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Prevention Of Caries Before And After Treatment.

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ABSTRACT

The primary targets of caries prevention include elimination of different causes and factors for diseases formation and progression as well as increase of the adaptation abilities of men to adverse environmental factors. We believe that an implementation of preventive measures requires an individual approach taking general diseases and dental characteristics of patients into account. The goal of the research is to increase the efficiency of dental caries prevention in adults by means of creating an individualized caries prevention policy and its putting into practice. The findings have shown that regular dental check-ups of caries-susceptible patients afford an opportunity to achieve a favourable effect in the course of the preventive actions and a long-term optimal result based on the improvement of patients' skills in oral hygiene and motivation of their participation in caries prevention programs.

Keywords: individualized caries prevention, preventive programs, caries prediction, individualized follow-up care program, caries risk patients.

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INTRODUCTION

Health is a condition maintained by natural forces provided, however, that an individual has a strong intention to preserve it. Beautiful teeth have become an integral part of the image of a successful man now when success, prosperity and high social status are primarily associated with good health. Meeting a person for the first time, we always take notice of his or her teeth revealed in smiling and speech [1, 2]. According to the findings of the German Institute of Dentistry, 70% of people consider a feeling of well-being to be dependent on good health, 66% of people think of beautiful teeth as a sign of health, 60% associate their self-esteem with the whiteness of teeth, 61% appraise themselves with reference to tooth strength and health, and 50% believe that healthy teeth contribute to better personal relationships [7].

The prevalence of dental caries in primary teeth among 3-year-old children varies from 14% to 78% with the mean intensity =3.7, which means that every 3-year-old child in Russia has about four teeth decayed. The prevalence of dental caries in permanent teeth among schoolchildren aged 12 ranges from 61% to 96% in different regions of Russia, and comes to 100% in adults [5, 6].

Caries prevention in adults has not been always highly sought at the practical level, and the oral health status of the population of Russia has been generally poor [4].

All countries of the world continue to develop caries prevention programs; an assortment of tooth pastes, oral rinses, chewing gums, and toothbrushes including electrical ones, is constantly increasing. Regular information with reference to various caries preventive means coming from magazine, newspapers, and TV spots might facilitate current situation changing but, unfortunately, the prevalence of dental caries has remained at the same high level, both in children and adults [1, 4]. It can not be denied that such an abundance of consumable items for caries prevention made it possible to choose the most appropriate tooth paste and toothbrush on a doctor's advice or under the TV spots influence. However, the studies performed at different medical schools all over the world including Voronezh State Medical Academy made evident that even regular use of different fluoride-containing agents, standard dental examinations, compliance with the recommendations on proper oral hygiene, and timely made sanitation of the oral cavity give no 100% guarantee for dental caries prevention[3]. Meanwhile, there are a certain percentage of people with little dental caries or caries-free ones residing in regions with a significant reduction of fluoride in water and soil. These individuals, probably, have a certain medium in the oral cavity providing a required metabolic balance, which allows a cariogenic situation to be eliminated. It is our opinion that this peculiarity should be detected and proven scientifically as the world's highest rate of caries prevention efficiency in children equal to 50% shows its definite invalidity to deliver optimal results [2]. The results of the similar prevention in adults have not been supported by substantial evidence but, according to some authors, their rating is even lower than in children (Leontyev V.K., 2007; Kunin A.A., 2007, et al.) [1, 2, 3]. Thus, the primary targets of caries prevention include elimination of different causes and factors for diseases formation and progression as well as increase of the adaptation abilities of men to adverse environmental factors [6, 7]. We believe that an implementation of preventive measures requires an individual approach taking general diseases (i.e. gastrointestinal pathologies) and dental characteristics of patients into account [7].

The goal of the research is to increase the efficiency of dental caries prevention in adults by means of creating an individualized caries prevention policy and its putting into practice.

The control group had doctors' consultations and professional oral hygiene procedures followed by massive preventive measures. The patients were also examined for a comparative analysis of the results. The treatment group underwent our individualized caries-preventive therapy.

