Testing the effect of Hybenx Oral Tissue Decontaminant (HOTD) in Aesthetic Dentistry

Testovanie účinku HYBENX Oral Tissue Decontaminant (HOTD) v estetickom zubnom lekárstve

Manesh, A. A., Fountoulaki, G., Valova, M., Stanko, P.

MUDr. Amir Amiry Manesh, PhD, MDDr. Georgia Fountoulaki, Department of Restorative Dentistry, Comenius University, Faculty of Medicine and St. Elizabeth Oncologic Institute, Bratislava, Slovak Republic
Bc. Miroslava Valová, AA Klinik sro, Holíč, Slovakia
Prof. Peter Stanko. PhD., Chair of the Department of Stomatology, Oral and Maxillofacial Surgery, Comenius University, Faculty of Medicine and St. Elizabeth Oncologic Institute, Bratislava, Slovak Republic (PhD, Prof.)

Abstract
Introduction: The aim of the study was to provide information about the Hybenx Oral Tissue Decontaminant, its' practical use removing biofilm and effects in clinical praxis. **Methods:** The survey sample consists of 20 patients treated with Hybenx during dental hygiene. Three patients were photographed for the result after using Hybenx. Questionnaires were handed to treated patients and dentists using HOTD. **Results:** Measured values using the two or six sited plaque index after staining with the detector and after treatment with Hybenx. After application of the detective agent, the average plaque index value was 2.725, after the application of Hybenx, the value of 1.216 was calculated so the mean difference before and after using Hybenx is 1.509. **Conclusion:** HYBENX reduces the amount of plaque but can not remove it completely from tooth'surface even despite following the manufacturer's instructions.

Key words: HYBENX, chemical agent, dental hygiene, plaque removal.

Abstrakt
Úvod: Cieľom štúdie bolo poskytnúť informácie o HYBENX Oral Tissue Decontaminant (HOTD), jeho praktickom využití pri odstraňovaní biofilmu a účinkoch v klinickej praxi. **Metódy:** Študijnú skupinu tvorilo 20 pacientov liečených HYBENXom počas dentálnej hygieny. Po použití HYBENXu boli vyšetrené tri pacientky kvôli zisteniu výsledkov. Dotazníky boli vrátené pacientom liečeným HOTDom a zubným lekárom. **Výsledky:** Po ošetrení HYBENXom a nanesení detekčného činidla, na dvoch alebo šiestich miestach, boli hodnoty merané pomocou plakového indexu. Po nanesení detekčného činidla bola priemerná hodnota indexu plaku 2,725, po aplikácii HYBENXu bola zistená hodnota 1,216. Priemerný rozdiel pred a po použití HYBENXu bol 1,509. **Záver:** HYBENX znižuje množstvo zubného povlaku, ale nemôže ho úplne odstrániť z povrchu zubov, napriek tomu, že boli dodržané pokyny výrobcu.

Kľúčové slová: HYBENX, chemické činidlo, dentálna hygiena, odstraňovanie zubného povlaku

INTRODUCTION

Oral cavity hosts more than 700 species of different microorganisms with which we share common nutrients. Benefits come when organisms are in right amount. Vertical transmission happens, so offsprings acquire microbes from parents. Infants become primarily exposed to them natal and later on by their nutrition intake through maternal milk [5].

Mechanism of plaque adhesion

Colonization and Biofilm Formation

Bacteria that have the greatest adhesion are attached together forming extracellular matrix composed of polymeric substances such as polysaccharides, proteins and DNA in order to attract bacteria with less adhesive properties. Extracellular polysaccharides produce bacteria capable of metabolizing sugars, most commonly glucose and sucrose. By sequential binding of bacteria complex colonies are formed. Colony-forming processes involve co-aggregation between the same types of bacteria like streptococci as well as aggregation in different species of bacteria. On the upper layer of the plaque are aerobic, gram-positive bacteria and in the deepest layers of the plaque are anaerobic, gram-negative bacteria. Colony after maturity will begin to grow three-dimensional. As a result of plaque growth after 7 days, streptococci are the dominant microorganisms and after 14 days they give place to anaerobic bacteria [4].

Creation of biofilm - supragingival plaque.

