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Dental erosion in children : An increasing clinical problem

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ABSTRACT

Epidemiological studies carried out on dental erosion have established that the prevalence is high in young people and adolescents. The objective of this study was to look at the prevalence and etiology of dental erosion, particularly in children, and its practical management for its possible control. The children between 5-6 yrs were examined and findings recorded, and this study has shown that approximately 1/3rd of 5-6 yrs old children have appreciable tooth wear and dental erosion.

Key words

Children, Erosion,Increasing, Problem clinical.

INTRODUCTION

There has been a clinical impression among dental practitioners, particularly those working with children that the problem of dental erosion is increasing. Is this really the case or are we more aware of the problem? What is causing this increase, if it really exists? Perhaps more importantly what can we do about it?

Tooth wear has long been a recognized phenomenon in adults and ascribed to the triumvirate of attrition, abrasion and erosion. Pathological tooth wear has been seen in antiquity but the problems are becoming even more evident in society now, with an ageing population, who are retaining their natural teeth, for significantly longer. There has been a gradual realization in recent years that our younger population may also be increasingly affected. This is with increasing dental erosion, rather than attribution, abrasion, although these factors also contribute[1]. Dental erosion (perimylolysis) has been defined as "the irreversible loss of dental hard tissue by a chemical process not involving bacteria, and not directly associated with mechanical or traumatic factors, or with dental caries"[2].

The pathophysiology of dental erosion is probably multifactorial, with a number of potentially important risk factors. Carbonated drinks, salivary buffering capacity and gastro-esophageal reflux may all be implicated in dental erosion , but this has not been investigated in adolescents[3].

Intrinsic Acidic Sources are essentially of gastric acid origin and are often associated with significant palatal dental erosion.

Gastro-oesophageal reflux (GOR) is the uncontrolled movement of gastric juice through the lower oesophageal sphincter into the distal oesophagus. In some patients the reflux continues past the upper oesophageal sphincter to reach the mouth when it is called regurgitation.

In silent refluxers dental erosion may be the only clinical sign that pathological GOR is occurring. This remains the gold standard for the investigation of reflux disease[4-6].

Vomiting may be spontaneous or self induced and may be associated with a variety of medical problems like Psychosomatic, Metabolic and endocrine, Gastro-intestinal, Disorders, Drug induced, Patients with eating disorders frequently brush their teeth after each vomiting episode - which may increase abrasion.

Rumination is an uncommon condition in which people deliberately induce reflux of a small amount of their gastric contents and chew this before reswallowing. Several case reports have been published.[2,6]

Various sources of contact with acids as part of work or leisure activities have been reported. Extrinsic sources include environmental causes such as contact with acids as part of work or leisure activities. Battery, dynamite and fertilizer factory workers, laboratory technicians, professional wine tasters and competitive swimmers have all been reported as having significant dental erosion.[2]

Much emphasis has been placed on healthy food and drink in recent years and dietary habits are apparently changing. Consumption of soft drinks has increased dramatically since the 1950s when they were first associated with tooth erosion in children.

If demineralized tissue is brushed, even with a brush and water, abrasion accelerates until the demineralized layers are removed. The effects of repeatedly consuming acidic foods and drinks followed by tooth brushing are probably very important as far as erosion is concerned.

A number of common medications including vitamin C tablets and Iron preparations are also very acidic.

Vitamin C has been produced in a chewable tablet form which has been associated with extensive destruction when used to excess.

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It is not just the total exposure to acidic substances that appears to have increased in recent years; there have also been changes in habits and general lifestyle.

The frequency of intake of food is changing with greater numbers of snacks being consumed and a reduction in the number of meals eaten at home. This is commonly known as "grazing". A habit of "frothing" up carbonated beverages in the mouth has also developed along with constant sipping from canned drinks. The use of the drug "Ecstasy" (3.4. Methylenedioxymethamphetamine) reduces salivary flow.[7-13]. Although the etiology of dental erosion is acidic substances from a variety of sources, there are some individual factors that may predispose to erosion.Various risk factors associated are as follows :

1. Citrus fruit intake (more than twice daily)
2. Soft drinks consumed (more than 4-6 per week)
3. Eating disorder
4. Bruxism
5. Whole saliva unstimulated flow rate (less than 0.1ml/ min)
6. Apple vinegar intake (weekly or more often)

