ISSN No:-2456-2165

Review: Correlation Between Diabetes Mellitus and Residual Ridge Resorption

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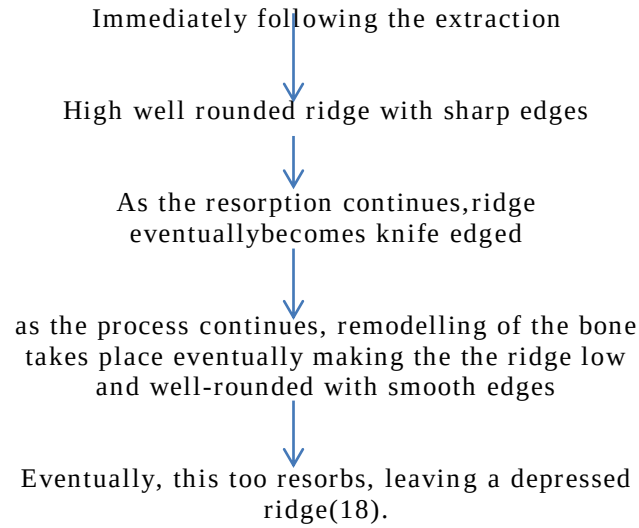
Abstract:- Diabetes mellitus is a disease resulting from impaired insulin availability in the body leading to increased blood glucose which is called as type 1 diabetes mellitus,or varying degree of insulin resistance or unable to use the available insulin by the body is called type 2 diabetes mellitus. Residual ridge resorption is a progressive disease which is not a reversible process that occurs in every patient and itsone of the main cause for complete denture failures. Uncontrolled diabetes is one of the main reason for acceleration of residual ridge resorption, so the aim of this review is to find a correlation between diabetes mellitus and residual ridge resorption.

Keywords:- *Diabetes Mellitus Type 1, Diabetes Mellitus Type 2, Residual Ridge Resorption.*

I. INTRODUCTION

Diabetic mellitus is a chronic metabolic disorder in the body, diagnosed by increased blood glucose level in the blood.Diabetes mellitus is classified into(a) type 1(insulin dependent) and(b) type 2(noninsulin- dependent)(1).In type 1, the destruction of beta cells in pancreas leads to lack of insulin availability in the body , in type 2diabetes mellitus either there is lack of production of insulin or body cannot use the produced insulin.(2,3).Type 1 diabetes is a chronic disease which is due to small amount of insulin production by the organ called pancreas, insulin is a hormone which is needed for sugar to enter into the cells to produce energy. Type 1 diabetes usually occurs in early stage of life. Type 2 is usually due to genes, excessive weight gain and unhealthy lifestyle,and it's the most common type compared to type 1. (4,5)Diabetic mellitus affects more than 100 million people worldwide. India leads the world with the largest number of diabetic mellitus and has been declared has "diabetic capital of the world"by WHO(6).Residual ridge resorption(RRR)is a natural process which occurs after loss of teeth, in which the bone undergoes constant remodelling(7).RRR is nothing but quality and quantity changes of the bone after teeth has been extracted(8).RRR is greater during the first few months of extraction and eventually the resorption process slows down.The rate of resorption is more in lower jaw (mandible)than compared with upper jaw (maxilla), the ratio 4:1 mandibular to maxillary resorption.(9)Factors affecting RRR are both systemic and local factors. systemic factors are: nutritional in sufficiency, impaired hormonal production, bone disorders, some renal diseases, uses of drugs, constant hormonal changes in women etc. (10) .some of the local factors that leadingRRR are lack of denture retention and stability, constant pressure, incorrect relationship and night time wearing (11).Osteoporosis is another common reason for RRR it usually increases with advance in age. PATHOGENESIS of RRR



II. BONE RESORPTION AT CELLULAR LEVEL (BMD)

Osteoclasts breakdown the tissues in the bone which leads to increased calcium level in the blood which is called as bone resorption. The hallmark of the resorbing surface is the appearance of scalloped erosion, called Howships's or resorption lacuna.(12)Currently, bone resorption density (BMD) is most reliable diagnostic standard given by WHO. T-score, is representation of BMD valuethat is the number of standard deviations that shows whether the individualis above or below the average of healthy adult.