After the teeth have been cleaned, the acellular layer called the pellicle is formed on the surface of the tissue for several seconds. Using calcium and phosphate ions in the enamel, salivary proteins are bound to the surface of the tooth via an electrostatic charge. On the pellicle layer, after several hours, the first gram-positive cocci (Streptococcusanguis) and actinomycetes are present. They are bacteria with high adhesion ability. These types of bacteria form extracellular polysaccharides that promote colony formation. Plaque further increases and increases its volume. There are different types of microorganisms: gram-positive, gram-negative, cocci, rods, spirochetes, fibrous bacteria. Mature plaque, „Plain plaque has a typical structure after about 3 weeks.“ Biofilm consists of inflated bacteria that are active on the surface and slow down their growth in deeper layers of plaque. Accumulation of the mineral crystals begins with the formation of the tartar. Bacteria that are separated start with the formation of new colonies [3].

Mechanism of action of HYBENX

Interested is seen in Hybenx technology as well as mechanism of action as it acts as a strong desiccant. When in contact with liquid various mixtures of sulphonic acids are formed presenting high affinity to water. The sulfate group has a polar internal structure with oxygen atoms on the external surface of the group, which carries a strong negative surface charge. Water molecules also have a structure of significant which gives a negatively charged surface on one side and a positively charged surface on the other. The sulfate group in water is considered to be similar to a large magnet that touches a large negative surface (negative magnetic pole) on many small positive surfaces of water molecules (positive magnetic poles). Reversible hydrogen bonds form between positively charged surface of the hydrogen molecules of the water molecule and negatively charged surface of a group of oxygen atoms. The strength of any hydrogen bond depends, in particular, on the intensity of the negative polarity of the group that is drawn on the water molecule. Sulfate groups actually compete for available molecules of water with other polar molecules near them. The group with the highest „unsatisfied“ polarity will have greater affinity to water and pulls out of the other groups in order to maintain a stronger hydrogen bond. Highly concentrated sulfuric acid has no water or the minimum amount of water bound to its substance. It has affinity for water under such conditions that it is so strong that if no other water molecules are available, it pulls the hydroxyl groups and hydrogen atoms apart from close organic molecules [1].

HYBENX Oral Tissue Decontaminant (HOTD) is a chemical product used by general dental practitioners and hygienists. HYBENX finds place in daily work routine as an additional cleansing product in oral cavity. Main effect is complementing dental treatment without having effect on oral diseases or replacing standard dental procedures. Efficiency of work is improved without any mechanical loading of dentist or patient. Facilitation of working time and convenience of treatment are major characteristics of the product.

The aim of HOTD is to improve the results of treatment by its local application at individual performance with the effect of removing the infectious environment. From the point of view of dental hygiene, application of the product ensures „biofilm separation“ from oral cavity surfaces. The chemical action provides the patient with a more comfortable and less traumatic treatment, unlike a mechanical treatment. Standard mechanical removal of the coating contributes to infection control issues.

HOTD is easy to apply having maximum effect and no damage to soft or hard tissue. Finally, the product is chemically stable without toxic effects on the patient or the attendant. Hybenx should not cause tissue oxidation after application and among characteristics are safety, effect, and easy manipulation in oral tissues [5].

METHODS

Ethics

Hybenx was used in dental clinic by healthcare professionals under direct or indirect supervision of a dentist. During the hygienic phase, the dental hygienist performs removal of deposits by mechanical and chemical cleaning. In connection to simpler and more effective tooth cleaning, HOTD was also designed. It is a viscous liquid of violet color prepared in plastic syringes. Hybenx can be applied locally or throughout the denture, supragingival and subgingival [2].

