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# Assessment of Oral Cytomorphological Changes Associated with Chemotherapy and Radiotherapy

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## ABSTRACT

**Aim:** *This study was aimed to assess the effect of chemotherapy and radiotherapy on the epithelial of oral cavity obtained from people infected with cancer.*

**Materials and Methods:** *40 buccal smears were obtained from people infected with various types of cancers; Smears were prepared, fixed in 95% Ethanol immediately and then stained by Papnicolaou's stain, then examined under the light microscope.*

**Results:** *The cytological assessment among study group revealed the following findings; in the study group, inflammation were detected in 29(72.5%)*

*Individuals, metaplasia reported in 11(27.5%) and atypia in 31(77.5%).*

*In control group , inflammation 5(.001). But not detected any metaplasia and atypia.*

**Conclusion:** *On the basis of this study, Chemotherapy and Radiotherapy are risk factors for cytomorphological changes of oral mucosa.*

*However buccal cytology provides a useful tool in the evaluation of oral cytomorphological changes.*

**Keywords:** *Chemotherapy, radiotherapy, cytomorphological changes.*

## INTRODUCTION

Cancer is a one of, if not being, the most encountered disease which countless doctors and scientists around the world whose discoveries in anatomy, physiology, chemistry, epidemiology, and other related field. (1)

Cancer is the second leading cause of death in the United States, half of men and one-third of women will develop cancer during their life. Scientists face various problems to treat cancer; chemotherapy and radiotherapy are being till now the only way to restrict cancer from progression to worse level (1).

Chemotherapy is the use of anti-cancer drugs to treat cancer. It can stop the growth of a tumor and kill cancer cells. (2)

Radiotherapy is one of the most common treatments for cancer. It uses high-energy particles or waves, such as x-rays, gamma rays, electron beams, or protons, to destroy or damage cancer cells. (3) Environment, life style1, age, chemical carcinogens and radiation are the most causes of cancer. (4)

Cancer can be grouped according to its site of origin into categories such as :

Carcinoma which is the most common kind of cancer and is generally known by the place in the body . Where the cancer begins, such as the lung, breast , or colon.

Sarcoma is another type of cancer found in supporting tissue , such as bone, muscle, or fat.

Leukemia is a cancer type that starts in the blood or bone marrow; an abnormal production of blood cells.

Lymphoma is a cancer that starts in immune system cells within the lymphatic system.

Cancer of central nervous system is a type of cancer which starts in the brain and spinal cord. (5)

Beside its therapeutic effect, chemotherapy and radiotherapy have a side effect on some normal cells. turn over" or regenerate rapidly is also the most vulnerable to side effects. These particularly sensitive normal components of your body include the cells which line the mouth and the gastrointestinal tract.(6), (7), (8)

## Materials And Methods

Oral examinations were performed using a mouth mirror and artificial light. Patients were asked to rinse their mouths with normal saline before samples were taken to eliminate debris and excess saliva from the oral mucosa. Exfoliated epithelial cells were obtained from the dip site with the help of a brush. Samples were spread on a slide and immediately fixed with fixation spray to avoid exposure to dry air. In the pathology laboratory, the samples were stained with Papanicolaou on the same day.

The fixed dried smear are hydrated in 95% alcohol for 2 min, through 70% alcohol for 2 min, rinse in water for 1 min, stained in harries hematoxylin for 5 min, rinsed in water for 2 min, differentiated in 0.5% aqueous hydrochloric acid for 10 seconds, rinsed in water for 2 min, blued in Scott's tap water substitute for 2 min, rinsed in water for 2 min, dehydrated in 70% alcohol for 2 min, dehydrated in 95% alcohol for 2 min, dehydrated in 95% alcohol for 2 min, stained in OG6 for 2 min, rinsed in 2 changed 95% alcohol for 2 min in each, stained in EA50 for 3 min, dehydrated in 95% alcohol for 1 min, through absolute alcohol, cleared in xylene and mounted in DPX. (3)