Clinical Features are as follows

·Broad concavities within smooth surface enamel.
·Cupping of occlusal surfaces (incisal grooving) with dentin exposure.
·Increased incisal translucency.
·Wear on non-occlusal surfaces.
·"Raised" Amalgam restorations
·Clean, non-tarnished appearance of amalgam.
·Loss of surface characteristics of enamel in young children.
·Preservation of enamel "cuff" in gingival crevice is common.
·Hypersensitivity.
·Pulp exposure in deciduous teeth (severe cases).[14]

Some of the studies have been carried out out in the past and presented in Table 1.

MATERIALS AND METHODS

The present investigation was undertaken in Sherman school of Belgaum city with the random sampling of 100 school children. Said sample was examined with the permission of the respected Principal and the parents.

Children having full complement of deciduous dentition between 5-6 years of age group were selected. Examination of the children was performed by the investigators, in their respective class rooms under natural day light.

Before the start of the examination, each child's teeth were dried thoroughly with cotton rolls. Examination was carried out with plain mouth mirror and probe.

A systematic approach of examination was carried out in an orderly manner starting from 51 - 55, 61 - 65, 71 - 75 and 81 - 85.

The surfaces were proceeded in an orderly manner starting from occlusal or incisal, buccal, palatal / lingual surfaces.

The degree of tooth wear was recorded according to the modified Smith and Knight index[15].

Each student was examined thoroughly and examination form having specific performa was filled in with socioeconomic group, age, sex, ethnic group, medical history, dietary history and oral hygiene appraisal.

Any child with the score between 0-1 put under low erosion

	Age (years)	*% Affected*
Milosevic & Lennon 1992	14	30
Millward et al 1994	4-5	38
UK Child Dental Health	5-6	52
Survey 1993	11	25
UK Toddlers Survey	1-4	20
Bartlett et al	11-14	57

Table 1(a) Summary of Prevalence studies of tooth wear in children.

CODE 0	Normal
CODE 1	Enamel only-on incisor teeth there is a loss of developmental ridges resulting in smooth, Glazed or 'ground glass'appearance . On occlusal surfaces the cusps appear rounded and there may be depression producing 'cupping'.
CODE 2	Enamel and dentine- there is loss of enamel exposing dentine. On incisors this may resemble a 'shoulder preparation'parallel to the crest of the gingivae, particularly on palatal surfaces.The incisors may appear shorter and there may be chipping of the incisal edges. On occlusal surfaces 'cupping' and rounding-off of cusps is evident. Restorations may be raised above the level of the adjacent tooth surface.
CODE 3	Enamel, dentine and pulp- loss of enamel and dentine resulting in pulpal exposure.
CODE 9	Assessment cannot be made.

Table 1(b) Criteria For The Assessment Of Dental Erosion [15].

criteria, score 2 is put under moderate erosion and scores between 3-9 is put under severe erosion criteria.[16] Table **1(b).**

RESULTS

60 males and 40 female children made up the study population. Among 100 children, 35 children were 5 yrs old and 65 children were 6 yrs old with mean age of 5.5 (Table 2, Fig. 1). Out of 100 children examined, percentage of children with dental erosion for the 5 years age group was found to be 28.57% while for the age group of 6 years 30.70% was noted. The increase of higher percentage that is 30.7% was seen for the age group of 6 yrs may be due to the exposure of carbonated drinks or soft drinks, though from the questionnaire data it could not be statistically evident (Table 3, Fig. 2). The number of surfaces involved by the dental erosion in the maxillary arch showed loss of enamel in majority of tooth surfaces, except in the incisal surfaces of canine, palatal surfaces of 1st deciduous molar and buccal surfaces of 2nd deciduous molar. The palatal and buccal surfaces of central incisor showed maximum dental erosion with 35% and 21.6% respectively (Table 4, Fig. 3). However, in the mandibular arch, maximum dental erosion was seen on the occlusal surfaces of 1st deciduous molar with 13.3% and 11.6% for mandibular canines (Table 5, Fig. 4). Of the total 100 children who were investigated in depth in this study, it was observed that 20 cases has low severity with 66.6% and 9 cases with moderate severity which accounts for 30% for the total (Table 6, Fig. 5).

