The oral microbial flora

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The wide concept of health does not benefit of a single definition, but of multiple definitions and this plurality is related to the knowledge assimilated and the socio-economic dynamics. This is due to the fact that health is an ongoing process, its notion changing with the passage of time. Thus, at international level, health is nowadays defined considering multiple criteria. In the last decade, the analysis of relevant statistical data presents an unfavourable evolution for the three major components of population dynamics: natality, mortality and external migration, accompanied by the deterioration of the entire demographic construction and tendencies of heading towards an imminent demographic drift. Humans protect themselves against the microbial aggression by using their inborn barriers and mechanisms that are completed and modulated by acquired barriers and mechanisms. For a microorganism to reach the internal environment and generate an infectious process, it must get through and overcome these barriers. In order to overcome these barriers, the infectious agent must first adhere to the surface of epithelial cells and then pass through the epithelium. Local defence mechanisms help limit the infection and present the antigen to the regional lymphatic ganglions, contributing at the initiation of the immune response. On the other hand, the infectious agent present in the lymphatic system causes lymphangitis and satellite adenitis, which stand as a filter in the infections’ way. The study included 127 patients with bacterial infections that were studied from 2014 to 2018. Infection can be caused by certain species of germs whose main feature is pathogenicity. Specific infections are caused by a foreign infectious agent that has accidentally reached the oral cavity causing oral lesions that appear in the secondary phase of the general infection. Specific infections are individualized, caused by a single microbe (monomicrobial) while the non-specific ones are associated (polymicrobial).

Keywords: oral microbial flora, bacteria, human host, conflictual reactions, biological unbalance, oral primoinfection.

The oral cavity presents one of the most concentrated and various microbial populations. The oral cavity hosts a complex microbial ecosystem with different species and development particularities according to the anatomic structure (lips, teeth, tongue, jugal mucosa, palate, saliva, gingival cleft) and the artificial constructions they are located on (bridges, dental prostheses). Numerous bacterial species interact either in a synergetic manner, creating the proper environment for the survival of others, or antagonistic manner - some species are in competition with the others for food and survival [1-3].

Oral microbial flora presents itself as follows: Gram positive bacilli, Gram negative bacilli, cocci or aerobic and anaerobic bacilli. Anaerobic or optional anaerobic streptococci represent almost 80% of the total viable germs [4,5].

Candida and coliforms are indigenous in the oral cavity of adults. Protozoans are present in a smaller number; in high number indicate a poor oral hygiene.

Lactobacilli are found near the cavities. Candida is much more frequent in patients who were subjected to a treatment with antibiotics than in those who were not treated. After cortisone treatment plurispecific fungal strains appear.

There are bacteria that attack the specific elements of connective tissues - collagen, chondroitin - sulphuric acid, hyaluronic acid. A single species of diphtheroid, in pure culture, produces chondroitinase, Bacillus melanogeneticus, capable of digesting active collagen [6-8].

The biological unbalance of this flora generates a pathogenic microbial activity favouring orodontal infections which lead to focal disease. Multiple cavities, chronic superficial, marginal and profound periodontitis, gangrene are just a few of them.

The constant decline of tuberculosis in developed countries changed in certain areas where the prevalence of AIDS increased. Nevertheless, in Romania, there is still a high prevalence of tuberculosis, regardless of the HIV infections. The initial localization of tuberculosis on the oral mucosa is, classically, considered to be exceptional [9-11].

Oral primoinfection represents only 0.25%. It is the most frequent from the initial extrapulmonary tuberculosis (61%). Almost every time it is caused by bovine bacilli. The contamination has its origin in food, in milk or unsterilized dairy products.

In its typical form, oral primoinfection presents itself as an oral chancre adenitis complex and slight modification of the general condition in children aged between 8 and 12 years old. Submaxillary adenitis is first; it can be mono or pauci-ganglonary. Ganglions are, at first, firm and painless, mobile at superficial and profound level; they rapidly become sensitive, warm, with integumentary infiltration.