## Results

Cytomorphological changes in buccal smear in 80 individuals (40 as cases and 40 as control) were exposed to chemotherapy or / and radiotherapy in Radio isotope central hospital in EL-gazirra state in Sudan results as follow:

Their ages ranged between 8-85years, notably study population 8-30 years account 4 (10%) , 31-50 years account 18 (45%) , more than50 tears account 18 (45%) shown in table (1). Sex in this study include males 11 (27.5%) and female 29(72.5%) shown in table (2). Duration of exposure to treatment from 1-12 mouth appears 28 (70%) while 1-10 years 9 (22.5%) ,and more than 50 year 1 (2.5%) show in table (3).Duration of cancer between 1-12 mounth appears25(62.5%) while 1-10 years 12 (30%) ,and more than 50 years 1 (2.5%) show in table (4). Inflammation appears 29 (72.5%),while no inflammation in 11(27.5%)shown in table (5) chronic represent 11 (27.5%), while acute inflammation 18 (45%),shown in table (6). Atypia appears 31 (77.5%),while no atypia in 9 (22.5%)shown in table (7). Metaphase appears 11(27.5%),while no metaplasia in29 (72.5%) shown in table (8).

Selected sample from patient cancer as following CA breast 16 (4.25%), cervix1 (2.5%),endometrium2(5%),NHL1(2.5%),Nasopharynx1(2.5%),hypopharynx3(7.5%),Ovary 4 (10%),pelvic1(2.5%), pancreatic 2(5%), axillary+pelvic1(2.5%), uterus 2(5%), rectal2(5%), bronchogenic+liver (2.5%), Nasopharynx+breast1 (2.5%),cervix+ovary1(2.5%),utrus+endomt-rus1 (2.5%) as in table (9).

This patient given chemotherapy 26 (65%) while adiotherapy,2 (5%),and both therapy 12 (30%)shown in table (10) .

**Table1.** *Show age of patient.*

| Age | Frequency | Percent |
|---|---|---|
| 8 – 30 year | 4 | 10 |
| 31 – 50 year | 18 | 45 |
| More than 51 year | 18 | 45 |
| Total | 40 | 100 |

**Table2.** *Show sex of cancer patient.*

| Sex group | Frequency | Percent |
|---|---|---|
| Male | 11 | 27.5 |
| Female | 29 | 72.5 |
| Total | 40 | 100 |

**Table3.** *Show duration of treatment*

| Duration of treatment | Frequency | Percent |
|---|---|---|
| 1 – 12 month | 28 | 70 |
| 1 -10 month | 9 | 22.5 |
| More than 10 month | 1 | 2.5 |
| Missing | 2 | 5 |
| Total | 40 | 100 |

**Table4.** *Show duration of cancer.*

| Duration of cancer | Frequency | Percent |
|---|---|---|
| 1 – 12 month | 25 | 62.5 |
| 1 – 10 year | 12 | 30 |
| More than 10 year | 1 | 2.5 |
| Missing | 2 | 5 |
| Total | 40 | 100 |

**Table5.** *Show inflamed state.*

| Inflammation | Frequency | Percent |
|---|---|---|
| Inflamed | 29 | 72.5 |
| Non inflamed | 11 | 27.5 |
| Total | 40 | 100 |

**Table6.** *Shows chronic and acute inflammation*

| Inflammation | Frequency | Percent |
|---|---|---|
| Acute | 11 | 27.5 |
| Chronic | 18 | 45 |
| Total | 29 | 72.5 |
| Missing | 11 | 72.5 |
| Total | 40 | 100 |

**Table7.** *Show atypia.*

| Atypia | Frequency | Percent |
|---|---|---|
| Atypia | 31 | 77.5 |

| | | |
|---|---|---|
| No atypia | 9 | 22.5 |
| Total | 40 | 100 |

**Table8.** *Shows metaplasia.*

| Metaplasia | Frequency | Percent |
|---|---|---|
| Metaplasia | 11 | 27.5 |
| No metaplasia | 29 | 72.5 |
| Total | 40 | 100 |

