

Proceeding Paper

# Oral Complications of Chemotherapy on Paediatric Patients with Cancer: A Systematic Review and Meta-Analysis †

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**Abstract:** The goal of cancer treatment is to fight and/or control cancer. The aim of this study was to review and meta-analyse the incidence of main oral complications in paediatric oncology during chemotherapy. The search results were obtained from B-on, Web of Science, Scopus, Cochrane Library and PubMed databases. Of 1032 articles potentially relevant, 13 were included in this review. The overall incidence of caries, gingivitis, ulcers, mucositis, and candidiasis was 67.8%, 55.6%, 44.2%, 41.6%, and, 29.5%, respectively. During chemotherapy, paediatric patients with cancer present higher incidence of caries and gingivitis. Incidence rate meta-analysis show high heterogeneity. More studies should be done to reduce uncertainty.

**Keywords:** chemotherapy; paediatric dentistry; oral manifestations



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## 1. Introduction

The goal of cancer treatment is to fight and/or control cancer. Unfortunately, there are no fully selective therapies yet and the body ends up suffering adverse effects that can compromise the patient's quality of life. These therapies and the cancer disease itself are deeply linked to oral health [1–3]. Existing evidence indicates that the chemotherapy used to treat paediatric cancer is associated with disturbances in tooth development, poorer oral hygiene, oral lesions, hyposalivation and an increased prevalence of dental caries when compared to healthy children [4]. The purpose of this systematic review was to assess and summarize impact of disease/treatment interaction on the incidence ratio of caries, gingivitis, ulcers, mucositis and candidiasis. The focused question addressed was: “What are the major oral complications in paediatric patients during chemotherapy?”. This study systematically investigates oral complications resulting from chemotherapy treatments in children within a maximum period of 2 years after treatment.

## 2. Materials and Methods

The search results were obtained from B-on, Web of Science, Scopus, Cochrane Library and PubMed databases. Articles that met the inclusion and exclusion criteria were selected. The inclusion criteria included: (i) studies including cancer patients diagnosed between the ages of 3 and 18; (ii) participants who did not receive cancer treatment during the data collection period; (iii) patients who experienced oral complications after finishing the cancer treatment and the exclusion criteria were: participants who continue cancer treatment or who have finished treatment for more than 2 years. Incidence rates calculation and subsequent meta-analytical plots were performed using OpenMeta [Analyst] and JASP (Version 0.13.1). Heterogeneity was considered high when  $I^2 > 50\%$ . Subgroup meta-analysis and

meta-regressions were used to assess possible effects of factors (geographic region) and covariates (age, latitude [5] and DMFT–caries only), on oral complications incidence.

### 3. Results and Discussion

Of 1032 articles potentially relevant, 13 were included in this review. The overall incidence of caries, gingivitis, ulcers, mucositis, and candidiasis was 67.8%, 55.6%, 44.2%, 41.6%, and, 29.5%, respectively (Table 1). Meta-regressions of the incidence of caries, ulcers and candidiasis showed positive effects of age ( $p < 0.001$ ). The results of the cumulative meta-analysis suggest a recent increase in the incidence of ulcers and a decrease in the incidence of caries, gingivitis, and mucositis, over the study period. Subgroup meta-analysis indicated that there are significant regional incidence differences among continents (Z Test,  $p < 0.05$ ), only in ulcers and candidiasis this difference was not significant. We believe that these discrepancies may eventually be associated with government measures to prevent caries disease.

**Table 1.** Meta-analysis incidence rate and heterogeneity levels (% of total).

Meta-Analysis	Incidence Rate	Heterogeneity ( $I^2 > 50\%$ )
Caries	67.8%	97.06%
Gingivitis	55.6%	98.82%
Ulcers	44.2%	98.12%
Mucositis	41.6%	96.67%
Candidiasis	29.5%	98.24%

During chemotherapy, paediatric patients with cancer present higher incidence of caries and gingivitis (the two more frequent complications). Incidence rate meta-analysis show high heterogeneity. More studies should be done to reduce uncertainty. We believe that the results obtained may be improved if more dental check-ups are performed in order to prevent or, if necessary, treat early, any oral manifestations resulting from chemotherapy treatments. Children's oral hygiene can always be improved with regular visits to the Dentist and with better education/sensitivity by health professionals and family members.

**Conflicts of Interest:** The authors declare no conflict of interest.

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