Mario NOVAK, Mario ŠLAUS & Maja PASARIĆ

BIOARHEOLOŠKE OSOBINE NOVOVJEKOVNE POPULACIJE S NALAZIŠTA KOPRIVNO – KOD KRIŽA KRAJ KLISA

BIOARCHAEOLOGICAL CHARACTERISTICS OF THE EARLY MODERN POPULATION FROM THE KOPRIVNO – KOD KRIŽA SITE NEAR KLIS

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Mario Novak
Odsjek za arheologiju
Hrvatska akademija znanosti i umjetnosti
Ante Kovačića 5
HR – 10000 Zagreb
marionovak@net.hr

Mario Šlaus
Odsjek za arheologiju
Hrvatska akademija znanosti i umjetnosti
Ante Kovačića 5
HR – 10000 Zagreb
mario.slaus@zg.htnet.hr

Maja Pasarić
Odsjek za etnologiju
Hrvatska akademija znanosti i umjetnosti
Andrije Hebranga 1
HR – 10000 Zagreb
majapasaric@net.hr

Svrha bioarheološke analize bila je sintetizirati antropološke podatke s novovjekovnoga nalazišta Koprivno – Kod križa te usporediti demografsku sliku i učestalost različitih oboljenja u uzorku iz Koprivna s kompozitnim kasnosrednjovjekovnim/novovjekovnim uzorkom iz kontinentalne Hrvatske koji čine nalazišta Nova Rača, Tomaš i Torčec.

*Kod svih su kostura određeni spol i starost te je analizirana prisutnost sljedećih patoloških promjena: dentalnih patologija (alveolarnih oboljenja i karijesa), osteoloških i dentalnih pokazatelja subadultnoga stresa (*cribra orbitalia *i hipoplazija zubne cakline), pokazatelja nespecifičnih zaraznih bolesti (periostitisa), degenerativnih promjena na kralježnici i velikim zglobovima, Schmorlovih defekata na kralješcima i trauma.*

Prikupljeni podaci pokazali su bitne razlike u bioarheološkim karakteristikama između analiziranih uzoraka u prosječnoj doživljenoj starosti, razdoblju najvećega mortaliteta, učestalosti alveolarnih bolesti i karijesa, učestalosti aktivnoga oblika cribra orbitalia *kod djece te učestalosti Schmorlovih defekata i degenerativnoga osteoartritisa na kralježnici i glavnim zglobovima.*

Uzorak iz Koprivna karakterizira vrlo niska učestalost trauma dugih kostiju, no visoka učestalost kranijalnih

The purpose of bioarchaeological analysis was to synthesise anthropological data from the Early Modern site at Koprivno – Kod križa and compare the demographic picture and frequency of various ailments in the sample from Koprivno with a composite late medieval/early modern sample from inland Croatia composed by the sites at Nova Rača, Tomaš and Torčec.

*For each skeleton, the sex and age was determined, and the presence of the following pathological changes was analysed: dental pathology (alveolar bone disease and caries), osteological and dental indicators of subadult stress (*cribra orbitalia *and dental enamel hypoplasia), indicators of non-specific infectious diseases (periostitis), degenerative changes on the spine and major joints, Schmorl's nodes on the vertebrae and trauma.*

The gathered data demonstrated significant differences in the bioarchaeological characteristics between the analysed samples in terms of average life span, periods of highest mortality, frequency of alveolar bone disease and caries, frequency of active forms of cribra orbitalia *among subadults and frequency of Schmorl's nodes and degenerative osteoarthritis on the spine and major joints.*

trauma sugerira određeni stupanj fizičkoga rizika koji je najvjerojatnije bio posljedica manjih sukoba između pojedinaca unutar same zajednice. Prikupljeni osteološki podaci sugeriraju da je tijekom novoga vijeka kvaliteta života u dalmatinskome zaleđu bila nešto veća nego na području sjeverno od Save.

Ključne riječi: bioarheologija, Koprivno kraj Klisa, novi vijek, paleodemografija, paleopatologija, dentalne bolesti, subadultni stres, traume

The sample from Koprivno is characterised by a very low frequency of long bone traumas, but a high frequency of cranial traumas suggesting a certain degree of physical risk that was most likely a result of minor conflicts between individuals within the same community.

The gathered osteological data suggest that during the Early Modern era the quality of life in the Dalmatian hinterland was somewhat better than in the territory north of the Sava River.

Key words: bioarchaeology, Koprivno near Klis, Early Modern era, palaeodemography, palaeopathology, dental disease, subadult stress, trauma

Uvod

Bioarheologija je relativno mlada znanstvena disciplina koja proučava ljudske bioarheološke ostatke (kosti) unutar njihova kulturnoga (arheološkoga) aspekta, a razvila se kroz suradnju i istraživanja arheologa i antropologa. Ona daje uvid u uvjete i način života arheoloških populacija te služi kao potvrda i nadopuna arheološkim i povijesnim podacima te donosi važne informacije do kojih se uz pomoć arheologije i povijesnih znanosti ne može doći. Kada se radi o prapovijesnim populacijama, informacije o učestalosti i vrsti trauma, zaraznih bolesti, nedovoljne i neadekvatne prehrane te kroničnoga teškog fizičkog rada nisu lako dostupne zbog nedostatka pisanih izvora.

Bioarheologija se kao znanost intenzivnije počela razvijati početkom druge polovice 20. stoljeća kada se u SAD-u i u zapadnoj Europi pojavljuju nove analitičke metode i teorije koje omogućuju nove pristupe proučavanju ljudskih osteoloških ostataka. Vjerojatno najvažnija promjena bila je pomak od tipološkoga načina razmišljanja prema orijentaciji utemeljenoj na ideji o proučavanju interakcijskih procesa između čovjekovih bioloških i sociokulturnih fenomena, kao i o proučavanju bioloških struktura (Baker 1966; Howells 1966; Johnston 1966; Bennett 1969). Taj novi pristup doveo je do toga da se ljudske kosti ne analiziraju samo u uskome arheološkom kontekstu nego i u kontekstu čovjekove interakcije s ekološkim sustavom koji ga okružuje. U isto je vrijeme s razvojem metodologije arheoloških iskopavanja i s novim metodama datiranja povećana dostupnost velikih, dobro otkopanih i čvrsto datiranih arheoloških zbirki koštanoga materijala. Razvoj i opće prihvaćanje pouzdanih i standardnih metoda za određivanje spola (Tieme & Schull 1957; Krogman 1962; Giles & Elliot 1963; Phenice 1969; Giles 1970; Black 1978) i doživljene životne dobi na ljudskome kosturu (Hunt & Gleiser 1955; McKern & Stewart 1957; Greulich & Pye 1959; Kerley 1965; Acsádi & Nemeskéri 1970; Gilbert & McKern 1973; Fazekas & Kósa 1978) bili su neki od najvažnijih čimbenika koji su potaknuli brži razvoj bioarheologije kao znanosti. Napredak informatičke

Introduction

Bioarchaeology is a relatively new scientific discipline which aims to study human bioarchaeological remains (bones) within their cultural (archaeological) aspect; it developed through cooperation between archaeologists and anthropologists. It provides an insight into the conditions and lifestyle of archaeological populations and serves to confirm and supplement archaeological and historical data and generates important information that cannot be obtained using archaeology and the historical disciplines alone. When dealing with prehistoric populations, information on the frequency and types of trauma, infectious diseases, insufficient and inadequate nutrition and chronic physical labour are not easily available due to a lack of written sources.

Bioarchaeology as a scientific discipline began to develop at the beginning of the latter half of the twentieth century, when new analytical methods and theories appeared in the United States and Europe which facilitated new approaches to the study of human osteological remains. Probably the most important change was the move from a typological way of thinking toward an orientation based on the idea of studying interactive processes between human biological and socio-cultural phenomena, and toward the study of biological structures (Baker 1966; Howells 1966; Johnston 1966; Bennett 1969). This new approach led to human bones being analysed not solely within their narrow archaeological context, but also in the context of human interaction with the surrounding ecosystem. At the same time, the development of new methods for archaeological excavations and new dating methods increased the accessibility of large, well-excavated and soundly dated osteological materials. The development and general acceptance of reliable and standard methods to determine sex (Tieme & Schull 1957; Krogman 1962; Giles & Elliot 1963; Phenice 1969; Giles 1970; Black 1978) and duration of life using the human skeleton (Hunt & Gleiser 1955; McKern

tehnologije i razvoj osobnih računala omogućili su korištenje novootkrivenih multivarijantnih statističkih metoda u bioarheološkim analizama (Birkby 1966; Schwidetzky 1967, 1972; Jantz 1973; Rösing & Schwidetzky 1977, 1981; Owsley & Jantz 1978), a brojni statistički programi omogućavali su laku i brzu upotrebu tih analiza, kao i sigurniju potvrdu interpretacija koje su se iz njih mogle dobiti.

Suvremena bioarheološka istraživanja u Hrvatskoj počinju početkom 60-ih godina prošloga stoljeća (Pilarić 1967, 1968, 1969; Pilarić & Schwidetzky 1987). Do značajnoga kvalitativnog i kvantitativnog pomaka dolazi 90-ih godina kada se u Hrvatskoj počinju provoditi antropološke analize po svemu ravnpravne onima u Europi i SAD-u, a istodobno se pojavljuje i veći broj radova od kojih su mnogi objavljeni u časopisima kao što su *American Journal of Physical Anthropology*, *Homo*, *Journal of Forensic Sciences*, *Croatian Medical Journal*, *Collegium Antropologicum*, *Opuscula Archaeologica* itd. Među važnijim su radovima i autorima: Boljunčić (1991, 1993, 1997, 1997a), Rajić & Ujčić (2003), Rajić Šikanjić (2005), Šlaus (1993, 1994, 1996, 1997, 1997a, 1998, 1998a, 1999, 2000, 2000a, 2001, 2002, 2002a, 2002b, 2003, 2004, 2004a, 2006), Šlaus & Filipec (1998), Šlaus & Novak (2006), Šlaus & Tomičić (2005), Šlaus *et al.* (1997, 2000, 2002, 2003, 2004, 2004a, 2004b, 2007).

Do danas su se bioarheološka istraživanja u Hrvatskoj fokusirala prvenstveno na rani srednji vijek i na pokušaj objašnjavanja migracija starohrvatskih populacija, što nije čudno s obzirom na veliku popularnost teorija o etnogenezi i doseljenju Hrvata. Tek se manji broj radova bavio antropološkim analizama populacija iz drugih povijesnih razdoblja, ponajprije zbog nedostatka materijala, ali i zbog nezainteresiranosti istraživača na terenu koji su ljudske kosti često smatrali nepotrebnim viškom.

Prijelaz iz kasnoga srednjeg vijeka u novi vijek (razdoblje od 15. do 18. stoljeća) u Hrvatskoj je obilježen turskim osvajanjima i vladavinom, što je ostavilo trajne posljedice u svim aspektima života koje se osjećaju još i danas. To turbulentno razdoblje iz korijena je izmijenilo društvenu, demografsku i gospodarsku sliku Hrvatske. S obzirom na to da je to vremensko razdoblje jedno od najslabije istraženih u bioarheološkome kontekstu, ukazala se potreba za opsežnim istraživanjem koje će se pozabaviti pokušajem rekonstrukcije uvjeta i kvalitete života novovjekovnih populacija s ovoga područja. U Hrvatskoj se u posljednjih desetak godina pojavilo nekoliko radova koji se bave problematikom bioarheologije kasnoga srednjeg vijeka i prijelaza u novi vijek: Šlaus (1996, 2000), Jakovljević & Šlaus (2003), Šarić-Buzančić (1999), Šlaus & Filipec (1998), Šlaus & Stewart 1957; Greulich & Pye 1959; Kerley 1965; Acsádi & Nemeskéri 1970; Gilbert & McKern 1973; Fazekas & Kósa 1978) were the most important factors that prompted the accelerated development of bioarchaeology as a science. The advancement of information technology and the development of personal computers enabled the use of newly-discovered multivariate statistical methods in bioarchaeological analyses (Birkby 1966; Schwidetzky 1967, 1972; Jantz 1973; Rösing & Schwidetzky 1977, 1981; Owsley & Jantz 1978), while numerous statistical programs enabled fast and easy use of these analyses, and more certain confirmation of interpretations that could be derived from them.

Modern bioarchaeological research in Croatia began in the early 1960s (Pilarić 1967, 1968, 1969; Pilarić & Schwidetzky 1987). A major qualitative and quantitative leap forward was made in the 1990s, when anthropological analysis began in Croatia that stood entirely shoulder to shoulder with its counterparts in Europe and the United States, accompanied by the appearance of a considerable number of works, many of which were published in journals such as the *American Journal of Physical Anthropology*, *Homo*, *Journal of Forensic Sciences*, *Croatian Medical Journal*, *Collegium Antropologicum*, *Opuscula Archaeologica*, etc. Among the more important works and authors are: Boljunčić (1991, 1993, 1997, 1997a), Rajić & Ujčić (2003), Rajić Šikanjić (2005), Šlaus (1993, 1994, 1996, 1997, 1997a, 1998, 1998a, 1999, 2000, 2000a, 2001, 2002, 2002a, 2002b, 2003, 2004, 2004a, 2006), Šlaus & Filipec (1998), Šlaus & Novak (in press), Šlaus & Tomičić (2005), Šlaus *et al.* (1997, 2000, 2002, 2003, 2004, 2004a, 2004b, in press).

To date, bioarchaeological research in Croatia has focused primarily on the Early Middle Ages and attempts to explain the migrations of old Croatian populations, which is not surprising considering the great popularity of the theory of the ethnogenesis and arrival of the Croats. Only a smaller number of papers dealt with anthropological analyses of populations during other historical periods, primarily due to a lack of osteological material, but also due to a lack of interest by researchers in the field, who often deemed human bones an unnecessary surfeit.

The transition from the Late Middle Ages to the Early Modern period (fifteenth to eighteenth centuries) in Croatia was marked by Ottoman conquest and rule, which had lasting consequences in all aspects of life that are still felt today. This turbulent period radically altered Croatian society, demography and economy. Since this period is one of the least researched in the bioarchaeological context, the need arose for extensive research that would

us *et al.* (1997, 2003), a M. Šlaus u svojoj je knjizi (Šlaus 2002) objavio analize provedene na četirima lokalitetima iz kontinentalne Hrvatske koji kronološki pripadaju razdoblju kasnoga srednjeg vijeka i prijelazu u novi vijek.

Prilika za istraživanje jedne veće, dobro uščuvane i odlično iskopavane novovjekovne populacije ukazala se 2003, kada je u laboratorij Odsjeka za arheologiju Hrvatske akademije znanosti i umjetnosti u Zagrebu dopremljen osteološki ljudski materijal s lokaliteta Koprivno – Kod križa. Taj se materijal po nalazima i načinu ukopa datira u novi vijek, tj. u razdoblje turskih osvajanja i turske vlasti u Dalmaciji i njezinu zaleđu. Opsežna i minuciozna paleodemografska i paleopatološka analiza rezultirala je magistarskim radom (Novak 2004), a ovaj je članak ponešto izmijenjena i nadopunjena verzija toga rada.

Kako bi se dobila što jasnija slika o kvaliteti života, zdravstvenim uvjetima i uspješnosti prilagodbe na okolinu onoga stanovništva koje je od kraja 15. do početka 18. stoljeća nastanjivalo nalazište Koprivno – Kod križa, rezultati ovoga uzorka uspoređeni su s kompozitnim kasnosrednjovjekovnim/novovjekovnim uzorkom iz kontinentalne Hrvatske sjeverno od Save koji se sastoji od triju nalazišta: Nova Rača, Tomaš i Torčec. Usporedba će pokazati postoje li između uzorka iz Koprivna i kompozitnoga uzorka iz kontinentalne Hrvatske bitne razlike u prosječnoj doživljenoj starosti i osteološkim pokazateljima bolesti ili nasilja i jesu li te razlike uvjetovane različitim geografskim smještajem ili kojim drugim čimbenicima.

Materijal i metode

Ljudski osteološki materijal analiziran u ovome radu otkriven je tijekom 2001. i 2002. prilikom zaštitnih arheoloških iskopavanja na trasi buduće autoceste Split – Zagreb u selu Koprivnu. Radovima su rukovodili Konzervatorski odjel iz Splita i splitski Muzej hrvatskih arheoloških spomenika pod vodstvom arheologa H. Gjurašina. Selo Koprivno smješteno je sjeveroistočno od Klisa, a sam se lokalitet nalazi u zaseoku Nazliću na predjelu koji se naziva Kod križa. Unutar groblja istraženo je ukupno 97 grobova koji se mogu datirati u novi vijek, tj. od kraja 15. do početka 18. stoljeća. Groblje se prostiralo na jugoistok preko kamene gomile u kojoj je nađen zgrčeni ukop odrasle osobe iz brončanoga doba, a na sjeveru i zapadu protezalo se ispod seoskoga puta (Gjurašin 2001). Grobovi su najčešće ukopani u uklesani kamen živac, a konstrukcija im se sastojala od kamenih ploča ili poluobrađenoga kamena (Gjurašin 2002). Groblje je potpuno iskopano, a broj skeleta

deal with attempts at reconstruction of the conditions and quality of life of Early Modern populations from this territory. Several works have appeared in Croatia over the past decade which deal with the problem of the bioarchaeology of the Late Middle Ages and the transition to the Early Modern period: Šlaus (1996, 2000), Jakovljević & Šlaus (2003), Šarić-Buzančić (1999), Šlaus & Filipec (1998), Šlaus *et al.* (1997, 2003), while in his book, M. Šlaus (Šlaus 2002) published the analyses conducted at four sites in continental Croatia which were dated to the Late Middle Ages and the transition to the Early Modern period.

The opportunity to research a large, well preserved and ideally excavated Early Modern population arose in 2003, when the human osteological remains from the Koprivno – Kod križa site were delivered to the laboratory of the Department of Archaeology of the Croatian Academy of Sciences and Arts. This material, based on accessories and burial methods, has been dated to the Early Modern era, i.e. the period of Ottoman conquest and rule in Dalmatia and its hinterland. Extensive and meticulous palaeodemographic and palaeopathological analysis has resulted in a master's thesis (Novak 2004), and this article is a somewhat altered and supplemented version of that work.

In order to obtain a clearer picture of the quality of life, general health conditions and success of adaptations to the environment of the population inhabiting the Koprivno – Kod križa site from the late fifteenth to the early eighteenth century, the results of this sample were compared with a composite late medieval/early modern sample from continental Croatia north of the Sava River consisting of three sites: Nova Rača, Tomaš and Torčec. A comparison will show whether there are significant differences in the average life span and osteological indicators of diseases or violence between the sample from Koprivno and the composite sample from continental Croatia, and whether these differences were caused by different geographic locations or some other factors.

