USE OF COMMERCIAL SODIUM HYPOCHLORITE SOLUTIONS IN RESPECT TO THE QUALITY OF THE PRODUCTS

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INTRODUCTION AND AIM

Sodium hypochlorite is the most popular solution for root canal irrigation in stomatology practice. NaOCl ionizes in water into hypochlorite ion OCl^-, establishing an equilibrium with hypochlorous acid (HOCl). At acidic and neutral pH, chlorine exists predominantly as HOCl, whereas at high pH of 9 and above, OCl^- predominates. Hypochlorous acid is responsible for the antibacterial activity. As the strong oxidant it is effective disinfectant which disrupts several vital functions of the microbial cell, resulting in cell death. In concentrations between 0.5% and 6% it is a potent antimicrobial agent, killing most bacteria instantly on direct contact.
The aim of this study was to investigate the possibility of using some bleach solutions for root canal irrigation.

MATERIALS AND METHODS

Because of its low price, bleach is widely used in Macedonia. Alkaloid AD Skopje produces 10% and 20% Sodium hypochlorite disinfectant solution that is used in the food industry diluted with water in various concentrations. The Varakina bleach which is a solvent of sodium hypochlorite with a scent of lemon is used for whitening laundry and bed linen. The samples of commercial solutions were taken from the market and tested on the presence and concentration of heavy metals as impurities.
The atomic absorption spectrophotometry (AAS) is used for determination of heavy metals in tested solutions.

RESULTS AND DISCUSSION

The results of this study are given in Table 1 and Table 2. The concentrations of iron (<0.06), copper (<0.03), chromium (<0.06), nickel (<0.10), cadmium (<0.02) and lead (0.10) in both solutions were identical. The concentration of zinc was slightly greater in 20% Sodium hypochlorite disinfectant solution (0.06 mg/l) than in 10% Sodium hypochlorite disinfectant solution (0.05mg/l).
Results were compared to the German code standard which allows not more than 20ppm (0.02 mg/l) of heavy metals in hypochlorite solutions used for irrigation.
Comparing these values with the maximum allowed concentration values for bottled drinking water (Economic Journal “Drinking water” from 1990, the standard for hygienic validity) only insignificant differences were noticed.
The results of this study were obtained on samples containing 4 g/l of active chlorine. Given that in endodontic therapy diluted solutions (0.5 and 1%) are most frequently used, the concentration of possibly present metals is certainly far less.

Tab. 1. pH and heavy metal concentrations of the 10% and 20% Sodium hypochlorite disinfectant solutions (Alkaloid AD Skopje)

Tested parametars	10%Sodium hypochlorite disinfectant solution	20% Sodium hypochlorite disinfectant solution
Iron (mg/l)	<0.06	<0.06
Cooper (mg/l)	<0.03	<0.03
Chromium (mg/l)	<0.06	<0.06
Nickel (mg/l)	<0.10	<0.10
Cadmium (mg/l)	<0.02	<0.02
Zinc (mg/l)	0.05	0.06
Lead (mg/l)	<0.10	<0.10

Tab. 2. Maximum allowed concentrations of heavy metals in the drinking water

Heavy metal	Maximum allowed concentrations of heavy metals in the drinking water (mg/l)
Iron	0.05
Cooper	0.1
Chromium	0.05
Nickel	0.01
Cadmium	0.005
Zinc	0.1
Lead	0.05

The data showed that the values of iron, chromium and lead were almost identical. The concentration of zinc in drinking water was double compared to the hypochlorite solutions. In addition, the value of copper, nickel and cadmium were slightly higher in the hypochlorite solutions than in drinking water, but the values were still below the maximum allowed concentrations. Since the bleaching solution was diluted in order to prepare 0.5 and 1% hypochlorite solution for root canal irrigation, these values were far less than those in drinking water. Compared to the German standards, the results were below the maximum allowed concentrations.

CONCLUSION

It can be concluded that commercial solutions can be used for root canal irrigation but only after checking the quality of the product on the content of heavy metals as impurities. The quality of the product can also be evaluated from the batch quality certificate from the producer. It is recommended to use purified water to obtain desired dilution. However, it is always safer to use products specially designed for stomatology use than commercial sodium hypochlorite products for other purposes.