ფიზიკური ანთროპოლოგია
– PHYSICAL ANTHROPOLOGY

Liana Bitadze, Shorena Laliashvili,
Giorgi Mtskeradze, Giorgi Laghiashvili,
Roberto Cameriere, Leonardo Catalini,
Denise Piano, Piera Allegra Rasia, Elena Rova,
Francesca Bertoldi, Pier Francesco Fabbri

A Comparison between Anthropological (Dental Wear and Cranial Suture Closure Analysis) and Forensic (Dental Radiographic Approach) Methods of Age Estimation on a Middle Ages Human Sample from Beris Saqdrebi (Borjomi, Georgia)

Introduction

Determination of the age at death and sex of human skeletal remains is fundamental for studying the demographic profile of an ancient population. These kinds of studies reflect the biological and social adaptations of past human groups to an ever-changing environment. Human bones can give information regarding sex and age, physical features, traits, adequacy of nutrition, skeletal and dental diseases, activity patterns, and stress indicators, thus representing a fundamental contribution to the study of bio-archaeological data and providing us with a true biological archive. There are several kinds of methods listed in anthropological literature to estimate age at death, more specifically on the skull (which makes up most of our sample), we can record and diagnose age from techniques based on a set of cranial indicators (as suture synostosis and teeth wear).

The Berebis Saqdrebi or Beris Saqdrebi complex (both terms are accepted), was archaeologically investigated and excavated in the summer of 2020 by G. Laghiashvili and G. Mtskeradze before the restoration of the church. The complex is located in the Samtskhe-Javakheti region, in the territory of Borjomi, 3 km east of the village of Kvibisi, on the right bank of the river Kvibisistskali (41 51^{l} 47.8^{ll} N, 43 27^{l} 04.5^{ll} E) and it has always been called the “Church of the Monks” or the “Churches of the Monk” (fig. 1-2).

A preliminary observation of the osteological bone material recovered from the Berebis Saqdrebi (Borjomi, Georgia), crypt and church, has been published by anthropologist Liana Bitadze after their discovery in 2020. This research led to the study and publication of four subjects, one was recovered from the sarcophagus and the other three from the material (those found still in anatomical connection)[1] retrieved from the crypt. The article determines sex, age, and stature based on the measurement of long bones of the skeleton, proportions, non-metrical traits, markers of physiological stress, paleopathology and trauma. The spectrum of recorded diseases includes: osteoarthritis, Bechterew's disease (ankylosis), the fusion of the vertebrae, the sternum and the ribs, coxarthrosis, periostitis (periosteal disease), osteoma (benign tumor), metabolic disorders, dislocation of the lower jaw as a result of trauma, healed fracture of the clavicle, trauma caused by a blunt object, finger-like notches on the inner surface of the skull, anemia, abscesses on the upper and lower jaws.[2]

Historical and Archaeological Context

The archaeological excavation[3] led to the discovery of the original plan of this ecclesiastic building formed by an apse and rectangular building enclosed on N, S and W sides by an ambulatory connected with three entrances to the main building (fig. 3). The excavation brought to light a smaller building on its other corner of the E side, consisting of a party elevated but damaged and partly underground crypt formed by a single room with stone barrel vault. Two shelves made of stone slabs run along the N and S sides of this crypt at a height of 1 meter from the ground floor. A walkway on pillars runs parallel to the stone shelves in the middle of the room, leaving a space of around 50 cm from the shelves. Given that the last three subjects were found in anatomical connection on these shelves and the rest of the underlying space was filled by a mass of disarticulated skulls and postcranial bones it is reasonable to think that the disarticulated bones of the individuals were periodically pushed from the shelves to the underneath space, featuring this both as a primary burial for the most recently and articulated buried subjects and a disturbed primary collective one (not secondary and not strictly an ossuary, given that the bones probably rested in the same burial place and were not transported from elsewhere) for those deceased earlier. At the moment of the discovery this burial place was still sealed by stone slabs covering the rectangular

[1] Bitadze, *Anthropological report on bone material*, pp. 177-199.
[2] Bitadze, *Anthropological report on bone material*, p. 185.
[3] Laghiashvili, Mtskeradze, *The results of the archaeological research*, pp. 131-143.

small opening and the steps leading to the crypt so that it appeared in the way it was sealed in ancient times (fig. 4).

Other 15 burials have been recovered from the space delimited by the east side of the church and the crypt's south side, they were burials in lithic cysts and unfortunately only 7 of them could be archaeologically examined. In the central part of the southern side of the church a monolithic sarcophagus (fig. 5) has been excavated and the remains recovered and published by Prof. Liana Bitadze. The architectural and archaeological study led to a preliminary dating of the church's foundation to the 10th century. The results of the archaeological works together with the artistic-stylistic indicators of the temple give us an idea of the chronology of this architectural and archaeological complex; counterparts of the main temple are known from Borjomi gorge (historical Tori) e.g., Potoleti monastery near the village of Akhaldaba, "Green /Mtsvane" monastery, near Chitakhevi village. According to these artistic-stylistic features they are dated to the first half of 9th century.[1] In addition to constructional details, the temple is separated by arches from the surrounding area; the interior of the main church is divided by pilasters. However, according to the methods of artistic decoration, it is somewhat different from the samples of the mentioned period in this region. Attention should be paid to the strong, three-tiered pilaster of wall arches, which are rarely found in the so-called "Transition period" in Georgian architecture. With this sign, the "Church of the Monks" moves towards more developed medieval temples, and we consider it possible to tentatively assign it to the 10th century, so that "Churches of the Monk" is close to the "Matskhovari/Saviour" church of Chobiskhevi, which dates from the same period (10th century).[2]

Analyzing the information obtained from archaeological excavations, it is established that the monastery was active from the 10th century to the 16th-17th centuries.