Materials and methods

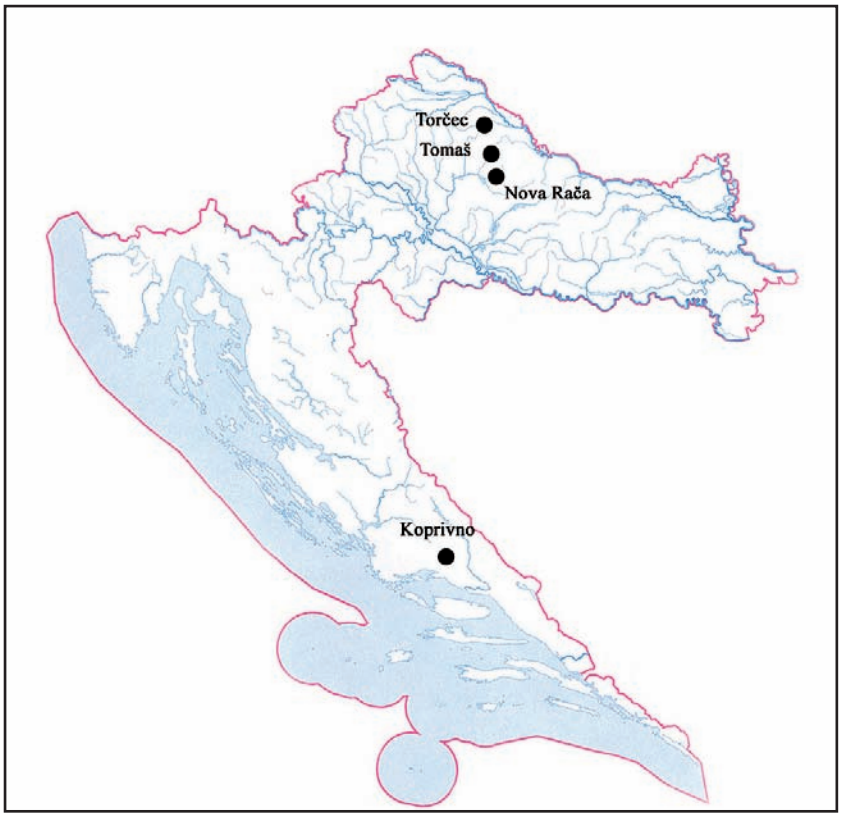
The human osteological material analysed in this work was discovered during 2001 and 2002 during rescue archaeological excavations on a section of the future Split – Zagreb high-speed motorway in the village of Koprivno. Works were conducted by the Conservation Department from Split and the Museum of Archaeological Monuments in Split under the leadership of archaeologist H. Gjurašin.

u pojedinome grobu varirao je od jednoga do šest: u šezdeset šest grobova nalazio se jedan kostur, u šesnaest grobova dva kostura, u pet grobova tri kostura, u četirima grobovima četiri kostura, u jednome grobu pet kostura i u dvama grobovima šest kostura. Grobni nalazi bili su relativno česti, ali vrlo uniformirani i skromni. Prevladavaju dijelovi odjeće (platno, koža), ulomci dvadeset osam željeznih igala, četrnaest puceta, četrnaest kopča za odjeću i tri para potkovica za obuću. Nađeno je nešto rimskih i turskih novčića, a najveća je posebnost šest probušenih španjolskih novčića s likom kralja Karla II. u grobu 79 (Gjurašin 2002). Za potrebe antropološke analize bilo je prikupljeno 146 kostura čiji je stupanj uščuvanosti podijeljen u četiri kategorije (loše, dobro, vrlo dobro i odlično). Od 146 kostura dostupnih za analizu tri su bila loše uščuvana, devet dobro, 32 vrlo dobro, a 102 kostura bila su odlično uščuvana.

S obzirom na to da s područja Dalmacije i njezina zaleđa do danas ne postoji dovoljno velik i reprezentativan novovjekovni osteološki uzorak s kojim bi se populacija iz Koprivna mogla usporediti, ovdje analizirani materijal usporedili smo s osteološkim materijalom koji je zbog svoje veličine, geografske i kronološke blizine, kao i činjenice da su sve analize načinjene po istim kriterijima, bio najpodobniji za takvo istraživanje. Za usporedbu u obzir su uzeti osteološki uzorci s triju nalazišta iz kontinentalne Hrvatske koji su udruženi u kompozitni kasnosrednjovjekovni/novovjekovni uzorak. Riječ je o nalazištima Nova Rača, Tomaš i Torčec (karta 1).

The village of Koprivno is located north-east of Klis, and the site itself is in the village of Nazlić at a place called Kod križa ('At the cross'). Within the cemetery, a total of 97 graves were examined which were dated to the Early Modern period, i.e. from late fifteenth to early eighteenth centuries. The cemetery extended in south-easterly over a stone mound, in which a Bronze Age flexed burial of an adult was found, and northward and westward under a village path (Gjurašin 2001). The graves were most often dug into bedrock, and they were constructed with stone slabs or semi-finished stone (Gjurašin 2002). The cemetery was completely excavated, and the number of skeletons in individual graves varied from one to six: sixty-six graves contained a single skeleton, sixteen contained two skeletons, five contained three skeletons, four contained four skeletons, one contained five skeletons and two graves contained six skeletons. Grave accessories were quite common, but very uniform and modest. They mainly consisted of parts of clothing (linen, leather), fragments of twenty-eight iron needles, fourteen buttons, fourteen clasps for clothing and three pairs of press-studs for clothing. Some Roman and Ottoman coins were also found, although the most specific discovery consisted of six pierced Spanish coins bearing the image of King Charles II in grave 79 (Gjurašin 2002). For the needs of archaeological analysis, 146 skeletons were gathered, with their degree of preservation classified into four categories (poor, good, very good and excellent). Out of the 146 skeletons available for analysis, 3 were poorly preserved, while 9 were classified as good, 32 as very good, and 102 as excellent.

Given that so far there is no sufficiently large nor representative Early Modern osteological sample from the territory of Dalmatia and its hinterland with which the population from Koprivno can be compared, the materials analysed here were compared with osteological material which, thanks to its size, geographic and chronological proximity, and the fact that all analyses were conducted using the same criteria, was the most suitable for this research. Osteological samples from three



Karta 1. Zemljopisni položaj analiziranih nalazišta (izradio: M. Novak, 2007).

Map 1. Geographic location of the analysed sites (prepared by M. Novak, 2007).

Iskopavanja u Novoj Rači pokraj Bjelovara provedena su od 1986. do 1995. na groblju oko crkve Uznesenja Sv. Djevice Marije pod vodstvom arheologa G. Jakovljevića iz Gradskoga muzeja u Bjelovaru. Na temelju arheoloških nalaza groblje se datira od 14. do 18. stoljeća (Medar 1987; Jakovljević 1988). Tijekom iskopavanja za antropološku su analizu prikupljeni osteološki ostaci 104 osoba čija je uščuvanost varirala od vrlo loše do odlične.

Arheološka istraživanja na groblju smještenome uokolo crkve u selu Tomašu istočno od Bjelovara vodio je 1997. arheolog G. Jakovljević. To se groblje upotrebljavalo tijekom 16. stoljeća (Jakovljević 1999). Za antropološku je analizu na raspolaganju bilo dvadeset kostura čija je uščuvanost varirala od loše do umjereno dobre.

Nalazište Torčec – Cirkvišće nalazi se sjeverno od mjesta Torčeca u općini Drnje u Koprivničko-križevačkoj županiji. Istraživanja je 2002. proveo Institut za arheologiju iz Zagreba u suradnji s Gradskim muzejom Koprivnica pod vodstvom Tajane Sekelj Ivančan. U pokusnim istraživanjima te je godine otkriveno osamnaest grobnih cjelina koje se na temelju fragmenata keramike, nakita i dijelova odjevnih predmeta iz grobnih cjelina mogu datirati od 14. st. do prve polovice 18. stoljeća (Sekelj Ivančan & Tkalčec 2003). Za analizu korišteni su ostaci dvadeset jedne osobe čija je uščuvanost varirala od vrlo loše do vrlo dobre.

Tijekom antropološke analize za svaki je kostur načinjena inventura uščuvanih kostiju, određen je spol i procijenjena starost u trenutku smrti te je izvršena analiza prisutnih patoloških promjena. Inventura kostiju načinjena je prema obrascu u kojemu su popisane sve kosti i zglobne plohe u ljudskome tijelu. Uza svaku je kost, ovisno o stupnju uščuvanosti, upisana šifra "1", što znači da je kost prisutna i da je sačuvano više od 50% njezine površine, dok šifra "2" znači da je kost prisutna, ali da je sačuvano manje od 50% njezine površine. Istovjetan način šifriranja korišten je pri evidentiranju prisutnosti zglobnih ploština. Zubi su popisani prema obrascu u kojemu su, osim prisutnosti ili antemortalnoga, odnosno postmortalnoga gubitka zuba, zabilježene i patološke promjene na zubima i alveolama.

Nakon popisivanja kostiju pristupilo se određivanju spola analizirane osobe, a u tu je svrhu korištena antroposkopska metoda koja se temelji na općim morfološkim razlikama između muškoga i ženskoga kostura. Te osnovne razlike nalaze se na zdjelici (Phenice 1969; Weaver 1980; Kimura 1982; Krogman & Iscan 1986; Sutherland & Suchey 1991), a ako zdjelica nije bila sačuvana, u obzir su uzete druge kranijalne i postkranijalne morfološke razlike (Bass 1987). Posebno korisnima pokazale su se dis-

sites from continental Croatia, consolidated into a composite late medieval/early modern sample, were taken into consideration for comparison. These are the Nova Rača, Tomaš and Torčec sites (Map 1).

Excavations in Nova Rača, near Bjelovar, were conducted from 1986 to 1995 at the graveyard around the Church of the Assumption of the Blessed Virgin Mary under the leadership of archaeologist G. Jakovljević from the Bjelovar City Museum. Based on the archaeological materials, the cemetery was dated from the fourteenth to eighteenth centuries (Medar 1987; Jakovljević 1988). During excavations, the remains of 104 persons were taken for anthropological analysis. Their level of preservation ranged from very poor to excellent.

Archaeological research in the church graveyard in the village of Tomaš east of Bjelovar was conducted by archaeologist G. Jakovljević in 1997. This graveyard was used during the sixteenth century (Jakovljević 1999). Twenty skeletons were available for anthropological analysis with levels of preservation varying from poor to moderately good.

The Torčec – Cirkvišće site is situated north of Torčec in the Drnje Municipality in Koprivnica – Križevci County. Research was conducted in 2002 by the Institute of Archaeology in Zagreb in cooperation with the Koprivnica City Museum under the leadership of Tajana Sekelj Ivančan. In that year, eighteen grave units were discovered during test excavations which, based on the potsherds, jewellery and pieces of apparel items, could be dated from the fourteenth to the early eighteenth centuries (Sekelj Ivančan & Tkalčec 2003). The remains of twenty-one individuals were used for analysis. Their level of preservation varied from very poor to very good.

During anthropological analysis, an inventory of preserved bones was conducted, the sex was determined and age at death was assessed, and present pathological changes were analysed. The inventory of bones was conducted based on a formula whereby all bones and joint surfaces in the human body were listed. Each bone, depending on its level of preservation, was designated with the code "1", which means that the bone is present and over 50% of its surface is preserved, while the code "2" means that the bone is present, but less than 50% of its surface is preserved. An identical coding system was used to record the presence of joint surfaces. The teeth were listed based on a system which, besides the presence of ante-mortem and post-mortem tooth loss, also recorded pathological changes in the teeth and alveoli.

After inventorying, the sex of the individuals was determined. An anthropomorphic method was used

kriminantne funkcije za određivanje spola odraslih osoba na temelju dimenzija bedrene (Šlaus 1997a) i goljenične kosti (Šlaus & Tomičić 2005). Spol djece nije određivan.

Starost u trenutku smrti određena je na temelju promjena koje nastaju na osteološkome tkivu tijekom rasta i starenja pojedinca. To su promjene na pubičnoj simfizi (Todd 1920, 1921; McKern & Stewart 1957; Gilbert & McKern 1973; Brooks & Suchey 1990), aurikularnoj ploštini zdjelice (Lovejoy *et al.* 1985) te sternalnim krajevima rebara (Iscan *et al.* 1984, 1985) i one su predstavljale dominantne metode za određivanje spola određene osobe. Pomoćne metode koje su korištene kako bi se dodatno potvrdila već ranije procijenjena starost bile su: stupanj obliteracije kranijalnih i maksilarnih šavova (Meindl & Lovejoy 1985), degenerativne osteoartritične promjene na zglobnim ploštinama dugih kostiju (Meindl & Lovejoy 1985; Mann & Jantz 1988; Pffeiffer 1991) i stupanj abrazije okluzalnih ploština zuba. Starost dječjih kostura procijenjena je na temelju promjena koje nastaju tijekom formiranja i nicanja mliječnih i stalnih zuba, stupnja osifikacije kostiju (spajanje epifiza s dijafizama) te prema dužini dijafiza dugih kostiju (McKern & Stewart 1957; Moorees *et al.* 1963; Fazekas & Kosa 1978; Bass 1987; Scheuer & Black 2000). U svim analizama korišten je najveći mogući broj kriterija kako bi se anulirao efekt loše uščuvanosti nekih kostura. Starost djece određena je u rasponu od jedne do tri godine, a odraslih osoba u rasponu od pet godina (npr. od 31 do 35 godina). Starosti veće od šezdeset godina nisu određivane, a sve osobe starije od šezdeset godina svrstane su u jednu skupinu nazvanu 60+.

Kod svih je kostura analizirana mogućnost prisutnosti sljedećih patoloških promjena: karijesa, alveolarnih bolesti, hipoplazije zubne cakline, *cribra orbitalia*, nespecifičnih zaraznih bolesti (periostitisa), osteoartritisa na kralješcima i velikim zglobovima, Schmorlovih defekata na trupovima kralješaka te trauma. Te su patologije odabrane zbog dvaju razloga: 1) sve te navedene promjene mogu se relativno lako prepoznati makroskopskom analizom osteološkoga materijala i 2) kumulativno navedene patologije daju dobar uvid u kvalitetu i uvjete života analizirane populacije. U nastavku teksta kratko su opisane spomenute patologije i objašnjen način na koji su evidentirane.

Zubni karijes zarazna je bolest koju karakterizira demineralizacija anorganskoga dijela i uništenje organskoga dijela zuba. Oboljenje je zarazno i prenosivo, a po svojoj je prirodi progresivno jer održavanje istih uvjeta koji su prouzročili pojavu karijesa u konačnici dovodi do potpunoga uništenja zuba (Pindborg 1970). Zubni se karijes na arheološkome

for this purpose which is based on general morphological differences between male and female skeletons. These basic differences can be found in the pelvic bone (Phenice 1969; Weaver 1980; Kimura 1982; Krogman & Iscan 1986; Sutherland & Suchey 1991), and if the pelvic bone was not preserved, then other cranial and postcranial morphological differences were taken into consideration (Bass 1987). The discriminatory functions to determine the sex of adults based on the dimensions of the femur (Šlaus 1997a) and tibia (Šlaus & Tomičić 2005) proved exceptionally useful. The sex of subadults was not determined.

Age at the time of death was determined on the basis of changes which occur on osteological tissue during the growth and aging of an individual. These are changes to the pubic symphysis (Todd 1920, 1921; McKern & Stewart 1957; Gilbert & McKern 1973; Brooks & Suchey 1990), the auricular surfaces of the pelvis (Lovejoy *et al.* 1985) and the sternal ends of the ribs (Iscan *et al.* 1984, 1985), and these are the dominant methods to determine the sex of specific individuals. Ancillary methods used to additionally confirm already estimated age were: the degree of obliteration of the cranial and maxillary sutures (Meindl & Lovejoy 1985), degenerative osteoarthritic changes on the joint surfaces of other bones (Meindl & Lovejoy 1985; Mann & Jantz 1988; Pffeiffer 1991) and degree of abrasion on occlusal surfaces of the teeth. The age of subadult skeletons was estimated on the basis of changes that occur during the formation and growth of deciduous and permanent teeth, the degree of ossification of bones (connection between epiphysis and diaphysis) and based on the length of the diaphysis of other bones (McKern & Stewart 1957; Moorees *et al.* 1963; Fazekas & Kosa 1978; Bass 1987; Scheuer & Black 2000). In all analyses, the largest possible number of criteria was used to overcome the effect o the poor preservation of some skeletons. The age of subadults was determined from a range of one to three years, while the age of adults covered a range of five years (e.g. from 31 to 35 years). Ages higher than sixty years were not determined, and all individuals over sixty years of age were classified in a single group called 60+.

In all skeletons, the possibility of the following pathological changes was analysed: dental caries, alveolar bone disease, dental enamel hypoplasia, *cribra orbitalia*, non-specific infectious diseases (periostitis), osteoarthritis on vertebrae and major joints, Schmorl's nodes on the vertebral body and traumas. These pathologies were selected for two reasons: 1) all of these changes can be relatively easily observed by macroscopic analysis of osteological material, and 2) the cumulative specified pathologies provide

materijalu lako prepoznaje po karakterističnim defektima koje stvara na kruni ili korijenu zuba. Defekti mogu biti različite veličine, od malih i plitkih do defekata koji potpuno unište krunu ili korijen zuba. Prisutnost karijesa dijagnosticirana je makroskopski, pod jakim svjetlom, uz pomoć dentalne probe. Karijes je dijagnosticiran samo ako je ustanovljen jasno vidljiv defekt zubne cakline, a prema opsegu dijeli se u četiri kategorije: 1) karijes u nastanku, 2) karijes zahvaća manje od 50% površine zuba, 3) karijes zahvaća više od 50% površine zuba i 4) karijes je potpuno uništio krunu zuba. Kod svakoga karijesa zabilježen je položaj defekta koji je mogao biti: okluzalan (na griznoj ploštini zuba), bukalan (na strani zuba okrenutoj prema unutrašnjoj strani obraza), lingvalan (na strani zuba okrenutoj prema jeziku), interproksimalan (na strani zuba okrenutoj prema susjednome zubu) te defekt na korijenu zuba.

Alveolarne su bolesti za potrebe ovoga rada definirane kao prisutnost periodontalnoga ili periapikalnoga apscesa ili gubitak zuba za života.

Hipoplazija zubne cakline prepoznaje se kao makroskopski defekt na površini zubne cakline (Sarnat & Schour 1941, 1942; Pindborg 1970). Riječ je o subadultnom poremećaju koji nastaje zbog akutnih, vremenski ograničenih stresova i najčešće se povezuje s gladovanjem, nedostatkom vitamina A, C i D te anemijom i psihičkom i/ili fizičkom traumom (Kreshover 1960; Goodman & Armelagos 1985; Goodman *et al.* 1980; Goodman & Rose 1991). Hipoplaziju karakterizira nedovoljna debljina zubne cakline, a najčešće se pojavljuje u dva oblika: 1) kao niz tankih paralelnih linija s labijalne strane zuba (linearna hipoplazija) ili 2) kao plitke jamice na zubnoj caklini. Hipoplazija zubne cakline pouzdan je pokazatelj nespecifičnoga stresa tijekom djetinjstva (od rođenja do otprilike 13. godine života, tj. u razdoblju stvaranja zubne cakline). Prisutnost hipoplazije zubne cakline analizirana je na trajnim maksilarnim središnjim sjekutićima te na maksilarnim i mandibularnim očnjacima. Ti zubi odabrani su zbog sljedećih razloga: 1) maksilarni centralni sjekutići i očnjaci mnogo su osjetljiviji na stres nego drugi zubi (Goodman & Armelagos 1985; Goodman & Rose 1990); 2) očnjaci imaju dug razvojni period (od četiri mjeseca do šest godina) (Gustafson & Koch 1974); 3) na sjekutićima i očnjacima zubne se naslage (*calculus*) u hrvatskim arheološkim populacijama pojavljuju u manjoj mjeri nego kod ostalih zuba te ih je stoga lakše analizirati.

Cribra orbitalia morfološki se očituje kao porozna, blago ispupčena kost na gornjim svodovima orbita. Nastaje zbog hipertrofije *diploë*, što uzrokuje stanjivanje i porozitet vanjskoga korteksa kosti, a smatra se posljedicom anemije uzrokovane nedostatkom željeza. Anemiju uzrokuju sljedeći čimbenici: nea-

a sound insight into the quality and conditions of life of the analysed population. Hereinafter these pathologies are described and the methods for recording them are explained.

Dental caries is an infectious disease characterised by demineralisation of anorganic portions and destruction of organic portions of the teeth. This disease is infectious and transferable, and by its nature it is progressive, because maintenance of the same conditions that cause carious lesions ultimately leads to complete destruction of the tooth (Pindborg 1970). Caries is easy to recognise in archaeological material based on the characteristic cavities that form on the crown or root of the tooth. Cavities may vary in size, from small and shallow ones to those which fully destroy the crown or root of the tooth. The presence of caries is diagnosed macroscopically, under strong illumination, with the help of a dental probe. Caries is diagnosed only if clearly visible cavities on the dental enamel are ascertained, and based on its extent it is divided into four categories: 1) emerging lesion, 2) lesion covering less than 50% of the tooth's surface, 3) lesion covering over 50% of the tooth's surface, and 4) lesion that has completely destroyed the crown. For each instance of caries, the position of the defect was recorded which may have been: occlusal (on the incising surface of the tooth), buccal (on the side of the tooth facing the interior of the cheek), lingual (on the side of the tooth facing the tongue), interproximal (on the side of the tooth facing the neighbouring tooth) and defects on the root.

