analysis was carried out on 356 skeletons (95 females, 206 males and 55 subadults) (Figure 3). The average age at death for males and females of the analysed sample is almost identical: 35.6 years for men (sd=8.1) and 35.3 years for women (sd=9.7).

Trauma analysis showed a variety of injuries ranging from sword cuts to the cranium and long bones, directly associated with the cause of death, to more mundane cases of healed broken fingers and ribs. A total of 2753 long bones were analysed and traumas were observed in 29/2753 (1.0%) of all analysed bones with no significant differences between men (1.1%) and women (0.9%) (Figure 4). Most long bone traumas are present in the clavicle (1.6%), tibia (1.4%) and radius (1.3%). The frequency of cranial traumas in Zadar-Relja is relatively high: 21 out of 91 preserved skulls (23.1%) exhibit some kind of trauma (Figure 5). Head fractures are two times more frequent in men (15/50 or 30.0%) than in women (6/41 or 14.6%), but this difference is not statistically significant. The most dramatic cranial trauma noted is a massive perimortem fracture to the left parietal and occipital bones of an adult male caused by a sharp bladed object (most likely a sword) (Figure 6).

The frequency of long bone traumas in Zadar-Relja was compared with long bone trauma frequencies in two composite Antique skeletal samples (3rd and 4th century AD): one from eastern Croatia and the other from the eastern Adriatic coast. The overall frequency of long bone traumas in Zadar-Relja (1.0%) is quite similar to the frequency of such traumas in Antique composite skeletal samples from eastern Croatia (1.1%) and eastern Adriatic coast (1.6%) (Figure 7).

	Left side			Right side		
	N[1]	n[2]	%[3]	N	n	%
Clavicle						
Males	139	3	2.2	134	2	1.5
Females	55	1	1.8	49	0	0.0
Humerus						
Males	139	2	1.4	137	0	0.0
Females	55	0	0.0	53	0	0.0
Radius						
Males	130	2	1.5	125	0	0.0
Females	51	1	2.0	51	2	3.9
Ulna						
Males	139	1	0.7	127	1	0.8
Females	52	1	1.9	51	0	0.0
Femur						
Males	156	3	1.9	166	2	1.2
Females	67	0	0.0	64	0	0.0
Tibia						
Males	138	4	2.9	144	0	0.0
Females	67	2	2.9	64	0	0.0
Fibula						
Males	143	1	0.7	143	1	0.7
Females	57	0	0.0	57	0	0.0
Males	**984**	**16**	**1.6**	**976**	**6**	**0.6**
Females	**404**	**5**	**1.2**	**389**	**2**	**0.5**
Total	**1388**	**21**	**1.5**	**1365**	**8**	**0.6**

[1] N = total number of long bones
[2] n = number of long bones with traumas
[3] % = % (perecentage) of long bones with traumas.

Figure 4. Distribution of long bone traumas by side and sex in the skeletal sample from Zadar – Relja

Discussion

In a major urban centre like *Iader* one would expect a large number of accidents. That hypothesis is supported by the pattern of the long bone trauma in Zadar-Relja sample: high frequency of radial, clavicular, tibial and femoral traumas (Figure 8 and 9). High frequency of radial lesions and Colles fractures is most often attributed to falling onto pronated arms and outstretched hands (Ortner & Putschar, 1985; Killgore et al., 1997). For clavicular fractures Judd and Roberts (1999) suggest that equestrian accidents and injuries from close work with other large animals could have been an important risk factor. In addition, relatively high frequency of femoral and tibial fractures could also be connected with accidents rather than intentional violence.

Due to a very high density of population in Roman time *Iader* episodes of interpersonal violence were relatively common. Some authors (Alvrus, 1999; Standen & Ariazza, 2000) suggest that high frequency of cranial trauma is very probably a proof of intentional violence as is the case in the Zadar-Relja sample. Presence of perimortal traumas also supports this hypothesis. The pattern and frequency of analysed injuries seems to be most consistent with street fights and tavern brawls with only an occasional use of sharp weapons, rather than the more overtly violent confrontations encountered in battles or other military operations.