Materials and Methods

The human sample from the church is currently kept at the Monastery of the Nativity of the Holy Virgin in Borjomi under the supervision of Mama Andria Tariadisi. Skulls and post-cranial remains have been divided and collected according to the type of bone. The skulls sum up to an astonishing number of 619 (fig. 6). Some boxes of bones' fragments have yet to be processed and cleaned so the total number will almost certainly increase. The state of preservation of these remains is very good and on roughly 20% of the

[1] Khvistani, *Materials for Christian Archeology*.
[2] Berdzenishvili, *Essays from the historical geography*.

cranial remains evidence of cranial traumas has been recorded. A preliminary sample of 58 skulls (54 skulls from the crypt, the sarcophagus and the three articulated skeletons in the crypt) has been selected for anthropological analysis (fig. 7).

Sex has been estimated with two discriminant functions based on cranial visually assessed traits,[1] respectively on glabella-mastoid (GLA-MAS) and nuchal-mastoid (NUC-MAS) scores.

We compared three different methods of age estimation: Cameriere's radiological (CRX) method[2,3,4,5] lateral anterior score (LAS) of cranial suture closure;[6] dental wear (DWE).[7]

The Cameriere method, derived from forensic sciences, is a good chance to test the two selected anthropological methods of age determination, because it is simple, cheap and easily applied to human remains, needing only single rooted teeth to be preserved and x-rays to be performed easily on the site through an x-ray portable machine Rextar X. The Cameriere's approach turned out to be extremely useful also when applied to human remains recovered from archaeological sites.[8,9,10] It is based on the principle of the progressive reduction of the dimensions of the teeth pulp chamber, as age increases, due to the formation and deposition of secondary dentine. In a young subject, the area of the pulp chamber is quite wide, while in an older subject, its dimensions will decrease. Once the total area of the tooth and the area of the pulp chamber are calculated, we insert the values in the formula and we easily obtain an estimation of the age at death of the subject and, what is more important for statistical and paleo-demographical purposes, it appears as a single numerical value and not as a mere age span. As we have seen this application has recently given very promising results, especially for the age diagnosis of older subjects that traditionally fell in the ample and poorly significant "45-50+"

[1] Walker, *Sexing skulls using discriminant function analysis*.
[2] Cameriere, Ferrante, Cingolani, *Variations in pulp/tooth area ratio*, pp.1-3.
[3] Cameriere, Brogi, Ferrante, Mirtella, Vultaggio, Cingolani, Fornaciari, *Reliability in age determination*, pp. 861–864; Cameriere, Ferrante, Belcastro, Bonfiglioli, Rastelli, Cingolani, *Age estimation by pulp/tooth ratio in canines*, pp. 166–170.
[4] Cameriere, De Luca, Alemán, Ferrante, Cingolani, *Age estimation by pulp-tooth ratio in lower premolars*, pp. 105-112.
[5] Cameriere, Cunha, Wasterlain, De Luca, Sassaroli, Pagliara, Nuzzolese, Cingolani, Ferrante, *Age estimation by pulp-tooth ratio in lateral and central incisors*, pp. 530-536.
[6] Meindl, Lovejoy, *Ectocranial suture closure: a revised method*, pp. 57-66.
[7] Mays, Zakrzewski, Field, *The relationship between dental wear and age*.
[8] De Luca, Alemán, Bertoldi, Ferrante, Mastrangelo, Cingolani, Cameriere, *Age estimation by tooth-pulp ratio in canine*, pp. 3048-3058.
[9] Fabbri, Viva, Ferrante, Lonoce, Tiberi, Cameriere, *Radiological Tooth-Pulp ratio in canines*, pp. 423-430.
[10] Lonoce, Dalla-Zuanna, Fabbri, Vassallo, Barbiera, *An unexpected demographic regime*.

age span (evaluated with anthropological methods), not allowing more precise age determination, especially for mature and senile age spans. The most useful and precise data are those obtained from upper and lower canines followed by premolars, central incisors and lateral incisors.

Results

Both methods of sex determination produced a large majority of male sex diagnoses: 91.07% for GLA-MAS and 92.86% for NUC-MAS. This is in accordance with local traditions and archaeological data that this grave was mainly used for the burial of the monks from the nearby monastery. The observed high incidence of cranial traumas (both *peri-mortem* and *ante-mortem*) on subjects living in a monastic context and many clearly due to interpersonal violence (blunt force and sharp force injuries), is most probably related to war episodes connected to Tamerlane and Tahmasp I's raids and attacks in the Borjomi gorge that have to be confirmed by C14 dating of these remains[1] (as it is recorded in the literary sources – Tabatadze – and still surviving in the Green monastery legend on monks' blood stains on river stones).[2] The Green Monastery first appeared in records in the 16th century, when the Persian Shah Tahmasp I destroyed it and executed the monks living there. According to oral tradition, the stones in the stream next to the monastery have been red with the blood of the monks since the massacre and one of these stones can also be seen inside the church, next to the icon of St. George.