For the needs of this paper, alveolar bone disease has been defined as the presence of periodontal or periapical abscess or loss of a tooth during an individual's lifetime.

Dental enamel hypoplasia is recognised as a macroscopic defect on the surface of the enamel (Sarnat & Schour 1941, 1942; Pindborg 1970). This is a subadult disorder which emerges due to acute, chronologically limited stresses and is most often associated with starvation, a lack of vitamins A, C and D and anaemia and mental and/or physical trauma (Kreshover 1960; Goodman & Armelagos 1985; Goodman *et al.* 1980; Goodman & Rose 1991). Hypoplasia is characterised by insufficient thickness of the dental enamel, and it most often appears in two forms: 1) as a series of thin parallel lines on the labial side of the tooth (linear hypoplasia), or 2) as shallow depressions in the dental enamel. Dental enamel hypoplasia is a reliable indicator of non-specific stress during childhood (from birth to roughly 13 years of age, i.e. during formation of dental enamel). The presence of dental enamel hypoplasia was analysed on the permanent maxillary central incisors and on

dekvatna prehrana, endemični parazitizam, nehigijenski uvjeti života ili kronična gastrointestinalna oboljenja (Hengen 1971; Carlson *et al.* 1974; El-Najjar 1976; Mensforth *et al.* 1978; Stuart-Macadam 1985). Promjena se može uočiti kod odraslih osoba i djece, a može biti u aktivnome ili u zaraslome stanju. Zarasla i aktivna *cribra orbitalia* razlikuju se po površini kosti koja je zahvaćena, promjeru šupljina koje nastaju i debljini porozne kosti. Istraživanja arheoloških populacija iz različitih dijelova svijeta pokazala su da su aktivni oblici te patologije gotovo isključivo prisutni kod djece (Mensforth *et al.* 1978; Walker 1986; Mittler & van Gerven 1994). Kod odraslih osoba *cribra orbitalia* uglavnom je zarasla i remodelirana. Ta demografska distribucija stoga jasno pokazuje da je *cribra orbitalia* osteološka reakcija na anemiju koja se razvija u djetinjstvu (Stuart-Macadam 1985). Tijekom analize sve uščuvane lubanje makroskopski su pregledane pod jakim snopom svjetla, a sve uočene lezije podijeljene su prema stanju (aktivne ili zarasle) i intenzitetu (blaga, umjerena ili jaka) u trenutku smrti.

Zarazne bolesti u arheološkim su populacijama bile vodeći uzrok smrti, i to posebice u najranijemu djetinjstvu (Ortner & Putschar 1985). Većina zaraznih bolesti prisutnih u arheološkim populacijama imaju nespecifično porijeklo, što znači da su patološke promjene uzrokovane različitim mikroorganizmima čija etiologija nije poznata. Patološka promjena koja zahvaća vanjsku (periostalnu) površinu kosti zove se periostitis. Periostalne reakcije uzrokovane stafilokokima i streptokokima nastaju kao posljedica uzdignuća vanjskoga fibroznog omotača periosta, do čega dolazi zbog kompresije i širenja krvnih žila (Jaffe 1972). To može uzrokovati subperiostalno krvarenje što smanjuje dotok krvi u kost, a ovisno o toksičnosti patogena i trajanju bolesti periost može umrijeti (nekroza) ili nastaviti normalan rast kada se uzročni proces smiri. U aktivnome stanju periostitis je najčešće sive ili smeđe boje, porozan, s dobro definiranim i blago povišenim rubovima (izgledom podsjeća na koru drveta). U zaraslome obliku nova, slabo organizirana kost remodelira se u lamelarnu kost i spoji s kortikalnom kosti, zbog čega zahvaćeni dio kosti poprima valovit, pomalo napuhan izgled (Šlaus 2006). Nespecifične periostalne reakcije najčešći su pokazatelj zaraznih bolesti u arheološkim populacijama.

Fizički stres pokazatelj je akutnoga ili pretjeranoga fizičkog napora. U ovome radu posebna je pozornost usmjerena na degenerativne promjene (osteoartroze) na zglobnim ploštinama i kralješcima te na Schmorlove defekte na kralješcima.

Schmorlovi defekti morfološki se prepoznaju kao plitki okrugli ili bubrežasti defekti (čiji promjer

the maxillary and mandibular canines. These teeth were selected for the following reasons: 1) maxillary central incisors and canines are much more sensitive to stress than other teeth (Goodman & Armelagos 1985; Goodman & Rose 1990); 2) canines have a long developmental period (from four months to six years) (Gustafson & Koch 1974); 3) accumulations (calculus) on incisors and canines appear to a much lesser extent in Croatian archaeological populations than on other teeth, so they are easier to analyse.

Cribra orbitalia appears morphologically as a porous, gently extruding bone on the upper arches of the eye socket. It emerges due to hypertrophy of the *diploë*, which causes thinning and porosity on the external cortex of the bone, and it is believed to be a result of anaemia caused by a lack of iron. Anaemia is caused by the following factors: inadequate nutrition, endemic parasitism, unhygienic living conditions or chronic gastrointestinal diseases (Hengen 1971; Carlson *et al.* 1974; El-Najjar 1976; Mensforth *et al.* 1978; Stuart-Macadam 1985). Changes can be observed in both adults and subadults, and it may occur in active or healed condition. Healed and active *cribra orbitalia* differ by the surface of the bone encompassed, the diameter of the cavity that emerges and the thickness of the porous bone. Research into archaeological populations from different parts of the world has shown that active forms of this pathology are almost exclusive to subadults (Mensforth *et al.* 1978; Walker 1986; Mittler & van Gerven 1994). In adults, *cribra orbitalia* is generally healed and remodelled. This demographic distribution thus clearly indicates that *cribra orbitalia* is an osteological response to anaemia which developed in childhood (Stuart-Macadam 1985). During analysis, all preserved skulls were macroscopically examined under powerful illumination, and all observed lesions were classified based on condition (active or healed) and intensity (mild, moderate or severe) at time of death.

Infectious diseases in archaeological populations were the leading cause of death, particularly in earliest childhood (Ortner & Putschar 1985). Most infectious diseases present in archaeological populations have non-specific origin, which means that pathological change was caused by different microorganisms with unidentified aetiology. Pathological change that affects the external (periostal) surface of a bone is called periostitis. Periostal reactions caused by staphylococcus and streptococcus emerge as the result of protrusions of the outer fibrous tissue of the periosteum, which leads to compression and expansion of the blood vessels (Jaffe 1972). This can cause sub-periostal bleeding, which decreases the blood flow in the bone, and depending on the

obično nije veći od jednoga centimetra) na superiornoj ili inferiornoj ploštini trupa kralješka. Nastaju zbog prolapsa intervertebralnoga diska u tijelo kralješka, a prisutnost tih defekata obično se povezuje s jakim mehaničkim opterećenjima kralježnice (Schmorl & Junghanns 1971).

Degenerativne osteoartritične promjene na kralješcima najčešće nastaju zbog degenerativnih promjena u intervertebralnome disku, prvenstveno u njegovu vezivnome tkivu (Schmorl & Junghanns 1971). Pojavljuju se osteofiti slični grebenu ili trnu koji se pružaju prema susjednome kralješku, a u težim se slučajevima osteofiti spoje i tvore koštani most. Osteoartritis na kralješcima može se razviti na dvama mjestima: na zglobnim nastavcima te na superiornim i inferiornim rubovima trupa kralješka. Degenerativne promjene na kralješcima obično se pojavljuju nakon tridesete godine života, a zbog uspravna hoda i uloge koju kralježnica ima u nošenju težine tijela promjene su najčešće na slabinskim kralješcima. Učestalost i distribucija degenerativnih promjena na kralješcima pokazuju ukupnu količinu fizičkoga stresa kojoj su članovi neke populacije bili izloženi, a omogućuju i rekonstrukciju određenih fizičkih aktivnosti (npr. nošenje teškoga tereta na glavi očituje se na vratnim kralješcima).

Degenerativne promjene na zglobovima nastaju kao posljedica jakoga biomehaničkog trošenja i funkcionalnoga stresa (najčešće jednokratne, teške traume u blizini zgloba ili niz čestih kroničnih trauma vezanih uz svakodnevne aktivnosti), a za analizu u obzir su uzeti sljedeći zglobovi: rame, lakat, kuk i koljeno. Zglob je evidentiran kao prisutan ako je najmanje jedan zglobni element bio potpuno uščuvan ili ako je kod dvaju ili triju elemenata bilo uščuvano više od 50% zglobnih ploština.

Traume su za potrebe ovoga rada definirane kao prijelomi (frakture) kosti koji su posljedica djelovanja sile ili kontakta s oštrim ili tupotvrdim predmetima. Prisutnost trauma ustanovljena je makroskopskom analizom koja je uključivala provjeru bilateralne asimetrije kostiju, angularnih deformiteta i prisutnosti koštanih kalusa.

Analize trauma razlikuju se od primjerice analiza karijesa ili *cribra orbitalia* po tome što njihova interpretacija ne ovisi samo o njihovoj prisutnosti nego i o mjestu na kojemu se nalaze te o prisutnosti drugih trauma. Taj su problem istaknuli Berger & Trinkaus (1995) u analizi i interpretaciji traumatskih ozljeda kod neandertalaca. Oni su traume kod neandertalaca podijelili u četiri skupine, ovisno o mjestu na tijelu na kojemu se nalaze. Te su četiri skupine bile: 1) traume glave i vrata, 2) traume trupa i zdjelice, 3) traume gornjih ekstremiteta i 4) traume donjih ekstremiteta. Usporedbom s modernim, klinički do-

toxicity of the pathogen and the duration of the disease, the periosteum may die (necrosis) or continue to grow normally if the causal process palliates. In active condition, periostitis is usually grey or brown, porous, with well defined and gently raised edges (its appearance recalls tree bark). When healed, the new, weakly organised bone remodels into a lamellar bone and forms a connection with the cortical bone, so that the affected portion of the bone assumes a wavy, slightly inflated appearance (Šlaus 2006). Non-specific periostal reactions are most often indicators of infectious diseases in archaeological populations.

Physical stress is an indicator of acute or excessive physical exertion. In this paper, particular attention has been accorded to degenerative changes (osteoarthrosis) on joint surfaces and vertebrae, and to Schmorl's nodes on vertebrae.

Schmorl's nodes are recognised morphologically as shallow round or kidney-shaped defects (their diameter is never greater than one centimetre) on the superior or inferior surface of the body of the vertebra. They are caused by the prolapse of the intervertebral disc in the body of the vertebra, and the presence of these defects is normally associated with intense mechanical burdens to the vertebrae (Schmorl & Junghanns 1971).

Degenerative osteoarthritic changes on the vertebrae are usually caused by degenerative changes in the intervertebral disc, primarily in its connective tissue (Schmorl & Junghanns 1971). Osteophytes similar to ridges or thorns appear that extend toward the neighbouring vertebra, while in more severe cases the osteophytes bond and form a bony bridge. Osteoarthritis on the vertebrae may develop in two places: on the joint processes and on the superior and inferior particular processes of the vertebral body. Degenerative changes on the vertebrae normally appear after thirty years of age, and due to upright posture and the role which the vertebrae play in carrying the body's weight, changes are most often manifested in the lumbar vertebrae. The frequency and distribution of degenerative changes on the vertebrae demonstrates the overall amount of physical stress to which the members of a certain population were exposed, and allow a reconstruction of certain physical activities (e.g. carrying heavy loads on the head is manifested in the cervical vertebrae).

Degenerative changes on the joints appear as a result of intense biomechanical exertion and functional stress (most often one-time, severe trauma near the joint or a series of frequent chronic traumas tied to everyday activity), and the following joints were taken into consideration for analysis: shoulders (*articulatio humeri*), elbows (*articulatio*

bro dokumentiranim populacijama, posebno onima koje su zbog prirode svoga posla često izložene traumama, Berger i Trinkaus došli su do zaključka da je ustroj trauma kod neandertalaca najsličniji onome kod suvremenih jahača rodea, odnosno konzistentan je s ustrojem u kojemu je fizičko nasilje stalno prisutno (Berger & Trinkaus 1995). Karakteristika je toga ustroja visoka učestalost trauma glave, vrata i gornjih ekstremiteta praćena niskom učestalošću trauma donjih ekstremiteta. Identičan ustroj primijetili su Smith (1996), Kilgore *et al.* (1997) i Jurmain (2001) u arheološkim populacijama gdje je nasilje proizlazilo iz čestih međuljudskih ili plemenskih sukoba. Sigurna potvrda namjernoga nasilja u tim populacijama bili su česti nalazi različitih vrsta projektila zabodenih u kostima te brojne ozljede tupotvrdim i oštrobridnim predmetima.

Ista metodologija primijenjena je i u analizi učestalosti i distribuciji trauma u uzorku iz Koprivna. Kako bi se rezultati mogli usporediti s drugim arheološkim populacijama u kojima su kralješci i rebra uniformno loše uščuvani, traume su evidentirane samo za: 1) glavu, 2) gornje ekstremitete i 3) donje ekstremitete. Navest ćemo koji su kriteriji pritom korišteni. Glava je uključena u analizu samo ako su bile uščuvane sve kosti svoda lubanje i lica. Gornji ekstremiteti uključeni su u analizu ako su sve tri velike kosti ruke (nadlaktična, palčana i lakatna kost) imale uščuvane barem dvije trećine dijafize te superiorne i inferiorne zglobne ploštine. Kosti zapešća, pešća i prstiju ruke nisu analizirane. Isti su kriteriji primijenjeni na donje ekstremitete: u analizu su uključeni samo ako su tri velike kosti (bedrena, goljenična i lisna kost) imale uščuvane dvije trećine dijafize, kao i superiorne i inferiorne zglobne ploštine. Budući da su traume kod djece u obama uzorcima iznimno rijetke, u analizu su uključene samo odrasle osobe.

Rezultati analize uzorka iz Koprivna uspoređeni su s drugim osteološkim uzorcima koji su istraživani sličnim metodama. Riječ je o kompozitnome kasnosrednjovjekovnom/novovjekovnom uzorku iz kontinentalne Hrvatske, kompozitnome srednjovjekovnom uzorku iz Crkvara i Kliškovca (Šlaus & Novak 2006), zatim o prapovijesnome indijanskom uzorku s nalazišta SCl-038 u Kaliforniji (Jurmain 2001) i srednjovjekovnome uzorku s nalazišta Raunds u Velikoj Britaniji (Judd & Roberts 1999).

Nakon provedene antropološke analize usporedbom podataka iz tih dvaju uzoraka pokušat ćemo odrediti je li geografski smještaj utjecao na uvjete i kvalitetu života tijekom kasnoga srednjeg vijeka i novoga vijeka u Hrvatskoj i u kojoj je mjeri utjecao te kako su se određene populacije i kategorije unutar populacija prilagođavale svomu okolišu.

cubiti), hips (*articulatio coxae*) and knees (*articulatio genus*). A joint was recorded as present if not less than one joint element was preserved or if over 50% of the joint surface was preserved in two or three elements.

For the needs of this paper, traumas were defined as fractures of the bones which result due to forceful impact or contact with sharp or hard, blunt objects. The presence of traumas was established by macroscopic analysis which includes verification of the bilateral asymmetry of bones, angular deformities and the presence of bone calluses.

Trauma analysis differs from analysis of dental caries or *cribra orbitalia* because its interpretation does not solely depend on their presence but also on their location and the presence of other traumas. This problem was pointed out by Berger & Trinkaus (1995) in an analysis and interpretation of traumatic injuries in Neanderthals. They divided Neanderthal traumas into four groups, depending on their location in the body. These four groups were: 1) head and neck traumas, 2) torso and pelvic traumas, 3) traumas of the upper extremities, and 4) traumas of the lower extremities. In a comparison with modern, clinically well-documented populations, particularly those frequently exposed to traumas due to the nature of their occupations, Berger and Trinkaus arrived at the conclusion that the structure of traumas in Neanderthals was the most similar to that of modern rodeo cowboys, meaning that it was consistent with a structure in which physical violence was constantly present (Berger & Trinkaus 1995). A feature of this structure of high frequency of injuries to the head, neck and upper extremities is that it is accompanied by a low frequency of injuries to the lower extremities. An identical structure was noticed by Smith (1996), Kilgore *et al.* (1997) and Jurmain (2001) in archaeological populations where violence occurred due to frequent interpersonal or tribal conflict. A certain confirmation of violence in these populations was the frequent discovery of various types of projectiles lodged in the bones and numerous injuries caused by hard, blunt and sharp-edged objects.

The same methodology was applied in analysis of the frequency and distribution of traumas in the sample from Koprivno. To facilitate comparison with other archaeological populations in which the vertebrae and ribs were uniformly poorly preserved, traumas were only recorded for the: 1) head, 2) upper extremities, and 3) lower extremities. We shall specify the criteria used in this process. The head was included in the analysis only if all bones of the cranium and face were preserved. The upper extremities were included in the analysis if all three

Rezultati

Distribucija smrtnosti po spolu i starosti za uzorak iz Koprivna i kompozitni uzorak iz kontinentalne Hrvatske prikazana je u tablicama 1 i 2. Uzorak se sastoji od 146 osoba od kojih je 86 djece (58,9%), 33 žene (22,6%) i 27 muškaraca (18,5%). Najmlađa osoba u uzorku umrla je oko rođenja, dok su najstarije osobe doživjele više od šezdeset godina. Kompozitni uzorak iz kontinentalne Hrvatske gotovo je identične veličine, a sastoji se od 145 osoba od kojih je 54 djece (37,2%), 44 žene (30,4%) i 47 muškaraca (32,4%).

Na većini srednjovjekovnih grobalja u Hrvatskoj broj žena i muškaraca obično je vrlo sličan – najčešći je omjer oko 1,00 : 1,00 (Šlaus 2002), što je slučaj i u obama analiziranim uzorcima. U uzorku iz Koprivna omjer između žena i muškaraca iznosi 1,00 : 0,82, dok u kompozitnome uzorku taj omjer iznosi 0,93 : 1,00.

U uzorku iz Koprivna vrlo je velik broj djece: dječji kosturi čine čak 58,9% ukupnoga uzorka. U kompozitnome uzorku situacija je nešto drugačija: ondje djeca sačinjavaju nešto više od trećine ukupne analizirane populacije (37,2%). Ta je razlika statistički značajna ($\chi^2 = 12,82$; $P < 0,01$).

Gledamo li iz današnje perspektive, smrtnost djece u Koprivnu doima se strahovito visokom – više od polovice uzorka iz Koprivna čine osobe koje nisu bile starije od petnaest godina. Tako visoka zastupljenost djece u ukupnome uzorku najvjerojatnije je posljedica nepoznavanja mikroskopskoga svijeta i potencijalne opasnosti od bakterija i virusa, kao i nepostojanja antibiotika.

U predindustrijskim populacijama smrtnost djece uvijek je najveća u najmlađoj starosnoj kategoriji. U nekim populacijama djeca mlađa od jedne godine čine i do 34% čitavoga uzorka (Coale & Demeny 1966; Acsádi & Nemeskéri 1970). U uzorku iz Koprivna situacija je nešto drugačija. Najveći mortalitet kod djece evidentiran je u razdoblju između druge i pete godine i iznosi 33/146 ili 22,6% čitavoga uzorka, odnosno 33/86 ili 38,4% ukupnoga broja djece u uzorku. Tek druga najveća stopa smrtnosti kod djece evidentirana je u razdoblju neposredno nakon rođenja pa do prve godine života i iznosi 19,9% čitavoga uzorka (29/146), odnosno 33,7% od uzorka djece (29/86). U komparativnome uzorku iz kontinentalne Hrvatske podzastupljenost djece (posebno one iz najmlađih dobnih skupina) još je uočljivija. U tome je uzorku mortalitet djece između rođenja i prve godine te između druge i pete godine identičan i iznosi 27,8% ukupnoga broja djece (15/54) ili 10,3% čitavoga uzorka (15/145). To sasvim sigurno nisu realni odnosi, pa nam ostaje odgovoriti na pi-

large arm bones (humerus, radius and ulna) had at least two thirds of their diaphysis and superior and inferior joint surfaces preserved. The metacarpal, carpal and phalangeal bones were not analysed. The same criteria were applied to the lower extremities: they were only included in the analysis only if two thirds of the diaphysis of the three large bones (femur, tibia and fibula), as well as the superior and inferior joint processes were preserved. Since traumas in subadults in both samples were extremely rare, only adults were included in the analysis.

