

## **Peculiarities of the Foreign Dental Students' Teaching the Topic "Oral Cavity Physiology"**

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Assessing the typological belonging taking into consideration represents informative research area in the theoretical and applied branches of Science. Ethnic (EV Tkachenko et al., 2022), gender, age and mixed typological aspects such as gender-age (V Tsuber et al., 2014), ethno-gender-age (EV Tkachenko et al., 2022; EB Ткаченко, 2021), temperament (EV Tkachenko, MKSK Pathan, 2021), interhemispherical asymmetry individual profile (EV Tkachenko, 2021), control locus (EB Ткаченко, BH Соколенко, 2021), behavioral strategies (EV Tkachenko et al., 2022; E Tkachenko et al., 2022), character accentuations and constitution types are the most known and used in research among them. Students represent separate age category, if the examined are foreigners – ethno-age typological aspect is taken into consideration, if male and female foreign students are in the research groups – they say and they write about ethno-gender-age typological aspect.

Studying the students particularly the foreign ones is paid much attention at the Science modern stage in Pedagogy and Psychology (M Yu Zhukova, OV Tkachenko, 2022; МЮ Жукова та ін., 2022; OV Tkachenko et al., 2023; M Zhukova, O Tkachenko, 2022; OV Tkachenko, 2022; M Yu Zhukova, OV Tkachenko, 2022; M Yu Zhukova, OV Tkachenko, 2022), physical education (VO Zhamardiy et al., 2020; VO Zhamardiy et al., 2020), Physiology (EV Tkachenko, M Aqib, 2022; EV Tkachenko et al., 2021) as well as under pathological conditions (EV Tkachenko et al., 2022; HN Sartipi et al., 2021).

The topic studied actuality is based on the fact that the pathological conditions appearing in the maxillary-facial area impact greatly on them in other organism systems and organs. For example, chronic decay can result into endocarditis, myocarditis, pericarditis and even myocardial infarction. Any doctor and moreover dentist must understand tight connections between maxillary-facial area as a whole and oral cavity

in part with other body systems. These questions are asked at the profile dental chairs as the module ones, exam ones, as the synopses, unfortunately without paying attention to them when studied these dental academic disciplines. In our opinion not one lesson but more must be dedicated to oral cavity physiology. We have only one lesson unfortunately though it has been two earlier – dedicated to oral cavity non-specific functions (other than participating into food digestion) and the specific ones (TN Zaporozhets, EV Tkachenko, 2011). Maxillary-facial area possesses vast blood circulation, innervation, powerful apparatus of non-specific and specific defensive means and mechanisms. There must be tight inter-disciplinary integration when studied these questions between Physiology; Pathophysiology (phenomen of Sanarelli-Shwartsman is characteristic for the oral cavity); Immunology (many non-specific and specific defensive mechanisms are characteristic for the oral cavity); Hematology (any inflammatory process in maxillary-facial area has two consequent phases of hemostasis changes namely hypercoagulation “to put the microorganisms in a prison made of fibrin threads, erythrocytes, thrombocytes and leucocytes” and hypocoagulation with fibrinolysis activation and this thrombus or clot dissolving for these causative agents liquidating; brightly-red, raspberry-like tongue with the teeth off-prints is characteristic for the pernicious malignant B12-deficient anemia of Addison-Birmer) (TN Zaporozhets, EV Tkachenko, 2009; ВП Мищенко, ЮИ Силенко, 2001); Otorhinolaryngology, Logopedy and Defectology (speech belongs to the oral cavity non-specific functions) (O.I. Березан, 2005; СД Яковлева, 2004); Biochemistry (catalase and superoxide dismutase have not only erythrocytic origin but are released as the salivary compounds; oral cavity pathology has characteristic biochemical changes for example lead intoxication is accompanied by black gums; mercurialism or mercury intoxication is accompanied by grey gums, the students must be ready to perform differential diagnosis with the cerebellar diseases because thremor is characteristic for them both, thus, Neurology and Neurophysiology must be managed well as well as Endocrinology because thyrotoxicosis is distinguished by thremor as well; the specialists of Professional or Occupational medicine call this state with neurological problems appeared macromercurialism, without them – micromercurialism; Endocrinology additionally (maxillary-facial area as a whole and oral cavity in part secrete and release biologically- and physiologically-active substances having systemic action (VD Dixit, DD Taub, 2005), puberty, pregnancy are accompanied by sexual hormones increase with gingivitis, female climax is accompanied by systemic osteoporosis and enamel decalcination (estrogens perform calcium delay in the organism while climax is accompanied by calciury and calcium release with feces) (R Eastell, 1998), thyroid hormones take part in enamelogenesis, parathyroid – in dentinogenesis while juvenile hypothyroidism is accompanied by dental and skeletal changes (PM Ng’ang’a, ML Chindia, 1990), endocrinal diseases are accompanied by the maxillary-facial area changes for instance acromegaly results into interdental gaps widening, food residues leaving in them with further decay and inflammatory processes development, multiple caries and periodontal diseases are characteristic for diabetes mellitus (TM Zaporozhets et al., 2019; WA Soskolne, 1998); Psychology (dental setting

is accompanied by anxiety, fear and acquires big knowledge in assessing the human individual peculiarities and thus belonging to human typologies, that represents the subject of Differential Psychology and should be paid more attention at the lessons on higher integrative functions study in Physiology course to our point of consideration; Cardiology (we mentioned the links between non-treated caries and heart problems).