We merged into two main age classes the single age estimation data obtained with the three aforementioned methods: -45 years and 45+ years.

These age classes have been established because while the CRX method provides single ages, the other two provide age classes and the youngest age span is <30 years for LSA and 17-25 years for DWE. Data are presented in Table 1.

In Table 2, p-values for a parametric test (χ^2 test) are presented, the observed difference in age distribution has a p-value which is below the 0.05 level, comparing CRX to DWE, that is the distributions of single age estimations obtained with the two methods are statistically different.

[1] Tabatadze, *The struggle of the Georgian people*.
[2] *History of Georgia*.

Age class	CRX	LAS	DWE	CRX	LAS	DWE
	N	N	N	%	%	%
<45	27	38	34	65.85%	70.37%	87.18%
45+	14	16	5	34.15%	29.63%	12.82%
Total	41	54	39			

Table 1. Number and percentage of individuals in the two main age classes according to the three methods employed in the study.

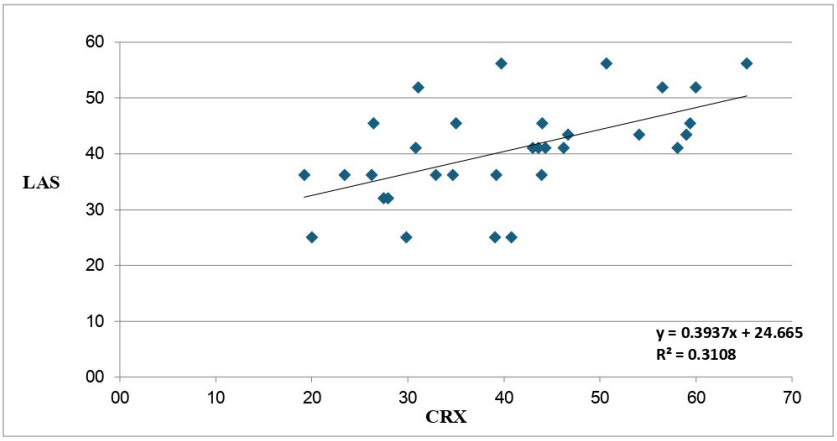
As to LAS and DWE, the p-value is very close, 0.055734, to the level of statistical significance. On the contrary, considering CRX and LAS, the p-value is high (0.639006), that is the two methods produce age classes distributions not significantly different between them.

	CRX	LAS	DWE
CRX		0.639006	0.025062
LAS			0.055734
DWE			

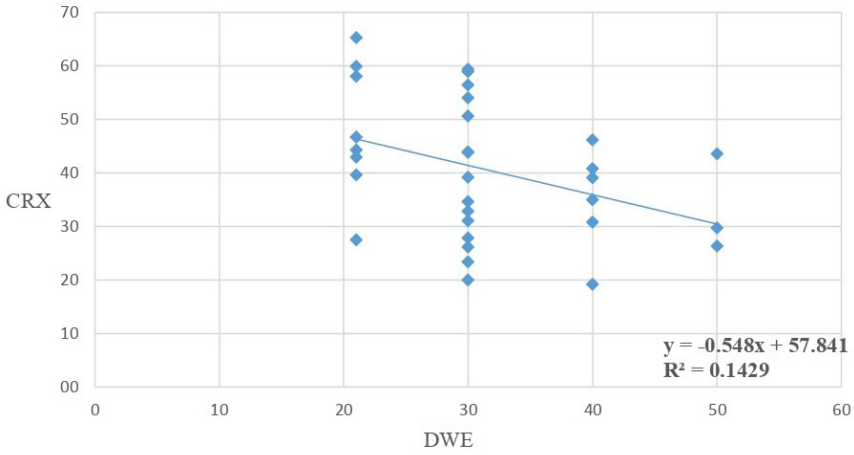
Table 2. $\chi 2$ TEST, p-values.

Regarding the individual results obtained with the different methods for LAS and DWE methods that produce age spans we used the central value of the span itself and the age of 50 for those subjects estimated as 45+, in we report the correlation between LAS and CRX (**Graph. 1)**. The Pearson's correlation coefficient shows a positive correlation, r is 0.5575, p-value is 0.000917.

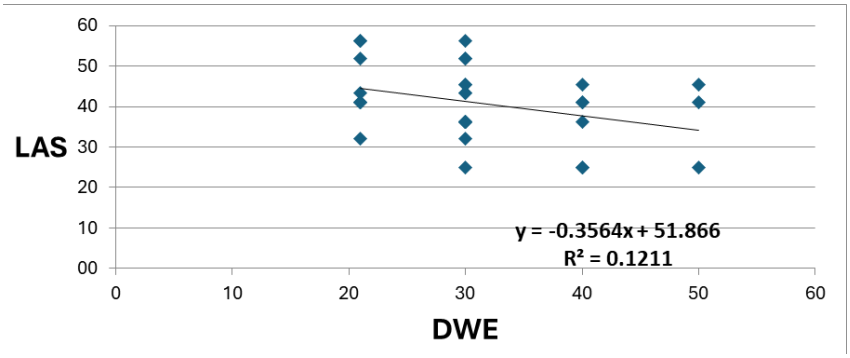
On the contrary, the correlation between CRX and DWE (**Graph. 2**) is negative, r is -0.378, p-value is 0.032919.