The results of the analysis of the sample from Koprivno were compared with other osteological samples that were examined using similar methods. This was a composite late medieval/early modern sample from continental Croatia, a composite medieval sample from Crkvari and Kliškovac (Šlaus & Novak, 2006), a prehistoric Native American sample from site SCl-038 in California (Jurmain 2001) and a medieval sample from the Raunds site in Great Britain (Judd & Roberts 1999).

After conducting an anthropological analysis by comparing data from these two samples, we shall attempt to determine whether geographic location influenced the conditions and quality of life during the late Middle Ages and Early Modern period in Croatia, and to what extent and how given populations and categories therein adapted to their environment.

Results

The sex- and age-based distribution of mortality for the Koprivno sample and the composite sample from continental Croatia is shown in Tables 1 and 2. The sample consists of 146 persons of whom 86 are subadults (58.9%), 33 are females (22.6%) and 27 are males (18.5%). The youngest individual in the sample died near birth, while the oldest individuals lived over sixty years. The composite sample from continental Croatia is almost identical in size, and consists of 145 individuals of whom 54 are subadults (37.2%), 44 are females (30.4%) and 47 are males (32.4%).

In most medieval skeletal samples from Croatia, the number of females and males is almost identical – the most frequent ratio is generally 1.00:1.00 (Šlaus 2002), which is the case in both analysed samples. In the Koprivno sample, the ratio between females and males is 1.00:0.82, while in the composite sample this ratio is 0.93:1.00.

The Koprivno sample contains a large number of subadults: subadult skeletons account for 58.9% of the total sample. In the composite sample, the situ-

tanje: zašto su djeca iz najmlađe starosne skupine podzastupljena u obama analiziranim uzorcima?

Što se tiče podzastupljenosti djece iz najmlađe starosne skupine, pregled svjetske literature pokazuje da je riječ o raširenu fenomenu. Sličnu ili još naglašeniju podzastupljenost primijetili su Acsádi & Nemeskéri (1970), Aner (1971), Kolnik & Stloukal (1974), Wahl (1988), Alesan *et al.* (1999), Kunter (1996), Šlaus (2000) i brojni drugi autori. Među čimbenicima koji pridonose toj podzastupljenosti najčešće se spominju različiti pogrebni običaji kod neonatalnih smrti i plići ukopi za vrlo malu djecu, ali i kemijski sastav tla (kiselost). Sve to nepovoljno djeluje na vrlo krhke dječje kosti.

Smrtnost odraslih osoba realnije prikazuje uvjete i kvalitetu života u analiziranim nalazištima. Prosječna doživljena starost svih odraslih osoba u uzorku iz Koprivna iznosi 44,4 godine – standardna devijacija (sd) = 13,0 (muškarci u prosjeku dožive 47,1 godinu, a žene 42,2 godine).

Najviše stope mortaliteta kod žena pojavljuju se između 31. i 35. te između 56. i 60. godine, kada umire 15,1% žena (5/33), dok je kod muškaraca najveća smrtnost između 51. i 55. godine, kada umire 25,9% muškaraca (7/27). Četiri su žene doživjele više od 60 godina (12,1%), dok nijedan muškarac u uzorku iz Koprivna nije doživio toliku starost.

Prosječna doživljena starost svih odraslih osoba u kompozitnome uzorku iz kontinentalne Hrvatske iznosi 33,1 godinu (sd = 11,6) (muškarci u prosjeku dožive 34,8 godina, a žene 31,4 godine).

U kompozitnome kasnosrednjovjekovnom/novovjekovnom uzorku iz kontinentalne Hrvatske najviša stopa mortaliteta kod žena pojavljuje se između 21. i 25. godine, kada umire čak 31,8% žena (14/44), dok je kod muškaraca najveća smrtnost između 31. i 35. godine, kada umire 25,5% muškaraca (12/47). Po dvije su osobe obaju spolova doživjele više od 60 godina (4,5% žena i 4,2% muškaraca).

Značajna je razlika između dvaju analiziranih uzoraka u prosječnoj doživljenoj starosti. Razlika između dvaju uzoraka iznosi više od jedanaest godina: u Koprivnu prosječna doživljena starost iznosi 44,4 godine, a u kompozitnome uzorku 33,1 godinu i statistički je značajna (χ^2 = 25,87; P = 0,00). Prosječna doživljena starost muškaraca također se jako razlikuje (u Koprivnu muškarci dožive 47,1 godinu, a u kompozitnome uzorku samo 34,8 godina) i ta je razlika statistički značajna (χ^2 = 21,14; P = 0,00). Statistički značajna razlika prisutna je i kod prosječne doživljene starosti žena (u Koprivnu 42,2 godine, a u kompozitnome uzorku 31,4 godine) i iznosi χ^2 = 9,54; P < 0,05.

Učestalost alveolarnih oboljenja u uzorku iz Koprivna i kompozitnome uzorku iz kontinentalne

ation is somewhat different: here subadults account for slightly over a third of the total analysed population (37.2%). This difference is statistically significant (χ^2 = 12.82; P < 0.01).

Viewed from today's perspective, subadult mortality in Koprivno appears shockingly high – over half of the Koprivno sample consists of individuals who were not older than fifteen years. Such a high percentage of subadults in the overall sample is probably the result of ignorance of microscopic organisms and the potential threats from bacteria and viruses, and the absence of antibiotics.

In pre-industrial populations subadult mortality was always highest in the youngest age category. In some populations, subadults less than one year old account for over 34% of the entire sample (Coale & Demeny 1966; Acsádi & Nemeskéri 1970). In the Koprivno sample, the situation is slightly different. The highest subadult mortality was recorded in the period between two and five years of age, and it is 33/146 or 22.6% of the entire sample, and 33/86 or 38.4% of the total number of subadults in the sample. The second highest rate of subadult mortality was recorded from the immediate post-natal period until the age of one, and it is 19.9% of the entire sample (29/146), or 33.7% of the subadult sample (29/86). In the comparative sample from continental Croatia, the under-representation of subadults (particularly those from the youngest age group) is still apparent. In this sample, the mortality of subadults between birth and one year of age and between ages two and five is identical, at 27.8% of the total number of subadults (15/54) or 10.3% of the entire sample (15/145). These are certainly not the actual ratios, so the question remains: why are subadults in the youngest age group under-represented in both analysed samples?

As to the under-representation of subadults in the youngest age group, a review of the international literature shows that this is a widespread phenomenon. Similar or even more notable under-representation was observed by Acsádi & Nemeskéri (1970), Aner (1971), Kolnik & Stloukal (1974), Wahl (1988), Alesan *et al.* (1999), Kunter (1996), Šlaus (2000) and many other authors. Among the factors contributing to this under-representation, the most oft-mentioned is the differing funeral customs for neonatal deaths and shallower graves for very small children, as well as the chemical composition of the soil (acidity). All of these have unfavourable effects on very fragile subadult bones.

Adult mortality more realistically reflects the conditions and quality of life in the analysed sites. The average life span of adults in the Koprivno sample is 44.4 years – standard deviation (sd) = 13.0 (males on average lived to the age 47.1, while females to 42.2).

Hrvatske prikazana je u tablicama 3 i 4. U obama uzorcima alveolarna su oboljenja iznimno rijetka kod djece: u uzorku iz Koprivna alveolarne bolesti kod djece prisutne su u samo 0,1% svih analiziranih alveola (1/1021), dok u kompozitnome uzorku nije uočen nijedan slučaj alveolarnoga apscesa ili gubitka zuba za života (0/522).

Kod odraslih osoba učestalost alveolarnih oboljenja iznosi 19,9% (314/1574) u Koprivnu (sl. 1) i 14,9% (166/1115) u kompozitnome uzorku. Pri tome je jasno vidljivo znatno povećanje alveolarnih bolesti kod starijih osoba. Kod osoba starih između 16 i 35 godina učestalost alveolarnih bolesti iznosi 0,5% (2/413) u Koprivnu i 8,2% (60/731) u kompozitnome uzorku, a kod osoba starijih od 35 godina ta je učestalost u obama uzorcima identična: 26,9% (312/1161) u Koprivnu i 26,9% (106/394) u kompozitnome uzorku. U obama je uzorcima razlika između "mladih" i "starih" osoba statistički značajna: u Koprivnu iznosi $\chi^2 = 131{,}19$; $P = 0{,}00$, a u kompozitnome uzorku iz kontinentalne Hrvatske $\chi^2 = 69{,}66$; $P = 0{,}00$.

Slika 1. Alveolarni apces praćen aktivnim periostitisom na alveoli pretkutnjaka donje čeljusti, grob 30 (snimio: M. Novak, 2004).

Figure 1. Alveolar abscess accompanied by active periostitis on the premolar alveoli of the mandible, grave 30 (photograph: M. Novak, 2004).

Ukupna učestalost alveolarnih bolesti odraslih osoba u Koprivnu (19,9%) znatno je viša od one u kompozitnome uzorku (14,9%) ($\chi^2 = 11{,}06$; $P < 0{,}01$), što nije iznenađujuće kada se u obzir uzme korelacija između starije životne dobi i veće učestalosti alveolarnih oboljenja te činjenice da osobe u uzorku iz Koprivna prosječno žive znatno dulje od osoba iz

The highest female mortality rate appears between the ages of 31 and 35, and between 56 and 60, when 15.1% of the females died, while among males the highest mortality occurred between the ages of 51 and 55, when 25.9% of the males died (7/27). Four females lived over the age of 60 (12.1%), while not one male from the Koprivno sample reached this age.

The average life span of all adults in the composite sample from continental Croatia is 33.1 years (sd = 11.6) (males on average reached the age of 34.8, and females 31.4).

In the composite late medieval/early modern sample from continental Croatia, the highest mortality among females appears between the ages of 21 and 25, when as many as 31.8% of the females died (14/44), while among males the highest mortality occurred between the ages of 31 and 35, when 25.5% of the males (12/47) died. Two individuals of each sex lived over the age of 60 (4.5% of the females and 4.2% of the males).

There is a considerable difference between the two analysed samples in the average life span. The difference between the two samples is over eleven years: in Koprivno the average life span was 44.4 years, while in the composite sample it was 33.1 years, and it is statistically significant ($\chi^2 = 25.87$; $P = 0.00$). The average life span of males also differ greatly (in Koprivno males lived an age of 47.1 years, while in the composite sample they only lived to 34.8 years) and this difference is statistically significant ($\chi^2 = 21.14$; $P = 0.00$). A statistically significant difference is also present in the average life span of females (42.2 years in Koprivno, and 31.4 years in the composite sample) and it is $\chi^2 = 9.54$; $P < 0.05$.

The frequency of alveolar bone disease in the Koprivno sample and the composite sample from continental Croatia is shown in Tables 3 and 4. In both samples, alveolar bone disease was exceptionally rare among subadults: in the Koprivno sample, alveolar bone disease among subadults is present in only 0.1% of all analysed alveoli (1/1021), while in the composite sample not one case of alveolar abscess or ante-mortem tooth loss (0/522) was noted.

Among adults, the frequency of alveolar bone disease is 19.9% (314/1574) in Koprivno (Fig. 1) and 14.9% (166/1115) in the composite sample. Here a considerable increase in alveolar bone disease among older individuals is clearly visible. For individuals aged 16 to 35, the frequency of alveolar bone disease is 0.5% (2/413) in Koprivno and 8.2% (60/731) in the composite sample, while for individuals over 35 years of age this frequency in both samples is identical: 26.9% (312/1161) in Koprivno and 26.9% (106/394) in the composite sample. In both samples the difference between "young" and "old" in-

kompozitnoga uzorka. Zbog činjenice da i muškarci i žene iz Koprivna žive značajno dulje od muškaraca i žena iz kompozitnoga uzorka, kod obaju spolova iz Koprivna veća je učestalost alveolarnih bolesti u odnosu na muškarce i žene iz kompozitnoga uzorka. Kod žena iz Koprivna značajno je veća učestalost alveolarnih oboljenja: 21,9% (192/875) prema 14,0% (67/478) u kompozitnome uzorku (χ^2 = 12,04; P < 0,01). Muškarci iz Koprivna također češće pate od alveolarnih oboljenja nego muškarci iz kompozitnoga uzorka, ali ta razlika nije statistički značajna.

Učestalost karijesa u uzorku iz Koprivna i u kompozitnome uzorku iz kontinentalne Hrvatske prikazana je u tablicama 5 i 6. Učestalost karijesa kod djece (riječ je o mliječnim i trajnim zubima) u uzorku iz Koprivna vrlo je niska i iznosi samo 0,9% (7/737), dok je u kompozitnome uzorku mnogo viša i iznosi čak 7,4% (36/485), što je statistički značajno (χ^2 = 34,22; P = 0,00). Kod odraslih osoba ta učestalost iznosi 8,7% (88/1016) u Koprivnu i 10,0% (91/910) u kompozitnome uzorku. Pri tome se kod starijih osoba ponovno znatno povećava učestalost bolesti. Kod osoba starih između 16 i 35 godina učestalost karijesa u dvama uzorcima dosta se razlikuje: u Koprivnu iznosi 2,1% (7/338), dok u kompozitnome uzorku iznosi 7,7% (52/678). Kod osoba starijih od 35 godina učestalost karijesa iznosi 11,9% (81/678) u Koprivnu i 16,8% (39/232) u kompozitnome uzorku. U obama je uzorcima razlika u učestalosti karijesa kod osoba mlađih i starijih od 35 godina statistički značajna: u Koprivnu iznosi χ^2 = 26,57; P < 0,01, a u kompozitnome uzorku iz kontinentalne Hrvatske χ^2 = 15,05; P < 0,01.

Ukupna učestalost karijesa kod odraslih osoba u Koprivnu (8,7%) nešto je niža od one u kompozitnom uzorku (10,0%). Uzimajući u obzir statističku činjenicu da su stanovnici Koprivna živjeli znatno dulje od stanovnika iz kompozitnoga uzorka te da je u obama uzorcima učestalost karijesa u jasnoj korelaciji s višom životnom dobi, uočenu je distribuciju najlogičnije tumačiti načinom prehrane: stanovnici iz kompozitnoga uzorka više su se hranili namirnicama koje pogoduju nastanku karijesa (npr. žitaricama), dok su se stanovnici Koprivna više hranili namirnicama u kojima prevladavaju bjelančevine (npr. mesom).

Naime učestalost i distribucija karijesa u nekome arheološkom nalazištu usko je povezana s načinom i vrstom prehrane. Tako je niska učestalost karijesa zabilježena u populacijama čija se prehrana bazirala na lovu i prikupljanju divljih plodova, dok je visoka učestalost uočena kod populacija koje su se bavile poljoprivredom.

Analiza uzorka iz Koprivna pokazuje razliku u učestalosti karijesa između muškaraca i žena: žene iz

dividuals is statistically significant: in Koprivno it is χ^2 = 131.19; P = 0.00, while in the composite sample from continental Croatia it is χ^2 = 69.66; P = 0.00.

The overall frequency of alveolar bone disease among adults in Koprivno (19.9%) is considerably higher than in the composite sample (14.9%) (χ^2 = 11.06; P < 0.01), which is not surprising when one takes into consideration the correlation between older ages and the higher frequency of alveolar bone disease and the fact that the individuals in the Koprivno sample lived longer on average than individuals from the composite sample. Due to the fact that both males and females from Koprivno lived considerably longer than the males and females in the composite sample, there was a higher frequency of alveolar bone disease among both sexes in Koprivno than among males and females in the composite sample. The frequency of alveolar bone disease among the females from Koprivno is considerably higher: 21.9% (192/875) compared to 14.0% (67/478) in the composite sample (χ^2 = 12.04; P < 0.01). Males from Koprivno also suffered from alveolar bone disease more often than males from the composite sample, but the difference is not statistically significant.

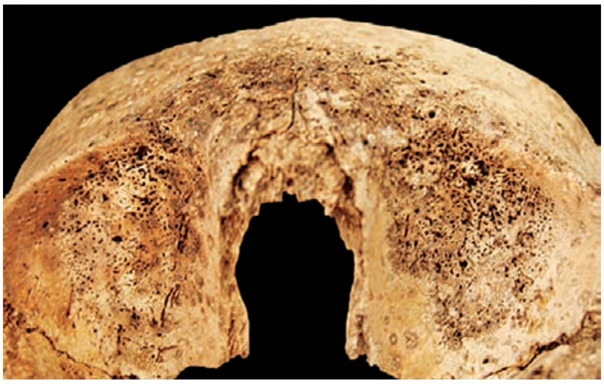
The frequency of dental caries in the Koprivno sample and in the composite sample from continental Croatia is shown in Tables 5 and 6. The frequency of caries among subadults (these are deciduous and permanent teeth) in the Koprivno sample is very low, only 0.9% (7/737), while in the composite sample it is much higher at 7.4% (36/485), which is statistically significant (χ^2 = 34.22; P = 0.00). Among adults this frequency is 8.7% (88/1016) in Koprivno and 10.0% (91/910) in the composite sample. Here the frequency of disease once more increases considerably among older individuals. Among individuals aged 16 to 35 years, the frequency of caries differs considerably: in Koprivno it is 2.1% (7/338), while in the composite sample it is 7.7% (52/678). Among individuals over 35 years of age, the frequency of caries is 11.9% (81/678) in Koprivno and 16.8% (39/232) in the composite sample. In both samples the difference in the frequency of dental caries among individuals both under and over 35 years of age is statistically significant: in Koprivno it is χ^2 = 26.57; P < 0.01, while in the composite sample from continental Croatia it is χ^2 = 15.05; P < 0.01.

The overall frequency of caries among adults in Koprivno (8.7%) is somewhat lower than among those in the composite sample (10.0%). Taking into consideration the statistical fact that the inhabitants of Koprivno lived considerably longer than the inhabitants from the composite sample and that in both samples the frequency of caries clearly corre-

Koprivna češće obolijevaju od karijesa nego muškarci.

Učestalost hipoplazije zubne cakline (HZC) za oba uzorka (djeca + odrasli) prikazana je u tablicama 7 i 8. Učestalost je nešto veća u uzorku iz Koprivna u kojemu je hipoplazija zubne cakline uočena na više od polovice analiziranih zuba (55,8% ili 87/156). U kompozitnome uzorku iz kontinentalne Hrvatske hipoplastični su defekti prisutni na nešto više od jedne trećine analiziranih zuba (93/244 ili 38,1%). Razlika je statistički značajna (χ^2 = 11,28; P < 0,01). U obama uzorcima hipoplazija zubne cakline najčešće je evidentirana na očnjacima donje čeljusti.

Učestalost *cribra orbitalia* prikazana je u tablicama 9 i 10. U uzorku iz Koprivna *cribra orbitalia* uočena je na 42 od 128 lubanja (32,8%) s barem jednom dobro uščuvanom orbitom. Ukupna učestalost kod djece iznosi 43,2% (32/74). Kod tri djeteta uočena je *cribra orbitalia* u aktivnome stanju (sl. 2), što je gotovo jedna desetina od svih uočenih slučajeva ove patologije kod djece (9,4% ili 3/32). Kod odraslih osoba učestalost je mnogo manja i iznosi 18,5% (10/54). Ta je razlika statistički značajna: χ^2 = 7,57; P < 0,01.



