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Paleopathological Changes in the Human Postcranial Skeletal Remains from the Necropolis in the Locality of Saint Spas, in the Varosh Quarter, Town of Pernik, Western Bulgaria (15th-19th Centuries)

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Rescue archaeological excavations were undertaken in the locality of St. Spas situated in the Varosh Quarter, town of Pernik in 2003 and 2004. A sector of wide necropolis was examined, which had been in use within the periods of the 11th-12th and the 14th-19th c. The 2014 field season excavated fifty-one burial pits with inhumation, dated in 15th-19th c. Bone remains of a total eighty-seven individuals were identified. The aim of present study comprised identifying the age and sex of buried and the pathological changes on postcranial skeletal in the series of the necropolis. The percentage distribution between adults and subadults is almost equal but children in early childhood prevail. Pathological changes were observed in 31.51% of the postcranial skeletons: 65.22% were males, 30.43% were females and 4.35% unsexed individuals (a child). Fractures, arthritis, pathology on the limbs, vertebral pathology, ossified insertionitis and *myositis* were registered.

Key words: paleopathology, palaeoanthropology, necropolis, human postcranial skeletal remains.

Introduction

Rescue archaeological excavations were undertaken in the locality of St. Spas situated in the Varosh Quarter, town of Pernik in 2003 and 2004 under the direction of Vasilka Paunova from the Regional Historical Museum - Pernik. During the field work it was ascertained that this localization had been considered a holy place for centuries. Here, three churches had existed which were situated in cultural layers one above the other – Early Christian from the 6th c. AD, Late Medieval and from the beginning of 20th c. (a chapel). A sector of wide necropolis was examined around them, which had been in use within the periods of the 11th-12th and the 14th-19th c. [19].

The 2014 field season excavated fifty-one burial pits with inhumation, dated in 15th-19th c. Most of them are used repeatedly or overlap each other. People were buried

directly in the ground as in some cases stones of various sizes were placed along the periphery of bottom of gravel pit. Small coals were discovered in all graves. All buried were placed in supine position (lying on the back). Many different positions can be observed for upper limbs: they can lie both along the sides, or one along the side (equally left or right) and one on the chest or on the pelvis; also hands can be crossed on the chest or on the pelvis. The lower limbs are usually outstretched. The majority of the skeletons are placed in northwest-southeast orientation [20].

Materials and Methods

The study includes bone material unearthed in 51 graves from the excavation season 2014. Bone remains of a total eighty-seven individuals were identified. The skeletal remains are in good condition. Their cortical layers are well preserved. Despite the good condition of the bones, there are completely preserved skulls only in six individuals.

The anthropological analysis was carried out in the laboratory of the National Anthropological Museum at the Institute of Experimental Morphology, Pathology and Anthropology with Museum – BAS. The analysis of the human skeletal remains followed procedures defined by Martin–Saller [9], Алексеев [15, 16], Герасимов [17], Simpson, Olivier [16], Kühl [7], Bass [2], Facchini, Veschi [5].

Sex and age at death were estimated using standard non-destructive procedures and are divided into two groups – for immature and for adults. Skeletal remains have been classified into six general age groups: Early childhood (*Infans* I) – 0-7 years; Late childhood (*Infans* II) – 7-14 years; Adolescence (*Juvenis*) – 14-18/20 years; Adults (*Adultus*) – 20-40 years; Matures (*Maturus*) – 40-60 years; Elderly (*Senilis*) – over 60 year.

For the immature group age at death, dental formation and eruption [6, 15] were utilised whenever possible. Other criteria included bone development [2, 5]. Main data used to estimate adult age at death included morphology of the pubic symphysis [14] and the ossification of cranial sutures [6, 10, 14, 16]. Epiphyseal union, dental attrition and other [3, 1] general age indicators [2, 4, 6] were also used.

