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The parents' knowledge and behavior towards the effects of using iron supplements on tooth staining and dental caries in Mashhad, Iran

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ABSTRACT

Background: Iron deficiency is estimated to be the most common nutritional deficiency in both developed and underdeveloped nations. Iron supplements at early age may prevent iron deficiency. The aim of this study was to assess the knowledge and management of parents about using iron supplements related to dental caries and staining among Iranian children (6 months to 2 year-old) and to identify some factors underlying these attitudes.

Materials and Methods: This randomized cross sectional study was carried out on the parents of 220 children (6 months to 2-year-old) evaluated in health services centers in Mashhad in 2008. Parents filled questionnaires assessing their opinions on the risk of using iron supplement on tooth staining and dental caries. The results were statistically analyzed by descriptive-analytical, Mann Whitney and Kruscal Wallis tests.

Results: According to this study the relation between iron supplement application with tooth staining and its effect on dental caries, it must be noted that most parents (82.7%) had a moderate range of knowledge. Major of the parents (72.7%) had a moderate level of behavior. There was a significant difference between the knowledge level of fathers with their level of education ($P = 0.01$).

Conclusion: The finding of this study indicates that parental knowledge about consumption of iron supplements by their children (6 months to 2-year-old) has been moderate. But their behavior was poor and needs more attention.

Key Words: Behavior, iron deficiency, knowledge, stains

INTRODUCTION

Anemia should be considered as a major health problem among Iranian children. 7.3% of 2 to 6-year-old children suffered from anemia in Iran.[1] Iron supplementation, starting at an early age, may prevent iron deficiency.[2]

Several studies have shown the protective effect of iron on enamel demineralization.[3-5] Although iron protective mechanism against mineral dissolution is not completely clear for the investigator but Torell[6] reported that when enamel is incubated with ferrous salt solutions, acid-resistant enamel surfaces are established due to the combination of ferric ions with phosphate ions dissolved on enamel surface. The formation of ferric phosphate layer was also suggested in *in-situ* studies simulating a high cariogenic challenge.[5] Other possible explanations have been suggested for these protective effects such as participation in the remineralization of human enamel and in the nucleation of appetite, substitution of calcium in appetite, increase concentration in remineralized caries lesions in dentin and enamel, inhibition of demineralization and formation of a protective film on enamel surfaces.[7] However, the concentration of Fe ions in saliva did not have any

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consistent relationship with caries experience[8] Iron supplements are generally consumed in the form of syrups or drops for children. Besides its undesirable taste, one of its main problems is black discoloration of teeth after consumption. Staining is more obvious on hypomineralized and decalcified areas. Tooth staining due to iron supplement might be caused by an insoluble ferric compound such as ferric sulfide produced by interaction between Fe ions or gingival fluid composition and hydrogen sulfide produced by bacteria.[9]

There was a positive correlation by ward of Fe levels in water and stain distribution.[10] Group of people with higher concentration of salivary lactoferrin exhibited more staining in their anterior teeth.[11] Sometimes parents come up without the wrong idea that iron supplements cause dental caries in children, and therefore, they refuse using it. The correct method of using iron supplements can prevent tooth discoloration to a great extend. Iron supplements which cause extrinsic staining particularly on enamel defects without making any change on its surface. This staining can deposit in the form of insoluble ferric like ferric sulfide.[12] The extent of staining has direct relation with the period of its contact with teeth. Oral liquid or drops may stain teeth. So combining it with water or other liquids such as fruit juice and drinking it with straw or dripping the drops on posterior parts of mouth can prevent tooth discoloration. Brushing teeth before consuming iron supplements is effective on decreasing the rate of staining.[4]

The purpose of this study is to evaluate parents' knowledge and management on using iron supplements related to dental caries and staining in Iranian children (6 months to 2-year-old).

MATERIALS AND METHODS

This randomized cross-sectional study was performed among parents of 220 children (between the ages of 6 months and 2-year-old) who referred to health services centers in Mashhad in 2008. Parents filled questionnaire forms in a quiet room in health centers.

In order to determine an appropriate specimen quantity to achieve an adequate power of 95% and defined significance level of 5% the number of parents determined to be 220.

To evaluate the range of knowledge and management, the correct answers of the questionnaire were counted. Each correct answer received the score of 1 and each incorrect answer received the score of 0.Then percentage of correct answers were determined (>66.7%: Sufficient, 33.7-66.7%: Moderate, <33.7%: Poor). Reliability of the questionnaire was assigned by using Kranbach Alpha method for the similar questions (Distributed questionnaires among 20 parents).

The questions consisted of:

1. Demographic characteristics
   a. Occupation
   b. Educational levels
2. Parental knowledge on using iron supplements and dental staining in children
   a. Why does the child receive iron supplements?
   b. In which range do you use iron supplements for children?
   c. Does an iron supplement have to be used 6 months after birth?
   d. Does iron supplement cause tooth decay?
   e. Does iron supplement cause tooth staining?
3. Parental behavior on using iron supplements and dental staining in children
   a. Do you combine iron supplement with water or juice?
   b. Do you use iron supplement after brushing child's teeth?
   c. In which part of mouth of child do you use iron supplement?

Statistical analysis

The descriptive-analytical tests were used. The results were statistically analyzed by Mann Whitney and Kruskal Wallis tests (P-value ≤ 0.05).