Being painless, the chancre can pass unobserved if it is not systematically studied; the ulceration being superficial it is often positioned on the lower arch mucosa at the cervix
of a tooth or two; the ulceration is ovoid or cross-like. The
general signs are: weakness, asthenia, anorexia, subfebrile
state.
Parotid tuberculosis is rare and the diagnosis is very
difficult to establish. In 1883 De Paoli presented the first
case of parotid tuberculosis. Since then the number of cases
increased, well known authors (Dechaume, Firu, V.
Popescu, Gafar, Burliba et al.) indicating also other cases of
parotid tuberculosis.

The disease affects mainly female individuals, aged over
40 years old. The evolution of the disease expands on a
very long period of time (2-20 years). In 50% of the cases
the disease is unilateral while in 30% of the cases it is
bilateral.

The general condition of the sick individuals is generally
good; they present unilateral or bilateral tumefaction. The
pulmonary radioscopy is normal, IDR intensely positive to
tuberculin, high VSH level [12-14].

Pathogenically speaking, some authors claimed the
tuberculous bacilli reached the lymphatic pathway starting
from tuberculosis of tonsils.

The same authors state that, on the same pathway, the
infection can reach the teeth. In case of generalized
tuberculosis, it can also be taken into consideration the
hematogenic pathway. Most authors indicate that in almost
75% of the cases the lesion is isolated – without bacillary
antecedents. The rarity of the cases, according to some
authors, might be the cause by the fact that the salivary
parenchyma has an extraordinary defence ability. Biopptic
puncture can be extremely useful.

In case of infected gums it can be used the bacteriological
examination of the gingival pocket or of the bacterial
plaque proliferated in the pockets.

The samples are collected, depending of the case, with
one sterile cotton swab placed on a Miller needle or, in
case of dental plaque, with a sterile scaler. Afterwards it
is inseminated in culture environments and is sent to the
laboratory for bacteriological investigations.

Vinzent, Sehmans and Goudert proposed the gingival
hemoculture to demonstrate the ethiopathological role of
bacteria in chronic marginal periodontitis, whose value
was not confirmed by the studies conducted in the Pasteur
Institute from Lille [15].

The factors influencing the development of oral
microbial flora are: the oral environment which creates
the favourable conditions for bacterial species to survive
and reproduce: humidity, neutral pH, food, and as long as
these features of the environment are present, the bacteria
will continue to exist; adherence to the epithelial cells of
the mucosa, dental enamel and dentin form intergeneric
cocaggregates; protection areas are those places that protect
the poorly adherent microbial species: occlusion fossette,
enamel fissures, polysaccharidic matrix of the pellicle
acquired from the surface of the dental hard tissue, gingival
sulcus; the elimination of the microorganisms from
the oral environment occurs naturally through the
desquamation of the oral epithelium, the salivary flux,
movements of the tongue and soft tissue, through
mastication and deglutition and artificially by tooth
brushing, use of dental floss and mouthwater; the
nutrients necessary for the survival of bacteria come from
food, being mainly carbohydrates and saccharides which
through metabolization by part of certain microbial species
from the bacterial plaque that adheres to the hard intraoral
structures decrease the pH level and initiate the
demineralisation process of the enamel; local or systemic
antimicrobial therapy (antibiotics) affect the balance
of the oral flora favouring the proliferation of fungi, involved
in the cutaneous-mucous infections [16-18].

The microorganisms from the oral fluid are different
from those that survive on the hard tissues forming the
bacterial plaque.

These are more vulnerable and easier to remove using
the means of oral hygiene unlike the ones forming the
microbial plaque that adheres to the teeth and which are
more resistant and more difficult to remove.

It is important to know that by respecting the measures
of oral hygiene it is intended the removal of the bacterial
plaque from the hard structures but the oral environment
will never be a sterile one. Maintaining the balance of the
oral microbial ecosystem is essential because commensal
bacteria have a protective role, helping the immune
response and preventing the development of other
pathogenic species that make the organism ill [19-22].

Between the microbial flora and the human host (the
mouth) can appear conflictual reactions, resulting various
infections that manage to overcome the resistance
mechanisms of the host.

Sickness is determined by two factors: the bacterial
factor (the virulence and number of microorganisms) and
the field factor (the organisms’ resistance and the local
defence system).