In order to get a clearer picture concerning the health conditions of the Roman populations inhabiting the territory of contemporary Croatia trauma frequencies in Zadar-Relja sample were compared with trauma frequencies in two composite Antique skeletal samples (one from eastern Croatia and the other from the eastern Adriatic coast). Trauma frequencies in all three skeletal samples are relatively low and very similar, which might suggest longer periods of peace and stability during the Late Antique period in the observed region.

Overall trauma frequency in Antique skeletal Zadar-Relja is relatively low, even though, as mentioned earlier, Zadar was one of the largest urban centres on the eastern Adriatic coast and one would expect much higher trauma frequencies. Majority of the observed fractures imply some sort of an accident, but a number of traumas are definitely a product of intentional interpersonal violence of lesser intensity.

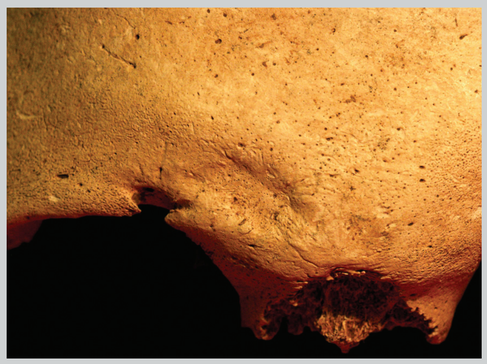

Figure 5. Depressed healed fracture of the frontal bone. Relja – Vrt, grave 50, male 41-45 years old

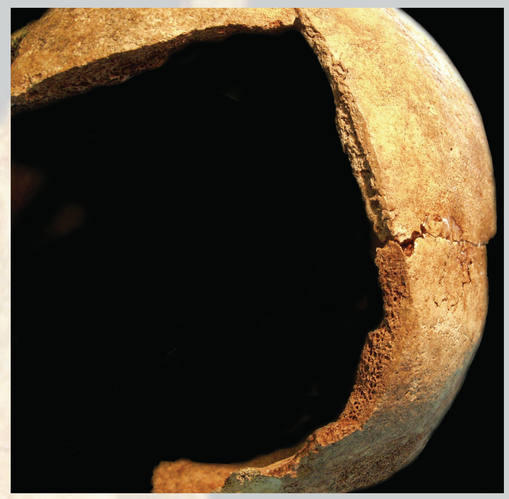

Figure 6. Massive perimortem trauma of the left side of cranium caused by sword. TC Relja, grave 378, skeleton B, male 36-40 years old.

	Zadar – Relja sample			Eastern Croatia sample			Eastern Adriatic coast sample		
	N[1]	n[2]	%[3]	N	n	%	N	n	%
Clavicle	377	6	1.6	303	3	1.0	85	1	1.2
Humerus	384	2	0.5	237	1	0.4	66	1	1.5
Radius	357	5	1.3	224	5	2.2	55	2	3.6
Ulna	369	3	0.8	223	4	1.8	62	1	1.6
Femur	453	5	1.1	305	0	0.0	96	0	0.0
Tibia	413	6	1.4	286	6	2.1	69	2	2.9
Fibula	400	2	0.5	248	2	0.8	51	1	2.0
Total	**2753**	**29**	**1.0**	**1826**	**21**	**1.1**	**484**	**8**	**1.6**

[1] N = total number of long bones
[2] n = number of long bones with traumas
[3] % = % (perecentage) of long bones with traumas.

Figure 7. Frequency of long bone traumas in Antique skeletal samples from different parts of Croatia

Figure 8. Poorly healed fracture of the right femur. TC Relja, grave 26, female 46-50 years old.

Figure 9. Poorly healed fracture of the right humerus. Relja – Vrt, grave 359, skeleton A, female 46-50 years old.

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