

Effect of Metronidazole on Halitosis of 2 to 10 Years Old Children

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Background: Regarding the fact that halitosis has social and personal aspects which can lead to social embarrassment and consequently low self-esteem and self-confidence in subjects suffering from the problem, especially children, its proper treatment is an important issue.

Objectives: The aim of this study was to evaluate the effect of metronidazole as a nonspecific antimicrobial agent in the treatment of halitosis in children.

Materials and Methods: In this study, 2-10 years old children with oral halitosis were enrolled. Children without *H. pylori* infection and parasitic infection were randomized in two interventional and control groups. Metronidazole was given 5mg/kg/day for one week. Information regarding the demographic characteristics of studied population and halitosis (duration and time of day with more halitosis and its severity) before and after intervention was recorded using a questionnaire

Results: 77 children with halitosis were studied in two interventional (40 children) and control (37 children) groups. There was no significant difference between two groups before intervention. After intervention, halitosis improvement rate - according to the reports of mothers of studied children - was higher significantly in intervention group ($P < 0.05$).

Conclusions: The results support the effectiveness of metronidazole in the treatment of halitosis. Moreover, it supports recent findings regarding the participation of specific bacteria specially unculturable ones in the pathogenesis of the disease.

Keywords: Metronidazole; Halitosis; Oral Health

1. Background

Halitosis (Oral malodor) is common oral health condition defined as unpleasant breath emitted from a person's mouth with oral or not-oral origin. To date, a few studies have been conducted on the pediatric halitosis (1). It regularly affects 50% of population and it estimated that in 90% of cases the main cause originates from oral cavity and in remainder cases non-oral causes are responsible. In non-oral causes, halitosis may indicate underlying medical conditions which need proper treatment (2-4). Regarding oral causes, it is caused mainly by bacteria infecting the dorsal surface of the tongue which predominantly produces volatile sulfur compounds (VSCs). It is believed that VSC is produced by gram-negative proteolytic anaerobes (5).

The exact pathophysiological mechanism of halitosis is not clear and according to previous studies there is no obvious relationship between halitosis and any specific type of bacterial infection. It is suggested that the interaction between different bacterial species reflects as halitosis and production of compounds such as VSCs, diamines and short chain fatty acids (6). But recently some studies have indicated the halitosis to have a microbial etiology. They showed that in subjects with halitosis the prevalence of some special bacterial species

such as *Solobacterium moorei* or *Atopobium parvulum* are significantly higher than in those without halitosis. They concluded that like any other microbial disease, halitosis should be treated with specific and non specific antimicrobial agents (7). Evidences indicate that halitosis in children, as in adults, is related primarily to oral factors. Also the correlations between nasal and oral halitosis suggesting that postnasal drip plays a major role. Other factors related with halitosis in children are; *H. pylori* infection or other gastrointestinal problems such as gastroesophageal reflux disease, parasitic infection, sinusitis, tonsillitis, allergies, dry mouth and chronic renal, hepatic and respiratory disease (8, 9).

Regarding the fact that halitosis has social and personal aspects which can lead to social embarrassment and consequently low self-esteem and self-confidence in subjects suffering from the problem (10), specially children, its proper treatment is considered as an important issue among pediatricians. In addition there is an increasing trend of research in this field in order to improve our knowledge of the condition.

2. Objectives

The aim of this study was to evaluate the effect of metronidazole as a nonspecific antimicrobial agent in the

treatment of halitosis in children.

3. Materials and Methods

Seventy seven children, aged 2-10 years with oral halitosis were enrolled. Halitosis in children was diagnosed by two pediatricians from patients referred to two offices in Isfahan, in 2007. Children with known causes of halitosis such as, dental problem, parasitic infection or *H. pylori* infection were excluded from study. The study was approved by Medical Ethics Committee of Isfahan University of Medical Sciences and Education and Development Administration of Isfahan. Written informed consent was obtained from parents of children after describing the method and aim of the study.

In order to rule out other causes of halitosis, selected children were examined by a dentist to diagnose the possible dental disease. Laboratory measurement was performed in order to rule out *H. pylori* infection and parasitic infection by measuring Anti *H. pylori* IgG and stool examination (3 times), respectively. All laboratory tests were assessed in one laboratory. Children without *H. pylori* infection and parasitic infection were enrolled and randomized in two interventional and control groups. Metronidazole (supplied by Amin Pharmaceutical Company, Tehran, Iran) was given 5 mg/kg/day for one week. Both studied groups were advised to pay

more attention to their dental care during study. Information regarding the demographic characteristics of studied population and halitosis before and after intervention was recorded using a questionnaire.

