

Oral Mucosal Status of Children with Cancer Undergoing Treatment at a Tertiary Health Care Facility in Lucknow, India

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Abstract

Original Research Article

Background: Oral Mucositis is one of the side effects of treating cancer with chemotherapy and high dose of targeted radiotherapy, which negatively affects the quality of life of a cancer patient. The aim of this cross-sectional study was to find the oral mucosal status of children undergoing chemotherapy in a tertiary health care facility in Lucknow, India. Association of oral mucosal status to parent's oral health knowledge, parental educational level, family's monthly income and preferences of doctors regarding oral health care were also observed. 106 children below the age of 14 years attending the Department of Pediatric Oncology in a tertiary health care facility at Lucknow and undergoing active chemotherapy were invited for the study. The study comprised of two parts 1) a parental questionnaire, and 2) a clinical examination of the oral mucosa of the child. Grading of oral mucosa was done according to the WHO scale. Frequency, distribution tables and descriptive statistics were calculated for all variables. 39% children were seen to be suffering from some grade of oral mucositis. 60% of the parents had poor knowledge regarding oral health care. Health care providers and parents had an unfavorable attitude towards oral health of the child. Oral health knowledge of care givers and the role of health care professionals were lacking in many aspects and needed to be improved so as to reduce the oral affliction of pediatric cancer patients.

Keywords: Oral health care, Oral Mucositis, Chemotherapy, Cancer, Children.

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INTRODUCTION

In India, cancer is the ninth most common cause of death for children aged 5-14 years [1] with approximately 45,000 children diagnosed with cancer every year [2]. As reported by the Indian cancer registries, the proportion of childhood cancers relative to all cancers varied from 0.8% to 5.8% in boys, and 0.5% to 3.4% in girls [3].

With advances in medical science, contemporary cancer therapy can cure nearly four out of

five children diagnosed with cancer. This represents a dramatic advancement as 50 years ago when the cure rate of childhood cancer was less than twenty five percent [4]. The introduction of chemotherapeutic agents has allowed the use of multimodal treatment approach, i.e., in concomitance with surgery and radiation [4]. However treatment of cancer is not limited to longer survivals but also mitigating treatment-related complications, which are equally important. Oral complications are well-recognized sequelae of childhood cancer therapy [5].

One side effect is oral mucositis (OM), where ulceration occurs in oral mucosa, affecting over 75% of high-risk patients (those receiving radiotherapy to the head and neck or high-dose chemotherapy)[6, 7]. OM induced due to chemotherapy is an acute condition, with ulceration normally occurring one week after treatment, and resolving within three weeks of treatment [8]. On the other hand radiotherapy-induced OM is chronic in nature, with ulceration normally occurring around two-seven-weeks of treatment cycles, and resolving three to four weeks after post treatment [8]. Moreover, during cancer therapy, mineralization and salivary functions might be disturbed and this may lead to higher caries risk in cancer patients [9, 10]. Pediatric cancer patients suffering from chemotherapy-induced OM, suffer from varying severity of pain and difficulty in eating, swallowing and talking. This negatively affects the quality of life of a juvenile who is already suffering. The severity of OM ranges from erythema to frank ulceration and haemorrhage[11]. Moreover, cancer patients are immunocompromised and, if bacteria under oral mucosa enter the submucosa through the ulcers it may lead to bacteremia requiring drastic medical interventions with hospitalization and in some cases may lead to death. In severe cases OM can compromise the airway, leading to anoxia-induced brain injury and even death [12].

Awareness and positive attitude of physician, dietician, oncologist, parents and dentist can reduce the oral affliction of the juvenile with low cost interventions and no side effects. The distress and suffering, which an innocent juvenile undergoes due to the negligence on part of caregivers, need a call for attention for all caregivers.

The objectives of this pilot study are to find the oral mucosal status of children undergoing chemotherapy in a tertiary health care facility in Lucknow. The study also aims to relate oral mucosal status of the children and adolescents with chemotherapy to their dental habits, parental educational level and dental knowledge, monthly family income and preferences of parent and doctors. Literature search did not report the oral health status of pediatric oncology patients and the knowledge and attitude of the caregivers regarding oral health care, with chemotherapy in Lucknow.