Patients: number of patients is 20, they all agreed. After application, the fluid is left for 20 seconds. The water is then rinsed with the remnants of the plaque and the applied fluid. The surface of the tooth remains free from damage to the surface and without biofilm. If the tartar is also present, it is necessary to mechanically remove it with subsequent polishing of the surface. Using Hybenx in practice in dental hygiene, work simplifies the caregiver, the cleaner itself results in cleaning without damaging the surrounding tissues. The caregiver is not physically burdened by mechanical cleaning during exercise. For the patient, treatment with Hybenx is more comfortable and less stressful. This fact can be used in patients with excessive fear of treatment. Also less stressful treatment with Hybenx is indicated for children having only limit the age. Children have to be at least 12 years old. Hybenx provides better cleaning options for patients with periodontal disease. A frequent problem of persistent activity of periodontitis may be the problem of insufficient removal of infectious material in the parodontal pocket. Even the depth of the pocket itself represents the risk of persistent periodontitis, so it is possible to use Hybenx to remove soft biofilm. HOTD acts as an antimicrobial agent and disinfects the space in the parodontal pocket, which improves its healing.

CASE RECORDS

Case report No. 1

46 y.o male, negative anamnesis, regular dental visits, intraoral examination: Hard dental tissues present non-microbial damage in the frontal area of the teeth, inactive white spots present on the upper cuts, otherwise sanitized, denture present. Hygienic examination of the KOD index, had the value 7 and CKP, where the neck and interdental areas of the dentition were most stained. Periodicity examination by CPITN had the highest value 2. Mucogingival region with no pathological changes present.

Fig. 1. *Index CKP*
Obr. 1. *Index CKP*

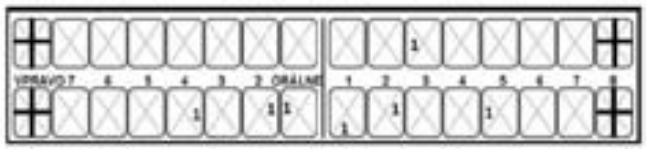


Fig. 2. *Index KOD*
Obr. 2. *Index KOD*

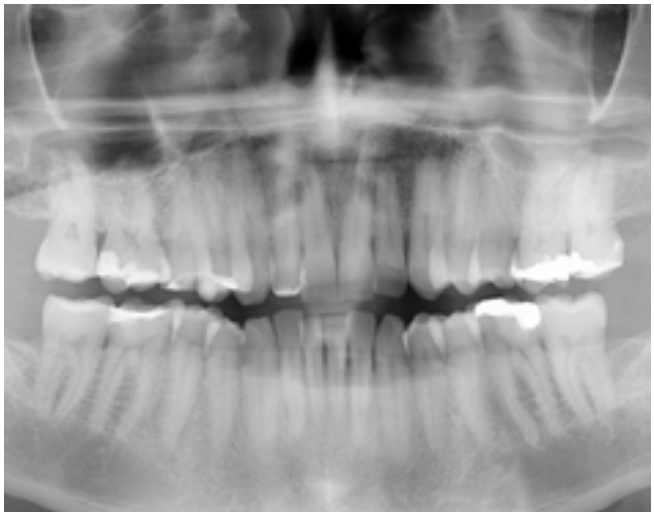


Fig. 3. *OPG*
Obr. 3. *Ortopantomogram*

Fig. 4. *Intraoral xray with retractors*
Obr. 4. *Intraorálny RTG s retraktormi*

Fig. 5. *Intraoral photo after staining with detective agent*
Obr. 5. *Intraorálny pohľad po nanesení detekčného činidla*

Fig. 6. *Intraoral photo after application of Hybenx*
Obr. 6. *Intraorálny pohľad po aplikácii HYBENXu*

Case report No. 2

13 y.o male, negative anamnesis, regular dental visits, Intraoral examination: Microbial and non-microbial changes were not present on hard dental tissues. On OPG superimposed 34, 35, tooth 43 abutted. The hygiene test was performed with the KOD index having the value of 20 and the CKP index showed that the microbial coating was present throughout the body. Using the CPITN index, the highest value was investigated. 2 From the investigation of the mucosa, gingival hyperplasia was detected above the superior frenum.