Slika 2. Umjerena aktivna cribra orbitalia*, grob 24 (snimio: M. Novak, 2004).*

Figure 2. Moderate active cribra orbitalia*, grave 24 (photograph: M. Novak, 2004).*

Ukupna učestalost ove patologije u kompozitnome uzorku iznosi 40,2% (39/97). Učestalost kod djece (56,1%) nešto je veća nego u Koprivnu, ali razlika nije statistički značajna. Aktivna *cribra orbitalia* prisutna je kod čak 56,5% (13/23) uočenih slučajeva te patologije kod djece. Učestalost te patološke promjene kod odraslih osoba od 28,6% (16/56) manja je od one evidentirane kod djece i ta je razlika statistički značajna (χ^2 = 6,36; P < 0,05).

Analiza *cribra orbitalia* u proučavanim uzorcima pokazuje jednu, ali zato bitnu razliku. Naime dok je njezina učestalost kod djece i odraslih osoba vrlo slična, učestalost *aktivnoga* oblika ove patologije kod djece bitno je različita. U kompozitnome uzorku *cribra orbitalia* evidentirana je u aktivnome sta-

lates to higher ages, the observed distribution can most logically be explained by the diet: the individuals from the composite sample ate more foods that were conducive to caries (e.g. grains), while the individuals of Koprivno ate more foods in which proteins predominated (e.g. meat).

The frequency and distribution of caries at an archaeological site is closely tied to the manner and type of diet. Thus, a low frequency of dental caries was recorded in populations with diets based on hunting and gathering of wild produce, while a high frequency was observed among populations that engaged in agriculture.

An analysis of the samples from Koprivno shows a difference in the frequency of caries between males and females: females from Koprivno suffered from caries more frequently than males.

The frequency of dental enamel hypoplasia (DEH) in both samples (subadults + adults) is shown in Tables 7 and 8. The frequency is somewhat greater in the sample from Koprivno in which dental enamel hypoplasia was observed in over half of the analysed teeth (55.8% or 87/156). In the composite sample from continental Croatia, hypoplastic defects were present in a little over a third of the analysed teeth (93/244 or 38.1%). The difference is statistically significant (χ^2 = 11.28; P < 0.01). In both samples dental enamel hypoplasia is most often recorded on the mandibular canines.

The frequency of *cribra orbitalia* is shown in Tables 9 and 10. In the sample from Koprivno *cribra orbitalia* was observed in 42 of 128 skulls (32.8%) with a minimum of one well preserved orbit. The overall frequency among subadults is 43.2% (32/74). In three subadults, *cribra orbitalia* in active condition was observed (Fig. 2), which is almost one tenth of all observed cases of this pathology among subadults (9.4% or 3/32). Among adults, the frequency was much lower at 18.5% (10/54). This is a statistically significant difference: χ^2 = 7.57; P < 0.01.

The total frequency of this pathology in the composite sample is 40.2% (39/97). The frequency among subadults (56.1%) is somewhat higher than in Koprivno, but the difference is not statistically significant. Active *cribra orbitalia* is present among 56.5% (13/23) of the observed cases among subadults. The frequency of this pathological change among adults is 28.6% (16/56), less than that recorded among subadults and the difference is statistically significant (χ^2 = 6.36; P < 0.05).

An analysis of *cribra orbitalia* in the studied samples indicates one, albeit very important, difference. Namely, while its frequency among subadults and adults is very similar, the frequency of the *active*

nju u 56,5% (13/23) slučajeva, dok su u uzorku iz Koprivna uočena samo tri slučaja aktivnoga oblika (9,4% ili 3/32). Razlika je statistički značajna (χ^2 = 12,22; P < 0,01).

Učestalost periostitisa u obama analiziranim uzorcima prikazana je u tablicama 11 i 12. Učestalost periostitisa kod djece u Koprivnu izrazito je visoka: na čak 79,7% (59/74) dobro uščuvanih dječjih kostura vidi se prisutnost periostitisa, od čega je više od jedne trećine (33,9%) u aktivnome stanju. U komparativnome uzorku učestalost periostitisa kod djece još je viša od one u Koprivnu i iznosi vrlo visokih 85,7% (24/28), od čega je čak 79,2% u aktivnome stanju. Većina aktivnoga periostitisa pojavljuje se u dobnoj skupini od rođenja do prve godine života i tu je najčešće riječ o jakome, generaliziranome aktivnom periostitisu na kraniju i postkraniju, što bi mogao biti dokaz prisutnosti sistemskih bakterijskih infekcija. Kod djece starije od pet godina najčešće je riječ o zaraslome periostitisu, lokaliziranome u području donjih ekstremiteta, prvenstveno na goljeničnim i lisnim kostima. Kod odraslih osoba u obama uzorcima periostitis se pojavljuje u mnogo manjemu omjeru (četiri slučaja u Koprivnu i pet slučajeva u kompozitnome uzorku) (sl. 3) i najčešće nastaje kao posljedica komplikacija prouzročenih težim traumama (Novak 2004).

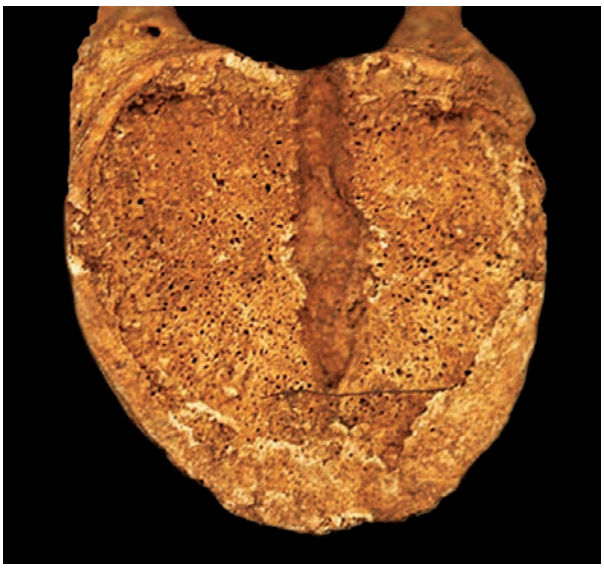
Slika 3. Jaki aktivni periostitis na 7. lijevom rebru, grob 13 (snimila: V. Vyroubal, 2005).

Figure 3. Severe active periostitis on the seventh left rib, grave 13 (photograph: V. Vyroubal, 2005).

Učestalost Schmorlovih defekata u obama analiziranim uzorcima prikazana je u tablicama 13 i 14. Ukupna učestalost Schmorlovih defekata u uzorku iz Koprivna iznosi 24,8% (193/778) (sl. 4), pri čemu su Schmorlovi defekti nešto učestaliji kod odraslih muškaraca nego kod žena. Ukupna učestalost Schmorlovih defekata u kompozitnome uzorku iznosi 21,9% (90/410). Slično kao i u Koprivnu kod muškaraca su Schmorlovi defekti učestaliji nego kod žena (30,0% prema 11,7%), a u ovome slučaju ta je razlika statistički značajna (χ^2 = 18,75; P < 0,01). Analiza dvaju uzoraka pokazuje da su kod muškara-

form of this pathology is essentially different. In the composite sample, *cribra orbitalia* was recorded in active condition in 56.5% (13/23) of the cases, while in the Koprivno sample only three cases of the active form (9.4% or 3/32) were observed. The difference is statistically significant (χ^2 = 12.22; P < 0.01).

The frequency of periostitis in both analysed samples is shown in Tables 11 and 12. The frequency of periostitis among subadults in Koprivno is remarkably high: on as many as 79.7% (59/74) of the well-preserved subadult bones, the presence of periostitis can be seen, of which over a third (33.9%) is in active condition. In the composite sample the frequency of periostitis among subadults is higher than that in Koprivno at a very high 85.7% (24/28), of which 79.2% is in active condition. Most of the active periostitis appears in the age group from birth to the age of one, and this is most often a severe, generalised active periostitis on the cranium and post-cranium, which could be evidence of the presence of systemic bacterial infections. Among subadults over the age of five, healed periostitis is most common, localised in the area of the lower extremities, primarily on the tibia and fibula. Among adults in both samples, periostitis appears in a much lesser ratio (four cases in Koprivno and five cases in the composite sample) (Fig. 3) and it most often appeared as a result of complications caused by severe forms of trauma (Novak 2004).



Slika 4. Schmorlov defekt na 7. prsnom kralješku, grob 58 (snimio: M. Novak, 2004).

Figure 4. Schmorl's node on the seventh thoracic vertebrae, grave 58 (photograph: M. Novak, 2004).

The frequency of Schmorl's nodes in both analysed samples is shown in Tables 13 and 14. The total frequency of Schmorl's nodes in the sample from Kop-

ca iz kompozitnoga uzorka Schmorlovi defekti bili nešto učestaliji nego kod muškaraca iz Koprivna. Kod žena situacija je obrnuta: Schmorlovi su defekti znatno učestaliji kod žena iz Koprivna nego kod žena iz kompozitnoga uzorka (22,2% prema 11,7%). Ta je razlika statistički značajna (χ^2 = 8,65; P < 0,01).

Učestalost osteoartritisa na kralješcima prikazana je u tablicama 15 i 16. Ukupna učestalost osteoartritisa na kralješcima u Koprivnu iznosi 24,7% (267/1082). U analiziranome uzorku osteoartritis se najčešće pojavljuje na slabinskim kralješcima, zatim na prsnima, a najmanje na vratnim kralješcima. Kod muškaraca je osteoartritis na kralješcima znatno učestaliji nego kod žena (30,5% prema 20,8%), što predstavlja statistički značajnu razliku (χ^2 = 12,85; P < 0,01).

Ukupna učestalost osteoartritisa na kralješcima u kompozitnome uzorku iz kontinentalne Hrvatske iznosi 12,1% (72/596), što je znatno manje od onoga u Koprivnu (χ^2 = 37,04; P = 0,000). U ovome uzorku osteoartritis se najčešće pojavljuje na prsnim kralješcima, zatim na vratnima, a najmanje na slabinskim kralješcima. Kod muškaraca ukupna je učestalost osteoartritisa na kralješcima znatno viša nego kod žena (16,3% prema 7,0%; χ^2 = 10,97; P < 0,01).

Učestalost osteoartritisa na velikim zglobovima prikazana je u tablicama 17 i 18. U uzorku iz Koprivna osteoartritis je kod žena najčešće evidentiran u ramenu i koljenu, zatim slijedi kuk i na kraju lakat. Kod muškaraca osteoartritis je najčešći u koljenu, zatim u ramenu te na laktu i kuku. Nešto drugačija distribucija uočena je u kompozitnome uzorku: osteoartritis je kod žena najčešće evidentiran na laktu i ramenu te nešto manje u koljenu i kuku, dok je kod muškaraca osteoartritis podjednako čest na laktu i kuku, a slijede rame i koljeno. Ukupna učestalost kod žena i muškaraca znatno se razlikuje u analiziranim uzorcima. Kod žena iz Koprivna osteoartritis je uočen na 31,1% analiziranih zglobnih ploština, dok je kod žena iz kompozitnoga uzorka evidentiran na samo 12,5% analiziranih zglobnih ploština. Razlika je statistički značajna (χ^2 = 10,13; P < 0,01). Statistički značajne razlike ustanovljene su i kod muškaraca: osteoartritis je evidentiran na 48,1% analiziranih zglobnih ploština muškaraca iz Koprivna i na samo 26,2% zglobnih ploština muškaraca iz kompozitnoga uzorka (χ^2 = 11,69; P < 0,01).

U uzorku iz Koprivna uočen je i veći broj kranijalnih i postkranijalnih trauma. Traume su ustanovljene kod 11 osoba (kod jednoga djeteta, triju žena i sedam muškaraca), a ukupan broj trauma iznosi 19. Kod šest osoba evidentirana je jedna trauma, dvije traume uočene su kod dviju osoba, a tri traume prisutne su kod triju osoba. Broj osoba koje imaju više

rivno is 24.8% (193/778) (Fig. 4), wherein Schmorl's nodes are slightly more frequent among adult males than females. The overall frequency of Schmorl's nodes in the composite sample is 21.9% (90/410). In a manner similar to that observed in Koprivno, Schmorl's nodes are more frequent among males than females (30.0% in comparison to 11.7%), and in this case the difference is statistically significant (χ^2 = 18.75; P < 0.01). An analysis of the two samples shows that among males from the composite sample, Schmorl's nodes are slightly more frequent than among males from Koprivno. Among females, the situation is just the opposite: Schmorl's nodes are more frequent among females from Koprivno than among females from the composite sample (22.2% in comparison to 11.7%). This difference is statistically significant (χ^2 = 8.65; P < 0.01).

The frequency of osteoarthritis is shown in Tables 15 and 16. The overall frequency of osteoarthritis on the vertebrae in Koprivno is 24.7% (267/1082). In the analysed sample, osteoarthritis most often appears in the lumbar vertebrae, and then on the thoracic and the least on the cervical vertebrae. Among males, osteoarthritis on the vertebrae is considerably more frequent than among females (30.5% in comparison to 20.8%), which is a statistically significant difference (χ^2 = 12.85; P < 0.01).

The total frequency of osteoarthritis on the vertebrae in the composite sample from continental Croatia is 12.1% (72/596), which is considerably less than in Koprivno (χ^2 = 37.04; P = 0.000). In this sample, osteoarthritis most often appears on the thoracic vertebrae, and then on the cervical and the least on the lumbar vertebrae. Among males, the total frequency of osteoarthritis on the vertebrae is considerably less than among females (16.3% in comparison to 7.0%; χ^2 = 10.97; P < 0.01).

The frequency of osteoarthritis on the major joints is shown in Tables 17 and 18. In the sample from Koprivno, osteoarthritis among females is most often recorded in the shoulders and knees, followed by the hips and then elbows. Among males, osteoarthritis most often appears in the knees, followed by the shoulders and then the elbows and hips. A somewhat different distribution was observed in the composite sample: osteoarthritis among females was most frequently recorded on the elbows and shoulders and less on the knees and hips, while among males osteoarthritis is equally frequent on the elbows and hips, followed by the shoulders and knees. The overall frequency among females and males differs considerably in the analysed samples. Among females from Koprivno, osteoarthritis was observed on 31.1% of the analysed joint surfaces, while among females from the composite sample,

od jedne traume u odnosu na ukupan broj osoba s traumama tako iznosi 45,5% (5/11).

Učestalost trauma po analiziranim dugim kostima prikazana je u tablici 19. U toj je tablici evidentirana svaka kost s traumom, bez obzira na to nalazi li se na njoj jedna ili više trauma. Analizirane su 722 kosti koje su podijeljene s obzirom na spol i stranu tijela na kojoj se nalaze. Traume su evidentirane na samo 3 od 722 analizirane kosti (0,4%).

Traume su evidentirane na lakatnim kostima (2/99 ili 2,0%) i na palčanim kostima (1/104 ili 1,0%). Iz tih podataka vidljivo je da se sve traume dugih kostiju u uzorku iz Koprivna nalaze na gornjim ekstremitetima. Iz tablice 19 također se vidi da postoji razlika u učestalosti trauma s obzirom na stranu tijela – ukupna učestalost trauma na lijevoj strani tijela iznosi 0,3%, dok je na desnoj 0,6%, ali razlika zbog izrazito maloga broja trauma nije statistički značajna. Dodatna analiza po spolu također pokazuje razliku u učestalosti trauma na dugim kostima: kod muškaraca traume su prisutne na samo 0,3% (1/318) analiziranih dugih kostiju, dok su kod žena prisutne na 0,5% (2/404) analiziranih kostiju, ali razlika nije, kao ni u prethodnome slučaju, statistički značajna zbog izrazito maloga broja trauma.

Usporedba učestalosti trauma u Koprivnu s drugim arheološkim populacijama iz Hrvatske i svijeta prikazana je u tablici 20. Iz te tablice jasno se vidi da se po učestalosti trauma na dugim kostima uzorak iz Koprivna izdvaja od drugih analiziranih uzoraka. Višu ukupnu učestalost trauma od uzorka iz Koprivna imaju svi analizirani uzorci: kompozitni kasnosrednjovjekovni/novovjekovni uzorak iz kontinentalne Hrvatske, kompozitni srednjovjekovni uzorak iz Crkvara i Kliškovca, prapovijesni indijanski uzorak s nalazišta SCl-038 u Kaliforniji (SAD) i srednjovjekovni uzorak s nalazišta Raunds (Velika Britanija). Kompozitni uzorak iz kontinentalne Hrvatske donekle je sličan uzorku iz Koprivna, ali samo zbog činjenice da ima relativno nisku učestalost trauma dugih kostiju (1,7% ili 7/416). Ipak, između tih dvaju uzoraka jedna je bitna razlika: u Koprivnu se sve traume dugih kostiju pojavljuju na gornjim ekstremitetima, dok se u kompozitnome uzorku sve uočene traume nalaze na donjim ekstremitetima. Po rasporedu trauma na dugim kostima uzorku iz Koprivna najsličniji je uzorak s nalazišta SCl-038 u SAD-u gdje se, kao i u Koprivnu, najviše trauma pojavljuje na lakatnim (6,9%) i palčanim (3,7%) kostima, a učestalost trauma donjih ekstremiteta zanemarivo je niska i iznosi samo 1,0%. Usprkos tim sličnostima može se zaključiti da uzorak iz Koprivna po učestalosti i distribuciji trauma na dugim kostima znatno odskače od ostalih analiziranih osteoloških uzoraka.

it was recorded on only 12.5% of the analysed joint surfaces. The difference is statistically significant (χ^2 = 10.13; P < 0.01). A statistical significance in the differences was also observed among the males: osteoarthritis was recorded on 48.1% of the analysed joint surfaces of males from Koprivno and on only 26.2% of the joint surfaces of males from the composite sample (χ^2 = 11.69; P < 0.01).

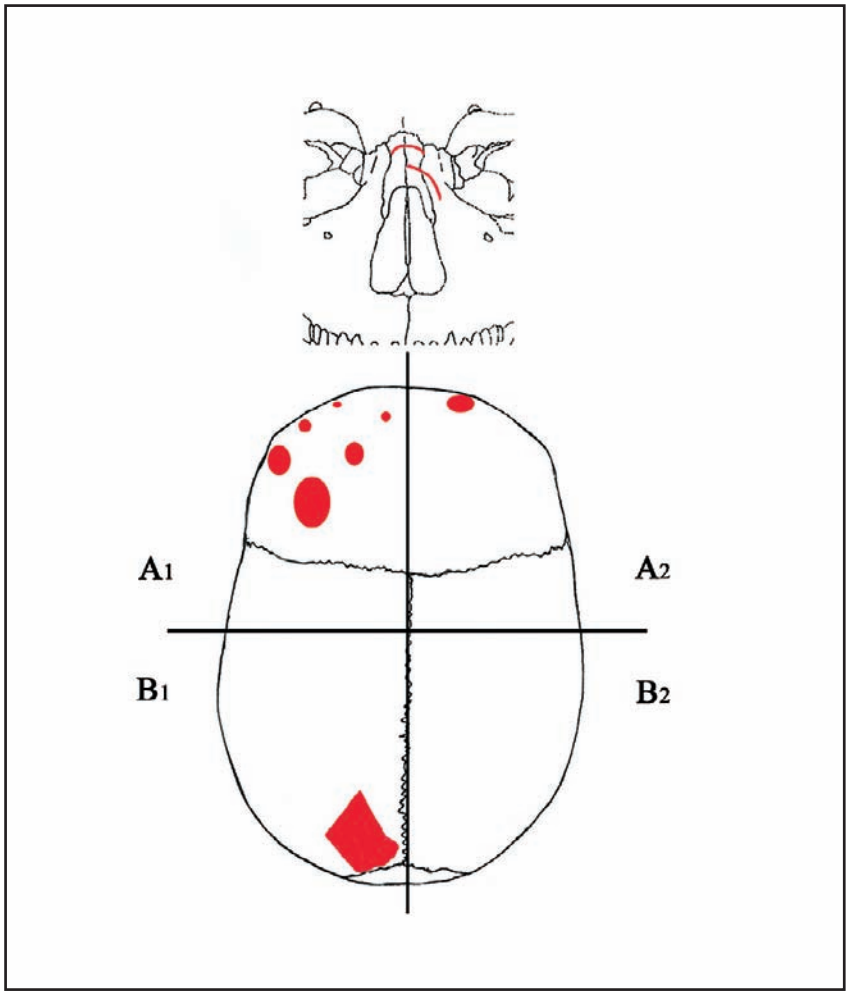
A larger number of cranial and post-cranial traumas were observed in the Koprivno sample. Traumas were ascertained among 11 individuals (in one subadult, three females and seven males), while the total number of traumas is 19. A single trauma was recorded on six individuals, two traumas on two individuals, and three traumas were present on three individuals. The number of individuals with more than one trauma is comparison to the total number of individuals with trauma is thus 45.5% (5/11).

