

## THE CONDITION OF THE DENTO-MAXILLARY SYSTEM IN TWO HISTORICAL AGES. ANTHROPOLOGICAL STUDY ON SKULLS FROM THE MESOLITHIC ERA AND THE EARLY MIDDLE AGES, DISCOVERED ON ROMANIAN TERRITORY

MANUELA POPESCU<sup>a</sup>, OLIVIA POPOVICIU<sup>a</sup>, CRISTINA STAN<sup>b</sup>, ANDREI SOFICARU<sup>b</sup>, NICOLAE MIRITOIU<sup>b</sup>  
and CRISTIANA GLAVCE<sup>b</sup>

<sup>a</sup>Department of Orthodontics and Dento-facial Orthopedics, Faculty of Dental Medicine U. M. F. "Carol Davila"  
Str. Eforie nr 4-6, Bucharest, e-mail: manupopescu@yahoo.com

<sup>b</sup>"Francisc I. Rainer" Institute of Anthropology, Eroilor Sanitari 8, P.O. Box 3513, 050471, Bucharest  
e-mail: asoficaru@yahoo.com

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The spectacular evolution for dental therapeutic techniques is the outcome of the complexity of the dento-maxillary pathology of the contemporary man. The study means to investigate two samples of skulls belonging to ancient populations: Mesolithic Age and early Middle Age, from the collection of the "Francisc I. Rainer" Institute of Anthropology. We intend to highlight the main dento-maxillary traits specific to the man of those times: attrition, growth pattern anomalies, particularities of decay and its complications. Through comparison with the actual population, these observations may be of assistance in diagnosing dental pathology and institute eventual prophylactic measures in contemporary dental medicine.

*Key words:* Dento-maxillary system; Mesolithic; Medieval age; Attrition.

### INTRODUCTION

Anthropologic studies evaluating the evolution of the dento-maxillary system from a dentistry perspective demonstrate that the so frequent dental pathology of the contemporary man is frequently the illustration of phylogenetic evolution characteristics and ontogenetic variations induced, throughout the historic, social, economic and cultural journey of the human species.

The hominization process lasts millions of years. The homo sapiens sapiens has itself an existence of tens of thousands of years. There are significant differences between various evolutive stages, but, as regards the dental pathology, its increased incidence seems to be a characteristic of the most recent hundreds of years.

The particularly high incidence of dental diseases occurrence in the actual population is well known. With few differences this is present in the

population of at least the previous thousand years: decay and its complications, periodontal disease, orthodontic pathology.

The international specialty literature contains numerous studies trying to identify cranial, facial and dento-maxillary similarities or differences between men of different historical ages: prehistoric ages, antiquity, Middle Age, modern times<sup>3-5,6,8</sup>.

Darwin, in 1881, stated that "the posterior area of the jaws is always shorter in the civilized human populations", incriminating the civilized man's food habits (prepared food, of lower consistency)<sup>7</sup>.

Begg,<sup>1</sup> an orthodontist who realized important anthropological research, is the most representative supporter of the theory that a characteristic of the modern man is the lack of attrition due to modified food habits, the main consequence being the shortening of the alveolar arches and derived from this the frequent appearance of crowding.

From this perspective, we have realized the anthropological and orthodontic examination of the cranio-facial parameters and their dispersion in two samples of population:

- 1) the first group includes 5 adult skulls dating from the Mesolithic period, found in the collection of the “Francisc I. Rainer” Institute of Anthropology;
- 2) the second group includes 20 adult skulls, discovered in an archaeological site dating from the centuries XI-XII, the Early Middle Ages, located on the Danube, on the current village Nufaru, 5 km from the town of Tulcea. The historical and archaeological data confirm that the skeletons found here belong to a population with Balkan origin, with a significant Greek component. The archaeological diggings are conducted under the patronage of the Romanian Academy and the National History Museum.

