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Short fieldwork report

Human remains from Qareh Tepe, Iran, 2019

Joanna Trębicka[1], Mostafa Dehpahlavan[2], Elham Farnam[3], Zahra Alinezhad[2], Marjan Mollabeirami[2], Arkadiusz Sołtysiak[*4]
[1] Antiquity of Southeastern Europe Research Centre, University of Warsaw, Krakowskie Przedmieście 32, 00-927 Warszawa, Poland
[2] Institute of Archaeology, University of Tehran, No. 13, Poorsina St., Qods St., Enghelab St., 14176-53911, Tehran, Iran
[3] University of Tehran, Enghelab St., 14174-14418, Tehran, Iran
[4] Department of Bioarchaeology, Faculty of Archaeology, University of Warsaw, Krakowskie Przedmieście 26/28, 00-927 Warsaw, Poland
email: a.soltysiak@uw.edu.pl (corresponding author)

Qazvin Plain is a broad cirque located in the NW part of the Iranian Central Plateau, extending for c. 60km along the NW-SE axis (along the Alborz Mountains) and c. 30km along the NE-SW axis. North to the village of Sagzabad a complex of archaeological sites has been found, including the cemetery called Qareh Tepe (35°49′00″N, 49°57′08″E) (**Figure 1**), which covers more than 5 hectares and contains Iron Age II and III strata (c. 1200-600 BCE according to the local pottery sequence) (Trębicka et al. 2019).

Figure 1. The location of Trench 12 at Qareh Tepe.

Figure 2. Trench 12 at Qareh Tepe (2019).

A large part of the site had been heavily looted in the past. However, a series of test trenches excavated in 2016 and 2017 revealed that the cemetery extends substantially beyond the area affected by the devastation. Therefore, since 2017, archaeological work has focused on the eastern part of the cemetery (Trench 12) (**Figure 2**), currently used as agricultural lands. The burials are relatively densely distributed in this area and—although the virgin soil has not been reached—at least four layers were identified so far.

There is no specific orientation of the graves and most of them were constructed with mudbrick walls. Abundant grave goods were found, including pottery, metal and stone objects. Apart from fine pottery, large kitchen ware was also present in some graves, being quite a rare find in Iron Age cemeteries. In two-thirds of all burial contexts, animal bones were deposited as offerings, including ovicaprids, cattle and equids. Some remains were fairly complete and lacked any indications of cutting or butchery. The most frequent among zooarchaeological remains were small ruminants, goats and sheep (Dehpahlavan 2019).

Osteological analysis of human remains from Qareh Tepe was conducted according to the protocol proposed by Brickley and McKinley (2004). The sex of adult individuals was based on dimorphic morphologies of the pelvis (Phenice 1969; Buikstra & Ubelaker 1994) and skull (Acsádi & Nemeskéri 1970; Buikstra & Ubelaker 1994). The age-at-death of subadults was based on development and eruption of teeth (AlQahtani et al. 2010), as well as the diaphyseal lengths and epiphysis fusion status (Scheuer et al. 2010). In the case of adult individuals, age-at-death was based on

morphological changes in the pubic symphysis (Brooks & Suchey 1990) and auricular surface (Buckberry & Chamberlain 2002). Stress markers, such as *cribra orbitalia* and porotic hyperostosis, were scored according to Steckel et al. (2006). Pathologies, including, among others, trauma and degenerative join disease were described based on the protocol of Waldron (2009), while the presence of dental caries was analyzed according to Hillson (2001).

The minimum number of individuals buried in 33 excavated graves is 52 (**Table 1**). In seven burials partial or complete anatomical order was observed. Despite the commingled context in the majority of graves, in most cases it was possible to identify bones belonging to specific individuals. Among the studied skeletons, there were remains of 18 males, 9 females, 4 adults of unknown sex, 8 children of 8-15 years old, 4 children of 2-7 years old, as well as 9 neonates and infants. The age-at-death distribution corresponded with the distribution observed at the Qareh Tepe cemetery in the previous season (Trębicka et al. 2019), which is typical for attritional cemeteries.