Obtained data was analyzed using SPSS software and t-test, χ^2 , Wilcoxon and Man-Whitney tests.

4. Results

Seventy seven children with halitosis were studied in two interventional (40 children) and control (37 children) groups. The characteristics of studied children regarding demographic and halitosis are presented in Table 1. The effect of metronidazole on halitosis after intervention in comparison with control group is presented in Figure 1.

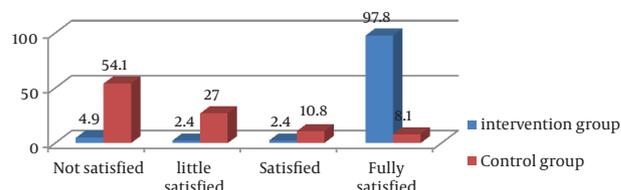


Figure 1. Improvement Rate (%) in Intervention Group in Compare With Control Group ($P < 0.05$)

Table 1. The Characteristics of Children Regarding Demographic and Halitosis in two Studied Groups ^{a,b}

	Intervention Group (n = 40)	Control Group (n = 37)	P Value
Age, y	5.23 ± 2.61	5.78 ± 2.29	NS
Gender			NS
Male	19	18	
Female	18	19	
Duration of halitosis			
7 days-1 month	8 (21.1)	7 (18.9)	NS
1 month-1 year	20 (52.6)	23 (62.2)	
> 1 year	10 (26.2)	7 (18.9)	
Mean duration of halitosis, d	267.1 ± 325.0	222.2 ± 325.8	NS
Time of day with more halitosis			NS
Morning	23 (59)	17 (47.2)	
Morning and afternoon equally	12 (30.8)	13 (36.1)	
Morning more than afternoon	4 (10.3)	6 (16.7)	
Severity of halitosis			NS
Low	2 (4.9)	3 (8.1)	
Moderate	3 (7.3)	6 (16.2)	
High	4 (9.8)	1 (2.7)	
Very high	32 (78)	27 (73)	

^a Abbreviation: NS, not significant.

^b Data are presented as mean ± SD or No. (%).

5. Discussion

The findings of this study on the efficacy of metronidazole in the treatment of halitosis in children have indicated that orally administered metronidazole could be useful in this regard and it had significant effect on the improvement and satisfaction of subjects with halitosis. Several studies have reported different therapeutic approaches for the management of halitosis. Considering that the most common causes of the disease have oral originality, most therapeutic approaches are concentrated in reduction of total load of oral microorganisms and/or bacterial nutrients in the oral cavity using mechanical and chemical approaches (11). Some previous studies have supported the effectiveness of metronidazole in the treatment of halitosis (12, 13), which is in line with our results. Baghery et al. have shown that metronidazole could properly treat halitosis in adult population (14). In a similar study, in 2002, Hoshi and colleagues have investigated the effect of metronidazole on children's halitosis and reported that it was effective in 82.6% of cases according to their mothers report and overall the drug had a treatment improvement rate of 70-100% (15).

In current study children who had dental problems, evidences of *H. pylori* infection and parasitic infection were not included. In addition, we recommended all studied children of the two groups to pay more attention to their oral hygiene by regular interdental cleaning and tooth brushing to perform the mechanical therapy. So, our results indicated that factors other than mentioned factors are responsible for halitosis in children and metronidazole had significant effect on the treatment of these cases. Haraszthy et al. indicated that halitosis considered as a microbial disease and some species such as *Solobacterium moorei* are more prevalent among subjects with halitosis than in control groups (7). Riggio et al. reported an increased rate of some uncultured species in halitosis sample (16).

Kazor et al. have reported that the predominant bacteria on the tongue dorsum of healthy subjects were different from those with halitosis (17). *Atopobium parvulum*, a phylotype of *Dialister*, *Eubacterium sulci*, a phylotype of the uncultivated phylum TM7, *Solobacterium moorei*, and a phylotype of *Streptococcus* were the more prevalent species in patients with halitosis (17). Haraszthy et al. have indicated the *S. moorei* which is associated with halitosis is sensitive to all antibiotics tested except gentamicin, kanamycin, nalidixic acid and rifampin. It seems that possibly the effect of metronidazole on halitosis is due to its effect on this microorganism (18). The results of this study support the effectiveness of metronidazole in the treatment of halitosis. Moreover it supports recent findings regarding the participation

of specific bacteria especially unculturable ones in the pathogenesis of the disease.

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