The anthropological comparison between the two lots is possible because of the similarity between the populations concerned. The historical and archaeological data concerning the Middle Age group of skulls indicates their belonging to the white Caucasian race, and concerning the Mesolithic group they are considered similar as race.

The only difference is the historical and cultural period in which the subjects lived, specifically in food and marital customs, economical and social environment.

The approximate age of the skulls is determined on the basis of two criteria: the features of cranial sutures- using the scheme of determining the chronological age created by Vallois<sup>9</sup>- and the degree of molar abrasion, using a numerical classification of the age depending on the degree of the molar abrasion conceived on British skulls from the Neolithic-Middle Age<sup>2</sup> period. This age-determination of the skulls is useful for selecting subjects with similar ages in the contemporary sample.

## MATERIALS AND METHOD

We performed the dento-maxillary system analysis by investigating the following aspects:

### 1. Odontal situation

- The integrity of dental arches;
- Dental injury: cavities, cuneiform lesions, marmorations;
- The presence of tartar.

### 2. Degree of wear (abrasion)

- assessed on the basis of the numerical classification of the age made on the British skulls from the Neolithic-Medieval period, abrasion being an element of differentiation in recent human evolution<sup>2</sup>.

**3. Dento-alveolar analysis** (in many cases done selectively, depending on the integrity of skeletal parts):

- Dental measurements:
  - Incisive sum (IS= the sum of the maximum distal diameters of the four superior incisors)
  - Dental perimeter (DP= the sum of the maximum mesio-distal diameters of the teeth of an arch)
  - Alveolar perimeter (AP= the length of the alveolar arch)

### 4. Occlusion analysis

The occlusion assessment in the three spatial plans of the permanent dentition, but also in temporary and mixed dentition, in the skull collection dating from Middle Age there are also children skulls.

**5. Status of the wisdom teeth**, assessed by:

- odontal state;
- position;
- occlusal reports;
- degree of abrasion;

### 6. Dental anomalies

Isolated anomalies like inclusion, ectopia, diastema, rotations, supernumerary teeth, anodontia.

### 7. Skeletal anomalies

As changes of growth and development of the maxillary and mandibular jaw base, associated with dento-alveolar changes, increasingly common in the current population.

## RESULTS AND DISCUSSIONS

Obtained data will serve as a basis for comparative analysis of the cranio-facial development for populations who have lived in the Balkan geographical area in the two periods of time.

### Mesolithic sample

Includes five skulls, selected on the criterion of a higher integrity of the cranial skeleton, investigations in the interests of a more complex situation of the dento-maxillary apparatus. The skulls are from Schela Cladovei, an important Romanian source of Mesolithic anthropological material, being discovered in the period of 1967–1968, and they are part of the Mesolithic collection of the Paleoanthropology Department of the “Francisc I. Rainer” Institute of Anthropology, representative as historical and anthropological value and not only for Romanian territory, but also European territory.

We are presenting three of the five skulls included in the present study:

First skull, with code Largirea M7, XVI 1, estimated at the age of 17 years, impressing by the diagnosis of a dento-alveolar anomaly type generalized mesial position on the left side of the dental arches (Fig. 1).



Fig. 1. Mesolithic skull – Largirea M7, XVI 1.

As all Mesolithic collection, it provides very interesting data:

- full permanent dentition, with the third molars in eruption, with the lack of odontal lesions type cavities, cuneiform injuries;
- abrasion grade 3 on the  $M_1$  (first molar), 2+ and 2 on  $M_2$  (second molar)(according to Brothwell<sup>2</sup> classification)
- the presence of interproximal abrasion, destroys the contact points, transforming them in contact surfaces on premolar-molar level;
- extremely interesting for filo- and ontogenetic interpretation of dento-maxillary characteristics is the presence of dental malpositions type ectopic eruption of the superior left canine and increased rotation of the inferior left canine;
- the wisdom molars are erupting in a vertical axe , there is only a slight mesial inclination of 48;
- class I Angle occlusal and skeletal relations, with minimum frontal overbite;
- perimeters analysis revealed:
  - DPsup=137/APsup=146
  - DPinf=138,4/APinf=140
  - IS=7+9+9+7=32

The dental arch perimeter fit into the alveolar arch perimeter.