MATERIAL AND METHOD

This cross sectional study is performed at the Department of Pediatrics, King Georges Medical University, Lucknow. Ethical clearance was taken from the Institutional Review Board (IRB) of the University (90th ECM II B-IMR-S/P17). All pediatric cancer patients aged 14 or below attending the Department of Pediatrics (Oncology unit), King Georges Medical University, and Lucknow who were under active chemotherapy were considered. Assuming the prevalence of mucositis in children undergoing

chemotherapy as 50% (as the prevalence in this population is unknown), with 10% precision, 95% confidence interval and 80% power, the required sample-size was calculated to be 96 using the formula. To ensure adequate sample size in light of anticipated non-response of 10%, the desired sample size was 106. Subjects (either parent or child) who did not provide the written consent were excluded from the study. Additionally, the parents who were unable to read either Hindi or English were also excluded from the study. Written consent was taken before the subjects were enrolled.

A dental specialist performed the clinical examination of the oral mucosa of the pediatric cancer child and the oral mucosal state was recorded based on the WHO Oral Mucositis Grading Scale [13, 14].

Examination of Oral Mucosa was done on/after the 7th day to the 14th day from the day of onset of chemotherapy and were categorized as - No mucositis, soreness/erythema, soreness/erythema with ulcers but able to eat solids, ulcers but required liquid diet and oral alimentation not possible. Children were examined in supine position with disposable intra-oral LED light and front-surface dental mirror.

Guardians of the child undergoing chemotherapy were also enrolled in the study and were asked to complete a closed ended questionnaire. If both the parents had accompanied the child, the mother was chosen for the study, considering they are the primary care givers. Section 1 of the questionnaire included information regarding —age, gender and place of birth of the child, medical history, parental educational level and monthly family income. Section 2 had questions which assessed the oral health knowledge of the parents like tooth brushing frequency, role of fluoride, previous dental visits. Section three evaluated the attitude of the parents towards oral health care of the child. The last section analyzed the preferences of care givers/health care professionals regarding the oral health care of the child. The questions were gathered from a survey done on Chinese pediatric and adolescent oncology patients with chemotherapy in Hong Kong [15]. The reliability, validity and comprehensibility of questions were tested and any modification required was done before administering the questionnaire, in the best interest of the study. The questionnaire was in Hindi and English. The participants were explained about the importance of answering the questions honestly and confidentiality was assured.

For assessing knowledge and attitude of the respondents towards oral health care of the child, correct answers were given a score of 1 whereas incorrect answers and 'I don't know' answers were given a score of zero. Later subjects were classified as per their scores. Study Participants who scored 4 or more were categorized into having 'good knowledge'

group and rest in 'poor knowledge' group. For categorization, on basis of attitude, those scoring 2 or higher were considered having 'positive attitude' towards oral health care of their child, while the remaining having 'negative attitude'. Frequencies and descriptive statistics were computed for all the variables in the study. Chi square test of association was performed to check for bi-variate association between two categorical variables. For continuous variables like age and duration of chemotherapy treatment received, since they were found to be non-normal (On applying Kolmogorov Smirnov test for normality), Kruskal Wallis H test was applied to check for if there existed a difference in these variables according to the oral mucosal system of the child. Level of significance for the study was taken at 5%. All the statistical analyses were performed using Statistical Packages for Social Sciences (SPSS) Software v20.

RESULTS

One hundred respondents successfully completed the survey. The average age of children surveyed was seven years and the average duration of chemotherapy given to them was four months (Table 1). Most of the children in the study were boys. For more than sixty five percent of children, the mothers answered the questions however for the remaining the fathers were the respondents. Fathers of twenty one percent children received secondary or higher education while seventeen percent of the mothers received secondary school or above education. More than eighty percent of the children surveyed belonged to households having monthly income of less than Rs. 10,000. Thirty four percent children had grade 1 oral mucosa while one, two and two percent children had moderate, severe and life threatening oral mucosa respectively (Fig. 1).

Most of the respondents surveyed had knowledge about the use of toothbrush for cleaning teeth and the use of dental floss, as shown in Table 2. Only half of the parents knew about the frequency of use of toothbrush in a day. About seventy percent respondents did not know about the role of sweet and sticky food in tooth decay. Eighty five and ninety six percent parents did not know about the role of fluoride in tooth decay and the effect of treatment of cancer on the oral health of the child respectively.