The research became possible in 1994 due to foundation of the Center for Individualized Caries Prevention affiliated to the Dental Clinic of Voronezh State Medical Academy. The staff of the Center had been trained and recruited for diagnostic and preventive techniques arrangement and prevention programs development.

The preassessment of patients as well as looking for ways to realize the intended objectives and goals showed up much need for a new integrated system of detection, treatment and follow-up care of caries-susceptible patients. We see the problem solution in implementation of a well-directed, modified method for

caries-susceptible patients' health survey, which should be carried out in three stages. The first stage called screening is an identification of caries risk patients required to be reported; the second stage called registration is intended for registration of patients subject to a follow-up care program; the third stage called monitoring includes individualized medical and preventive measures implementation and their effectiveness control.

The identification of caries risk individuals at the stage of screening has provided support for earlier studies and confirmed the findings on high caries prevalence.

Out of 2673 patients, 11.1% (297 patients) required primary prevention of dental caries, and 88.9% (2376 patients) required secondary prevention. Thus, all the patients required certain preventive measures for dental caries prevention. However, 2054 (76.8%) individuals refused, for a number of reasons, to take part in the caries prevention program and only the rest 23.2% (619 patients) showed their willingness to participate in it. Out of these 619 patients, 419 (67.7%) individuals, i.e. two thirds of the total number of the participants, gave their consent to the preventive treatment only after having consulted a specialist at the Center for Individualized Caries Prevention. This means that educative activities, which may be effective only when implemented in designated structures work and conducted by a specially trained high professional, are still of current interest. As a result of the interview and examination held at the first stage of the health survey, the following patients were selected and referred to the second stage:

- those with a medium, high or extremely high caries intensity;
- those with a periodontal pathology (edema, gingival hyperemia, bleeding on probing);
- those with a visually detected poor oral hygiene;
- those with no clinical indications but wishing to take part in the program.

Chart 1: Symptoms ranging according to the expert estimates

1	Patient reporting
2	Examination, probing
3	Caries intensity detection
4	pH-determination
5	Oral health status evaluation
6	Plaque cariogenicity assessment
7	Acid biopsy of the enamel
8	Enamel remineralization rate determination
9	Enamel health evaluation
10	Gingivitis index determination
11	Bacterioscopy
12	Cytology
13	Identification of the demineralization focuses at the border with filling material
14	Dental hard tissues electrical conductivity testing
15	Evaluation of the buffering capacity of saliva
16	X-ray spectrum microanalysis
17	Gingival hemorrhage index testing
18	Improper tooth filling detection
19	Evaluation of the mixed saliva acidity
20	Periodontal treatment needs determination
21	Plaque quantity determination
22	Plaque-formation rate testing
23	Electric Pulp Testing (EPT)
24	Gingival inflammation intensity detection
25	Oral fluid microcrystallization testing
26	Mixed saliva viscosity testing
27	Salivation rate determination

During the second stage of the health survey, the selected patients were examined with the use of diagnostic techniques for caries risk prediction and detection of the cariogenic factors defined by a prior ranging. Out of 27 diagnostic techniques (chart 2), we specified the 14 most significant ones, which we used in the study.

At the third stage of the health survey called monitoring, the patients were prescribed an active or passive (under clinical indications) caries-preventive therapy focused on elimination of general and local cariogenic factors. Regular dental check-ups were also recommended.

Methodological backgrounds and means of individualized dental caries prevention

Patient reporting	Professional advice
Examination	Related-field expert advice; sanitation; regimen prescription, bottled drinking water prescription
Oral fluid pH	Individual selection of oral hygiene products restoring a normal acid-base balance; Gastroenterologist's advice; prescription of enzymatic and bacterial preparations for the oral and intestinal biocenosis normalization under control of a prescribing physician
Oral health status	Oral hygiene instruction; tooth brushing under control; selection of a tooth paste reducing plaque accumulation; selection of a toothbrush; professional oral hygiene procedures
Plaque cariogenicity	A tooth paste with an antiseptic effect (for 1 month), a tooth paste maintaining proper oral hygiene; laser therapy (Patent No. 2076757)
Enamel resistance (Enamel remineralization rate testing, acid biopsy of the enamel)	Local ionization; laser therapy (Patent No. 2125850); individual selection of a toothbrush and other oral hygiene products with due account for their active components and the patient's age
CPITN, Macrohistochemistry, Bacterioscopy, Cytology	Periodontal advice; individual selection of a toothbrush and other oral hygiene products; laser therapy
Enamel demineralization at the border with filling material	Individual selection of filling material and local laser therapy during and after tooth filling (Patent No. 2125850); ion therapy; individual selection of oral hygiene products