When possible, sex was determined from pelvis morphology (the shape of *incisura ischiadica major*), the value of the pubic angle, pelvic inlet shape (*foramen obturatum*), the breadth and length of the sacrum (*os sacrum*). When the pelvis was not available or was too fragmentary for use, the size of other bones and cranial elements (development of supercilary arches (*arcus superciliaris*) and *glabella*, the shape of orbital edge and the bottom view of the lower jaw [2, 4, 7, 8, 13] were used.

During anthropological analysis some pathological changes and natural variation were noticed: fractures, arthritis, pathology on the limbs, vertebral pathology, *spina bifida*, etc. All diagnoses of pathological conditions followed the recommendations of important clinical journals, books and paleopathological texts [1, 8, 11, 12].

Tooth wear (*abrasio*) is the term used to describe the progressive loss of a tooth's surface due to actions other than those which cause tooth decay or dental trauma. Tooth wear increases with age. In the archaeological researches dental attrition is an aging indicator and of dietary behaviors and/or health problems in earlier human populations [3, 17].

Results and Discussion

The aim of present investigation comprised identifying the age and sex of buried and the pathological changes on postcranial skeletal in the series of the necropolis in locality of St. Spas, Varosh Quarter, town of Pernik (15th-19th c.).

Age at death estimation

The eighty-seven individuals excavated in the necropolis in Varosh Quarter, town of Pernik were classified into six age groups based on anthropological analysis: thirty-two individuals are in **early childhood group (*Infans* I**); ten individuals are identified in **late childhood (*Infans* II)**; three were **Juveniles (*Juvenis***); fourteen were **Adults (*Adultus***); twenty-one of them were **Matures (*Maturus***) and three are in **elderly** group (**Table 1**).

Table 1. Age distribution of buried in the excavated graves from the necropolis in locality of St. Spas, Varosh Quarter, town of Pernik, season 2014

Infans I	**N**	**Infans II**	**N**	**Juvenis**	**N**	**Adultus**	**N**	**Maturus**	**N**	**Senilis**	**N**	**Adultus +**	**N**	
Fetus	2	7–8 y	3	14–15 y	0	20–25 y	6	40–45 y	2	60–70 y	3		4	
0–6 m	4	8–9 y	2	15–16 y	0	25–30 y	2	45–50 y	9					
6m–1y	3	9–10 y	1	16–17 y	0	30–35 y	3	40–50 y	1					
1–2 y	7	10–11 y	2	17–18/20	3	35–40 y	3	50–55 y	5					
2–3 y	3	11–12 y	1					55–60 y	3					
3–4 y	5	12–13 y	1					50–60 y	1					
4–5 y	1	13–14 y	0											
4–6 y	1													
5–6 y	0													
≈ 6 y	2													
6–7 y	2													
Inf I	2													
Total	32		10		3		14		21		3		4	**87**

Diagnostic bone fragments for more accurate age determination were not preserved in four adults individuals. Therefore, they are defined as individuals with uncertain age group (*Adultus* +).

The percentage distribution between adults and subadults is almost equal (48.28-51.72%) but children in early childhood prevail (**Fig. 1**).

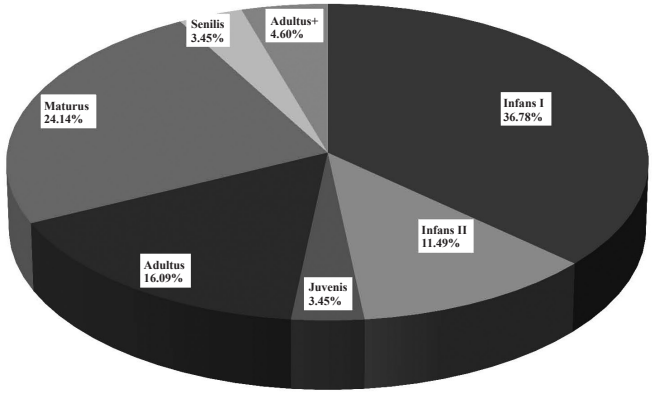

Fig. 1. Percentage of age groups from the necropolis in locality of St. Spas Varosh Quarter, season 2014

Sex determination

Sex is determined in 46 out of 87 individuals: 25 were male and 15 were female. Five individuals are determined probably as male and one probably as female, because the sexual characteristics are not clearly expressed and/or gender diagnostic bone fragments are not preserved. In one case because of the lack of diagnostic fragments the sex of the individual is undetermined.