DISCUSSION

Sherman school is a large comprehensive school in the Belgaum city serving a multi-ethnic population with children from a variety of socioeconomic groups. The school was chosen because it was a typical inner city school and participated in previous studies.

The current investigation has shown that random sample of hundred 5-6years old have relatively high levels of dental erosion : these results are comparable with those of Milosevic et al 1992.[1]

These results serve to confirm that tooth wear is relatively common in children and its relationship with diet, salivary factors and the symptom of reflux is complex. As reliability and validity of self reported symptoms and dietary intake is always difficult to assess.Management and prevention includes the followings :

- Early diagnosis is important so that all the possible etiological factors can be identified & preventive measures can be taken to halt further progression.
- The frequency and severity of the acid challenge.
- Enhance the defence mechanisms of the body (increase is to reduced salivary flow and pellicle formation).
- Enhance acid resistance, remineralization and rehardening of the tooth surfaces.

- Improve chemical protection.
- Decrease abrasive forces.
- Provide mechanical protection.
- Monitor stability
- Restorative Treatment.[14,17]
- Limit acidic foods and drink at mealtimes.
- Reduce frequency of acidic substances at night.
- Finish meals with something alkaline such as a small piece of cheese or milk.
- Avoid tooth brushing after acidic substances.
- Check medication, mouthwashes for acidic ingredients.
- Chewing gum has been shown to stimulate salivary flow and increase buffering capacity, but may also cause increased gastric secretion.

Age in years	Males	Females	Total No. of Children Examined
5 Years	20	15	35
6 Years	40	25	65

Table 2. Age and Sex Distribution of subjects.