RESULTS

1. All the answers and data extracted from the questionnaire are described in Table 1.
2. Distribution of parents with respect to their educational levels is described in Table 2.
3. Most parents (82.7%) had a moderate range of knowledge [Table 3].
4. The majority of parents (72.7%) had a moderate level of behavior [Table 4].
5. 11.8% of mothers were employed. There was no significant difference in the level of knowledge among employed and unemployed mothers [Table 5]. This case is also true about their behavior (P = 0.79).

Table 1: Distribution of parents' answers about iron supplements for their children

Questions	Correct answers (%)
Why does the child receive iron supplements?	167 (75.2)
In which range do you use iron supplements for children?	219 (99.5)
Does an iron supplement have to be used 6 months after birth?	196 (89.1)
Do you combine iron supplement with water or juice?	192 (87.3)
Do you use iron supplement after brushing child's teeth?	54 (24.5)
In which part of mouth of child do you use iron supplement?	205 (93.2)
Does iron supplement cause tooth decade?	68 (30.9)
Does iron supplement cause tooth staining?	195 (88.6)

Table 2: Distribution of parents, with respect to their educational levels

Educational level	Mother (%)	Father (%)
Elementary school	54 (24.5)	52 (10.8)
High school	128 (58.1)	120 (54.5)
Academic education	38 (17.2)	48 (21.8)
Total	220 (100)	220 (100)

Table 3: Distribution of parental knowledge levels about iron supplements for their children

Level of knowledge	Number	Percentage
Poor	13	5.9
Moderate	182	82.7
Sufficient	25	11.4
Total	220	100

Table 4: Distribution of parental behavior levels about iron supplements for their children

Level of behavior	Number	Percentage
Poor	14	6.4
Moderate	160	72.7
Sufficient	46	20.9
Total	220	100

Table 5: Mothers' knowledge according to their occupation

Occupation	Mean	S.D
Employed	4.92	0.81
Unemployed	4.68	0.70
Total	4.71	0.72
Mann Whitney Test	Z=1.5	*P*=0.13

6. There was a significant difference between knowledge levels in parents with higher levels of education [Kruskal-Wallis Test, Table 6]. Parents' behavior had no significant relationship with their educational levels [Kruscal-Wallis Test, Table 6].

Table 6: Parents' knowledge and behavior in relation to educational levels

Knowledge		
Mother	χ^{2}=10.32	*P*=0.06
Father	χ^{2}=15.05	*P*=0.01*
Behavior		
Mother	χ^{2}=6.43	*P*=0.26
Father	χ^{2}=5.35	*P*=0.37

*Significant difference

DISCUSSION

Anemia should be considered as a major health problem in Iranian children.[1] Iron supplements starting at an early age may prevent iron deficiency.[2] The prevalence of iron deficiency anemia among unsupplemented breastfed infants in the first 6 months of life is low (3%) and iron enriched powdered milks can fulfill the need of children only before one year of iron element on children growth.[13] Therefore, informing parents about the importance of consuming this vital element should be done through the health service centers, the media and other means of propaganda. Tooth staining caused by iron supplements and misunderstanding about the relation between iron supplement usage and dental caries, are the most critical problems that result in avoiding iron supplement usage for children by parents, so it is necessary to explain the effect of these kinds of supplement, on teeth for parents to correct their misunderstandings.

Parents' knowledge

The parental knowledge levels about iron supplements for their children were moderate (82.7%).

99.5% of parents know the range that the supplement should be used, however, Karimi[14] reported that just 41.75% of parents in Yazd answered correctly about this range.

In this study 88.6% of parents describe that iron supplements cause tooth staining and 93.2% of them know that if the iron supplements are used in the posterior part of the mouth, it may reduce tooth staining. So it shows that informing and training in this field were good, but only 30.9% of participants answered to the relation between iron supplement and tooth decay correctly. However, Miguel reported that iron and fluoride component may reduce caries,

incidence.[4] It is crucial to inform parents in health service centers about the fact that there is not any consistent relationship between iron supplements usage and caries, incidence.

Parents' behavior

Parents' behavior about iron supplements was sufficient only in 19-20% of cases. As a result, notifying them how to consume iron supplements is required. Although, 93.2% of parents answered correctly about the right part of mouth, in which iron supplements should be poured, and 87.3% of them combine iron supplements with water and juice to reduce tooth staining and these finding reflect the proper efforts of health service center's staff in increasing the parent's knowledge and modifying their behavior, but only 24.5% of parents brush child's teeth after using iron supplement, so it seems there is a lack of proper informing and guidance in reducing the tooth staining, and anticipatory guidance must be repeated frequently to conduct the parents' behavior and manner.

Evaluation of knowledge and behavior of parents due to their level of education and employment

Considering the knowledge, and behavior of parents, especially mothers, with respect to their state of employed or unemployed, there was no difference between the two groups (P = 0.13). Although employed mothers have more presence in society, they did not have more information than the other group. Fathers' knowledge had a significant relationship with their level of education (P = 0.01). So those with lower educational levels needed more notification.

Parents' behavior had no relationship with their level of information about iron supplements. In fact, many parents with good level of knowledge did not have a proper attitude. Therefore, merely informing them about the importance of consuming iron supplements was enough. Parents need to be informed and reminded in a practical and identical manner about the consumption of iron supplements, in order to create an improvement in their previous beliefs.

CONCLUSION

The findings of this study indicate that parental knowledge about consumption of iron supplements by their children (6 months to 2-year-old) was moderate. But their behavior was poor and needed more attention.

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