

Anthropology in Contemporary Dental Medicine: A Review

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Background. The evolution of the dental medicine and the anthropology has resulted in the emergence of new theories to explain the etiology and pathogenesis of some oro-dental anomalies and dental diseases. The anthropological elements implied in the onset of oro-dental anomalies are as follows: phylogenetic evolution, dental arch parameters, post-eruption changes, teeth loss patterns, cultural factors. Considering the role of genes in the onset of the development of teeth (position, number, shape), various orofacial syndromes are influenced by a combination of genetic, environmental and cultural factors. The knowledge of the basic anthropologic elements by the dental practitioner could contribute to an early diagnosis of these anomalies and early start of an effective therapy related both to anatomical and functional components.

Conclusions. By focusing on the anthropological factors, the dental practitioners can perform more effectively the primary or secondary prevention as well as the amelioration of the stomatognathic system disorders. A complex personalized preventive and therapeutic approach must include pharmacogenomics approaches, familial transgenerational and cultural factors counselling, as well as modern measurement and analysis of the alveolar bone parameters and post-eruptive changes.

Key words: oro-dental anomalies, genetic factors, environmental factors, cultural factors, anthropology

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The evolution of the dental medicine and the anthropology has resulted in the emergence of new theories to explain the etiology and pathogenesis of some oro-dental anomalies and dental diseases. The anthropological elements implied in the onset of oro-dental anomalies are as follows: phylogenetic evolution, dental arch parameters, post-eruption changes, teeth loss patterns, cultural factors (1). The anthropology researchers related the dental arch parameters to aesthetics and other social functions of the oral cavity (speaking, mastication). Also, the functional status influences the mental and spiritual state of the human being (1).

Considering the role of genes in the onset of the development of teeth (position, number, shape), various orofacial syndromes are influenced by a combination of genetic control, environmental and cultural factors.

The disorders of the teeth development related to the genetic factors are as follows: hypodontia, anodontia, hyperdontia, microdontia, macrodontia, enamel hypoplasia, unerupted teeth, impacted teeth (2, 3). The mutations of the genes involved in the odontogenesis are related to the phylogenetic evolution of the stomatognathic system, one of the factors researched by anthropology. The development teeth changes can conduct to significant disorders of the occlusal, muscular, and articular parameters, and modern paraclinical examens (CBCT, T-SCAN, EMG, CADIA) are requested to detect them and to monitorize their posttreatment evolution. The arthroscopy and RMN can be use to detect the disorders related to the temporo-mandibular joints. The developmental teeth changes and post-eruption changes influenced by the widespread extension of the processed foods favours the dental crowding and occlusal disorders due to the decrease of the average masticatory forces (4, 5, 6).

The Romanian population with age at least 55 is featured by the high prevalence of the extended partial edentation (70-75%) and a teeth pattern loss related to the maxillary and mandibular molars absence associated to high frequency of class I Kennedy edentation (7). The pattern of the teeth loss, especially the anterior teeth, can alter the psychic status, the social activities, and the working productivity (8). Also the loss of the posterior teeth will alter both the masticatory functions and the systemic status of people. The patterns of the teeth loss can be related both to positive or negative cultural and environmental factors, research fields related to the anthropology (9, 10, 11). The influence of the nutritional diet changes, migration, social and economic factors, interethnic marriages, are cultural factors that can influence the status and the functions of the stomatognathic system (9, 10).

The anthropological studies found a direct relation between the population and both the morphological parameters of the components of the stomatognathic system and the post-eruption changes. The anatomic parameters of the alveolar bone and the teeth migration are especially important for the diagnostic and treatment of the edentulous patient candidate to implant-prosthetic therapy (12, 13).

The arch form influences the success rate of the implant-prosthetic therapy considering clinical situations when anterior implants are splinted with posterior implants to minimize cantilever forces (14). For example, the ideal biomechanical arch form depends on the restorative situation as the tapering arch form is favorable for anterior implants supporting posterior cantilevers, and the square arch form is favorable when canine and posterior implants are used to support anterior teeth (15). The key areas of the prosthetic field that must be assessed

preoperatively by CBCT in the implant-prosthetic therapy are as follows: favorable areas for implantation as posterior maxillary area and chin rest areas, cancellous bone areas localized to anterior area or palatal areas as well as the parameters of the mandibular alveolar ridge (height under 8 mm and width under 6mm require alveolar augmentation techniques) (16). Software applications can be used for the measuring of bone support parameters (height, width, density) for the planning and the execution of the proimplant and implant procedures and the design of the future prosthetic reconstruction (17). Some of these applications are NobleGuide (Nobel Biocare, USA), Digital Smile Design (DSD), ImplantMaster (iDent, USA), Implant 3D (Media Lab, Italia), EasyGuide (Keystone Dental).