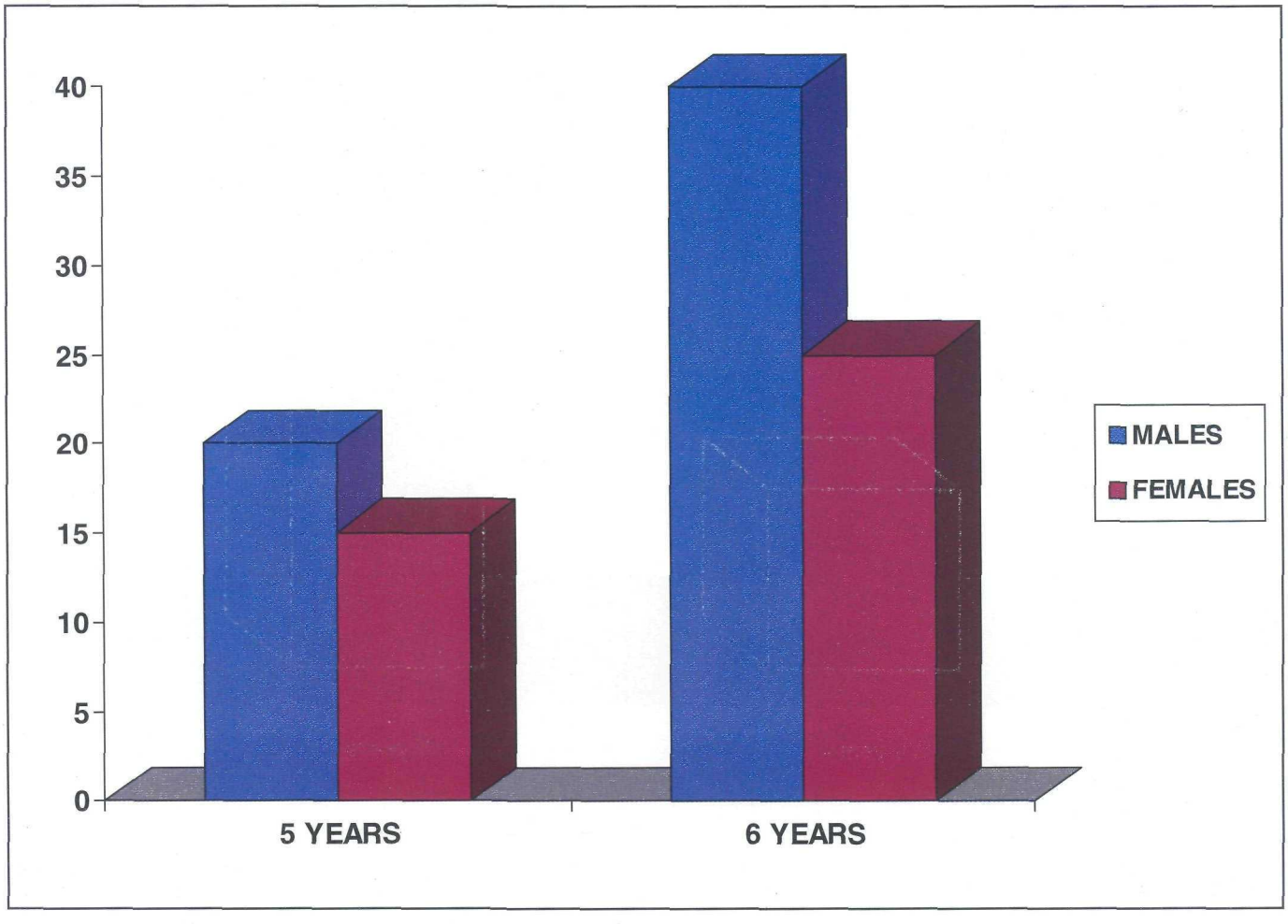

Fig. 1: Age and Sex Distribution of subjects

Age in Years	No. of Children Examined	No. of Children With Dental Erosion	% of Children With Dental Erosion
5 Years	35	10	28.57%
6 Years	65	20	30.70%

Table 3. Prevalence of Dental Erosion (Both Sexes).