The frequency of traumas among the analysed long bones is shown in Table 19. This table shows each bone with trauma, regardless of whether or not there is more than one trauma on it. A total of 722 bones were analysed, which were classified based on sex and the part of the body from which they came. Traumas were recorded on only 3 of the 722 analysed bones (0.4%).

Traumas were recorded on the ulna (2/99 or 2.0%) and radius (1/104 or 1.0%). These data show that all long-bone traumas in the Koprivno sample appear on the upper extremities. Table 19 also shows that there is a difference in the frequency of trauma with regard to the side of the body – the overall frequency of trauma on the left side is 0.3%, while on right it is 0.6%, but the difference, due to the exceptionally small number of traumas, is not statistically significant. Additional analysis based on sex also indicates a difference in the frequency of trauma on other bones: among males trauma is only present on 0.3% (1/318) of the analysed long bones, while among females it is present on 0.5% (2/404) of the analysed bones, but the difference, as in the preceding case, is not statistically significant due to the exceptionally small number.

A comparison of the frequency of trauma in Koprivno with other archaeological populations from Croatia and the world is presented in Table 20. This table clearly shows that in terms of frequency of long-bone traumas, the Koprivno sample stands apart from the other analysed samples. All other analysed samples exhibit a higher overall frequency of traumas than the Koprivno sample: the composite late medieval/early modern sample from continental Croatia, the composite medieval sample from Crkvari and Kliškovac, the prehistoric Native American sample from site SCl-038 in California

Osim trauma dugih kostiju u uzorku iz Koprivna ustanovljene su i traume glave i lica. Kranijalne traume uočene su kod devet osoba (kod šest muškaraca, dviju žena i jednoga djeteta). Učestalost kranijalnih trauma kod odraslih osoba u analiziranome uzorku vrlo je visoka, pa čak 8 od 45 (17,8%) dobro uščuvanih lubanja odraslih osoba ima neku vrstu traume. Traume glave i lica mnogo su češće kod muškaraca (6/19 ili 31,6%) nego kod žena (2/26 ili 7,7%). Na osam je lubanja po jedna trauma, dok su na jednoj lubanji dvije traume. Većina uočenih trauma svoda lubanje nalazi se na čeonoj kosti (sedam fraktura), a jedna je fraktura na lijevoj tjemenoj kosti. Traume lica evidentirane su na dvjema lubanjama, a u obama slučajevima riječ je o transverzalnim frakturama nosnih kostiju. Velika većina (75%) trauma svoda lubanje nalazi se na lijevoj čeonoj kosti (kvadrant A1) (sl. 5). Takav raspored sugerira da je riječ o traumama koje su posljedica nasilja, ali s obzirom na njihovu veličinu i oblik te su nasilne situacije bile slabijega obujma i intenziteta.



Slika 5. Shematski prikaz položaja trauma na lubanji i licu u analiziranome uzorku (snimio: M. Novak, 2007).

Figure 5. Schematic view of locations of cranial and facial traumas in the analysed sample (photograph: M. Novak, 2007).

(USA) and the medieval sample from the Raunds site (Great Britain). The composite sample from continental Croatia is somewhat similar to the Koprivno sample, but only because of the relatively low frequency of long-bone traumas (1.7% or 7/416). Nonetheless, there is one essential difference between the two samples: in Koprivno all long-bone traumas appear on the upper extremities, while in the composite sample all traumas were observed on the lower extremities. Based on the distribution of long-bone traumas, the Koprivno sample is most similar to the sample from site SCl-038 in the United States where, as in Koprivno, the most traumas appeared on the ulnar (6.9%) and radial (3.7%) bones, while the frequency of traumas on the lower extremities is negligibly low at only 1.0%. Despite these similarities, one can conclude that the Koprivno sample deviates considerably from the other analysed osteological samples in terms of frequency and distribution of traumas.

Besides long-bone traumas, cranial and facial traumas were also ascertained in the Koprivno sample. Cranial traumas were observed in nine individuals (six males, two females and one subadult). The frequency of cranial traumas among adults in the analysed sample is very high, so that 8 of the 45 (17.8%) well preserved adult skulls exhibit some form of trauma. Cranial and facial traumas are much more frequent among males (6/19 or 31.6%) than among females (2/26 or 7.7%). Eight skulls had one trauma each, while one skull exhibited two traumas. Most of the observed traumas on the cranium were on the cranial vault (seven fractures), while one fracture was on the left temporal bone. Facial traumas were recorded on two skulls, and both cases are transversal fractures of the nasal bones. A great majority (75%) of cranial traumas were located on the left frontal bone (quadrant A1) (Fig. 5). Such a distribution suggests that traumas were a result of violence, but given their size and form, these violent incdents were of lesser extent and intensity.

Out of all cranial traumas from the Koprivno sample, the most remarkable is the trauma to the left

Slika 6. Masivna penetrirajuća fraktura lijeve tjemene kosti, grob 66 (snimio: M. Novak, 2004).

Figure 6. Massive penetrative fracture of the left parietal bone, grave 66 (photograph: M. Novak, 2004).

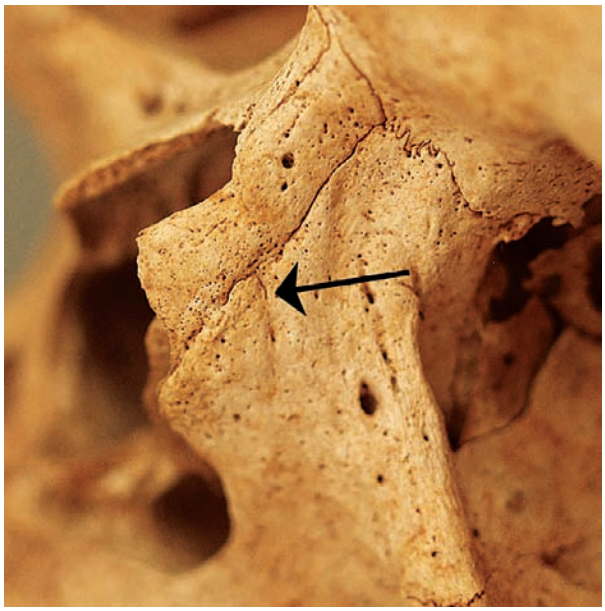
Od svih kranijalnih trauma u uzorku iz Koprivna najupečatljivija je trauma lijeve tjemene kosti muškarca starog između 56 i 60 godina iz groba 66 (sl. 6). Riječ je o staroj zarasloj penetrirajućoj frakturi nepravilnoga četvrtastog oblika veličine 51 × 41 mm nanesenoj najvjerojatnije teškim tupotvrdim oružjem ili oruđem. Svod lubanje na lateralnome je rubu frakture probijen, ali nema znakova infekcije. Rubovi su glatki i remodelirani, što svjedoči o tome da je osoba preživjela traumu, a lokacija i veličina defekta pouzdano sugeriraju teška neurološka oštećenja.

Kada je riječ o traumama, posebno se izdvaja slučaj muškarca staroga između 46 i 50 godina iz groba 5. Kod te su osobe uočene tri frakture: transverzalna fraktura lijeve nosne kosti (sl. 7), fraktura lijeve lakatne kosti i fraktura 11. desnog rebra. Osim trauma uočen je i gubitak svih sjekutića gornje čeljusti za života, dok su svi ostali zubi na broju. Raspored i izgled trauma (izbijeni zubi, slomljen nos i lom lakatne kosti) sugeriraju da je analizirana osoba barem jednom tijekom svoga života sudjelovala u nasilnoj situaciji gdje je zadobila višestruke frakture.

Od trauma sitnih kostiju najbrojnije su frakture rebara, a uočena je i jedna fraktura metakarpalne kosti lijevoga stopala.

Rasprava

Analiza ljudskoga osteološkog materijala iz Koprivna prvo je bioarheološko istraživanje novovjekovnih



Slika 7. Transverzalna fraktura lijeve nosne kosti, grob 5 (snimila: V. Vyroubal, 2005).

Figure 7. Transversal fracture of the left nasal bone, grave 5 (photograph: V. Vyroubal, 2005).

parietal bone of a male aged 56 to 60 from grave 66 (Fig. 6). This is an old, healed penetrative fracture of irregular rectangular form with dimensions of 51 × 41 mm, probably inflicted by a hard, blunt weapon or tool. The cranium was punctured on the lateral edge of the fracture, but there are no signs of infection. The edges are smooth and remodelled, which indicates that this individual survived the injury, while the location and size of the defect certainly indicate severe neurological damage.

When speaking of trauma, the case of a male aged 46 to 50 from grave 5 stands out in particular. Three fractures were observed on this individual: a transversal fracture of the left nasal bone (Fig. 7), a fracture of the left ulna and a fracture of the eleventh right rib. Besides these injuries, the loss of all maxillary incisors during his lifetime was also observed. The distribution and appearance of these traumas (lost teeth, broken nose and fractured ulna) suggest that this individual had participated in a minimum of one violent situation in his life in which multiple fractures were incurred.

Among the small-bone traumas, the most frequent are fractured ribs, and one fracture of a metatarsal bone of the left foot was observed.

Discussion

The analysis of human osteological material from Koprivno is the first bioarchaeological research into Early Modern populations from Dalmatia and its hinterland, and as such it offers exceptionally im-

populacija iz Dalmacije i njezina zaleđa i kao takvo pruža iznimno važne podatke o biološkoj povijesti stanovnika toga područja. U ovome trenutku ti podaci predstavljaju sve informacije koje imamo o kvaliteti i uvjetima života u tome dijelu Hrvatske za turske vladavine. Nadajmo se da je ovo tek početak sustavnih antropoloških analiza koje će nam dati preciznije informacije o tome kako su se stanovnici dalmatinskoga zaleđa tijekom novoga vijeka suočavali s različitim izazovima.

Demografske karakteristike uzorka iz Koprivna razlikuju se od demografskih karakteristika drugih, do danas analiziranih, arheoloških nalazišta iz Hrvatske. Bitna razlika između Koprivna i ostalih dosad analiziranih koštanih uzoraka iz Hrvatske izrazito je visok udio djece u odnosu na čitav uzorak. U Koprivnu djeca čine gotovo dvije trećine ukupnoga uzorka (58,9%), dok je u ostalim uzorcima taj udio mnogo niži i kreće se oko jedne trećine ukupne populacije: u kompozitnome kasnosrednjovjekovnom/novovjekovnom uzorku iz kontinentalne Hrvatske udio djece iznosi 37,2%, u kasnosrednjovjekovnome uzorku iz Zagreba – Opatovine 18,9% (Šlaus *et al.* 2007), u kasnoantičkome uzorku iz Štrbinaca 29,2% (Šlaus *et al.* 2004a), u srednjovjekovnome uzorku iz Zagreba – Stenjevca 32,1% (Šlaus 2002a) itd. Razlika u omjeru djece između uzorka iz Koprivna i ostalih analiziranih uzoraka najvjerojatnije je posljedica tafonomije, tj. stupnja uščuvanosti pojedinih uzoraka. U Koprivnu grobovi su načinjeni od kamenih ploča i ukopani u kamenu prapovijesnu gomilu, što je rezultiralo odličnom uščuvanošću kosturnoga uzorka. Za razliku od Koprivna skeletni uzorci iz kontinentalne Hrvatske mnogo su lošije uščuvani zbog nepovoljnoga kemijskog sastava tla (kiselosti), podzemnih voda, intenzivne obrade zemlje i višestrukoga ukapanja na malome prostoru koje je dosta oštetilo kosture iz ranijih faza, naročito kosti male djece jer su izrazito krhke.

Značajne su i razlike u prosječnoj doživljenoj starosti, kako na razini čitavoga uzorka tako i zasebno za žene i muškarce iz Koprivna. Stanovnici Koprivna u prosjeku su živjeli znatno dulje od svojih susjeda iz kontinentalne Hrvatske – 11,3 godine na razini čitavoga uzorka: žene 10,8 godina, a muškarci čak 12,3 godine. Te se razlike reflektiraju i u različitim razdobljima najvećega rizika, pa je tako najveća smrtnost žena u kompozitnom uzorku zabilježena između 21. i 25. godine, dok je najveća smrtnost žena u Koprivnu zabilježena između 31. i 35. te između 56. i 60. godine. Slična je situacija i kod muškaraca: u Koprivnu najveća je smrtnost muškaraca zabilježena između 51. i 55. godine, a u kompozitnome uzorku između 31. i 35. godine života.

Uočene demografske razlike između uzorka iz Koprivna i kompozitnoga uzorka moglo je uzrokovati

portant data on the biological history of the population of this region. At this moment, these data represent the sum of all information that we have on the quality and conditions of life in this part of Croatia during Ottoman rule. We hope that this is only the beginning of systematic anthropological analysis that will generate precise information on how the inhabitants of the Dalmatian hinterland confronted various challenges during the Early Modern period.

The demographic characteristics of the Koprivno sample differ from the demographic characteristics of other so far analysed archaeological sites in Croatia. An essential difference between Koprivno and the other analysed bone samples from Croatia is the exceptionally high share of subadults in comparison to the entire sample. In Koprivno subadults account for almost two thirds of the total sample (58.9%), while in the remaining samples this share is much lower and stands at roughly one third of the total population: in the composite late medieval/early modern sample from continental Croatia, the share of subadults is 37.2%, while in the late medieval sample from Zagreb – Opatovina it is 18.9% (Šlaus *et al.* in press), in the Late Antique sample from Štrbinci it is 29.2% (Šlaus *et al.* 2004a), in the medieval sample from Zagreb – Stenjevec it is 32.1% (Šlaus 2002a), etc. The difference in the ratio of subadults between the Koprivno sample and the remaining analysed samples is probably a result of taphonomy, i.e. the degree of preservation of individual samples. In Koprivno, the graves were made of stone slabs and interred in a prehistoric stone mound, which resulted in excellent preservation of the skeletal sample. In contrast to Koprivno, the skeletal samples from continental Croatia were much more poorly preserved due to the unfavourable chemical composition of the soil (acidity), ground water, intense land cultivation and multiple interments over a small surface which considerably damaged the skeletons from earlier phases, especially the bones of small children, as they are exceptionally fragile.

The differences in average life span are also considerable, both at the level of the entire sample and separately for females and males from Koprivno. On average, the inhabitants of Koprivno lived considerably longer than their neighbours from continental Croatia – 11.3 years at the level of the entire sample: females 10.8 years, and males as long as 12.3 years. These differences are also reflected in different periods of greatest risk, so that the highest mortality of females in the composite sample was recorded between the ages of 21 and 25, while the highest mortality of females in Koprivno was recorded between

nekoliko čimbenika. Pri tome se, dakako, ne smije zanemariti činjenica da su oba analizirana uzorka relativno mala, pa su zato moguće slučajne varijacije. Najvjerojatniji uzrok uočenih demografskih razlika nešto su bolji uvjeti života tijekom novoga vijeka u dalmatinskome zaleđu u odnosu na kontinentalnu Hrvatsku. Slični podaci uočeni su na nalazištu Ličtani u Hercegovini gdje su uvjeti života, s obzirom na rezultate sustavnih bioarheoloških istraživanja, zasigurno bili bolji u odnosu na uzorak iz kontinentalne Hrvatske tijekom kasnoga srednjeg vijeka (Šlaus, neobjavljeni podaci).

Demografske razlike utjecale su i na različitu učestalost nekih patoloških promjena. Tako je jasna korelacija između starije životne dobi i veće učestalosti alveolarnih bolesti glavni razlog značajno veće učestalosti alveolarnih bolesti u uzorku iz Koprivna u odnosu na kompozitni uzorak.

U tom je kontekstu neočekivana niža ukupna učestalost karijesa u Koprivnom u odnosu na kompozitni uzorak i to može sugerirati različitu vrstu prehrane u tim dvama uzorcima. Naime niska učestalost karijesa evidentirana je u populacijama čija se prehrana uglavnom bazirala na lovu, dok je visoka učestalost uočena kod populacija koje su ovisile o poljoprivredi (Armelagos 1969; Toth 1970; Wells 1975; Larsen *et al.* 1991; O'Sullivan *et al.* 1993; Fujita 1995). Razlog je što u prehrani populacija koje ovise o poljoprivredi postoji veći udio ugljikohidrata: škrob i šećer koji se nalaze u žitu, kukuruzu i drugim kulturama uzgajanima na arheološkim nalazištima sadrže od 45% do 80% ukupnih kalorija u prehrani predindustrijskih poljoprivrednih populacija (Gutherie 1979). Za razliku od toga prehrana koja je bazirana na lovu sadrži mnogo manje šećera i mnogo više bjelančevina, što smanjuje učestalost karijesa jer sadrži puno manje ugljikohidrata, povisuje pH-vrijednost sline i kraće se zadržava u ustima. S obzirom na geografski smještaj obaju analiziranih uzoraka ta je pretpostavka vrlo vjerojatna jer se prehrana populacije iz kontinentalne Hrvatske najvjerojatnije temeljila većim dijelom na poljoprivredi i ovisila je o uzgojenim biljkama, dok se populacija iz Koprivna zbog nedostatka obradivoga tla bavila primarno stočarstvom i njezina se prehrana bazirala na mesu i životinjskim proizvodima.

Iako postoje razlike između analiziranih populacija, ipak imaju jednu zajedničku karakteristiku dentalnoga zdravlja: ona se očituje u dosta visokoj učestalosti alveolarnih oboljenja i karijesa, što je najvjerojatnije pokazatelj vrlo niske razine oralne higijene.

Cribra orbitalia danas je gotovo svugdje prihvaćena kao osjetljiv i pouzdan osteološki pokazatelj subadultne anemije uzrokovane nedostatkom željeza, koja se razvila zbog neadekvatne prehrane, ende-

the ages of 31 and 35, and between 56 and 60. The situation is similar among males: in Koprivno the highest mortality among males was recorded between the ages of 51 and 55, while in the composite sample it was recorded between the ages of 31 and 35.

The observed demographic differences between the Koprivno sample and the composite sample may have been caused by several factors. Here one should not overlook the fact that both analysed samples are relatively small, so coincidental variations are possible. The most likely cause of the observed demographic differences is the slightly better living conditions in Dalmatia as opposed to continental Croatia during the Early Modern period. Similar data were observed at the Ličtani site in Herzegovina, where living conditions, given the results of systematic bioarchaeological research, were certainly better than in the sample from continental Croatia during the Late Middle Ages (Šlaus, unpublished data).

Demographic differences also influenced differing frequencies of certain pathological changes. Thus the clear correlation between older ages and greater frequency of alveolar bone disease is the principal reason for the considerably greater frequency of alveolar bone disease in the sample from Koprivno in comparison to the composite sample.