The diagnostic and the therapeutic management of the oro-dental anomalies can represent a challenge considering various factors and mechanisms involved in their etiology and pathogenesis. The knowledge of the basic anthropologic elements by the dental practitioner could contribute to an early diagnosis of these anomalies and early start of the therapy that must be related both to the anatomical and functional components. The consideration of the anthropologic factors could help the dentists in their goal to rehabilitate both the biological and the social functions of the individuals. The preventive approach and early treatment will optimize the functional and aesthetic outcome and will improve their life quality and wellbeing.

Conclusions:

- By focusing on the anthropological factors, the dental practitioners can perform more effectively the primary or secondary prevention as well as the amelioration of the stomatognathic system disorders
- A complex personalized preventive and therapeutic approach must include pharmacogenomics approaches, familial transgenerational and cultural factors counselling, as well as modern measurement and analysis of the alveolar bone parameters and post-eruptive changes.

References

1. Firu P, Forna N- Dinții în antropologia medicală dentară, Iasi, 2012.
2. Pekka Nieminen, Dental Anomalies: Genetics, eLS, (2013). Wiley Online Library
3. Ye, X.; Attaie, A.B. genetic basis of nonsyndromic and syndromic tooth agenesis. *J. Pediatr. Genet.* 2016, 5, 198–208.
4. Rose JC, Roblee RD. Origins of dental crowding and malocclusions: an anthropological perspective. *Compend Contin Educ Dent.* 2009 Jun;30(5):292-300

5. Yan-Vergnes W, Vergnes JN, Dumoncel J, Baron P, Marchal-Sixou C, Braga J. Asynchronous dentofacial development and dental crowding: a cross-sectional study in a contemporary sample of children in France. *J Physiol Anthropol.* 2013;19;32:22
6. Evensen JP, Øgaard B. Are malocclusions more prevalent and severe now? A comparative study of medieval skulls from Norway. *Am J Orthod Dentofacial Orthop.* 2007 Jun;131(6):710-6.
7. Firu, P., Apostolescu S. Asistența și învățământul de medicină dentară din trecut până în prezent. Ed. Junimea, Iași, 2006.
8. Forna N. Actualități în clinica și terapia edentației parțial întinse. Tratat de protetică dentară. Edit. "Gr.T.Popa" Iasi, 2008.
9. Swati Jain, Basavaraj Patthi. Cultural anthropology and its effect on oral health. <https://www.researchgate.net/publication/313860039>. 2014
10. Townsend G, Kanazawa E, Takayama H. New directions in dental anthropology: paradigms, methodologies and outcomes. <https://www.adelaide.edu.au/press/titles/dental-anthro/new-directions-in-dental-anthropology-ebook.pdf>. 2012.
11. Scott GR, Turner CG. The Anthropology of Modern Human Teeth: Dental Morphology and Its Variation in recent human populations. Cambridge Press, 2004.).
12. Forna N & col. Protetica dentară vol.I,II. Editura Enciclopedica, 2011.
13. Frățilă Dragoș, Scutariu Monica Mihaela, Forna Norina. Clinical and paraclinical indicators in the establishment of an oral diagnosis with high predictability. *Romanian Journal of Oral Rehabilitation.* 2014;Vol. 6, No. 2: 100-105.
14. Manga Snigdha Gowd, Thatapudi Shankar, Rajeev Ranjan, Arpita Singh. Prosthetic Consideration in Implant-supported Prosthesis: A Review of Literature. *J Int Soc Prev Community Dent.* 2017 Jun; 7(Suppl 1): S1–S7.
15. Michalakakis KX, Calvani P, Hirayama H. Biomechanical considerations on tooth-implant supported fixed partial dentures. *J Dent Biomech.* 2012; 3:1758736012462025.
16. Forna N, Firu P. Introducere în antropologia medicală dentară. Iasi: Casa Editorială Demiurg, 2013.
17. Dreiseidler T, Tandon D, Kreppel M, Neugebauer J, Mischkowski RA, Zinser MJ, Zöller JE. CBCT device dependency on the transfer accuracy from computer-aided implantology procedures. *Clin Oral Implants Res.* 2012 Sep;23(9):1089-97