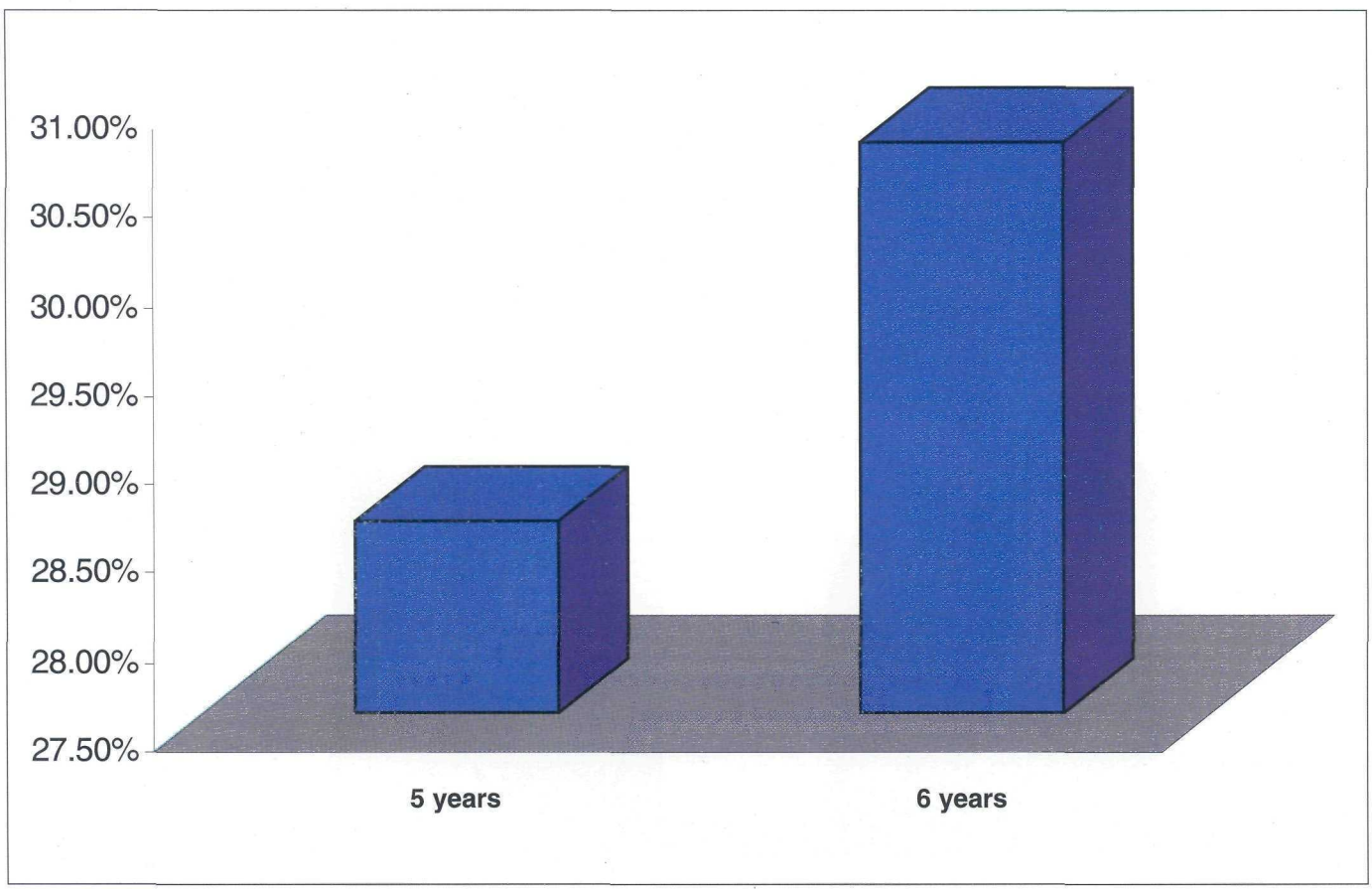

Fig. 2: Prevalence of Dental Erosion (Both Sexes).

Tooth	Buccal	Palatal	Incisal/ Occlusal
C.I	13(21.6%)	21(35%)	04(6.6%)
L.I	03(5%)	3(5%)	02(3.35%)
C	02(3.3%)	2(3.3%)	0
1st Molar	03(5%)	0	4(6.6%)
2nd Molar	0	1(1.6%)	1(1.6%)

Table 4. Number of Surface Involved (Dental Erosion) in the maxillary Arch.