Graph. 1. Scatter plot of individual age estimations with LAS and CRX methods.

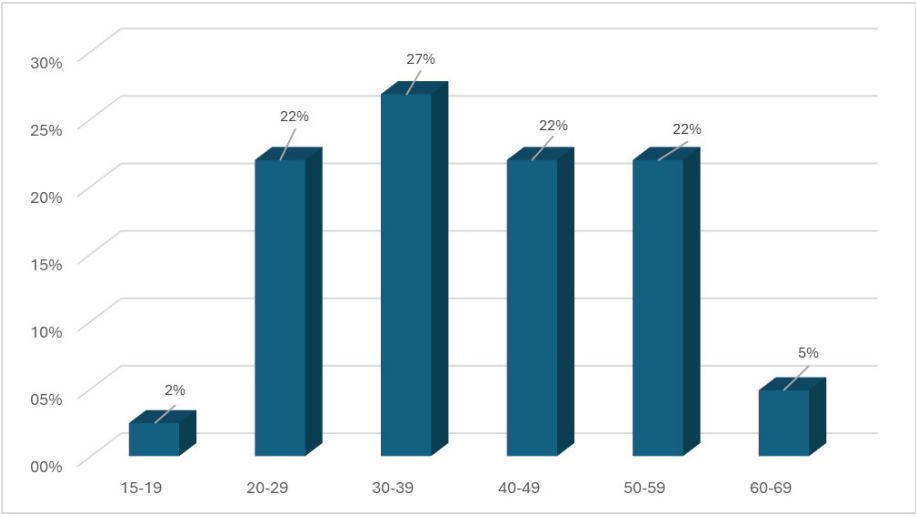


Graph. 2. Scatter plot of individual age estimations with DWE and CRX methods.



Graph. 3. Scatter plot of individual age estimations with DWE and LAS methods.

Similarly, the correlation between LAS and DWE (**Graph. 3)**, is negative, r is -0.3481, p-value is 0.050896. Alltogether the evaluation of the coefficients of correlation confirms the impression that the DWE method is not reliable in our sample. This is not surprising as several papers already showed the low reliability of dental wear methods for age estimation when applied to populations far (chronologically, geographically or nutritionally) from the one for whom the selected method has been established.[1,2,3]



Graph. 4. Age Classes of subjects estimated with CRX method.

Conclusions

In conclusion, we can suppose that although the DWE method for age estimation is accepted method in anthropology, according to our study this method is not reliable for our sample, because, apart from some single cases in which the observed high degree of dental wear seems related to dental pathology, dental wear is not particularly marked.

Regarding CRX and LAS we observe a very good agreement in discriminating between young (<45 years) and old (45+ years) adults, and a good correlation between individual ages estimated with the two methods.

The advantage of the CRX method stands out because of the possibility of quantifying the age of older adults, who, using LAS are simply lumped in the 45+ years

[1] Falys, Lewis, *Proposing a way forward*, pp. 704-716.
[2] Jeon, Pak, Woo, *The correlation between the tooth wear*, pp. 759-768.
[3] Viva, Lonoce, Vincenti, Cameriere, Valentino, Vassallo, Fabbri, *The mass burials from the western necropolis*, pp. 307-317.

age class. Indeed, with the CRX method, 9 individuals (22% of the sample) could be assigned to the 50-59 years class age and 2 (5% of the sample) to the 60-69 years age class (Graph. 4).

The mean adult age at death is estimated to be 40.4 years and 34.15% of adults according to CRX fall in the class aged 45+, more than other monastic contexts that have been analysed in the literature f. ex. in Britain (they range from 30% to 20% of the total in three monastic sites mentioned by Gilchrist and Sloane,[1] that are Westminster Abbey, St. Mary Merton and St. Mary Graces and from 20% to 32% in Cambridge Austin Friars cemetery and friary, data from Cessford and Neil[2]), but less than Vicopisano – San Michele alla Verruca, an Italian site that recorded more than 60% of the total number of monks aged more than 45 (39 out of 64 subjects).[3]

Bibliography

Berdzenishvili, ***Essays from the historical geography*** – Berdzenishvili D., *Essays from the historical geography of Georgia, Zemo Kartli-Tori, Javakheti*, Tbilisi, 1985 (in Georgian).

Bertoldi, Giacomello, ***Analisi paleobiologica e paleopatologica degli inumati*** – Bertoldi F., Giacomello R., *Analisi paleobiologica e paleopatologica degli inumati*, In: "L'aratro e il calamo: Benedettini e Cistercensi sul Monte Pisano. Dieci anni di archeologia a San Michele alla Verruca (a cura di S. Gelichi e A. Alberti)", Pisa, 2005, pp. 239-274.

Bitadze, ***Anthropological report on bone material*** – Bitadze L., *Anthropological report on bone material obtained at "Berebis sakdari" in the village of Kvibisi*, Academician Andria Apakidze Archaeological Institute, Scientific-Research Journal "Archaelogy", 8, 2023, pp. 177-199 (in Georgian).