Dental caries is caused by the biofilm bacteria that produce acid while metabolizing sugars and lead to demineralization of tooth enamel (Waldron 2009). For that reason, a diet rich in fermentable carbohydrates is one of the crucial factors contributing to the development of dental caries (Hillson 1996). Among analyzed human remains from Qareh Tepe, dentition was preserved in 34 individuals. Carious lesions were observed for 7 of them (21%), including 2 females and 5 males, which is less than observed in the previous season (41%). The frequency of this disease was lower as well, considering that caries were documented in 16 out of 429 teeth (4%) compared to 6% noted in 2018.

Skeletal stress markers, such as *cribra orbitalia* (CO) and porotic hyperostosis (PH), develop in response to exposure to environmental stressors, such as malnutrition or infections (Walker et al. 2009; McIlvaine 2015). In Qareh Tepe both CO and PH were relatively frequent and affected adults more often than subadults. In the group of 27 individuals with preserved orbital roofs, *cribra orbitalia* was diagnosed for 4 individuals (15%), including 3 out of 19 adults (16%) and 1 out of 8 children (13%). In the case of porotic hyperostosis, among the 38 individuals with preserved bones of the cranial vault, lesions were noted in 4 individuals (11%); if only adults are considered, the rate of porotic hyperostosis increases to 17% (n=4/24). Such a prevalence of stress markers is distinctively higher than in the previous season when both CO and PH were observed only in single subadults.

Furthermore, the skulls of two adult male individuals exhibited signs of sharp force trauma (cf. Love 2019), with one additionally accompanied by a blunt force trauma (cf. Kranioti 2015). Moreover, for the skull of one female a possible perimortem sharp force lesion was observed.

Table 1. Basic characteristics of human remains from Qareh Tepe, 2019.

Tag	Sex	Age-at-death	Caries	CO[1]	PH[2]	Completeness
12018 subad. 1	?	subadult				partially preserved
12018 sk. B	M	adult		0		fairy complete
12018 #9	?	14-15 years				partially preserved
12018 box C/1	?	8 months				partially preserved
12018D/1	M?	20-25 years	0/10	0	0	incomplete
12018D/2	?	3-4 years			0	incomplete
12018D/3	F?	young adult	0/1	0	0	partially preserved
12018 E-1A	M??	<18/21 years	0/28		0	cranium, cervical, clavicle
12018 E-2	F??	<18/21 years	0/15	1	0	cranium, cervical
12018 E-3	M?	young adult	0/7	0	0	cranium
12018 E-4	M?	young adult	0/16	0	1	cranium
12027A	?	6 months			0	partially preserved
12027D	?	adult				partially preserved
12040A	F?	adult	0/15		0	partially preserved
12040B	?	14-18 years	0/11			partially preserved
12049	M	30-35 years	3/18		0	incomplete
12051A	F?	adult	0/24	0	0	cranium
12051B	?	12-15 years	0/6	1	0	fairly complete
12051C	?	8 months		0	0	partially preserved
12053A	M	25-29 years	0/25	1	1	fairly complete
12053D	?	adult	0/3			partially preserved
12055/56B	?	adults	0/1			commingled individuals
12058	M	40-44 years	1/11	0	1	partially preserved
12061A	M	30-34 years	0/14		0	incomplete
12061B	?	adult				partially preserved
12063A	?	3-4 years	0/1		0	incomplete
12068	?	5 years				incomplete
12070A	F	20-24 years	0/28	0	0	incomplete
12071A	M	40-44 years	1/11	1	0	fairly complete
12072	?	perinate		0	0	cranium
12073A	?	8 years	0/9		0	incomplete
12075A	?	3 years	0/8	0	0	incomplete
12076	?	9 months		0	0	fairly complete
12077A	M?	18-21 years	2/12	0	0	incomplete
12080A	?	15 years	0/12			partially preserved
12080B	M?	adult		0	0	partially preserved
12082A	F	35-39 years	4/6	0	0	incomplete

[1] *Cribra orbitalia*: 0 – no signs of *cribra orbitalia*, 1 – at least one orbital roof preserved with *cribra orbitalia*, blank – no orbital roofs preserved for the scoring.