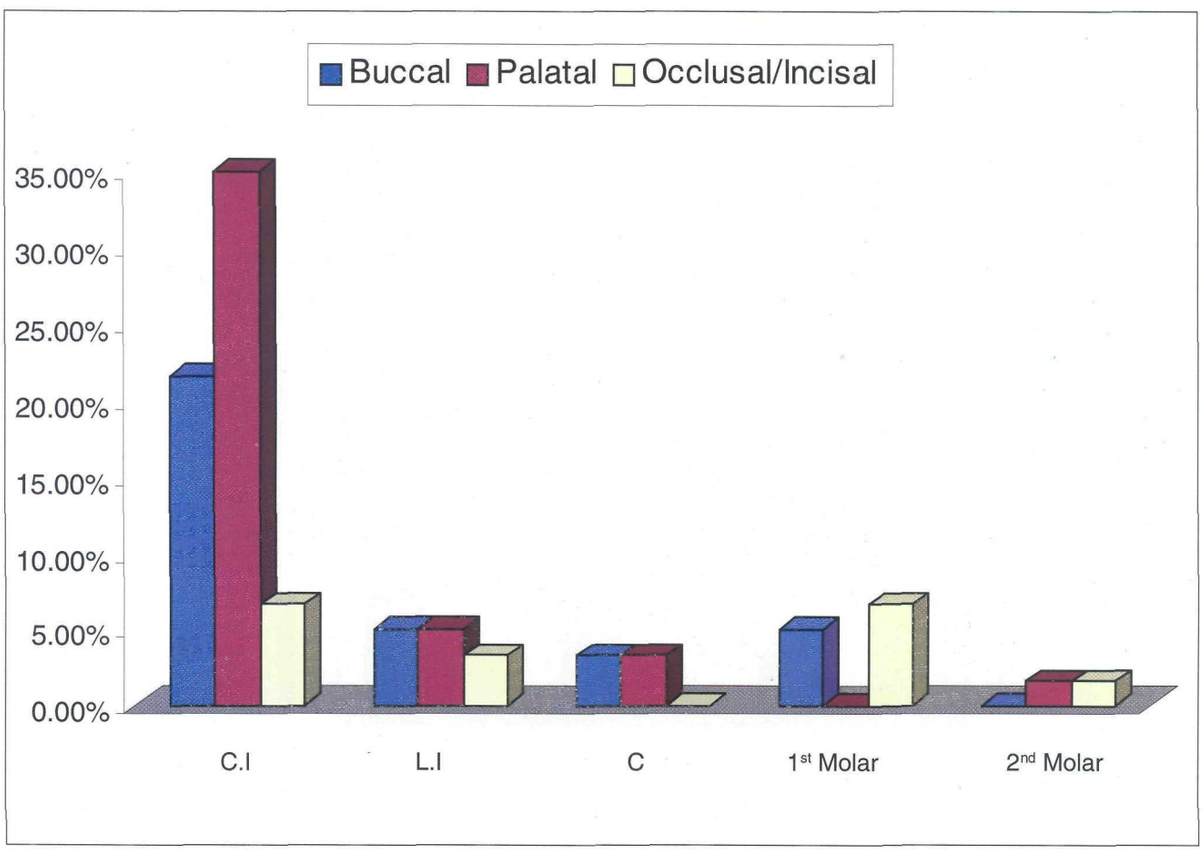

Fig. 3: Number of Surface Involved (Dental Erosion) in the maxillary Arch.

Tooth	Buccal	Palatal	Incisal/ Occlusal
C.I	0	2(3.3%)	0
L.I	1(1.6%)	0	0
C	7(11.6%)	0	0
1st Molar	2(3.3%)	0	8(13.3%)
2nd Molar	1(1.6%)	0	3(5%)

Table 5. Surfaces of Mandibular Teeth Involved with erosion.