There appeared a whole direction in a Science – Physiological Dentistry.

It is rather important to pay much attention and to spend enough time while discussing the topic studied actuality at every lesson start (ВП Мищенко, 2004). It is a big pity that there are domestic dental students who think that they don't need to study a whole organism but need to study only the oral cavity physiology while forgetting that organism represents an integrity with tight connections between separate components *id est* between the oral cavity and other systems both under physiological and pathological conditions as it has been stated and approved earlier in our article; that every studied topic has not only theoretical but expressed applied significance in non-stomatological academic disciplines, Dentistry, often even not one branches of it. For example, electromyography (EMG) and chronaxymetry are applied in Physiology, Sport Medicine, Pharmacology (while controlling over the medicines' application regimes), Neurology, Traumatology, Pediatrics, Therapeutic Dentistry, Prosthetic Dentistry, Orthopedic Dentistry, Implantology (ВП Мищенко и др., 2002; TN Zaporozhets, EV Tkachenko, 2008). The students pay their attention to EMG of masticatory muscles as well as its types (saturated and non-saturated; local, interferential and stimulative) and analysis. The students of dental faculty get acquainted to such powerful stomatological diagnostic methods as masticatory muscles EMG, chronaxymetry, masticacyography, gnathodynamometry at Physiology corresponding topics dedicated to skeletal muscles physiology and the masticatory muscles peculiarities, excitive tissues common features and activity laws and oral cavity physiology correspondingly. Galvanism is discussed at the second lesson of Physiology course dedicated to bioelectrical phenomena (resting and action potentials) and excitability changes during action potential generation. The teacher should pay the students' attention to the fact that crowns and dentures can be made of different metals possessing varying standard electrode potentials (while reminding the topic in Chemistry about the standard electrode potentials row or the metals' electrical tensions row, the first term was found to be more scientific) with further local currents' appearance between them and thus between crown's parts, near-located crowns, father-located crowns, dentures' parts on one jaw and on both. There can be immediate or delayed allergy reaction (pathophysiologists should also pay great attention to this fact as well as allergologists and immunologists) appearing either right after the dental setting or far after it, characterizing by such non-specific symptoms as sialorrhea (ptyalism or hypersalivation), hypo- or even asalivation, bad or absent appetite, decreased or perversed taste (gustatory) and/or other sensitivity types in the oral cavity in part and the maxillary-facial area as a whole. The patient can not realize exactly when these problems appeared, can have anaphylactic reactions till anaphylactic shock (belonging to the I-st type of allergy reactions by Koumbs, the IgE-dependent type of immediate allergy), losing the patients' consciousness can appear

during the dental setting, right after it or even in course of 10-15 minutes after it. Other symptoms can occur in 2-30 days after the setting. We see significant inter-disciplinary integration between Physiology, Pathophysiology, Prosthetic Dentistry or Orthopedic Dentistry (dealing to dentures or prostheses) and Orthodenty (dealing to separate teeth' setting, crowns' producing). There must be Proficient Specialists making dentures, there exists special secondary dental education about this.

Physiologists should emphasize to the fact that masticatory muscles belong to the powerful ones comparatively to the other skeletal muscles which are the ones of velocity. We pay the students' attention to the maxillary-facial area receptors and their classification while distinguishing their unique feature – crossed adaptation – increased sensitivity to the sweat is accompanied by significant desire to eat the salty (a human being wants to eat meat or salty cucumber after sweet foods) explaining by close relationships between these receptors by location. The receptors' adaptation is characteristic for all the receptors except the visceroreceptors (located in the inner organs and vessels, which must react to all external and internal stimuli while possessing poly-modality and without habituation/adaptation), the crossed one – only to oral cavity chemoreceptors – taste or gustatory receptors. Also we pay attention to other types of receptors in the maxillary-facial area – parodont and masticatory muscles' proprioceptors while mentioning about parodont hardness – 75 kg by the left molars and 75 kg by the right ones. The data about masticatory pressure are important in Prosthetic Dentistry, the patients' gum appropriate state can testify to normal masticatory pressure, cyanosis – to increased pressure after the denturing; only gums' massage can help to such a patient.

Superficial and deep sensitivity distinguishing features in the maxillary-facial area are discussed separately.