**Table9.** *Shows type of cancer.*

| Type of cancer | Frequency | Duration |
|---|---|---|
| Breast | 16 | 42.5 |
| Ovary | 4 | 10 |
| Endometrial | 1 | 2.5 |
| Pelvic | 1 | 2.5 |
| Cervix | 1 | 2.5 |
| NHL | 1 | 2.5 |
| Nasopharynx | 1 | 2.5 |
| Hyponasopharynx | 3 | 7.5 |
| Uterus | 1 | 2.5 |
| Bronchogenic+liver | 1 | 2.5 |
| HD | 1 | 2.5 |
| Rectal | 2 | 5 |
| Endometrial+pelvic | 1 | 2.5 |
| Pancreas | 1 | 2.5 |
| Axillary+breast | 1 | 2.5 |
| Overy+cervix | 1 | 2.5 |
| Nasopharynx+breast | 1 | 2.5 |
| Utrus+endomtrus | 1 | 2.5 |
| Cervix+overy | 1 | 2.5 |
| Total | 40 | 100 |

**Table10.** *Shows Type of treatment*

| Type of treatment | Frequency | Percent % |
|---|---|---|
| Chemotherapy | 26 | 65 |
| Radiotherapy | 2 | 5 |
| Both | 12 | 30 |
| Total | 40 | 100 |

**Fig1.** *buccal smear stained with Pap stain shows features of acute inflammation*

## DISCUSSION

To assess treatment associated with chemotherapy or /and radiotherapy on oral mucosa, this study investigated by cytological methods, and applied in wad Madani city. This study area distinct from other area of EL- Gezirra by presence of Radio Isotope Centre EL- Gezirra. In 80 individuals (40 as cases and 40 as control) Their ages ranged between (8-85years), included males 11(27.5%) and female 29 (72.5%) , Selected sample from patient cancer as following: CA breast 16 (4.25 %), cervix 1(2.5%), endometrium 2 (5%), NHL1(2.5%), Nasopharynx 1 (2.5%), hypo pharynx 3 (7.5%),Ovary 4 (10%) ,pelvic 1 (2.5%), pancreatic 2 (5%), axillary+pelvic 1(2.5%) ,uterus 2 (5%),rectal 2(5%), Bronchogenic +liver (2.5%), Nasopharynx +breast 1(2.5%), cervix+ovary 1 (2.5%),Utrus+ endomtrus 1 (2.5%). Inflammation appears 29 (72.5%), chronic represent 11(27.5%), while acute inflammation 18 (45%). Atypia appears as 31(77.5%) .Metaplasia appears 11(27.5%). This patient given chemotherapy 26 (65%) while radiotherapy, 2 (5%), and both therapies 12 (30%), with significant (P value 0.01). these finding is supported by the current study.

Other studies in cytological change associated with radiotherapy and /or chemotherapy in study conducted by Hussain G Ahmed, Dalia Al Elemirri, 14 July-29- novembar-2008 at Radio Isotope Centre, Khartoum to assess the effect of chemotherapy and or radiotherapy. With significant (P value 0.004) . In100 cases, 56 (56%), 7 (7%), and 37 (37%) were patients receiving chemotherapy, radiotherapy and both therapies respectively. Age ranged from10 to 80 years of age.100 cancer patients included head and neck cancers, breast cancer, hematolymphoid malignancies , cervical cancer prostatic cancer and the remaining 10 patients had tumors with unknown primary .The study finding relation between treatment by chemotherapy or/and radiotherapy and atypia by statistically significant (P value 0.0001) these finding is supported by the current study.

The study finding relationship between inflammation and therapy statistically significant (P value 0.004) .

Address Department of histology and cytology , Faculty of medical laboratory sciences, University of, Khartoum, Sudan 14 July-29-novembar-2008.

## CONCLUSION

On the bases of this study that: Chemotherapy Or /and Radiotherapy are risk factors for cyto morphological changes of oral mucosa.

However buccal cytology provides a useful tool in the evaluation of oral cyto morphological changes.

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