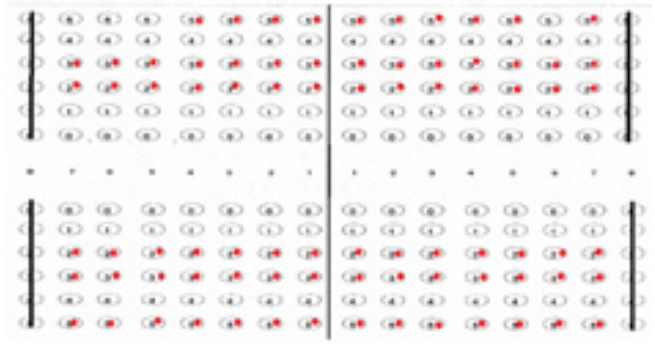


Fig. 7. *Index CKP, No. 2*
Obr. 7. *Index CKP, č. 2*

Fig. 8. *Index KOD*
Obr. 8. *Index KOD*

Fig. 9. *OPG, No. 2*
Obr. 9. *Ortopantomogram, č. 2*

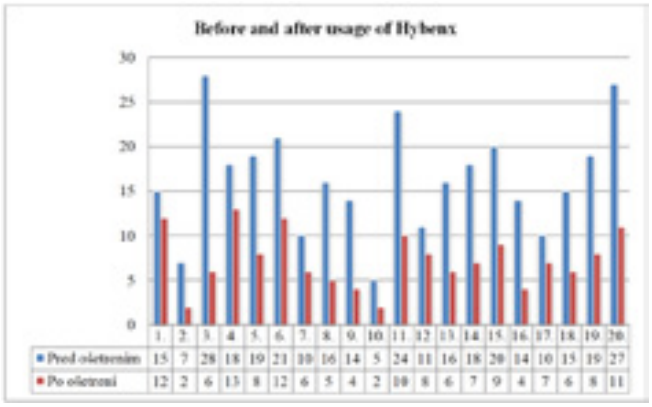
Fig. 10. *Intraoral image with retractors, No. 2*
Obr. 10. *Intraorálny pohľad s retraktormi, č. 2*

Fig. 11. *Intraoral photography after application of Hybenx, No. 2*
Obr. 11. *Intraorálny pohľad po aplikácii HYBENXu, č. 2*

Fig. 12. *Intraoral photography after staining with detective agent, No. 2*
Obr. 12. *Intraorálny pohľad po nanesení detekčného činidla, č. 2*

Treated patients with Hybenx were 12 males and 8 females, 2 below 18 years of age. From 20 patients, 17 of them responded that treatment didn't work well, 1 that treatment was satisfactory and 7 that they don't know. For 5 of them the treatment was less stressful, for 8 not and 7 of them are not aware. The survey was attended by 11 men and 9 women doctors. From them 8 were dentists, 2 were periodontologists and 10 were dental hygienists. Positive respond was from 5 of them, 6 didnt see any result and 9….)). 5 of the professionals mentioned that procedure was like normal treatment and 15 that they feel less fatigue. Finally 13 will never use the product again, 5 that they will think about it and 2 that they will use it. The result is satisfied by 1 attendant, 3 attendants are not satisfied with the results and 16 attendants had higher expectations

Graph 1. *Evaluation of plaque index before and after treatment with Hybenx*
Graf 1. *Vyhodnotenie indexu plaku pred a po liečbe HYBENXom*



Measured values using the Two or six sited plaque index after staining with the detector and after treatment with Hybenx. After application of the detection reagent, the average plaque index value was 2.725, after the application of Hybenx, the value of 1.216 was calculated. The mean difference before and after using Hybenx is 1.509.

DISCUSSIONS

The product reduces the amount of plaque but can not remove it completely from the surface of the tooth even despite following the manufacturer's instructions. The problem with using the product was increased sensitivity of the teeth several days after application in most patients. During the application, fluid flows into the patient's entire mouth, causing the presence of acidic taste in the patient. Upon completion of the treatment, a white gum on the gums at the application sites and the fluid itself was visible, the manufacturer does not consider the need to use gum protection material. The disadvantage of the product is also its price. After completing the questionnaires from the attending physicians, we also found that Hybenx was more time-consuming in a number of cases, in contrast to the normal procedure. The advantage of the product is that it works very simply and saves the physical burden of the attendant and the very fact that the amount of coating is reduced. Of course, it is a matter for every physician and dental hygienist to consider whether to work with Hybenx from time and financial demands and to increase patient costs for treatment.

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MUDr. Amir Amiry Manesh
Department of Restorative Dentistry,
Comenius University,
Faculty of Medicine and St. Elizabeth
Oncologic Institute, Bratislava,
Slovak Republic