One should pay significant attention to the oral cavity changes at anemias, non-specific and specific defensive mechanisms, vascular-platelet and coagulational hemostasis, anticoagulants and fibrinolysis activity and peculiarities in this region (ИВ Мищенко и др., 2022). It is of crucial importance to remember that any inflammation in part in the maxillary-facial area is accompanied by hypercoagulation “to put microbial agents in the prison made of fibrin threads, erythrocytes, leucocytes and thrombocytes” at the 1<sup>st</sup> phase with following hypocoagulation at the 2<sup>nd</sup> phase due to fibrinolysis acting to this thrombus for its liquidating with the causative agents and for salivary ducts passage renewal as it has been mentioned earlier. The students are told about fibrinogen and prothrombin absence in saliva that results into saliva impossibility to coagulate while emphasizing to oral mucosa big sensitivity to microtrauma even during eating, tooth extraction and other dental manipulations, dental diseases course distinguishing features at vasopathies, thrombocytopenias, thrombocytopathies, parahemophilias and hemophilias. The tutors should explain the bases of possible proper hemostasis reaching and maintaining at dental manipulations under physiological and pathological conditions.

We pay a significant attention to maxillary-facial area and oral cavity circulation peculiarities, rheoparodontogram and rheodontogram while studying the chapter about

cardiac-vascular system physiology. Dental students pay attention to the oral respiration during managing the chapter about respiration and vast excretory function of oral cavity in part during liver and kidneys insufficiency, diabetes mellitus at the lessons on humoral regulation, digestive and excretory systems physiology.

There exists individualized approach in the Science different branches – in Medicine (Personalized Medicine – it is correct if one treats a human being but not a disease, as Hippocrate proposed long ago), Psychology (psychological counseling is performed with the principle of considering a human being as a biopsychosocial system, with getting acquaintance to his/her life conditions from the very childhood, inheritance and taking the personal human individual peculiarities into maximal consideration, thus typological belonging) and Pedagogy (the Student-centered educating but not the Tutor-centered one must be in priority, based on its inclusive character; inclusive education for foreign applicants was proposed to be applied in the educating process by UNO and UNESCO; we think that inclusive education must be introduced for teaching the foreign applicants in much bigger extent than it is, the majority of educational establishments consider inclusive education as a proper one only for the people with special needs without taking the natural, psycho-social adaptation as a whole and its subtypes peculiarities such as cultural, cross-cultural or trans-cultural and pedagogical as well as their difficulties in the foreigners at any academic discipline and any chapter managing abroad) (HN Sartipi et al., 2021; EB Ткаченко, ВН Соколенко, 2021).

Thus, we distinguish such peculiarities while teaching the topic about oral cavity physiology to the foreign students:

- 1) inclusive education based on maximal individual, Student-centered approach to teaching, respect and humanism;
- 2) to take typological belonging of the applicants into obligatory consideration, to use the knowledge of Differential Psychology and Pedagogical Psychology;
- 3) to perform oral explaining the material every lesson obligatorily;
- 4) to give the well-adapted, short materials with less text and more figures, pictures, topical schemes, especially in the groups with language barriers, the Russian and the Ukrainian ones, before and after the practical lessons, to give the lecture materials on the electronic carriers of the information;
- 5) not to unite letters if to give the materials in the written form, even to use big capital letters, especially in the groups with language barriers;
- 6) to write the materials with colored pens, markers, chalks in the concepts and on the board (during non-remote education);
- 7) to use English and French in the Russian and Ukrainian academic groups to help the foreigners to understand materials better or to give them the materials in these languages additionally;
- 8) to emphasize to the discussed interrelations between maxillary-facial area and other body systems under physiological and pathological conditions;
- 9) to mention correlations between structure and function under physiological and pathological conditions – so called biogenetic law discovered by Hekkel;

- 10) to pay attention to every topic applied significance every lesson taking early physiogenesis into consideration beginning with the 2<sup>nd</sup> course to the dental students;
- 11) to propose the students writing the short materials or synopses about:
- maxillary-facial area as a whole and oral cavity particularly concerning to their interrelations to other organs and systems work under physiological and pathological conditions;
  - oral cavity non-specific functions;
  - every studied topic actuality in the work of a dentist;
- 12) to use such grams as masticacyograms, electromyograms of the masticatory muscles;
- 13) to propose the students working in the students' scientific research group on the topics between Physiology and Dentistry as well as typological aspects importance in Theoretical and Applied Dentistry for example:
- the patients' typological belonging and dental diseases peculiarities in ethiology, pathogenesis, clinics, in part injuries location and gravity, effective treatment and preventive measures (it is known that left-handed patients brush their teeth better on the right that leads to right-sided pathological weariness of the teeth and worse hygienic indexes on the left, left-handed adolescents had worse local T-cellular immunity in their gums on the left that resulted to left-sided gingivitis in them);
  - PMSU dental students considerations about dental pathology preventive measures (to perform a survey);
  - to perform a survey about the students' typological belonging, their dental problems, tooth pastes usage preferences, preventive or only treaty visiting the dentist and its regularity;
  - dental problems and life style peculiarities.

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