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Chewing gum is more effective than saline-solution gargling for reducing oral mucositis

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KEYWORDS
Chemotherapy;
Chewing gum;
Mucositis;
Saline solution

Abstract
Objective: This quasi-experimental study compared the effectiveness of chewing gum and gargling with a saline solution as two types of intervention to reduce oral mucositis scores.
Method: The sample consisted of 44 children who were divided into two groups, one of which chewed gum, and the other gargled with a saline solution. The Mann-Whitney *U* test was used to analyze the data.
Results: There was a significant difference (p = 0.001) in post-intervention oral-mucositis scores. The significant mean difference between the groups indicated that the decreased oral mucositis scores for the chewing gum group was more substantial than for the group gargling with a saline solution (p = 0.001).
Conclusions: The data showed that chewing gum is more effective than gargling with a saline solution, and it can be incorporated into the nursing protocol for treating pediatric cancer patients.

Introduction

Oral mucositis is a side effect of chemotherapy. The incidence of oral mucositis in pediatric cancer patients in the United States amounted to 132 000 cases[1]. At Indonesia's Sanglah Hospital Denpasar, based on a preliminary study conducted in two months period (January to February 2016), the data showed that 20 of 30 children undergoing chemotherapy experienced oral mucositis. It is known that chemotherapeutic agents can directly damage oral mucosa epithelial cells or compromise children's immune systems, leaving them vulnerable to infection. Although the mortality rate for oral mucositis is only 1%, 40% of patients experienced severe ulceration that caused physiological and functional disorders that decreased the patients' quality of life[2-4]. A side effect with such an impact on quality of life requires proper management.

Management of oral mucositis in Sanglah Hospital Denpasar is still limited to oral debridement and oral decontamination (gargling with a saline solution). Oral debridement can be very traumatic and cause intense pain, risk of bleeding, and infection. Regarding oral decontamination, Sanglah Hospital uses three main ingredients, namely 0.2% chlorhexidine, iodine, and saline. However, some studies do not recommend the use of chlorhexidine and iodine because of their ineffectiveness in reducing the severity of oral mucositis[5,6]. Furthermore, neither of these substances should be used for a long period of time, because they interfere with the nor-

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mal flora of mouth, and their alcohol content can cause dry mouth and irritate the tissues[7].

Nurses, as professional health workers, have a vital role in preventing and managing oral mucositis in children undergoing chemotherapy. One treatment for resolving mucositis is the act of chewing gum, which increases both oral pH and saliva production. This can prevent xerostomia (dry mouth) and prevent or minimize irritation and ulceration. Gargling with a saline solution is also an option, because it is useful in maintaining oral mucosa moisture and accelerates tissue granulation.

The purpose of this study was to compare the effectiveness of chewing gum with that of gargling with a saline solution on resolving oral mucositis in children with cancer who are undergoing chemotherapy. The results of this study are expected to enrich pediatric nursing practice and directly benefit the treatment of oral mucositis in children undergoing chemotherapy.

Method

The study employed a quasi-experimental design with consecutive sampling. The sample (n = 44) was composed of pediatric cancer patients ≥ 5 years old who were receiving chemotherapy. The children were divided into two groups of 22 each; one group used the chewing gum intervention, and the other was the saline-solution-gargling intervention group. The instrument used to measure oral mucositis scores was the Oral Assessment Guide (OAG)[8], an instrument found by researchers to be valid and reliable[9]. Data collection was completed within a month. During the first two weeks of January 2016, we collected data from the saline-solution-gargling group, and the final two weeks of that month were devoted to collecting data from the gum-chewing group. Pre-test mucositis scores were recorded for the children prior to chemotherapy, with intervention-data collection beginning on the first day of chemotherapy and continuing until the sixth day for each group. Each intervention was administered three times daily, and all children fasted for one hour prior to engaging in their assigned intervention. Tooth-brushing was required prior to oral decontamination. Post-test mucositis scores were measured on the seventh day. Data were interpreted via univariate, bivariate, and multivariate analyses. Bivariate analysis used a non-parametric test, because the data were not normally distributed. Multivariate analysis was used to identify confounding variables and to learn the effects of the interventions after controlling confounding variables[10].

Table 1 The homogeneity test of respondent characteristics

Variable	Scale	p value
Age	Numerical	0.669
Sex	Categorical	0.108
Oral fluid intake	Categorical	0.051
Therapeutic combination	Categorical	0.874
Nutritional status	Categorical	0.916

Results

As shown on Table 1, the probability value is greater than 0.05, indicating that there are no significant differences in characteristics among the respondents in the full sample. This homogeneous data acquisition for all confounding variables has fulfilled one of the internal validity requirements for a research experiment, because it proves that the change in mucositis score did not occur because of variations in respondent characteristics; rather, the interventions were the cause.

Table 2 shows that there was no significant difference among mucositis scores before the interventions, indicating that all respondents in the study had similar characteristics and mucositis scores ($p = 0.135$; $\alpha = 0.05$). Post-intervention mucositis scores revealed a significant difference after the gum-chewing and the gargling interventions ($p = 0.029$; $\alpha = 0.05$).

Table 3 shows a decline in oral mucositis scores in both the gum-chewing group (3.6) and the saline-solution-gargling group (1.64). However, the decrease in mucositis score is greater in the gum-chewing group ($p = 0.001$; $\alpha = 0.05$), indicating that chewing gum is a more effective intervention to reduce oral mucositis than is gargling with a saline solution.

Based on independent t-test data, the following respondent characteristics were associated with patient oral mucositis scores: age, oral fluid intake, whether receiving the therapeutic combination, and nutritional status. Multivariate analysis using linear regression showed that the age variable is the most significant influence on oral mucositis scores in both groups: chewing gum ($p = 0.015$; $\alpha = 0.05$) and gargling with a saline solution ($p < 0.001$; $\alpha = 0.05$).

Discussion

Based on Levine's Nursing Conservation Model Theory, children with cancer who are undergoing chemotherapy should be

Table 2 Pre- and post-mucositis intervention scores

Variable	Group	Rate	SD	p value*
Mucositis score before intervention	Chewing gum	12.86	1.89	0.118
	Gargling using saline solution	12.00	1.87	
Mucositis score after intervention	Chewing gum	9.27	1.24	0.029*
	Gargling using saline solution	10.36	1.68	

*Significant at $\alpha < 0.05$.