Cameriere, Ferrante, Cingolani, ***Variations in pulp/tooth area ratio*** – Cameriere R., Ferrante L. and Cingolani M., *Variations in pulp/tooth area ratio as an indicator of age: a preliminary study*, JFS, 49, 2004, pp. 1-3.

Cameriere, Brogi, Ferrante, Mirtella, Vultaggio, Cingolani, Fornaciari, ***Reliability in age determination*** – Cameriere R., Brogi G., Ferrante L., Mirtella D., Vultaggio C., Cingolani M. and Fornaciari G., *Reliability in age determination by pulp/tooth ratio in upper canines in skeletal remains*, JFS, 51, 2006, pp. 861-864.

[1] Gilchrist, Sloane, *Requiem: The Medieval Monastic Cemetery*.
[2] Cessford, Neil, *The people of the Cambridge Austin friars*, pp. 383-444.
[3] Bertoldi, Giacomello, *Analisi paleobiologica e paleopatologica degli inumati*, pp. 239-274.

Cameriere, Ferrante, Belcastro, Bonfiglioli, Rastelli, Cingolani, *Age estimation by pulp/tooth ratio in canines* – Cameriere R., Ferrante L., Belcastro M. G., Bonfiglioli B., Rastelli E. and Cingolani M., *Age estimation by pulp/tooth ratio in canines by peri-apical X-rays*, JFS, 52, 2007, pp. 166-170.

Cameriere, De Luca, Alemán, Ferrante, Cingolani, *Age estimation by pulp-tooth ratio in lower premolars* – Cameriere R., De Luca S., Alemán I., Ferrante L. and Cingolani M., *Age estimation by pulp-tooth ratio in lower premolars by orthopantomography*, FSI, 214, 2012, pp. 105-112.

Cameriere, Cunha, Wasterlain, De Luca, Sassaroli, Pagliara, Nuzzolese, Cingolani, Ferrante, *Age estimation by pulp-tooth ratio in lateral and central incisors* – Cameriere R., Cunha E., Wasterlain S. N., De Luca S., Sassaroli E., Pagliara F., Nuzzolese E., Cingolani M. and Ferrante F., *Age estimation by pulp-tooth ratio in lateral and central incisors by peri-apical x-ray*, "Journal for Legal Medicine", 20, 2013, pp. 530-536.

Cessford, Neil, *The people of the Cambridge* – Cessford C., Neil B., *The people of the Cambridge Austin friars*, AJ, 179-2, 2022, pp. 383–444. https://doi.org/10.1080/00665983.2022.2090675

De Luca, Alemán, Bertoldi, Ferrante, Mastrangelo, Cingolani, Cameriere, *Age estimation by tooth-pulp ratio in canine* – De Luca S., Alemán I., Bertoldi F., Ferrante L., Mastrangelo P., Cingolani M. and Cameriere R., *Age estimation by tooth-pulp ratio in canine by perapical Xray: reliability in age determination of Spanish and Italian medieval skeletal remains*, JAS, 37, 2010, pp. 3048-3058.

Fabbri, Viva, Ferrante, Lonoce, Tiberi, Cameriere, *Radiological Tooth-Pulp ratio in canines* – Fabbri P. F., Viva S., Ferrante L., Lonoce N., Tiberi I. and Cameriere R., *Radiological Tooth-Pulp ratio in canines and individual age estimation in a sample of adult Neolithic*, AJPA, 158, 2015, pp. 423-430.

Falys, Lewis, *Proposing a way forward* – Falys C. G., Lewis M.E., *Proposing a way forward: A review of standardisation in the use of age categories and ageing techniques in osteological analysis (2004–2009)*, Int J Osteoarchaeol, 21, 2011, pp. 704-716. https://doi.org/10.1002/oa.1179

Gilchrist, Sloane, *Requiem: The Medieval Monastic Cemetery* – Gilchrist R., and Sloane B., *Requiem: The Medieval Monastic Cemetery in Britain*, London, 2005.

History of Georgia – *History of Georgia*, Vol. III, Tbilisi, 2008 (in Georgian).

Jeon, Pak, Woo, *The correlation between the tooth wear* – Jeon C.-L., Pak S., Woo E. J., *The correlation between the tooth wear of the first molar and the estimated age from the auricular surfaces in a Joseon Dynasty population, South Korea*, Int J Osteoarchaeol, 30, 2020, pp. 759-768. https://doi.org/10.1002/oa.2906

Khvistani, ***Materials for Christian Archeology*** – Khvistani R., *Materials for Christian Archeology of Georgia*, Tbilisi, 2009 (in Georgian).

Laghiashvili, Mtskeradze, ***The results of the archaeological research*** – Laghiashvili G., Mtskeradze G., *The results of the archaeological research conducted on the "churches of the monk"*, Academician Andria Apakidze Archaeological Institute, Scientific-Research Journal "Archaeology", 8, 2023, pp. 131-143 (in Georgian).

Lonoce, Dalla-Zuanna, Fabbri, Vassallo, Barbiera, ***An unexpected demographic regime*** **–** Lonoce N., Dalla-Zuanna G., Fabbri P. F., Vassallo S., Barbiera I., *An unexpected demographic regime: The western necropolis of the Greek colony of Himera (Sicily, Italy) (550-409 BCE)*, JAS, 155, 2023.