Bacterial groups produce organic compounds that
protect the pathogenic bacteria (harmful) leading to the
inactivation of A immunoglobulins and thus decreasing the
local defence ability, causing halitosis.

Non-specific infections are triggered caused by
infectious oral agents (bacterial endocarditis). Non-specific
infections are mixt infections, caused by bacterial groups
acting simultaneously and which associate from a
pathogenic point of view; we refer to endodontic (from
inside the tooth) and periodontal infections (the tooth’s
support system), to neighbouring infections (ears, tonsils,
sinus) [23, 24].

Specific infections are caused by a foreign infectious
agent that accidentally reached the oral cavity; it generates
oral lesions (appear in the secondary phase of the general
infection). Specific infections are individualized,
determined by a single microbe (monomicrobial), while
the non-specific ones are associated infections
(polymicrobial).

Experimental part

Material and method

The study includes 127 patients with bacterial
infections, studied in the interval 2014-2018. The group
of etiological factors cause infectious diseases.

An infectious disease or infection must be seen as the
ensemble of phenomena that take place in the organism
due to the presence, proliferation and the action of
microorganisms. In an infectious process there are
important: the microorganism (the pathogenic agent of
the infection), the macroorganism (where the germ
conducts its biological activity) and the external
environment which exerts its influence on the features of
both macro- and microorganisms. Infectious diseases are
not caused by just any type of germ. Infections can be
caused by certain species of germs characterized by
pathogenicity. Humans can be carriers of pathogenic germs
without getting ill. In the oral cavity of certain people can
be discovered pathogenic bacilli of diphtheria or meningococci,
but nevertheless, these individuals are not ill of diphtheria or meningitis (healthy germ carriers). The
explanation resides in the different causes that are
connected with the features of pathogenic germs and with
the resistance of that particular organism.

Although the representative species for the microbial
flora can be isolated from most of the areas of the oral
cavity, certain surfaces – tongue, dental surface, gums, saliva – tend to favour the preferential colonisation with certain specific microorganisms.

**Results and discussions**

Based on the clinical signs of the patient, the clinician should be suspicious about the apparition of bacteria and choose the right moment for taking the sample for hemoculture. The diagnostic algorithms implemented by different researchers are intended to help the clinician in managing the great amount of clinical data and in transforming this information in predictive scores.

The treatment with antibiotics has only a therapeutic purpose in the basic treatment of post-surgical infection, as helping treatment in surgical infections (abscess, infection of salivary glands), but also in the prophylaxis of superinfection.

The normal oral flora contributes at the protection against infection by: producing bactericidal substances; producing Ig A and peroxidase which interact with the thiocyanate ions from food and the hydrogen-peroxidase produced by the commensal flora; producing lysozyme and lactoferrin; the existence of salivary proteins can inhibit, at their turn, the adherence of bacteria on the surface of teeth and the oral mucosa; the quick turnover from the level of the oral epithelium also helps removing the bacteria that adhered at this level.

Gingival inflammation can be associated to bacterial infection. When the pulp is inflamed it results a constant pressure on the dental nerves and the neighbouring tissues. The pressure can generate moderate or extreme pain, depending of the degree of inflammation and the organism’s immunity.

The bacterial plaque can be differentiated into two main types, depending of the place where it is formed. Thus, there is a supragingival bacterial plaque (appears on the surface of the teeth and on the oral mucosa, roof of the mouth and the tongue) and the subgingival bacterial plaque; they are more vulnerable and easier to remove by means of oral hygiene unlike the ones forming the bacterial plaque adherent to the teeth and which are more resistant and more difficult. Moreover, it prevents and reduces dental plaque, one of the gingival causes, and strengthens the enamel of teeth.

**Conclusions**

The microorganisms from the oral fluid are different from those that live on the hard tissues forming the bacterial plaque; they are more vulnerable and easier to remove by means of oral hygiene unlike the ones forming the bacterial plaque adherent to the teeth and which are more resistant and more difficult to remove.

Maintaining the balance of the oral microbial ecosystem is essential because commensal bacteria have a protective role, helping the immune response and preventing the development of other pathogenic species that make the organism ill.

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