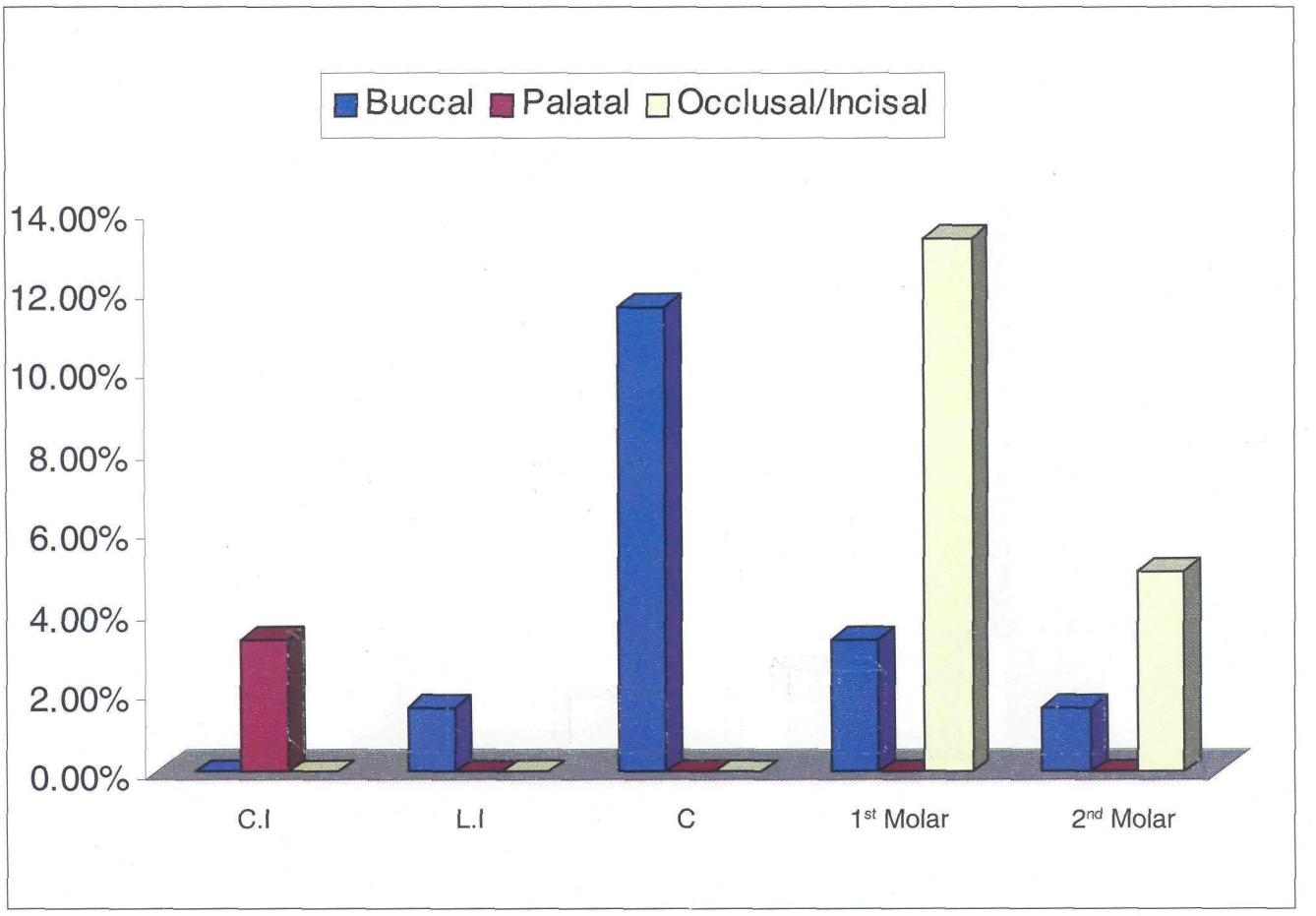

Fig. 4: Surfaces of Mandibular Teeth Involved with erosin.

Severity	Number of Children with Dental Erosion	% Affected
Low	20	66.6%
Moderate	9	30.0%
Severe	1	3.33%

Table 6. Severity of dental Erosin lesions.