Mays, Zakrzewski, Field, ***The relationship between dental wear and age*** – Mays S., Zakrzewski S., Field S., *The relationship between dental wear and age at death in British archaeological human skeletal remains: A re-evaluation of the 'Brothwell chart'*, "Journal of Archaeological Science: Reports", 46, 2022.

Meindl, Lovejoy, ***Ectocranial suture closure: a revised method*** – Meindl R. S., Lovejoy C. O., *Ectocranial suture closure: a revised method for the determination of skeletal age at death based on the lateral-anterior sutures*, AJPA, 68, 1985, pp. 57-66.

Tabatadze, ***The struggle of the Georgian people*** – Tabatadze K., *The struggle of the Georgian people against foreign invaders at the turn of the 14th-15thcenturies*, Tbilisi, 1974 (in Georgian).

Viva, Lonoce, Vincenti, Cameriere, Valentino, Vassallo, Fabbri, ***The mass burials from the western necropolis*** – Viva S., Lonoce N., Vincenti G., Cameriere R., Valentino M., Vassallo S., Fabbri P. F., *The mass burials from the western necropolis of the Greek colony of Himera (Sicily) related to the battles of 480 and 409 BCE*, Int J Osteoarchaeol, 30, 2020, pp. 307-317. https://doi.org/10.1002/oa.2858

Walker, ***Sexing skulls using discriminant function analysis*** – Walker P. L., *Sexing skulls using discriminant function analysis of visually assessed traits*, AJPA, 136, 2008, pp. 39-50.

**Liana Bitadze, Shorena Laliashvili,
Giorgi Mtskeradze, Giorgi Laghiashvili,
Roberto Cameriere, Leonardo Catalini,
Denise Piano, Piera Allegra Rasia, Elena Rova,
Francesca Bertoldi, Pier Francesco Fabbri**

A Comparison between Anthropological (Dental Wear and Cranial Suture Closure Analysis) and Forensic (Dental Radiographic Approach) Methods of Age Estimation on a Middle Ages Human Sample from Beris Saqdrebi (Borjomi, Georgia)

Summary

The traditional methods of age estimation applied on cranial remains diagnose age according to dental wear and sutures' obliteration. These methods were applied to our bio-archaeological sample, which mostly consisted of skulls lacking the lower jaw, that were recovered from the crypt, where monks were probably laid to rest on stone shelves and after some time their skeletonized remains were moved to the lower part of the burial, so that they completely lost their anatomical connection. The aim of our research is to estimate which method can detect biological age more reliably, comparing the traditional anthropological methods based on dental wear and sutures and the forensic Cameriere's radiographic approach on canines.

This research is of great importance for different reasons: in the monastery's crypt an impressive number of subjects is buried, allegedly all belonging to the monastic part of the population and thus representing the largest assemblage of this kind in Georgia; the monastery itself was functioning for centuries, reflecting the influence of different historical and archaeological contexts. Founded in the 10th century AD, abandoned in the 16th century and recently re-opened after the archaeological excavations and restorations, the monastery and its cemetery yield an enormous amount of human skeletal remains belonging to a selected population sample and have huge potential both for anthropological data collection and comparison, and for the testing of new techniques.

X-ray method of age determination is based on an irreversible biological process, that is size regression of pulp, caused by the generation of secondary dentin. At a young age, the pulp chamber is quite big and it occupies the largest area of teeth on X-rays but as age increases it reduces its size. According to this approach, we can calculate age, based on the pulp regression phenomenon and apply a specific formula for single-

rooted teeth. An important feature of this method is that it claims to be much more precise than other ones, the result in this case being a biological age and not a mere range. This radiographic approach turned to be extremely useful, especially in mature-senile age classes (45-50+), which with traditional anthropological techniques tend to be misdiagnosed and grouped in a single, flattened span.

Dental wear method (DWE) is not particularly suitable or reliable for our sample because this population and its dental evidence appear to be far from those selected for the proposed methods of dental wear, with a different pathological incidence and the biasing factor represented by the post-mortem loss of the anterior dentition due to taphonomic factors, while in the case of the X-ray method (CRX) and classical skull suture ossification method (LAS), these two methods show matching results both for younger age ranges (<45) and for older ones (45+).

The X-ray Cameriere's method indicates for elderly subjects that 40-49 and 50-59 spans represent each 22% of studied individuals and 60-69 span represents 5% of the total sample. Ages older than 45+ would have gone misdiagnosed with traditional approaches while in this human population, 34,15% of the subjects appear to be aged more than 45+ and this percentage is definitely high, if compared to other solely monastic contexts in Europe. The mean age of the population has been calculated at 40.4 years.