Seventy seven percent of respondents did not believe that regular visit to a dentist is necessary (Table 3). Almost none of the respondents took their child to dentist previously for routine examination and none of the children surveyed had any previous history of fluoride application. Only sixty percent of the respondents surveyed were interested in dental care for their child. Majority of the children surveyed did not have problem in eating/drinking since the inception of the treatment (Table 4). Only two children surveyed were referred to the dental surgeon for check-ups/follow ups. Most of the children surveyed were neither given any dietary counselling by the doctor nor any guidelines for oral health care before, during & after the treatment.

As mentioned above in the Methods section, after categorizing the respondents, only eighteen percent of them had good knowledge about oral health care of the child and only seventeen percent had a positive attitude towards the oral health care of their children (Fig. 2). Table 5 shows the association between oral mucosal system of the child and knowledge, attitude and socio-demographic characteristics of the respondents. However none of the factors came out to be significantly associated with the oral mucosal system of the child at 5% level of significance.

Table-1: Socio-demographic characteristics of the study participants

Characteristics (n=100)	
	Mean ± SD
Age (yrs.)	7.0±3.4
Duration of Chemotherapy (Months)	4.2 ±3.4
	Percentage
Gender	
Male	72
Female	28
Respondents	
Mother	66
Father	34
Father's Education	
Primary School or below	79
Secondary School or above	21
Mother's Education	
Primary School or below	83
Secondary School or above	17
Family's Monthly Income	
< Rs. 10,000	82
Rs. 10,000-Rs. 29,000	16
> Rs. 30,000	2

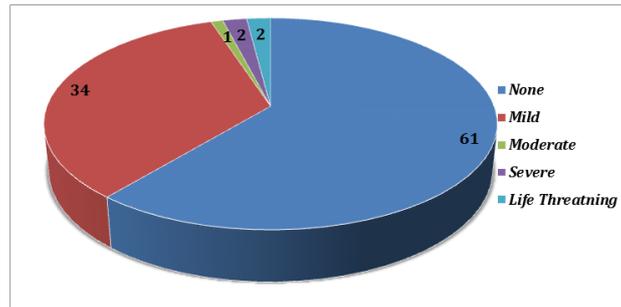


Fig-1: Oral Mucosal system of the child (WHO)

Table-2: Knowledge about Oral Health Care of the child

Knowledge about oral Health Care (n=100)	Incorrect answer/ Don't Know	Correct answer
	Percentage	Percentage
Knowledge about use of toothbrush for cleaning teeth.	5	95
Knowledge about toothbrush frequency per day.	48	52
Knowledge about the use of dental floss.	10	90
Knowledge about the role of fluoride in tooth decay.	85	15
Knowledge about the role of sweet and sticky food in tooth decay.	71	29
Knowledge about the effect of treatment of Cancer on the oral health of the child	96	04

Table-3: Attitude of respondents towards oral health care of the child

Attitude (n=100)	Yes	No
	Percentage	Percentage
Believing regular visit to the dentist is necessary	23	77
Child taken to dentist previously for routine examination	2	98
History of any fluoride application	0	100
Interested in dental care for the child	60	40

Table-4: Preferences of health care professionals/ and other care givers

Attitude (n=100)	Yes	No
	Percentage	Percentage
Child having problem in eating/drinking after start of the treatment	30	70
Was the child referred to a dental surgeon for check-ups/follow ups	2	98
Has child been given dietary counseling by doctor?	19	81
Has child been given any guidelines for oral health care before, during & after treatment?	11	89

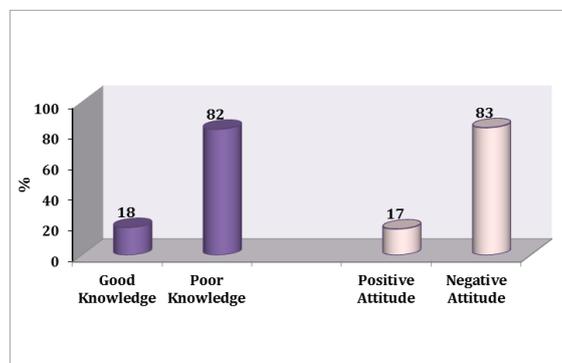


Fig-2: Distribution of respondent's Knowledge & Attitude towards Oral Health Care

Table-5: Association of child's oral mucosal status with dental habits and background characteristics

