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Review Paper

Content analysis of advertisements related to oral health in children: a systematic review and meta-analysis



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ABSTRACT

Objectives: The evidence about the content of TV advertisements broadcast during children's viewing times with an emphasis on the number of food advertisements and the number of cariogenic food advertisements was systematically reviewed and meta-analyzed.

Study design: A systematic review and meta-analysis.

Methods: Articles published up until October 2017 in PubMed, Scopus, Embase, Web of Science, Cochrane Library, and Persian databases such as Magiran, IranDoc, and Iranmedex with the keywords that were related to advertising and oral health in children were searched and screened by two reviewers independently, and the outcomes of interest were extracted. Meta-analysis was performed using the Comprehensive Meta-Analysis, version 2.0.

Results: A total of 480 titles were retrieved and reduced to 256 eligible studies after deletion of duplicates, and finally, after closer assessment of titles and abstracts, five articles were selected for systematic review and meta-analysis. Of the included studies, three were conducted in the UK, one in India, and one in Greece. About 38.0% (95% confidence interval: 19.6–60.6, $P = 0.296$) of advertisements were related to food and also about 70.6% (95% confidence interval: 53.7–83.3, $P < 0.019$) of food advertisements were related to cariogenic foods.

Conclusions: Food advertising during children's programs is dominated by food items that are potentially harmful to oral health. Moreover, the advertisements shifted toward food items that appeared healthy but contain a large amount of hidden sugar.

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Introduction

Dental caries constitutes a major public health problem in children worldwide,¹ and it continues to be the most common infectious disease of childhood.² There is mounting evidence that the cause of dental caries is multifactorial with behavioral and environmental determinants.³ It has been shown that high-sugar and acidic food consumption is harmful for oral health, and it is related to increased prevalence of dental caries. High numbers of bacteria, such as mutans streptococci and lactobacilli, are associated with dental caries that is the consequence of high sugar intake, and this results in periods of low pH levels in dental plaque and caries development.⁴ Moreover, dental caries is related to poor food selection behavior of children.³ Multiple factors influence food choices of children, including peer pressure, food access, and marketing.⁵ Marketing via TV advertisement is a potent source of introducing foods to children. Children are the major target for TV advertisement because of the influence of children on parent's purchases.⁶ It was shown that food advertising for children results in preference and purchase of the advertised products.^{7–9} Watching TV is the major free-time activity of children. Therefore, they are exposed to different food advertisements.³ It was shown that advertising of foods and beverages has a negative effect on children's dietary preferences.⁹ Assessment of the effects of food advertisements via TV on children's eating behavior showed that exposure to food advertisements increases the food consumption of children by 45%.¹⁰

Generally, the fat and sugar contents of advertised foods are high, and the fiber and nutrient contents of them are low.¹¹ For example, about 50% of food advertisements in India and 56% of them in England were high-sugar foods and beverages.^{12–15} Repeated exposure to low-nutrient, high-caloric, and sugary food advertisements may increase the craving for these foods. In addition to obesity, dental caries is one of the important negative health effects of consuming foods high in sugar and acid as mentioned. Despite several studies conducted about the content analyzing of children's TV advertisements in relation to oral and dental health, there is no systematic review and meta-analysis to summarize the results of these studies. The purpose of this systematic review and meta-analysis was to evaluate the evidence about the content of TV advertisements broadcast during children's viewing times especially with an emphasis on the number of food advertisements and the number of food advertisements harmful to dental health.

Methods

Data sources and search strategy

For this systematic review and meta-analysis, we searched the databases of PubMed, Scopus, Embase, Web of Science, Cochrane library, and Persian databases such as Magiran, IranDoc, and Iranmedex for articles published up until October 2017. Keywords were based on population, indicator, and outcome and included (but not limited to) (i) population: 'child' or 'pediatric'; (ii) indicator: 'media', 'TV', 'multimedia',

'advertising'; and (iii) outcome: 'oral health', 'health', 'oral', 'dental'. Keywords were combined by Boolean operators. The search strategy is shown in [Table S1](#). The references of eligible articles were also manually searched for further studies not identified. The Iranian Center for Evidence Based Medicine of Tabriz University of Medical Sciences approves the research protocol of the present study. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement was used to build and elaborate this systematic review and meta-analysis.¹⁶

Study selection

The present systematic review included observational studies that evaluated the nature and content of advertisements related to foods and oral health during children's TV viewing times and published as a journal article or conference paper. The articles were included if they report the total number of advertisements, number of food advertisements, and cariogenic food advertisements in children's viewing time. Editorials, review articles, and articles published in other languages rather than English or Persian were excluded.

Data extraction

Two reviewers extracted data independently. Initially, one reviewer screened the results to exclude duplicate data and irrelevant articles. Two reviewers independently screened the remaining records to identify which articles met the inclusion/exclusion criteria. For these records, the full text was obtained and was independently evaluated by two reviewers for relevance. For each eligible study, one reviewer extracted the data about the authors, publication date, method, sample size, duration of the study, and participants' characteristics and studied the outcomes, and then, the results were checked by a second reviewer. Any inconsistencies were resolved through discussion and by consulting a third reviewer.

Quality assessment

Two investigators independently rated the methodological quality of selected studies for two domains of the number of included channels and methods of outcome measurements. Each domain appraised for a quality assessment considering the number of channels reviewed, the recording time of each channel in prime and non-prime time, the number of reviewers, the assessment of the agreement between reviewers, and the clear classification of cariogenic and non-cariogenic food (ranked as low, moderate, or high).

Statistical analysis

The Comprehensive Meta-Analysis, version 2.0, was used for analyses of data. We extracted the total number of advertisements, the total number of food advertisements, and also the number of cariogenic food advertisements reported in the original articles, and then, the event rates were computed. Q statistic and I^2 were used for determination of heterogeneity. In the present meta-analysis, $I^2 > 50\%$ and also a significance level of $P < 0.10$ for Cochran's Q were considered as clinically

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