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Assessment of the Effect of Low Level Laser Therapy on Parotid Glands of Gamma Irradiated Rats (An Experimental Study)

Thesis
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ABSTRACT

Objective: Gamma radiation-induced salivary gland dysfunction has a major deleterious effect on oral health. **Aim:** This study was carried out to evaluate the possible effect of low level laser therapy (LLLT) on radiation induced oxidative stress in rats' salivary glands. **Material and Methods:** Sixty four male Albino rats were divided into two groups. One group where the left parotid gland was exposed to 3 sessions of LLL, then rats were subjected to 3 sessions of whole body gamma-radiation. In the other group, rats were subjected to 3 sessions of gamma-radiation; each was followed by a session of LLL to the left parotid gland. The right gland of both groups was used as irradiated control. Parotid glands were collected 1day, 3days, 1week and 2weeks after the end of treatment and were subjected to histological examination and immunohistochemical analysis. **Results:** The parotid gland of both laser groups showed less intracytoplasmic vacuolization, slight alteration of acinar architecture and almost even size nuclei as compared to the irradiated gland. LLL either before or parallel to gamma-irradiation was effective in increasing cell proliferation on the third and seventh day, respectively as compared to the gamma irradiated group ($P<0.05$). Statistically, results revealed significant decrease in optical density of caspase 3 activity in the lased groups on the first week as compared to the control. **Conclusion:** LLLT attenuates the harmful effect of gamma irradiation on the parotid glands of the rats. Also, it improves gland regeneration through modulation of cell proliferation and apoptosis.

KEY WORDS: ***Low level laser; Gamma radiation; Histopathological; Immunohistochemical; Salivary glands.***

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List of abbreviations

PCNA	Proliferating cell nuclear antigen
LLLT	Low level laser therapy
LLL	Low level laser
InGaAlP	Indium gallium aluminum phosphide
γ	Gamma
α	Alpha
β	Beta
NO	Nitric oxidase
IR	Ionizing radiation
RBCs	Red blood corpuscles
MVD	Microvascular density
RT	Radiotherapy
EF	Excretion fraction
DNA	Deoxynucleic acid
PI	Proliferation index
Co^{60}	Cobalt 60
PBL	Peripheral blood lymphocytes
Cox	cytochrome C oxidase
He- Ne	Helium- neon
ATP	Adinosine triphosphate
RNA	Ribonucleic acid
NADH	Nicotine adenine dinucleotide, reduced
MD	Mouth dryness
LPT	laser phototherapy
EC	Endothelial cell
HUVEC	Human umbilical vein endothelial cell
PDLFs	Periodontal ligament fibroblasts
CHO K-1	Chinese hamster ovary cells
HOB	Human osteoblast-like cells
MSCs	Mesenchymal stem cells
CSCs	Cardiac stem cells
MC3T3	Normal primary osteoblast
ALP	Alkaline phosphatase
SCs	Schwann cells
IGF-1	Insulin growth factor-1
IGFBP3	Insulin growth factor basic protein 3
Nd:Yag	
mRNA	Messenger ribonucleic acid
NIR	Near infra-red

VEGF	Vascular endothelial growth factor
D1	Day one
D3	Day three
W1	Week one
W2	Week two

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Introduction