

## Research Article



## Assessment of Genotoxic Effects of X-Rays in Buccal Mucosal Cells in Children Subjected to Dental Radiography

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Received: 18-09-2017; Revised: 22-10-2017; Accepted: 05-11-2017.

### ABSTRACT

The main objective of these investigations is to determine possible genotoxic effect of x-ray in buccal mucosa cells, at patient who subjected to dental radiography. The study group consisted of 40 patient: 20 females and 20 males. The samples of exfoliated buccal mucosa cells were obtained from the same individual, before the X-ray exposure and 15 days after exposure. For each individual prepare 7 slides. The frequency of micronucleus in exfoliated buccal cells was evaluated by scoring 1000 cells on each slide. Staining of slide is done by giemsa. Results show increasing the number of micronucleus and karyolysis, at patient who subjected to dental radiography

**Keywords:** Genotoxic, effect, x ray, buccal cells.

### INTRODUCTION

Roentgenography is an important diagnostic method with wide application in pediatric practice. There is a tremendous need for roentgenography in children compared with adults as there is a greater concern with regard to growth and development in children, and factors that alter them<sup>4</sup>. Even though X-rays are widely used for diagnostic and therapeutic reasons<sup>3</sup>, there is considerable concern with regard to the potential harmful effects associated with radiation exposure as there is no safe margin of dosage. Ionizing radiation either acts directly on the DNA molecule or indirectly through the formation of reactive compounds that interact with the DNA molecule resulting in cytotoxicity of the cell<sup>2</sup>. The possible genotoxic effects from bitewing and panoramic dental radiography as assessed by MN occurrence have not yet been satisfactorily explored, as it has been investigated in only a few studies on exfoliated cells. Hence, the aim of the present study was to evaluate the genotoxic effects induced by X-ray radiation from bitewing and panoramic dental radiography in exfoliated buccal epithelial cells collected from children who were subjected to routine diagnostic procedures, using the BMCyt assay<sup>8</sup>.

### MATERIALS AND METHODS

The study was conducted in the Department of Biology. The study group consisted of 40 patients who were randomly selected patient divided into two groups, according the gender: female group consisted of 20 patients, group II consisted of 20 males.

Exfoliated buccal cells were obtained by rolling the cytobrush in surface of the buccal mucosa. The cells were smeared over a precleaned, coded microscopic slide and immediately fixed with absolute alcohol.

### Sampling

The samples of exfoliated buccal mucosa cells were obtained from the same individual, before the X-ray exposure and 15 days after exposure. For each individual prepare 7 slides.

### Counting

The frequency of micronucleus in exfoliated buccal cells was evaluated by scoring 1000 cells on each slide. Staining of slide is done by giemsa.

### RESULTS AND DISCUSSION

The results are presented at Table 1, as it show in table Chromosome aberration, such as: Micronucleus formation and karyolysis.

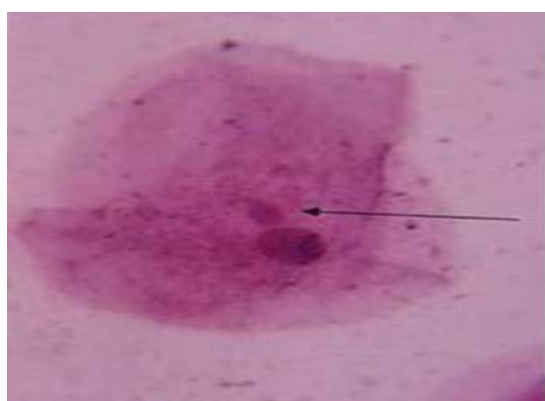
A the number of micronuclei were compared before and after exposure to full mouth radiographs in the buccal mucosa was increased after exposure, at both gender: female and male. At female the number of micronuclei is increased for 3 micronuclei, seven micronuclei after exposure, while before exposure is four micronuclei/ per 1000 buccal cells. And at male the number of micronuclei is increased for 6 micronuclei, eleven (11) micronuclei after exposure, while before exposure is five micronuclei/ per 1000 buccal cells.

After dividing the patient in old and young group we found that at oldest, both chromosomal aberration was higher compared with young group, before and after exposure.



**Table 1:** Chromosomal aberration of buccal cells, exposed to dental radiography, counted in 1000 cells.

	Before the X-ray exposure				15 days after exposure			
	Female (20 individual)		Male (20 individual)		Female (20 individual)		Male (20 individual)	
Micronucleus formation	4		5		7		11	
Karyolysis	3		5		9		13	
	MN	Karyolysis	MN	Karyolysis	MN	Karyolysis	MN	Karyolysis
Old	5	6	6	7	8	11	9	12
Young	3	5	5	6	7	9	8	10

**Figure 1:** Micronuclei at buccal cells

## DISCUSSION

Aberrant chromosomal structures such as micronucleus formation, and Karyolysis as well as large cells were detected in buccal cells.

At male gender was higher the number of micronuclei (before (6 MN) and after exposure (9 MN) compared with female gender (before (5 MN) and after exposure (8 MN)).

The same condition is and with karyolysis, the number of karyolysis (before (5 MN) and after exposure (13 MN)) compared with female gender (before (3 MN) and after exposure (9 MN)).

Also higher number of chromosomal aberration found at old group, compared with young group. At old female the number of micronucleus was 5 MN, while at young group was 3 MN. Also at old male the number of micronucleus was 6 MN, while at young group was 5 MN.

Regarding the karyolysis also is higher number of karyolysis found at old group, compared with young group. Before radiation the number of karyolysis is higher at old group (female - 6 MN, male- 7), compared with young group (female -5 MN, male 6 MN).

Also and after radiation the number of karyolysis is higher at old group (female - 11MN, male- 12 MN), compared with young group (female -9 MN, male 10 MN).

In the present study, a 15-day interval was taken because chromosomal damage leading to micronucleus formation

occurs in dividing cells from the basal layer of the oral epithelium but is only observed later in exfoliated cells after the differentiation. Rapid turnover of epithelial tissues brings the cells to the surface, where they exfoliate. As a result, the maximal rate of MN formation in exfoliated cells is seen between 1 and 3 weeks after exposure to the genotoxic agent<sup>14, 9</sup>. Analysis of micronucleus was carried out according to the criteria given by Tolbert *et al.*<sup>7</sup> and Sarto *et al.*<sup>5</sup>. Cytotoxic effects like pyknosis, karyolysis and karyorrhexis were also studied as their inclusion in assessment increases the sensitivity of bio monitoring studies<sup>6,10</sup>.

## CONCLUSIONS

Conclude that dental X-rays induce genotoxic effects at buccal cells.

It was concluded that the frequency of micronuclei and karyolysis, increases post exposure in both gender and age.

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**Source of Support:** Nil, **Conflict of Interest:** None.