The age and sex distribution of the St. Spas skeletal sample is as follows: thirty-two individuals are in early childhood group; a female child, one probably male child and eight with undetermined sex in late childhood group; two male and a female in Juvenile group; four male, two probably male, six female, one probably female and one with undetermined sex in *Adultus* group; sixteen male, one probably male and four female in mature group and three female in elderly group. In the group of adults with undetermined age there are three male and one probably male (**Table 2**).

Table 2. Sex and age distribution of buried in the excavated graves from the necropolis in locality of St. Spas, Varosh Quarter, town of Pernik, season 2014

Age group																					**Total**
Infans I	**Infans II**			**Juvenis**		**Adultus**					**Maturus**				**Senilis**			**Adultus+**			
	♂?	♀	♂♀	♂	♀	♂	♂?	♀	♀?	♂♀	♂	♂?	♀	♂♀	♂	♀	♂♀	♂	♂?	♀	
32	1	1	8	2	1	4	2	6	1	1	16	1	4	–	–	3	–	3	1	–	**87**

Pathologies and traumas

The postcranial skeletons are preserved in 73 individuals (83.91%) (**Table 3**).

Pathological conditions were observed in 31.51% of the skeletal remains: 65.22% were males, 30.43% were females and 4.35% undetermined individuals (children).

Table 3. Pathological changes of buried in the necropolis in locality of St. Spas, Varosh Quarter, town of Pernik, season 2014

Disease	N (number of individuals)	Percentage distribution
Destructive-degenerative diseases of the spine	**17**	**23.29%**
Degenerative-destructive diseases of the limbs	12	16.44%
Insertionitis	8	10.96%
Traumas	4	5.48%
Myositis ossificans	3	4.11%
Ankylosis	3	4.11%
Osteochondrosis	2	2.74%
Spina bifida	1	4.35%
Rickets	1	1.37%

In both sexes destructive-degenerative diseases of the spine were the most common pathology registered in 23.29% (17 individuals). This pathology is typical for buried in mature and elderly, and was identified at only one individual in the age group *Adultus*. Eleven of males and six of females suffered from vertebral arthritis with different degrees of seriousness, from initial degradation to very severe damages. It should be noted that destructive-degenerative diseases of the spine occur in almost all females (85.71%) over 40 years (**Fig. 2**).