**ლიანა ბითაძე, შორენა ლალიაშვილი,
გიორგი მწყერაძე, გიორგი ლაღიაშვილი
რობერტო კამერიერე, ლეონარდო კატალინი,
დანიელა პიანო, პიერა ალეგრა რასია, ელენა როვა,
ფრანჩესკა ბერტოლდი, პიერ ფრანჩესკო ფაბრი**

ასაკის განსაზღვრის ანთროპოლოგიური (კბილების ცვეთა და თავის ქალას ნაკერების შეზრდა) და სასამართლო (რენტგენოლოგიური) მეთოდების შედარებითი ანალიზი შუა საუკუნეების ადამიანის ნიმუშებზე „ბერის საყდრებიდან“ (ბორჯომი, საქართველო)

რეზიუმე

კრანიალურ ნაშთებზე გამოყენებული ასაკის განსაზღვრის ტრადიციული მეთოდები შესაძლებელს ხდის ასაკის დადგენას კბილების ცვეთის და ნაკერების შეზრდის ხარისხის მიხედვით. ამ მეთოდებით ვიხელმძღვანელეთ საძვალიდან ამოღებულ ბიოარქეოლოგიურ ნიმუშებზე, თავის ქალებზე, რომელთაც არა აქვთ ქვედა ყბა. ბერები დაკრძალულნი იყვნენ ქვის თაროებზე. გარკვეული დროის შემდეგ, დანაწევრებული გამომშრალი ჩონჩხი თაროებიდან ძვალსაცავის შიგნით გადაჰქონდათ. კვლევის მიზანი იყო გაგვესაზღვრა, რომელი მეთოდით შეიძლებოდა უფრო ზუსტად დაგვედგინა ბიოლოგიური ასაკი: ტრადიციული ანთროპოლოგიურით (კბილების ცვეთა, ნაკერების შეზრდა), თუ კამერიერეს სასამართლო-სამედიცინო რენტგენოლოგიური (ერთფესვიანი კბილების – ეშვების) კვლევით.

ჩატარებული სამუშაო უაღრესად მნიშვნელოვანია სხვადასხვა მიზეზის გამო: მონასტერში მიკვლეული ამ რაოდენობის კრანიალური ნაშთის შესწავლა საქართველოში ჯერ არ განხორციელებულა; ამავდროულად, მონასტერი ხანგრძლივი დროის მანძილზე (X-XVI სს.) ფუნქციონირებდა და თვალნათლივ ასახავს სხვადასხვა ისტორიულ და არქეოლოგიურ კონტექსტს; მონასტრის ძვალსაცავში და მის გარშემო არსებულ სასაფლაოზე მოპოვებულია უამრავი ადამიანის (ბერების, ადგილობრივი მოსახლეობის და ამდენად, შესაძლოა, სხვადასხვა სოციალური ფენის წარმომადგენლების) ძვლოვანი ნაშთები, რომელთა შედარებით შესწავლას დიდი მნიშვნელობა ენიჭება ახალი მეთოდების აპრობაციისათვის.

ასაკის განსაზღვრის რენტგენოლოგიური მეთოდი ეფუძნება შეუქცევად ბიოლოგიურ პროცესს, მეორადი დენტინის წარმოქმნით გამოწვეული

პულპის ზომის შემცირებას. ახალგაზრდა ასაკში პულპის კამერის მოცულობა საკმაოდ დიდია და რენტგენოგრამაზე კბილის უდიდეს ფართობს იკავებს. ასაკთან ერთად, მისი ზომა მცირდება. მას შემდეგ, რაც გამოითვლება კბილის მთლიანი და პულპის კამერის ფართობები და აღნიშნული მონაცემები ჩაისმება სათანადო ფორმულაში, ვიღებთ ინდივიდის გარდაცვალების ბიოლოგიურ ასაკს (და არა ასაკობრივ დიაპაზონს), რაც მნიშვნელოვანია სტატისტიკური და პალეოდემოგრაფიული კვლევებისთვის. რენტგენოლოგიურმა მეთოდმა განსაკუთრებით საგულისხმო შედეგები მოგვცა, ზრდასრული და ხანდაზმული ადამიანების ასაკის დადგენისას, რასაც ანთროპოლოგიური მეთოდებით „45-50+“ ასაკობრივი კატეგორიით აფასებენ და რომელიც უფრო ზუსტი განსაზღვრის საშუალებას არ იძლევა.

გარდაცვალების ასაკის დაზუსტება კბილების ცვეთის მიხედვით (DWE) შესასწავლი ნიმუშებისათვის სანდო არ არის, რადგან უმეტესობას სიცოცხლეშივე კბილების დაკარგვა აღენიშნება. ამიტომ კბილების ცვეთის მაღალი ხარისხი არ ვლინდება. როგორც ჩანს, ეს დაკავშირებულია სტომატოლოგიურ პათოლოგიებთან.

რაც შეეხება კამერიერეს რენტგენოლოგიურ (CRX) და თავის ქალას ნაკერების შეზრდის კვლევის (LAS) მეთოდებს, მათ შორის აღინიშნება ძალიან კარგი თანხვედრა. ეს შეეხება როგორც ახალგაზრდა (<45 წელზე) და უფროსი (45+ წელზე) კატეგორიის ინდივიდებს, ასევე ინდივიდუალური ასაკის პირებს.

თავის ქალას ნაკერების შეზრდის მიხედვით (LAS) ხანდაზმულების ასაკი 45+ წლით განისაზღვრა, ხოლო კამერიერეს მეთოდით ამავე კატეგორიის (45+) ინდივიდების ასაკი უფრო მეტად დაზუსტდა. კერძოდ, დადგინდა, რომ გარდაცვლილთა შორის 40-49 და 50-59 წლის ასაკობრივი კატეგორიის პირები 22% -ს, ხოლო 60-69 წლის – 5 %-ს შეადგენს.