[2] Porotic hyperostosis: 0 – bones of the cranial vault preserved with no signs of porotic hyperostosis, 1 – porotic hyperostosis present for at least one bone of the cranial vault, blank – no bones of the cranial vault preserved for the scoring.

Table 1. continued

Tag	Sex	Age-at-death	Caries	CO[1]	PH[2]	Completeness
12084A	M	45-49 years	0/18		0	fairly complete
12088A	F	16-20 years	0/11	0	0	fairly complete
12093A	M	17-18 years	0/9	0	0	fairly complete
12094A	M	35-39 years	4/22	0	1	fairly complete
12099A	?	perinate		0		partially preserved
120100A	M	15-23 years	0/27	0	0	incomplete
120101	?	6 months		0	0	fairly complete
120102A	M??	adult	0/12			cranium
120104A	F	50-59 years	29 AM[3]	0	0	fairly complete
120105	?	2 years	0/5		0	partially preserved
120107A	F?	adult	0/7		0	incomplete
120108	?	1 year			0	cranium
120110	?	12-15 years	0/9		0	cranium
120112	M	adult				partially preserved
120113	F?	15 years	1/17	0	0	cranium

[1] *Cribra orbitalia*: 0 – no signs of *cribra orbitalia*, 1 – at least one orbital roof preserved with *cribra orbitalia*, blank – no orbital roofs preserved for the scoring.
[2] Porotic hyperostosis: 0 – bones of the cranial vault preserved with no signs of porotic hyperostosis, 1 – porotic hyperostosis present for at least one bone of the cranial vault, blank – no bones of the cranial vault preserved for the scoring.
[3] Ante-mortem tooth loss

Figure 3. Completely healed sharp force trauma on the right parietal bone of a male individual (12018D/1; 20-25 years). Scale bar 1cm.

Figure 4. Completely healed sharp force trauma on the left parietal bone of a male individual (12084A; 45-49 years). Scale bar 1cm.

Figure 5. Completely healed blunt force trauma on the left side of frontal bone of a male individual (12084A; 45-49 years). Scale bar 1cm.

The first completely healed sharp force trauma was documented in the case of a 20-25 year old male (12018D/1) (**Figure 3**). A longitudinal depression stretched out on the right parietal bone from the temporal line until the coronal suture (20×3mm). Additionally, the skull exhibited both plagiocephaly, diagnosed by right sided occipital-parietal flattening and ipsilateral frontal bossing, as well as scaphocephaly, determined

Figure 6. Completely healed fracture of the 5th right metacarpal of a male individual (12084A; 45-49 years). Scale bar 1cm.

Figure 7. Possible perimortem trauma on the left parietal bone of a female individual (120104A; 50-59 years). Scale bar 1cm.

Figure 8. Fracture partially resembling perimortem trauma on the right tibia of a female individual (120104A; 50-59 years). Scale bar 1cm.

Figure 9. The healed fracture with displacement of the acromial end of the left clavicle of the male individual (12094A; 35-39 years).

by the flattening of both parietal bones and compensatory expansion of the occipital bone (Rogers 2011). Both parietal bones had distinct temporal lines. Moreover, slight Schmorl's nodes were observed in the thoracic vertebrae of this individual.

Figure 10. The fracture of the middle ribs in the process of healing, with distinct callus formation, of the male individual (12094A; 35-39 years).

Figure 11. The healed 2nd right metacarpal fracture of the male individual (12094A; 35-39 years).

The second male individual (45-49 years old; 12084A) had completely healed posttraumatic lesions to the skull, including both sharp and blunt force trauma. In the middle of the left parietal bone there was a linear lesion (80×6mm), parallel to

Figure 12. Supracondylar spur in the middle part of the left humerus shaft (12094A; 35-39 years).