Characteristics		Oral Mucosal system of children with Chemotherapy					p-value
		None	Mild	Moderate	Severe	Life Threatening	
Knowledge about oral health care	Poor	47(57.3)	31(37.9)	1(1.2)	1(1.2)	2(2.4)	0.287
	Good	14(77.8)	3(16.7)	0	1(5.6)	0	
Attitude towards oral health care	Negative	51(61.5)	27(32.5)	1(1.2)	2(2.4)	2(2.4)	0.853
	Positive	10(58.8)	7(41.2)	0	0	0	
Father's Education	Primary School or below	47(59.5)	27(34.2)	1(1.3)	2(2.5)	2(2.5)	0.831
	Secondary School or above	14(66.7)	7(33.3)	0	0	0	
Mother's Education	Primary School or below	52(62.7)	26(31.3)	1(1.2)	2(2.4)	2(2.4)	0.686
	Secondary School or above	9(52.9)	8(47.1)	0	0	0	
Family's Monthly Income	< Rs. 10,000	53(64.6)	26(31.6)	1(1.2)	1(1.2)	1(1.2)	0.451
	Rs. 10,000 – Rs. 29,000	6(37.6)	8(50.0)	0	1(6.2)	1(6.2)	
	> Rs. 30,000	2(100.0)	0	0	0	0	
Age (Years)		7.1±3.2	6.9±3.9	8	6±0.1	5.5±2.1	0.913
Duration of Chemotherapy (Months)		4.2±3.4	4.5±3.5	4	1.1±1.2	4.5±3.5	
							0.625

DISCUSSION

To ensure pediatric cancer patients have better quality of life worldwide, we need to consider strategies that reduce the associated complications of cancer treatment. Oral mucositis and associated systemic problems that arise with chemotherapy/ and or radiation therapy is an extremely serious and challenging complexity [16].

Historically, risk factors have been attributed to both therapy and patient and caregivers' characteristics. Moreover as poor oral hygiene is associated with more severe OM [17], oral hygiene education should be reinforced to minimize the effects of chemotherapy on the oral tissues and to maintain oral health. Because the treatment of oral mucositis is limited, preventive rather than the general curative approach is emphasized. Patient education with regard to oral hygiene is stressed. Oral prophylaxis, maintaining a healthy mouth to reduce systemic infections through the oral cavity, good nutrition and oral cryotherapy is highlighted for symptomatic relief. The study shows that 39 pediatric cancer patients under active chemotherapy were suffering from some grade of OM. Our result conforms to earlier studies like this that report a similar prevalence [18].

However there are limitations associated with the study. As presentation of OM varies over the course, dose, duration of chemotherapy and the chemotherapeutic agent taken, the mucosal status at the time of examination might not represent the full and accurate effects of chemotherapeutic intervention on the oral mucosa. Moreover, considering this is a pilot study, it is limited by sample size and also by time frame. In

order to get to more conclusive results the sample size must be increased in the future studies and longitudinal studies are recommended for more comprehensive inferences.

The study showed that eighty two percent of the respondents had poor oral health knowledge. This clearly shows that oral hygiene education should be reinforced to minimize the effects of chemotherapy on the oral tissues and to maintain oral health. Special educational and oral health promotional programs for children suffering from cancer and their parents should be conducted to reduce morbidity of cancer children. The prime focus should be on dietary counseling, oral hygiene practices and simple interventions for reducing the oral affliction. All patients with cancer should have an oral examination prior to initiation of the chemo/radiotherapy. There should be periodic dental check-ups during the treatment to register any specific dental problem and treatment be instituted at the right time so as to control any oral infection.

The parents and doctors' attitudes and preferences have a great influence on the oral care of their child with cancer. In this study it 83% of parents had an unfavorable attitude towards oral health. Faced with the diagnosis of cancer, a patient and/or their parents may not see dental care as a high priority [19]. It is imperative and dutiful on part of the health care providers to encourage and educate the parent to minimize the oral affliction of the child. However in the present study, only 2% of patients had been referred to the dentist and a mere 11 % were advised about the oral health care.

Care givers should be cognizant and conditioned about what needs to be done in regards to good oral health. Oral health literacy, positive attitude and behavior of the caregivers of the child undergoing chemotherapy dramatically reduce the morbidity of the suffering child.

CONCLUSION

It is recommended that dental examination should become an integral part of the routine management of every cancer patient and that of the medical curriculum. Moreover, promotion of oral health to parents and their children with chemotherapy should be through oral health talk and personalized oral health education.

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Conflict of interest

There is neither conflict of interest nor any interference in the results of this study.

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