კვლევებით დადგინდა, რომ გარდაცვლილთა საშუალო ასაკი 40,4 წელს შეადგენს, ხოლო მათ შორის 45 წელზე უფროსი ასაკის ადამიანთა კატეგორია 34,15%-ს. ეს უკანასკნელი მონაცემი უფრო მაღალია, ვიდრე სამეცნიერო ლიტერატურაში აქამდე წარმოდგენილი შესაბამისი პარალელური მასალის შესწავლის საფუძველზე მიღებული მონაცემები.

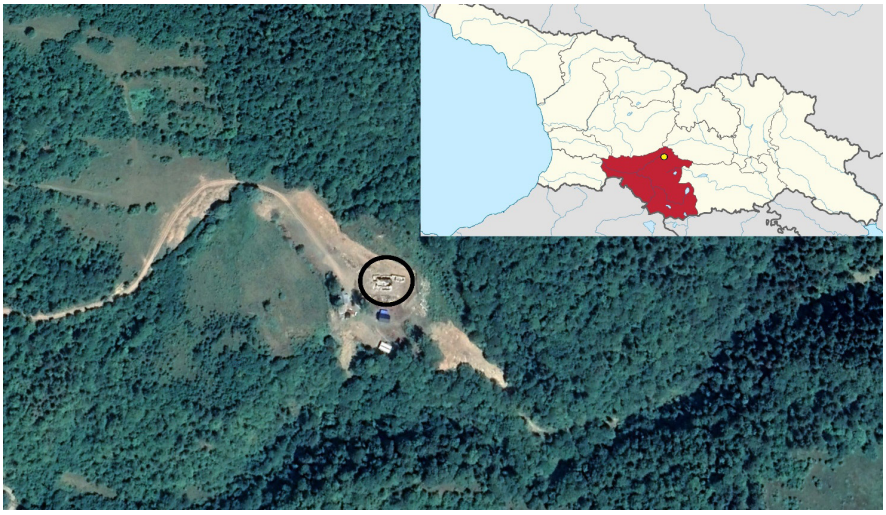


Fig. 1: map (სურ. 1: რუკა)

Fig. 2 (სურ. 2)

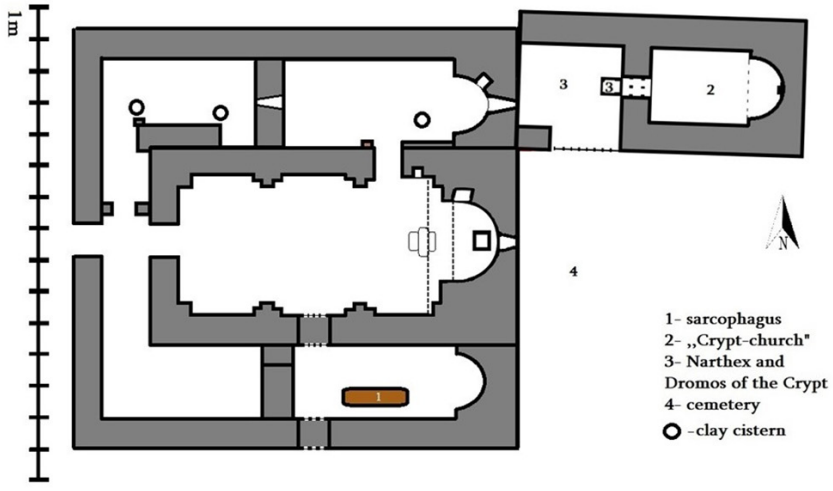


Fig 3 (სურ. 3)

Fig. 4 (სურ. 4)

Fig. 5 (სურ. 5)

Fig. 6 (სურ. 6)

Fig. 7 (სურ. 7)

Illustrations:

Fig. 1. Location of the church.
Fig. 2. Church before and after cleaning.
Fig. 3. The plan of the church.
Fig. 4. Crypt.
Fig. 5. Sarcophagus.
Fig. 6. Bone remains of the crypt.
Fig. 7. Bone remains of the crypt.

ილუსტრაციები:

სურ. 1. ეკლესიის მდებარეობა.
სურ. 2. ეკლესია გაწმენდამდე და მის შემდეგ.
სურ. 3. ეკლესიის გეგმა.
სურ. 4. საძვალე.
სურ. 5. სარკოფაგი.
სურ. 6. საძვალის ძვლოვანი ნაშთები.
სურ. 7. საძვალის ძვლოვანი ნაშთები.

Acknowledgements

We want to acknowledge funding from IIMAS and partly from an Erasmus grant for training and teaching awarded by the University of Venice, Ca' Foscari (Italy) to one of the Authors. The preliminary survey of the sites and the study of the materials was carried out at Borjomi Monastery of the Nativity of the Virgin Mary, Potoleti Church and Green Monastery (from 17 to 21 July 2023 and from October 25 to November 8, 2023), followed by X-raying and sampling of all preserved dental samples from the 619 skulls of Berebis Saqdrebi in June 2024. Currently, this anthropological and archaeological research is carried out under the patronage of the Italian MAECI for 2024 and financed by Ca' Foscari University from the Fund for archaeological research.