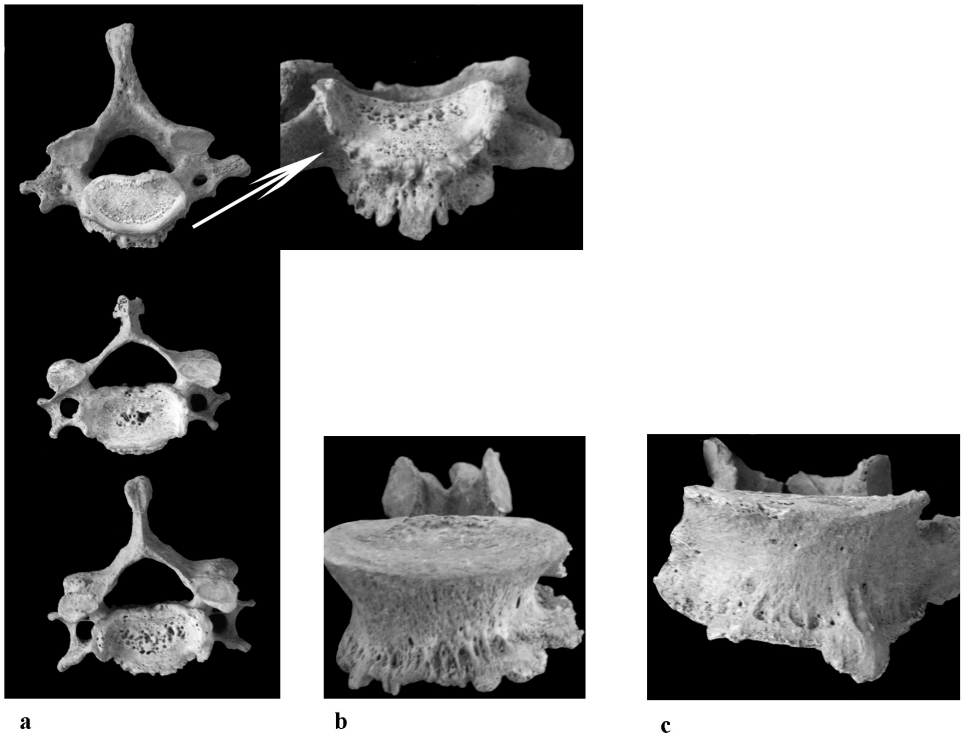

Fig. 2. Destructive degenerative diseases of the spine: a) 50-55-year-old female*;* b) 55-60-year-old male; c) 45-50-year-old male

The distribution of degenerative-destructive diseases of the limbs between male and female is equally (6 individuals of both genders). This type of pathology was not observed in any individual under 40 years. A high percentage of buried women were affected by a different type of arthritis on the limbs. It could be explained by the heavy physical labor (**Fig. 3**).

Ossified insertionitis represents dystrophic disease affecting mostly muscle-ligament areas of bone. These are sites of stress concentration at the region where tendons and ligaments attach to the bone. Consequently, they are commonly subject of overuse injuries (enthesopathies), physical overexertion or excessively strong movements received by hard work, sports etc. The ossified insertionitis is documented at a total of eight individuals including seven men and only one woman. This type of bone changes are identified in the buried in the age range 40 to 60 years, with the exception of a young male aged 20-25 years at death (**Fig. 4**).

Fig. 3. Degenerative-destructive diseases of the upper limb – 55-60-year-old male

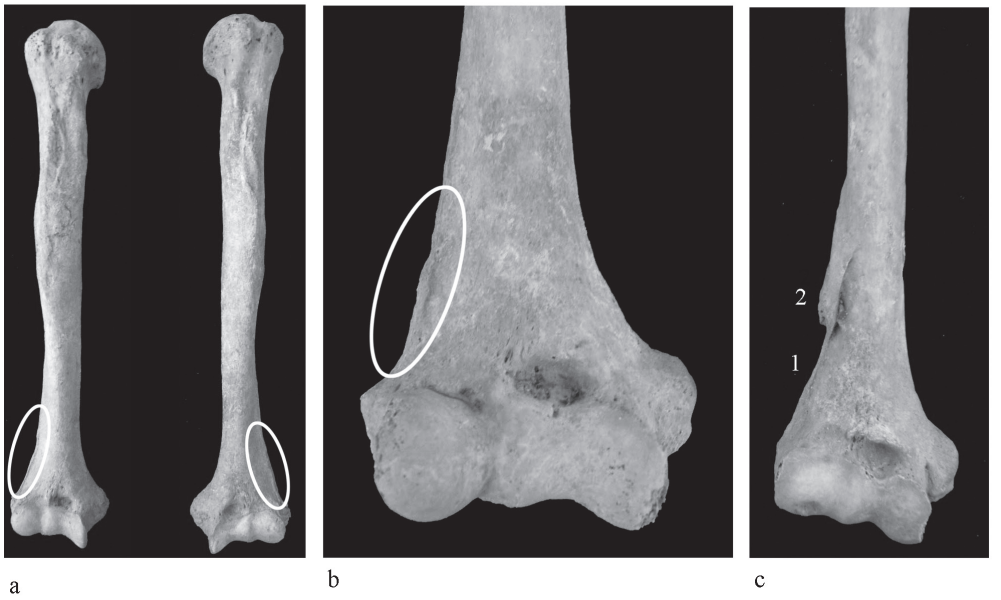

Fig. 4. Insertionitis on the upper limbs: a) 50-55-year-old male; b) 60-70-year-old female; c) 55-60-year-old male