The implementation of the developed program for individualized caries prevention by means of caries-susceptible patients' health survey has demonstrated its high efficiency. Thus, the results of the study go to prove high efficiency of the implemented program regarding to both primary and secondary dental caries.

Saying about the findings, we may conclude that the taken measures have affected favourably the exchange processes in the surface enamel. Our study also reported Calcium and Phosphorus loss decrease, proper oral health status of the patients, non-cariogenic plaque as well as positive tendencies for periodontal and mucosal health maintenance at 36 month after the individualized caries-preventive treatment. Further post-study preventive measures along with regular dental check-ups of the patients duly prepared for such health survey programs are likely to result in stabilization of Calcium, Phosphorus and other tooth minerals loss at the level required for keeping tooth intact and achieving the Ca/P goal, which is essential for acid resistance of the enamel, i.e. its resistance to dental caries. Therefore, the individualized caries-preventive treatment may be conducted in a good manner only within the framework of a health survey.

The findings have shown that regular dental check-ups of caries-susceptible patients afford an opportunity to achieve a favourable effect in the course of the preventive actions (preventing from any aggravation of the cariogenic situation in the oral cavity and eliminating stomatogenic factors initiating the susceptibility of teeth to dental caries) and a long-term optimal result based on the improvement of patients' skills in oral hygiene and motivation of their participation in caries prevention programs. Our dialogues with the patients in the framework of the study have clearly shown a significant increase in the level of their

knowledge and culture as well as their social status activation, which we by no means consider to be an unimportant factor for achieving optimal results in dental caries prevention.

The data resulting from the study may be used in the work of preventive dental units, centers and clinics. However, it indicates a need to rearrange the system of healthcare facilities by means of new organizational structures and methodological procedures implementation and staff instruction focused on creating an adequate complex of services for effective realization of the preventive programs.

CONCLUSIONS

- Dental caries prevention is recommended to be carried out after a thorough examination of the patient's dental status including such diagnostic techniques as acid biopsy of the enamel, enamel remineralization rate testing, oral health status evaluation, plaque cariogenicity identification, CPITN.
- The individualized preventive procedures should be taken in an integrated manner including individual and professional oral health care with an individual selection of oral hygiene products, toothbrushing under control, motivation-oriented oral hygiene instruction, local fluoridation, and endogenous fluorine prevention.
- Such dental health indices as an oral fluid pH, plaque cariogenicity, remineralizing properties of saliva, and enamel resistance to caries may vary considerably in accordance with the preventive measures prescribed.
- All preventive programs should provide for regular dental check-ups by a dental hygienist, correction of the preventive procedures if necessary, caries risk patients (especially those with gastrointestinal pathologies, a low pH, periodontal diseases, reduced enamel resistance to caries) monitoring.
- The detection of a periodontal disease should be followed by a treatment course considering the etiopathogenetic background of the pathology with an individualized follow-up care program development and regular dental examinations.
- Dental caries should be treated with individually selected filling materials in combination with a laser therapy for appropriate tooth enamel rebuilding and preventing from secondary caries progression. All oral hygiene products prescribed in accordance with the patient's dental health are likely to prolong a tooth restoration lifetime in the post-procedural period.
- The high efficiency of the preventive programs may be obtained in the framework of the patients' health survey, which allows to keep the preventive measures under control and to correct them, thereby increasing the patient's immunity against the cariogenic factors.

Conflict of Interest

The authors declare that they have no conflict of interest

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical tandards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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