The second skull (Fig. 2), with code SB4, M1, Schelet1, V 1, with a corresponding age of about 30 years, is presented in special storage conditions, that provided conditions for almost total conservation of the head skeleton; has entailed the following observations:

- complete permanent dentition, dentally intact;
- advanced abrasion, grade 4 on  $M_1$  , 3 on  $M_2$  , and 2 on  $M_3$  (third molar) (according to Brothwell<sup>2</sup> classification)
- the presence of interproximal abrasion in the lateral area, with destroying the contact points, that are transformed into contact surfaces;
- there are no dental malpositions, lower incisive crowding;

– Angle class I occlusal and skeletal relations, with frontal head to head occlusion, determined probably by advanced abrasion of the frontal groups;

– perimetrics revealed:

DPsup=126,5/ APsup=132

DPinf=122,06/ APinf=132

IS=6,6+8,6+6,6=30,4.

The gap between the dental and alveolar perimeter may be due to advanced abrasion, the maximum diameters measured on the dental level are not corresponding to the real maximum dental diameters.



Fig. 2. Mesolithic skull – SB4,M1,Schelet 1,V 1.

Third skull (Fig. 3), an important piece of the collection, received radioactive carbon dating, by that ascertaining:

– full permanent dentition, dentally intact;  
 – the abrasion is far advanced, grade 5++ on M<sub>1</sub>, 5+ on M<sub>2</sub> and M<sub>3</sub> (according to Brothwell<sup>2</sup> classification);

– the presence of interproximal abrasion in the lateral area, with destroying the contact points, that are transformed into contact surfaces; at the frontal level, particularly upper, interdental spaces appear due to the attrition up to ½ of the crown length;

– there are no dental malpositions, lower incisor crowding;

– class I occlusal and skeletal relations, with frontal overjet 0, determined in this case, probably, by the advanced abrasion of the frontal groups;

– perimetrics revealed

DPsup=116/ APsup=142

DPinf=111/ AP inf=140

IS=6,6+8,6+8,6+6,6=30,4



Fig. 3. Mesolithic skull, radioactive carbon dated.

The huge gap between the dental and alveolar perimeter confirms the advanced degree of abrasion, that is going up to dismantling of the clinical crowns on molar level; yet is not a nutritional masticatory abrasion, but is the result of the dento-maxillary apparatus assimilation of a working tool, probably in the tanning hides activity.

The analysis of the Mesolithic lot has entailed the following observations:

1. the absence of classical odontal lesions type cavities, cuneiform injuries;
2. the presence of a high grade of occlusal attrition, up to the entire crown height on the whole level of the arch, by masticatory nutrition function and masticatory occupational function.
3. the presence of interproximal abrasion in the form of extended area of contact;
4. the masticatory area includes the entire dental perimeter, including the wisdom teeth region;
5. the dental perimeter is smaller than the corresponding alveolus, in most of the cases to aligned arches;
6. neutral skeletal relations, class I Angle;
7. neutral occlusal relations, with one exception, in which was found the classical dental crowding at canine level;
8. the dento-maxillary system selectively has the work tool role, may be an expression of social organization of the specific human group, with an exact distribution of individual duties.

#### Middle Age sample, XI-XII centuries

Discovered in an archaeological site on the current village Nufaru, at 5 km from the city of Tulcea, and dated from XI-XII century, the selected skulls for this study, through the differences that are presented by comparison with the ones in the Mesolithic lot, on the dento-maxillary system level, confirms the biological and historical evolution of the human species in the 9000 years that passed.