In this context, the unexpectedly lower overall frequency of dental caries in Koprivno in comparison to the composite sample may also suggest a different diet in these two samples. Namely, the lower frequencies of caries were recorded in the populations whose diet was generally based on hunting, while the higher frequencies were noted among populations dependent on agriculture (Armelagos 1969; Toth 1970; Wells 1975; Larsen *et al.* 1991; O'Sullivan *et al.* 1993; Fujita 1995). The reason is that populations dependent on agriculture have diets with a higher share of carbohydrates: the starch and sugar found in wheat, maize and other crops cultivated at the archaeological sites contained 45% to 80% of the total calories in the diets of pre-industrial agricultural populations (Gutherie 1979). In contrast, a diet based on hunting contains much less sugar and many more proteins, which reduces the overall frequency of caries because it contains less carbohydrates, raises the pH-value of saliva, which remains in the mouth for a briefer duration. Given the geographic location of both analysed samples, this hypothesis is very probable because the diet of the populations from continental Croatia was probably based largely on agriculture and depended on cultivated plants, while the populations from Koprivno, due to a lack of cultivable soil, was primarily based on livestock breeding and their diets were based on meat and animal products.

mičnoga parazitizma, nehigijenskih uvjeta života ili kroničnih gastrointestinalnih oboljenja (Mittler & van Gerven 1994; Goodman & Martin 2002). Učestalost ove patologije kod djece u obama je uzorcima vrlo slična (otprilike polovica uščuvanih čeonih kostiju u obama uzorcima pokazuje znakove te patološke promjene), ali se bitna razlika vidi u učestalosti njezina *aktivnoga* oblika. Ta distinkcija iznimno je važna: zarasli oblici pokazuju da je osoba preživjela anemiju, dok aktivni oblici sugeriraju da je anemija uzrokovana nedostatkom željeza značajno kompromitirala zdravlje tih osoba. Niska učestalost aktivnih oblika kod djece iz Koprivna u kombinaciji s mnogo nižom učestalosti aktivnoga periostitisa kod djece u Koprivnu u odnosu na kompozitni uzorak (27,0% prema 67,9%) dodatno potvrđuje već iznesene pretpostavke da su u kasnome srednjem i u novome vijeku u dalmatinskome zaleđu uvjeti života bili nešto bolji nego u kontinentalnoj Hrvatskoj.

Infektivne bolesti koje se očituju kao pojava periostitisa prisutne su u visokome postotku u obama analiziranim uzorcima. Izrazito visoka učestalost periostitisa u Koprivnu (ponajprije kod djece u najmlađim dobnim skupinama gdje se većina periostitisa javlja u jakome, generaliziranom aktivnom stanju na kostima kranija i postkranija) sugerira da je riječ o pojavi sistemskih bakterijskih infekcija. Visoka učestalost periostitisa kod djece iz Koprivna sukladna je visokoj učestalosti pokazatelja subadultnog stresa, tj. simbiotičko djelovanje anemije i nespecifičnih zaraznih bolesti najvjerojatniji je uzrok natprosječno visokoga dječjeg mortaliteta u populaciji iz Koprivna u odnosu na druge arheološke populacije iz Hrvatske (Novak 2004). Kod odraslih osoba u obama je uzorcima periostitis mnogo rjeđi, a bolest se najvjerojatnije pojavljuje kao posljedica infekcija prouzročenih komplikacijama nakon težih trauma i lošega srastanja kostiju.

Schmorlovi defekti na kralješcima svjedoče o jakim mehaničkim opterećenjima kralježnice. Podaci prikupljeni u Koprivnu i u kompozitnome uzorku iz kontinentalne Hrvatske svjedoče o nešto većoj učestalosti Schmorlovih defekata u Koprivnu, što upućuje na to koliko se fizički moralo raditi da bi zajednica preživjela, kao i na to da su radni uvjeti u dalmatinskome zaleđu bili nešto teži jer su najvjerojatnije posljedica konfiguracije tla (riječ je o izrazito krševitu i teško prohodnu području). Veća učestalost Schmorlovih defekata kod muškaraca u obama analiziranim uzorcima sugerira i spolnu podjelu poslova: muškarci su obavljali teže fizičke poslove.

Čimbenici koji najviše pridonose razvoju osteoartritisa jesu mehanički stres i fizička aktivnost (Hough & Sokoloff 1989; McKeag 1992). Osim toga jasno je da se osteoartritis javlja u starijoj životnoj dobi. Čak

Even though there are differences between the analysed populations, their dental health has a common feature: it is manifested in a relatively high frequency of alveolar bone disease and caries, which is probably an indicator of very poor oral hygiene.

Cribra orbitalia is almost everywhere in the world accepted as a sensitive and reliable osteological indicator of subadult anaemia caused by iron deficiencies, which emerged due to inadequate nutrition, endemic parasitism, unhygienic living conditions or chronic gastrointestinal disease (Mittler & van Gerven 1994; Goodman & Martin 2002). The frequency of this pathology among subadults in both samples is very similar (roughly half of the preserved frontal bones in both samples show signs of this pathological change), but an essential difference is seen in the frequency of its *active* form. This distinction is exceptionally important: healed forms indicate that the person survived anaemia, while active forms suggest that anaemia caused by an absence of iron significantly compromised the health of these individuals. The low frequency of active forms among subadults from Koprivno in combination with the much lower frequency of active periostitis among subadults in Koprivno in comparison to the composite sample (27.0% as compared to 67.9%) additionally confirms the already stated hypothesis that in the Late Middle Ages and Early Modern period living conditions were somewhat better in the Dalmatian hinterland than in continental Croatia.

Infectious diseases appearing as periostitis are present in a high percentage in both analysed samples. The exceptionally high frequency of periostitis in Koprivno (mostly among the youngest subadults where most periostitis appears in severe, generalised active condition on the cranial and post-cranial bones) suggests that this is due to systemic bacterial infection. The high frequency of periostitis among subadults in Koprivno corresponds to the high frequency of indicators of subadult stress, i.e. the symbiotic action of anaemia and non-specific infectious diseases is probably the cause of above average high subadult mortality in the Koprivno population in comparison to other archaeological populations from Croatia (Novak 2004). Among adults in both samples, periostitis is much rarer, while the disease probably appeared as a result of infections caused by complications after severe injury and poor healing of the bones.

Schmorl's nodes on the vertebrae testify to the strong mechanical burdens on the spine. Data gathered in Koprivno and in the composite sample from continental Croatia testify to a somewhat higher frequency of Schmorl's nodes in Koprivno, which indicates the amount of physical work that

i danas većina osoba starijih od četrdeset godina ima osteoartritične promjene na kralježnici (Dieppe & Lim 1998; Schmorl & Junghanns 1971). Stoga je veća učestalost osteoartritisa na svim analiziranim segmentima kralježnice u uzorku iz Koprivna očekivana posljedica dužega prosječnog životnog vijeka u dalmatinskome zaleđu u odnosu na kontinentalnu Hrvatsku. Znatno viša učestalost osteoartritičnih promjena na glavnim zglobovima kod muškaraca u odnosu na žene u obama analiziranim uzorcima usko je povezana s duljim životnim vijekom muškaraca i dodatno potvrđuje ranije iznesenu pretpostavku o spolnoj podjeli poslova.

Uzorak iz Koprivna karakterizira izrazito niska učestalost trauma dugih kostiju. Analizirane su 722 duge kosti, a samo je na trima uočena neka vrsta traume: dvije se traume nalaze na lakatnim kostima i jedna na palčanoj kosti. Ni za jednu od uočenih trauma dugih kostiju iz Koprivna ne može se sa sigurnošću tvrditi da su posljedica nasilja, dok se, naprotiv, za većinu može pretpostaviti da su nastale nesretnim slučajem.

Za razliku od trauma dugih kostiju traume glave i lica u uzorku iz Koprivna iznimno su česte. Više autora (Tyson 1977; Walker 1989; 1997; Alvrus 1999; Standen & Ariazza 2000) ističe da je velika učestalost trauma glave i lica siguran dokaz pojačanoga nasilja u nekoj zajednici. Ukupna učestalost trauma lica i svoda lubanje kod odraslih osoba u Koprivnu iznosi 17,8%, što je bitno više nego što je evidentirano u drugim osteološkim uzorcima diljem svijeta. Tako Jurmain (2001) donosi podatak o učestalosti kranijalnih trauma u uzorku SCL-038 od 4,4%, a Bennike (1985) govori o najvećoj učestalosti od 4,6% u uzorku iz Danske. Robb (1997) donosi podatak o učestalosti od 8,9% u željeznodobnome uzorku iz Italije, a Owsley *et al.* (1994) o učestalosti od 2,5% u uzorku s Uskršnjih otoka. Analize sjevernoameričkih uzoraka koje su proveli Hooton (1930), Snow (1948), Newman (1957), Stewart & Quade (1969), Morse (1969), Miles (1975) i Ferguson (1980) pokazale su da se učestalost kranijalnih trauma kreće od 2% do 5%. Tek je nekoliko autora evidentiralo učestalost sličnu onoj iz Koprivna: u prapovijesnome uzorku iz Australije Webb (1995) je ustanovio da je učestalost kranijalnih trauma iznosila oko 15%, a Walker (1989) i Tyson (1977) u analizama prapovijesnih indijanskih populacija iz Kalifornije uočavaju učestalost od 19,9% do čak 30%.

Visoka učestalost kranijalnih trauma i činjenica da jedna osoba ima višestruke traume upućuju na to da su postojale sporadične epizode interpersonalnoga nasilja, kao i nešto viši stupanj fizičkoga rizika u populaciji iz Koprivna. Te nasilne epizode ne mogu se međutim povezati sa sukobima većega intenziteta

had to be done for the community to survive, and the fact that working conditions in the Dalmatian hinterland were more arduous, probably due to the configuration of the terrain (this is an area which is exceptionally rocky and difficult to traverse). The higher frequencies of Schmorl's nodes among males in both analysed samples also suggest a sex-based division of labour: males performed more difficult physical tasks.

The factors that contribute most to osteoarthritis are mechanical stress and physical activity (Hough & Sokoloff 1989; McKeag 1992). Besides this, osteoarthritis clearly appears at higher ages. Even today, most individuals older than forty years of age encounter osteoarthritic change on their vertebrae (Dieppe & Lim 1998; Schmorl & Junghanns 1971). Thus the higher frequency of osteoarthritis on all analysed segments of the vertebrae in the Koprivno sample is an expected consequence of the longer average life span in the Dalmatian hinterland in relation to continental Croatia. The considerably higher frequency of osteoarthritic changes on the major joints among males in comparison to females in both analysed samples is closely tied to the longer life span of males and additionally confirms the hypothesis stated earlier on the sex-based division of labour.

The sample from Koprivno is characterised by an exceptionally low frequency of long-bone traumas. 722 long bones were analysed, and only three exhibited some type of trauma: two were on the ulna and one on the radius. It cannot be said with any certainty if any of the long-bone traumas observed at the Koprivno were caused by violence, while, in contrast, most can be assumed to have been caused by accidents.

As opposed to long-bone traumas, cranial and facial traumas in the Koprivno sample are exceptionally frequent. Several authors (Tyson 1977; Walker 1989; 1997; Alvrus 1999; Standen & Ariazza 2000) stress that the high frequency of cranial and facial traumas certainly prove a higher level of violence in a given community. The overall frequency of facial and cranial traumas among adults in Koprivno is 17.8%, which is considerably higher than that recorded in other osteological samples world-wide. Thus Jurmain (2001) provides data on the frequency of cranial traumas in sample SCL-038 of 4.4%, while Bennike (1985) spoke of the higher frequency of 4.6% in a sample from Denmark. Robb (1997) provided data on frequency of 8.9% in an Iron Age sample from Italy, while Owsley *et al.* (1994) indicated a frequency of 2.5% in sample from Easter Islands. Analysis of the North American sample conducted by Hooton (1930), Snow (1948), Newman (1957),

(oružanim bitkama i sl.) zato što uopće nema perimortalnih trauma i trauma nanesenih oštrobridnim oružjem. Takvo je stanje dosta začuđujuće s obzirom na to da se Koprivno nalazilo na samoj granici između Turaka i Mlečana i da su, prema pisanim izvorima, oružani sukobi manjih ili većih razmjera bili vrlo česta pojava. Posebno žestoke borbe vodile su se oko utvrde Klis u čijoj se neposrednoj blizini smjestilo Koprivno (Novak 1961). Smještaj i intenzitet kranijalnih trauma (ovalna su oblika i vrlo su plitke, većinom smještene na lijevoj strani čeone kosti) sugeriraju da su nastale kao posljedica manjih međuljudskih sukoba unutar same zajednice. O uzrocima tih sukoba u ovome se trenutku može samo nagađati (nasilje u obitelji, sukobi oko stoke, plodne zemlje ili izvora pitke vode itd.). Potpuna odsutnost perimortalnih trauma u Koprivnu također ide u prilog činjenici da sukobljene strane nisu namjeravale trajno ukloniti protivnika (tj. ubiti ga), nego ga samo privremeno onesposobiti.

Zaključak

Proučavanje skeletnoga uzorka s nalazišta Koprivno – Kod križa pružilo je važne podatke o biološkoj povijesti stanovnika dalmatinskoga zaleđa i proširilo naše znanje o uvjetima života populacija koje su nastanjivale to područje tijekom novoga vijeka.

Usporedba tih podataka s podacima iz kompozitnoga uzorka iz kontinentalne Hrvatske pokazuje da su u novome vijeku životni uvjeti u dalmatinskome zaleđu bili nešto bolji, što bi moglo sugerirati da je geografski smještaj bitno utjecao na kvalitetu i uvjete života. Osteološki parametri koji to najbolje pokazuju jesu značajno dulji prosječni životni vijek, manja učestalost karijesa, značajno manja učestalost pokazatelja subadultnog stresa (aktivnoga oblika patologije *cribra orbitalia*) te manja učestalost trauma dugih kostiju u Koprivnu.

Mnogobrojni pokazatelji subadultnog stresa u Koprivnu (poglavito aktivnoga oblika *cribra orbitalia*) svjedoče o raširenoj anemiji i niskoj razini imuniteta kod djece, posebice u najranijoj dobi. Učestalost zaraznih bolesti također je vrlo velika, a simbiotičko djelovanje anemije i nespecifičnih zaraznih bolesti vjerojatni je uzrok izrazito visokoga dječjeg mortaliteta u Koprivnu.

Velika učestalost trauma lubanje, kao i njihov raspored i intenzitet, te osoba s višestrukim traumama u Koprivnu pokazuju da je kvaliteta života, premda bitno bolja od one u kontinentalnoj Hrvatskoj, bila daleko od idealne. Stupanj fizičkoga rizika bio je nešto povišen, ali nije povezan s oružanim sukobima većih razmjera jer uopće nema perimortalnih trau-

Stewart & Quade (1969), Morse (1969), Miles (1975) and Ferguson (1980) showed that the frequency of cranial traumas ranges from 2% to 5%. Only a few authors recorded a frequency similar to that from Koprivno: in the prehistoric sample from Australia, Webb (1995) ascertained a frequency of cranial traumas of approximately 15%, while Walker (1989) and Tyson (1977) observed a frequency of 19.9% to as much as 30% in the analysed Native American populations from California.

The high frequency of cranial traumas and the fact that one individual had multiple traumas indicate that there were sporadic episodes of interpersonal violence, and a somewhat higher degree of physical risk in the Koprivno population. These violent episodes cannot be linked to higher-intensity conflicts (armed battles, etc.) because there are no perimortem traumas or injuries caused by sharp-edged weapons. Such a situation is truly remarkable, since Koprivno was located on the very border between the Ottomans and Venetians, and, according to written sources, armed conflicts of greater or lesser intensity were quite common. Particularly fierce battles were waged around the fortress at Klis, which is in the immediate vicinity of Koprivno (Novak 1961). The location and intensity of cranial traumas (oval shaped and very shallow, mostly located on the left side of the frontal bone) suggest that they were caused by minor interpersonal conflicts within the community itself. At this point, one can only speculate as to the causes of such conflicts (familial violence or disputes over livestock, fertile land or sources of potable water, etc.). The complete absence of perimortem traumas in Koprivno is also indicated by the fact that the conflicting individuals did not intend to permanently eliminate their opponents (i.e. kill them), rather only temporarily disable them.

Conclusion

Study of the skeletal sample from the Koprivno – Kod križa site has provided vital data on the biological history of inhabitants of the Dalmatian hinterland and expanded knowledge on living conditions of the population which resided in this region during the Early Modern period.

A comparison of these data with data from the composite sample from continental Croatia shows that in the Early Modern period, living conditions in the Dalmatian hinterland were slightly better, which may suggest that geographic location considerably influenced the quality and conditions of life. The osteological parameters which best demonstrate this

ma ni trauma nanesenih oštrobridnim oružjem. To je čudno s obzirom na to da je nalazište bilo smješteno na samoj granici između Turaka i Mlečana u vrijeme najžešćih borbi tijekom 16. i 17. stoljeća. Većina zadobivenih trauma može se pripisati nesretnim slučajevima ili sukobima između pojedinaca unutar same zajednice.

Na kraju nužno je naglasiti da je potrebno dodatno istraživanje drugih osteoloških uzoraka iz Hrvatske, posebice onih iz novoga vijeka, kako bi se njihovom međusobnom usporedbom rasvijetlili uzroci uočenih razlika. Nadamo se da će ovaj rad poslužiti kao dodatan poticaj za buduće analize osteoloških uzoraka populacija koje su nastanjivale Hrvatsku u tim turbulentnim vremenima.

are the considerably longer life span, lower frequency of dental caries, few indicators of subadult stress (active forms of the *cribra orbitalia*) and lower frequency of the long-bone traumas from Koprivno.

Numerous indicators of subadult stress in Koprivno (generally the active form of *cribra orbitalia*) testify to widespread anaemia and a low level of immunity among subadults, particularly at the earliest age. The frequency of infectious diseases was also quite high, and the symbiotic effects of anaemia and non-specific infectious diseases are probably the cause of the exceptionally high subadult mortality in Koprivno.

The high frequency of cranial traumas, and their distribution and intensity, and the individual with multiple injuries in Koprivno indicates that the quality of life, although considerably better than in continental Croatia, was still far from ideal. The degree of physical risk was somewhat higher, but it was not tied to major armed conflict because there are no perimortem traumas nor traumas caused by sharp-edged weapons. This is odd given that the site was on the border between the Ottomans and the Venetians during their fiercest warfare during the sixteenth and seventeenth centuries. Most actual traumas can be attributed to accidents or conflicts between individuals within the same community.

Finally, it is important to stress that additional research into other osteological samples from Croatia is required, particularly Early Modern samples, so that comparisons can illuminate some of the observed differences. We hope that this paper will serve as an additional impetus for future analysis of osteological samples of the populations which inhabited Croatia during this turbulent period.

Tablica 1. Distribucija spola u uzorku iz Koprivna (M. Novak, 2004).
Table 1. Distribution of sex in the Koprivno sample (author: M. Novak, 2004).

Age	Subadults	Females	Males
0–1	29		
2–5	33		
6–10	15		
11–15	9		
16–20		4	
21–25		1	
26–30		4	1
31–35		5	1
36–40		1	5
41–45		4	5
46–50		1	3
51–55		4	7
56–60		5	5
60+		4	
Total	86	33	27
Mean age at death[1]		x = 42.2 (sd = 15.6)	x = 47.1 (sd = 8.5)

[1] Prosječna starost u trenutku smrti izračunata je na temelju prosječne vrijednosti za svaku dobnu kategoriju (npr. 38 godina za dobnu kategoriju od 36 do 40 godina) i 65 godina za dobnu kategoriju 60+.

[1] Mean age at death was calculated on the basis of the average value for each age category (e.g. 38 years for the 36–40 age category) and 65 years for the 60+ age category.

Tablica 2. Distribucija spola u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).
Table 2. Distribution of sex in the composite sample from continental Croatia (author: M. Novak, 2007).

Age	Subadults	Females	Males
0–1	15		
2–5	15		
6–10	17		
11–15	7		
16–20		5	3
21–25		14	7
26–30		8	6
31–35		5	12
36–40		2	8
41–45		4	5
46–50		2	2
51–55		2	1
56–60		0	1
60+		2	2
Total	**54**	**44**	**47**
Mean age at death[1]		x = 31.4 (sd = 12.2)	x = 34.8 (sd = 11.0)

[1] Prosječna starost u trenutku smrti izračunata je na temelju prosječne vrijednosti za svaku dobnu kategoriju (npr. 38 godina za dobnu kategoriju od 36 do 40 godina) i 65 godina za dobnu kategoriju 60+.

[1] Mean age at death was calculated on the basis of the average value for each age category (e.g. 38 years for the 36-40 age category) and 65 years for the 60+ age category.

Tablica 3. Učestalost alveolarnih bolesti u uzorku iz Koprivna (M. Novak, 2004).
Table 3. Frequency of alveolar bone disease in the Koprivno sample (author: M. Novak, 2004).