Figure 13. Completely fused second and third cervical vertebrae of the male individual (12094A; 35-39 years).

the coronal suture, beginning 15mm above the temporal line (**Figure 4**). An accompanying depression wound was observed in the middle of the frontal bone, 30mm above glabella (12×10mm) (**Figure 5**). Furthermore, there was a completely healed fracture of the 5th right metacarpal with change in the geometry of the shaft (**Figure 6**). The skeleton of this individual was very robust, with strongly developed muscle attachments, including the odontoid process of the axis extended by long bony spurs.

Figure 14. Possible healed fracture of 3rd left metacarpal with extremely prolonged styloid process of the male individual (12061A; 30-34 years). Scale bar 1cm.

Figure 15. The healed fracture of the adult left ulna, on the posterior surface found within the mixed context labelled as 12055/56B.

The first right mandibular molar of the individual was completely worn and an abscess with fistula developed around its roots. Osteoarthritis was observed along the articular surfaces of the calcaneus and sacrum, while Schmorl's nodes were observed in the thoracic and lumbar vertebrae.

A possible perimortem trauma was observed in a 50-59 year old female (120104A). On the left parietal bone there was a longitudinal lesion (20×2mm) with no signs of healing. The edges of the lesion were sharp and dense (**Figure** 7). Moreover, in the

distal part of the right tibia, on the anterior surface of the shaft, another possible perimortem fracture was noted. A concentric depression (21.1×15.2mm) was observed with circular fissures and linear fracture in the middle resembling a blade mark (6.6×0.6 mm) with 3 radiating lines (**Figure 8**). However, the edges of this fracture are brittle and ragged, therefore it is impossible to determine the timing of the trauma. Furthermore, osteoarthritis was documented on the odontoid process of the axis as well as both humeri, radii and talii. Moreover, a complete antemortem loss of dentition was documented.

Other fractures resembling perimortem sharp force trauma, but most probably resulting from excavation damage, were observed on the left parietal bone of a male individual (18-21 years old; 12077A) and on the right side of the frontal bone of a female individual (35-39 years old, 12082A).

Furthermore, in three individuals, traumatic lesions in the postcranial skeleton were observed. The first male individual (35-39 years old, 12094A) was diagnosed with three pathological changes: a displaced fracture of the acromial end of the left clavicle (**Figure 9**), five middle ribs fractured with distinct callus formation (**Figure 10**) and completely healed trauma of 2nd right metacarpal, with the change in the shaft geometry (**Figure 11**). Moreover, in the middle part of the shaft of the left humerus, on the anterior surface, there was a 10mm hooked supracondylar spur (**Figure 12**). Furthermore, the first two cervical vertebra were completely fused together (**Figure 13**). Dental abscess was noted for the upper left first premolar.

The second male (30-34 years old, 12061A) was diagnosed with a possible fracture of the 3rd left metacarpal with prolonged styloid process (**Figure 14**). Moreover, osteoarthritis was observed on the articular surfaces of the navicular and radius, while bony spurs were noted on the odontoid process of the axis and both patellae.

The last case of skeletal trauma was observed in the mixed context labelled as 12055/56B, in which bones belonging to at least two adult individuals were found. The left ulna, found within this assemblage, was fractured 40mm below the coronoid process, on the posterior surface (**Figure 15**). The trauma was completely remodeled.

To summarize, among the individuals excavated in Qareh Tepe in 2019 the frequency of caries was very low (4%), being similar to what we observed in the previous season (i.e. 6%). On the other hand, the prevalence of skeletal stress markers, including *cribra orbitalia* (15%) and porotic hyperostosis (11%), was distinctively higher and affected mostly adult individuals. Furthermore, sharp force trauma to the skull as well as fractures of metacarpals, typical for people engaging in martial arts, coupled with the high frequency of skeletal trauma documented in the previous season, suggest that the level of inter-personal violence among the individuals documented could have been high.

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