The investigation of the above mentioned issues, in this sample of 20 skulls, has highlighted the following:

1. We noticed the presence of decay with 15% frequency (3 of the 20 skulls), as follows:
  - at skull M13, Nufaru 2005, pct. “Trecere bac” (Fig. 4) there are mirroring cavities on the first and second right upper premolars,

concerning the marginal crest and the occlusal 1/3 of proximal faces, superficial cavities with low depth; an extremely interesting aspect can be found: edentulous spaces that correspond to the lower first and second molar bilateral, with the eruption of the lower third molars;

- at skull M3, Nufaru 2002, pct. “Trecere bac” (Fig.5) there are superficial cavities in the vestibular fossa of the lower molars;
  - at skull M5, Nufaru 2005, pct. “Trecere bac” (Fig.6) it can also be noticed the lack of the first and second lower molars on the right side, and the wisdom teeth present a massive coronary destruction, with radicular remains persisting on the arch;
2. There is localized dental abrasion on the entire dental arch, including on the wisdom teeth, but it decreases in comparison with what we found, for the same group of age, at the Mesolithic skulls. For the Mesolithic period we found the maximum grade of abrasion 5++ for the 33-45 age category, while for the Middle Age the maximum is 5.
  3. At 15 of the 20 skulls, benefiting from the skeleton and dento-alveolar integrity, the occlusion could be evaluated: in all the cases the occlusion is neutral, being class I Angle dental reports.
  4. The third molars are all aligned on the arch and participate at the occlusal function, proofed by the abrasion found at their level.
  5. We have not found any skeletal anomalies, a single skull presented upper moderate proclination of the incisors, but more as a structural aspect.
  6. There are isolated skeletal anomalies:
    - at three skulls we found lower incisive crowding,
    - at M13 skull, Nufaru 2005, pct. “Trecere bac” (Fig. 4) the right upper second molar is nanic, erupted and aligned on the arch, while the wisdom tooth separately analyzed, being detached from the maxillary because of the destruction of the skeletal component, dimensionally fits to the limit of microdontia, is therefore bigger than the second molar;
  7. There is also a skull that with an entopic upper canine and reversed angle with the lower arch.



Fig. 4. M13, Nufaru 2005, pct. „Trecere bac”.



Fig. 5. M3, Nufaru 2002, pct. „Trecere bac”.

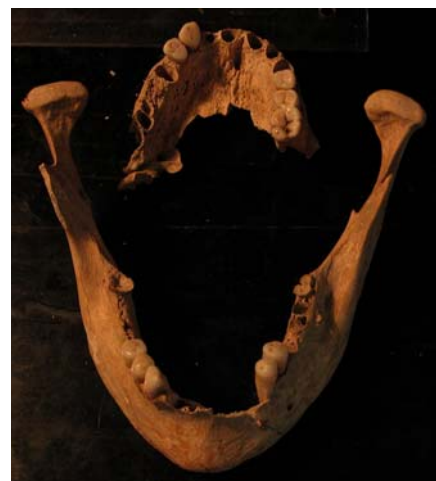


Fig. 6. M5, Nufaru 2005, pct. „Trecere bac”.

## CONCLUSIONS

Both historical ages, investigated from a dental perspective, display particularities of the dento-maxillary system regarding the dental and the orthodontic component.

Regarding decays, these are totally absent in the Mesolithic sample, starting to appear within Middle Age, but with low frequency.

The attrition morphology and importance displays a descending pattern, from affecting the molar crowns almost completely during Mesolithic to areas of dentine in the medieval population. The third molar takes part in mastication in both periods (proved by the existence and degree of attrition). The dento-maxillary system also has an important occupational role during Mesolithic, being assimilated to a working tool. Dento-maxillary anomalies exist even since Mesolithic.

Anthropological evaluation studies on the dento-maxillary system are of great importance in elucidating the dental diseases etiology in the modern man, and subsequently setting up the prophylactic and interceptive treatment guidelines, so important for the dento-maxillary system evolution.

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