Age category	Subadults		Females		Males	
	A[1]/O[2]	%[3]	A/O	%	A/O	%
Younger adults[4]			2/381	0.5	0/32	0.0
Older adults			190/494	38.5	122/667	18.3
Total	1/1021	0.1	192/875	21.9	122/699	17.4

1 A = broj alveola zahvaćenih periodontalnim ili periapikalnim apcesom ili antemortalnim gubitkom zuba / A = number of alveoli with periodontal or periapical abscesses or antemortem tooth loss
2 O = broj pregledanih alveola / O = number of examined alveoli
3 % = postotak alveola zahvaćenih periodontalnim ili periapikalnim apcesom ili antemortalnim gubitkom zuba / % = percentage of alveoli with periodontal or periapical abscesses or antemortem tooth loss
4 mlađe odrasle osobe = osobe između 16 i 35 godina starosti; starije odrasle osobe = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 4. Učestalost alveolarnih bolesti u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).
Table 4. Frequency of alveolar bone disease in the composite sample from continental Croatia (author: M. Novak, 2007).

Age category	Subadults		Females		Males	
	A[1]/O[2]	%[3]	A/O	%	A/O	%
Younger adults[4]			24/341	5.6	36/390	9.2
Older adults			43/147	29.2	63/247	25.5
Total	0/522	0.0	67/478	14.0	99/637	15.5

1 A = broj alveola zahvaćenih periodontalnim ili periapikalnim apcesom ili antemortalnim gubitkom zuba / A = number of alveoli with periodontal or periapical abscesses or antemortem tooth loss
2 O = broj pregledanih alveola / O = number of examined alveoli
3 % = postotak alveola zahvaćenih periodontalnim ili periapikalnim apcesom ili antemortalnim gubitkom zuba / % = percentage of alveoli with periodontal or periapical abscesses or antemortem tooth loss
4 mlađe odrasle osobe = osobe između 16 i 35 godina starosti; starije odrasle osobe = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 5. Učestalost karijesa u uzorku iz Koprivna (M. Novak, 2004).
Table 5. Frequency of dental caries in the Koprivno sample (author: M. Novak, 2004).

Age category	Subadults		Females		Males	
	A[1]/O[2]	%[3]	A/O	%	A/O	%
Younger adults[4]			2/297	0.7	5/41	12.2
Older adults			48/238	20.2	33/440	7.5
Total	7/737	0.9	50/535	9.3	38/481	7.9

1 A = broj zubi zahvaćenih karijesom / A = number of teeth with caries
2 O = ukupan broj analiziranih zubi / O = total number of analyzed teeth
3 % = postotak zuba zahvaćenih karijesom / % = percentage of teeth with caries
4 mlađe odrasle osobe = osobe između 16 i 35 godina starosti; starije odrasle osobe = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 6. Učestalost karijesa u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).

Table 6. Frequency of dental caries in the composite sample from continental Croatia (author: M. Novak, 2007).

Age category	Subadults		Females		Males	
	A[1]/O[2]	%[3]	A/O	%	A/O	%
Younger adults[4]			16/335	4.8	36/343	10.5
Older adults			18/72	25.0	21/160	13.1
Total	**36/485**	**7.4**	**34/407**	**8.3**	**57/503**	**11.3**

[1] A = broj zubi zahvaćenih karijesom / A = number of teeth with caries

[2] O = ukupan broj analiziranih zubi / O = total number of analyzed teeth

[3] % = postotak zuba zahvaćenih karijesom / % = percentage of teeth with caries

[4] mlađe odrasle osobe = osobe između 16 i 35 godina starosti; starije odrasle osobe = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 7. Učestalost HZC u odnosu na broj analiziranih zuba u uzorku iz Koprivna (M. Novak, 2004).

Table 7. Frequency of dental enamel hypoplasia in relation to the number of teeth analyzed in the Koprivno sample (author: M. Novak, 2004).

Tooth	N[1]	NwDEH	% wDEH
Maxillary I1[2]	44	22	50.0
Maxillary C	52	28	53.8
Mandibular C	60	37	61.2

[1] N = broj analiziranih zuba; NsHZC = broj zuba s jednim ili više HZC; % sHZC = % od N s jednim ili više HZC

[1] N = number of analyzed teeth; NwDEH = number of teeth with one or more case of DEH; % wDEH = % of N with one or more case of DEH

[2] I = sjekutić; C = očnjak / I = incisor; C = canine

Tablica 8. Učestalost HZC u odnosu na broj analiziranih zuba u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).

Table 8. Frequency of dental enamel hypoplasia in relation to the number of teeth analyzed in the composite sample from continental Croatia (author: M. Novak, 2007).

Tooth	N[1]	NwDEH	% wDEH
Maxillary I1[2]	80	28	35.0
Maxillary C	82	32	39.0
Mandibular C	82	33	40.2

[1] N = broj analiziranih zuba; NsHZC = broj zuba s jednim ili više HZC; % sHZC = % od N s jednim ili više HZC /

[1] N = number of analyzed teeth; NwDEH = number of teeth with one or more case of DEH; % wDEH = % of N with one or more case of DEH

[2] I = sjekutić; C = očnjak / I = incisor; C = canine

Tablica 9. Učestalost cribra orbitalia *u uzorku iz Koprivna (M. Novak, 2004).*
Table 9. Frequency of cribra orbitalia in the Koprivno sample (author: M. Novak, 2004).

Age/sex	*Cribra orbitalia*			Active lesions	
	O[1]	A1[2]	%	A2[3]	% of A1
0 – 0.9	21	1	4.2	0	0.0
1 – 4.9	31	18	58.1	2	11.1
5 – 9.9	14	7	50.0	1	14.3
11 – 14.9	10	6	60.0	0	0.0
Subadults – total	**74**	**32**	**43.2**	**3**	**9.4**
Females	29	8	27.6	0	0.0
Males	25	2	8.0	0	0.0
Adults - total	**54**	**10**	**18.5**	**0**	**0.0**

[1] O = broj analiziranih čeonih kostiju / O = number of analyzed frontal bones
[2] A1 = broj čeonih kostiju gdje bar jedna orbita pokazuje znakove *cribra orbitalia* / A1 = number of frontal bones on which a minimum of one orbit shows signs of *cribra orbitalia*
[3] A2 = broj čeonih kostiju gdje je *cribra orbitalia* aktivna u trenutku smrti / A2 = number of frontal bones on which the *cribra orbitalia* was active at time of death

Tablica 10. Učestalost cribra orbitalia *u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).*
Table 10. Frequency of cribra orbitalia *in the composite sample from continental Croatia (author: M. Novak, 2007).*

Age/sex	*Cribra orbitalia*			Active lesions	
	O[1]	A1[2]	%	A2[3]	% of A1
0 – 0.9	14	3	21.4	2	66.7
1 – 4.9	10	5	50.0	4	80.0
5 – 9.9	10	9	90.0	5	55.5
11 – 14.9	7	6	85.7	2	33.3
Subadults – total	**41**	**23**	**56.1**	**13**	**56.5**
Females	28	10	35.7	0	0.0
Males	28	6	21.4	0	0.0
Adults - total	**56**	**16**	**28.6**	**0**	**0.0**

[1] O = broj analiziranih čeonih kostiju / O = number of analyzed frontal bones
[2] A1 = broj čeonih kostiju gdje bar jedna orbita pokazuje znakove *cribra orbitalia* / A1 = number of frontal bones on which a minimum of one orbit shows signs of *cribra orbitalia*
[3] A2 = broj čeonih kostiju gdje je *cribra orbitalia* aktivna u trenutku smrti / A2 = number of frontal bones on which the *cribra orbitalia* was active at time of death

Tablica 11. Učestalost periostitisa u uzorku iz Koprivna (M. Novak, 2004).

Table 11. Frequency of periostitis in the Koprivno sample (author: M. Novak, 2004).

Sex	Periostitis			Active lesions	
	O[1]	A1[2]	%	A2[3]	% of A1
Subadults	**74**	**59**	**79.7**	**20**	**33.9**
Females	30	2	6.7	2	100.0
Males	22	2	9.1	0	0.0
Adults - total	**52**	**4**	**7.7**	**2**	**50.0**

[1] O = broj dobro uščuvanih kostura / O = number of well-preserved skeletons

[2] A1 = broj dobro uščuvanih kostura koji pokazuju znakove pojave periostitisa / A1 = number of well-preserved skeletons showing signs of periostitis

[3] A2 = broj dobro uščuvanih kostura gdje je periostitis aktivan u trenutku smrti / A2 = number of well-preserved skeletons on which periostitis was active at time of death

Tablica 12. Učestalost periostitisa u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).

Table 12. Frequency of periostitis in the composite sample from continental Croatia (author: M. Novak, 2007).

Sex	Periostitis			Active lesions	
	O[1]	A1[2]	%	A2[3]	% of A1
Subadults	**28**	**24**	**85.7**	**19**	**79.2**
Females	8	2	25.0	1	50.0
Males	11	3	27.3	1	33.3
Adults - total	**19**	**5**	**26.3**	**2**	**40.0**

[1] O = broj dobro uščuvanih kostura / O = number of well-preserved skeletons

[2] A1 = broj dobro uščuvanih kostura koji pokazuju znakove pojave periostitisa / A1 = number of well-preserved skeletons showing signs of periostitis

[3] A2 = broj dobro uščuvanih kostura gdje je periostitis aktivan u trenutku smrti / A2 = number of well-preserved skeletons on which periostitis was active at time of death

Tablica 13. Učestalost Schmorlovih defekata u uzorku iz Koprivna (M. Novak, 2004).

Table 13. Frequency of Schmorl's nodes in the Koprivno sample (author: M. Novak, 2004).

	Thoracic		Lumbar		Total	
	A[1]/O[2]	%	A/O	%	A/O	%
Females						
Younger adults[3]	32/143	22.4	14/69	20.3	46/212	21.7
Older adults	43/171	25.1	14/80	17.5	57/251	22.7
Total	**75/314**	**23.9**	**28/149**	**18.8**	**103/463**	**22.2**
Males						
Younger adults	8/12	66.7	0/5	0.0	8/17	47.1
Older adults	63/208	30.3	19/90	21.1	82/298	27.5
Total	**71/220**	**32.3**	**19/95**	**20.0**	**90/315**	**28.6**

[1] A = broj kralježaka sa Schmorlovim defektom / A = number of vertebrae with Schmorl's nodes

[2] O = broj pregledanih kralježaka / O = number of examined vertebrae

[3] mlađi odrasli = osobe između 16 i 35 godina starosti; stariji odrasli = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 14. Učestalost Schmorlovih defekata u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).

Table 14. Frequency of Schmorl's nodes in the composite sample from continental Croatia (author: M. Novak, 2007).

	Thoracic		Lumbar		Total	
	A[1]/O[2]	%	A/O	%	A/O	%
Females						
Younger adults[3]	3/66	4.5	2/41	4.9	5/107	4.7
Older adults	12/57	21.0	4/16	25.0	16/73	21.9
Total	**15/123**	**12.2**	**6/57**	**10.5**	**21/180**	**11.7**
Males						
Younger adults	28/95	29.5	11/49	22.4	39/144	27.1
Older adults	26/58	44.8	4/28	14.3	30/86	34.9
Total	**54/153**	**35.3**	**15/77**	**19.5**	**69/230**	**30.0**

[1] A = broj kralježaka sa Schmorlovim defektom / A = number of vertebrae with Schmorl's nodes

[2] O = broj pregledanih kralježaka / O = number of examined vertebrae

[3] mlađi odrasli = osobe između 16 i 35 godina starosti; stariji odrasli = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age.

Tablica 15. Učestalost degenerativnog osteoartritisa na kralješcima u uzorku iz Koprivna (M. Novak, 2004).

Table 15. Frequency of degenerative osteoarthritis on the vertebrae in the Koprivno sample (author: M. Novak, 2004).

	Cervical		Thoracic		Lumbar		Total	
	A[1]/O[2]	%	A/O	%	A/O	%	A/O	%
Females								
Younger adults[3]	0/86	0.0	1/143	0.7	0/69	0.0	1/298	0.3
Older adults	26/101	25.7	73/171	42.7	35/80	43.7	134/352	38.1
Total	**26/187**	**13.9**	74/314	**23.6**	**35/149**	**23.5**		**20.8**
Males								
Younger adults	0/7	0.0	0/12	0.0	0/5	0.0	0/24	0.0
Older adults	17/110	15.4	66/208	31.7	49/90	54.4	132/408	32.3
Total	**17/117**	**14.5**	**66/220**	30.0	49/95	51.6	132/432	30.5

[1] A = broj kralježaka zahvaćenih osteoartritisom / A = number of vertebrae with osteoarthritis

[2] O = broj analiziranih kralježaka / O = number of examined vertebrae

[3] mlađi odrasli = osobe između 16 i 35 godina starosti; stariji odrasli = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 16. Učestalost degenerativnoga osteoartritisa na kralješcima u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).

Table 16. Frequency of degenerative osteoarthritis on the vertebrae in the composite sample from continental Croatia (author: M. Novak, 2007).

	Cervical		Thoracic		Lumbar		Total	
	A[1]/O[2]	%	A/O	%	A/O	%	A/O	%
Females								
Younger adults[3]	1/53	1.9	0/66	0.0	0/41	0.0	1/160	0.6
Older adults	4/37	10.8	13/57	22.8	1/16	6.2	18/110	16.4
Total	**5/90**	**5.5**	**13/123**	**10.6**	**1/57**	**1.7**	**19/270**	**7.0**
Males								
Younger adults	2/61	3.3	14/95	14.7	0/49	0.0	16/205	7.8
Older adults	15/35	42.9	14/58	24.1	8/28	28.6	37/121	30.6
Total	**17/96**	**17.7**	**28/153**	**18.3**	**8/77**	**10.4**	**53/326**	**16.3**

[1] A = broj kralježaka zahvaćenih osteoartritisom / A = number of vertebrae with osteoarthritis

[2] O = broj analiziranih kralježaka / O = number of examined vertebrae

[3] mlađi odrasli = osobe između 16 i 35 godina starosti; stariji odrasli = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 17. Učestalost degenerativnoga osteoartritisa na glavnim zglobnim plohama u uzorku iz Koprivna (M. Novak, 2004).

Table 17. Frequency of degenerative osteoarthritis on the major joint surfaces in the Koprivno sample (author: M. Novak, 2004).

	Shoulders		Elbows		Hips		Knees	
	A[1]/O[2]	%	A/O	%	A/O	%	A/O	%
Females								
Younger adults[3]	0/13	0.0	0/13	0.0	0/13	0.0	0/13	0.0
Older adults	14/18	77.8	6/18	33.3	7/17	41.2	11/17	64.7
Total	**14/31**	**45.2**	**6/31**	**19.3**	**7/30**	**23.3**	**11/30**	**36.7**
Males								
Younger adults	0/2	0.0	0/2	0.0	0/2	0.0	0/2	0.0
Older adults	15/24	62.5	10/25	40.0	8/24	33.3	18/25	72.0
Total	**15/26**	**57.7**	**10/27**	**37.0**	**8/26**	**30.8**	**18/27**	**66.7**

[1] A = broj zglobova zahvaćenih osteoartritisom / A = number of joints with osteoarthritis

[2] O = broj analiziranih zglobova (zglob se registrira ako je barem jedan element zgloba kompletno sačuvan ili ako su dva ili tri elementa zgloba djelomično sačuvana) / O = number of analyzed joints (a joint is registered if a minimum of one element of the joint was completely preserved or if two or three elements were partially preserved)

[3] mlađi odrasli = osobe između 16 i 35 godina starosti; stariji odrasli = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 18. Učestalost degenerativnoga osteoartritisa na glavnim zglobnim ploštinama u kompozitnome uzorku iz kontinentalne Hrvatske (M. Novak, 2007).

Table 18. Frequency of degenerative osteoarthritis on the major joint surfaces in the composite sample from continental Croatia (author: M. Novak, 2007).

	Shoulders		Elbows		Hips		Knees	
	A[1]/O[2]	%	A/O	%	A/O	%	A/O	%
Females								
Younger adults[3]	0/16	0.0	1/16	6.2	0/21	0.0	0/14	0.0
Older adults	3/8	37.5	4/11	36.4	3/11	27.3	2/7	28.6
Total	**3/24**	**12.5**	**5/27**	**18.5**	**3/32**	**9.4**	**2/21**	**9.5**
Males								
Younger adults	4/17	23.5	8/24	33.3	4/25	16.0	1/25	4.0
Older adults	3/10	30.0	3/14	21.4	7/13	53.8	7/13	53.8
Total	**7/27**	**25.9**	**11/38**	**28.9**	**11/38**	**28.9**	**8/38**	**21.0**

[1] A = broj zglobova zahvaćenih osteoartritisom / A = number of joints with osteoarthritis

[2] O = broj analiziranih zglobova (zglob se registrira ako je barem jedan element zgloba kompletno sačuvan ili ako su dva ili tri elementa zgloba djelomično sačuvana) / O = number of analyzed joints (a joint is registered if a minimum of one element of the joint was completely preserved or if two or three elements were partially preserved)

[3] mlađi odrasli = osobe između 16 i 35 godina starosti; stariji odrasli = osobe starije od 35 godina / Younger adults = individuals aged 16 to 35; Older adults = individuals over 35 years of age

Tablica 19. Raspored trauma dugih kostiju po strani i spolu u uzorku iz Koprivna (M. Novak, 2007).

Table 19. Distribution of long-bone traumas by side and sex in the Koprivno sample (author: M. Novak, 2007).

	Left side			Right side		
	N[1]	n[2]	%[3]	N	n	%
Clavicles						
Males	21	0	0.0	23	0	0.0
Females	27	0	0.0	28	0	0.0
Humeri						
Males	23	0	0.0	23	0	0.0
Females	28	0	0.0	28	0	0.0
Radii						
Males	23	0	0.0	20	0	0.0
Females	30	0	0.0	31	1	3.2
Ulnae						
Males	24	1	4.2	19	0	0.0
Females	29	0	0.0	27	1	3.7
Femurs						
Males	25	0	0.0	25	0	0.0
Females	30	0	0.0	29	0	0.0
Tibiae						
Males	23	0	0.0	22	0	0.0
Females	29	0	0.0	29	0	0.0
Fibulae						
Males	24	0	0.0	23	0	0.0
Females	31	0	0.0	28	0	0.0
Males	163	1	0.6	155	0	0.0
Females	204	0	0.0	200	2	1.0
Total	367	1	0.3	355	2	0.6

[1] N = ukupan broj dugih kostiju / N = total number of long bones

[2] n = broj dugih kostiju s traumama / n = total number of long bones with trauma

[3] % = postotak ukupnoga broja dugih kostiju / % = percentage of total number of long bones

Tablica 20. Učestalost trauma dugih kostiju u različitim osteološkim uzorcima (M. Novak, 2007).
Table 20. Frequency of long-bone traumas in various osteological samples (author: M. Novak, 2007).

	Koprivno			Composite sample			Crkvari and Kliškovac			Raunds			SCl-038		
	N[1]	n[2]	%[3]	N	n	%	N	n	%	N	n	%	N	n	%
Clavicles	99	0	0.0	54	0	0.0	74	3	4.0	171	12	7.0	159	0	0.0
Humeri	102	0	0.0	59	0	0.0	91	6	6.6	178	2	1.1	142	3	2.1
Radii	104	1	1.0	52	0	0.0	70	2	2.8	167	8	4.8	161	6	3.7
Ulnae	99	2	2.0	59	0	0.0	77	2	2.6	164	6	3.7	144	10	6.9
Femurs	109	0	0.0	69	3	4.3	102	1	1.0	186	2	1.1	119	2	1.7
Tibiae	103	0	0.0	60	3	5.0	93	2	2.1	163	3	1.8	164	1	0.6
Fibulae	106	0	0.0	63	1	1.6	66	0	0.0	86	6	7.0	129	1	0.8
Total	722	3	0.4	416	7	1.7	573	16	2.8	1115	39	3.5	1018	23	2.3

[1] N = ukupan broj dugih kostiju / N = total number of long bones
[2] n = broj dugih kostiju s traumama / n = total number of long bones with trauma
[3] % = postotak ukupnog broja dugih kostiju / % = percentage of total number of long bones

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