Myositis ossificans is an unusual condition that often occurs in people who sustain a blunt injury that causes deep tissue bleeding. The soft-tissues that were injured in the traumatic event initially develops a hematoma, and subsequently develop the myositis ossificans. The myositis ossificans means that bone forms within the muscle, and this occurs at the site of the hematoma. Myositis is detected in three individuals from necropolis in locality of St. Spas. (**Fig. 5**).

Traumatic marks on bones from postcranial skeleton are also identified only in male skeletons (**Fig. 6**).

Fig. 5. Myositis: a) on the tibia et fibula dextra in 50-55-year-old male; b) on the femur dexter in 55-60-year-old male

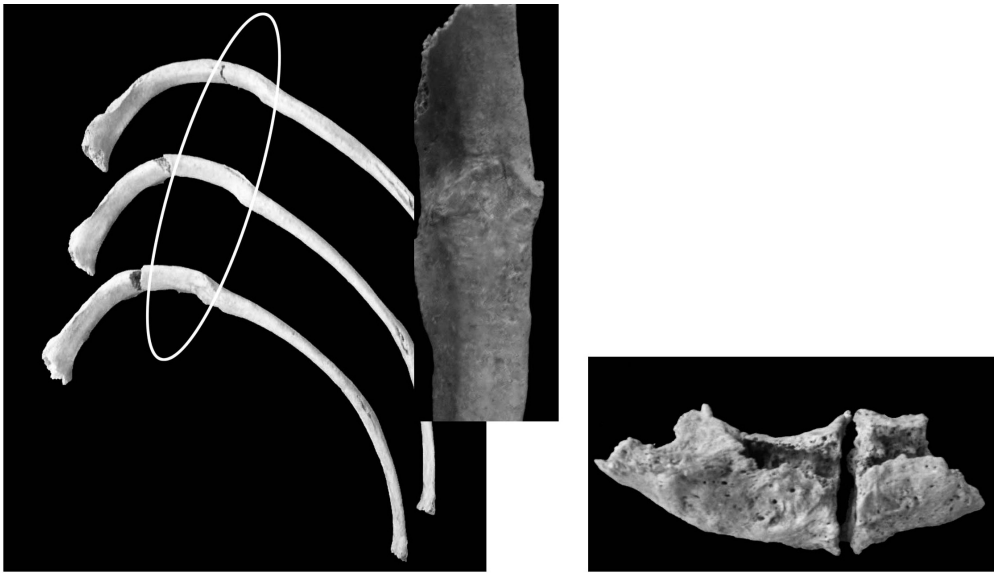

Fig. 6. Trauma on the ribs – 50-55-year-old male

Conclusion

This report on 87 studied individuals gives information about burial rituals, anthropometry and paleopathology and it must be considered preliminary until the end of the systematic excavation in the necropolis.

Results of anthropological analysis of the necropolis from locality of St. Spas, Varosh quarter, town of Pernik, strongly suggest a high mortality rate in the early childhood and mostly in the age range of 1-2 years. This fact most probably could be explained by systematic infections that children were exposed to (for example cholera, smallpox etc.), possibly because of immunity weakened by malnutrition, poor medical care as well as low life standards.

The children in early childhood had a weak immunity, so only the strongest survived who in most cases lived through the late childhood and adolescence (in these age groups in the studied necropolis mortality decreased sharply).

What makes an impression in adult individuals is the large number of female, for which death occurred in the range between 20 to 30 years. This is the active childbearing age and higher mortality for the young women could be associated with problems during the pregnancy, childbirth and postpartum period as well as the large number of successive births. In the necropolis were discovered skeletal remains of a pregnant woman.

Pathological changes in the postcranial bones, a result of various diseases, including injuries, were identified mainly in buried in mature and elderly age groups, as the most affected have been male individuals.

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