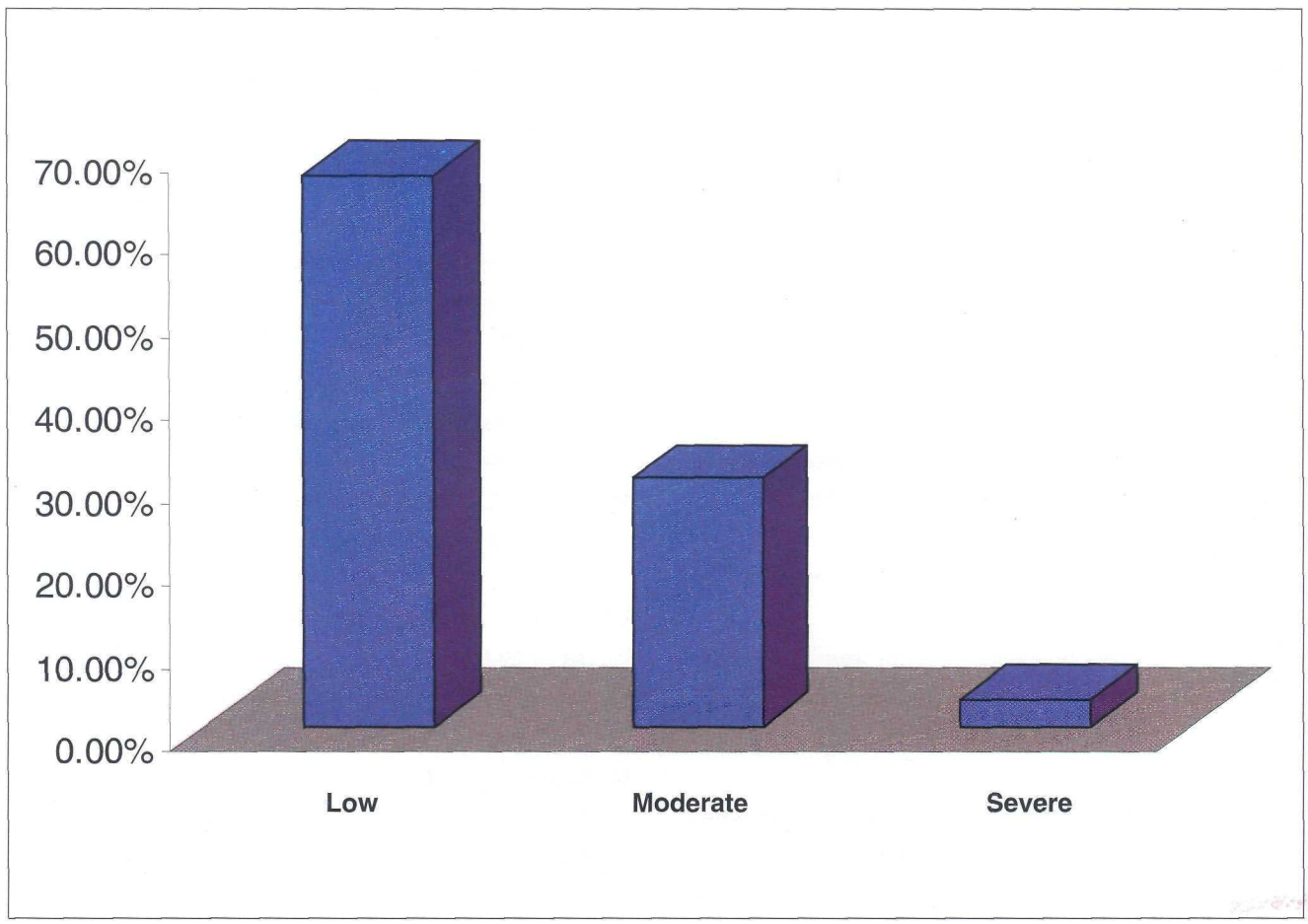

Fig. 5: Severity of dental erosin lesions.

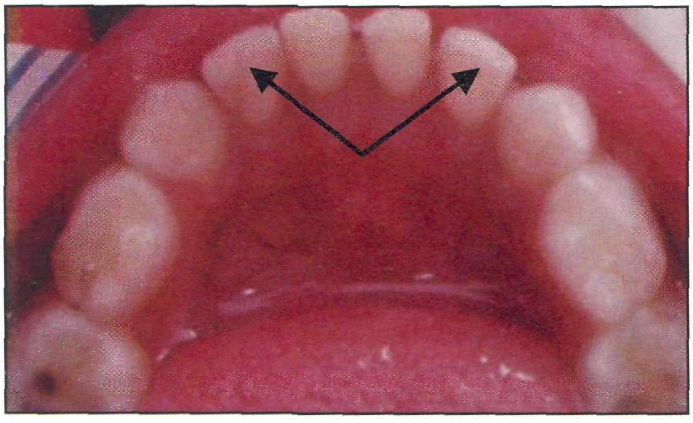

Fig. 6: Lingual Surfaces of lower incisor showing initial signs of dental erosin.

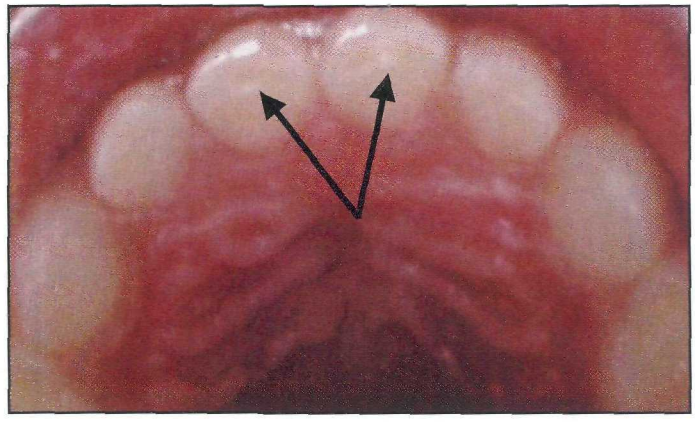

Fig. 7: The palatal surfaces of lower incisors showing increased incisal translucency.

It should not be recommended for children, below the age of 7 years, and is not suggested for those with a history of gastric reflux.[1,17]Thus this study has shown that approximately 1/3rd of 5-6 yrs old children have appreciable tooth wear & dental erosion, which was observed in middle socio-economic group. It is therefore important to identify those at risk of developing clinical problems so that preventive advise can be directed. While it may be easier for the dentists to advise on dietary control it is important for the further survey to be carried out with detail questionaire proforma which shall investigate potential cause of intrinsic as well as extrinsic causes of dental erosion in children.

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