ISSN No:-2456-2165

III. RESIDUAL RIDGE RESORPTION IN DIABETIC PATIENTS VS NON DIABETIC PATIENTS

According to the study done by oxford dental collegeand hospital, showedthat, when compared among male and female groups the females had significantly increased resorption compared to the male group.

Parameters	Gender	n	mean	std.Deviation value	P-
Rtmand.premolar	male	24	11.10	2.29	0.022*
	Female	26	13.24	3.85	
Ltmand .premolar	Male	24	11.36	2.56	0.049*
	female	26	13.35	4.37	
Rt.max.premolar	male	24	12.62	2.69	0.012*
	female	26	14.66	2.78	
l.ma.premolar	male	24	12.27	2.51	.008*
	female	26	14.46	3.00	
R.max.molar	male	24	11.52	2.72	.013*
	female	26	13.87	3.58	
L.max.molar	male	24	11.19	2.30	.012*
	female	26	13.67	4.17	

*p<0.05-significant-Indicates significant at 5% level of significance(13).

Residual ridge resorption was significantly increased among diabetics than non- diabetics and diabetics had significantly more RRR in mandibular premolar region and maxillary premolar and molar region. A weakpositive co-relation was observed between the time period of edentulousness and alveolar bone resorption in both the gender (13.)Another study done by Osama Al-Jabrah, reveals that the diabetic patient had twice the amount of RRR compared to controls. Significantly diabetic females had greater RRR than diabetic males. The amount of RRR was of greater in patients who had been edentulous for more number of years had greater residual ridge resorption compared to the patients who became recently edentulous.

IV. RESIDUAL RIDGE RESORPTION AND POST-MENOPAUSAL WOMEN

According to the study done by Dr. Prithika Eswaramurthy form Goa dental college. The mandibular residual ridge resorption had 0.5% increased resorption compared to the controlgroup. That is completely edentulous, post-menopausal diabetic women had more ridge resorption compared to non- diabetic post-menopausal women(15).

V. BONE DENSITY AN ANTI- DIABETIC DRUGS

The study was done by Mohsen soroush reveals that T2DM its self is not the main reason for bone resorption but the medications that is anti-diabetic drugs are the main reason for severe bone resorption (16).Another review article by A.G.D. VIANNA concludes that patients with type2DM had an increased risk of bone fractures, which was not predictable by BMD measurements. This risk is not caused by a single factor but it is multi factorial and also due to anti diabetic therapies(17).

VI. DISCUSSION

Prosthodontics rehabilitation becomes a difficult task when there is extensive residual ridge resorption which leads to failure of complete dentures. Some of the etiological causes related with RRRare quality ,quantity and shape of the residual ridge,muscle attachment, patients age, gender ,Ca deficiency, osteoporosis and disturbances in hormone production. These factors together cause changes in the edentulous maxilla and mandible which leads to RRR(14).DM is a carbohydrate metabolism disorder which is caused by either insulin insufficiency or unable to use the available insulin(insulin resistance). The studies suggested that the patients with uncontrolled or poorly controlled T2DM had morechance of residual ridge resorption and more severe bone loss when compared to individuals who didn't have *diabetic(*19).The patients with T2DM were positively associated with increased chances for a change in bone score compared to subjects without diabetes (20).These results suggest that poorly controlled diabetes patients suffered from both an increased risk for teeth loss which was followed by alveolar bone loss and more severe progression over those without T2DM(21). Most common cause for teeth loss in poorly controlled diabetes was periodontal problems. There are lot of techniques to determine RRR but orthopantomography (OPG) is most commonly used in studies ,due to benefits such as the image of both maxilla and mandible in a single film, with relatively low radiation dose, takes short time for processing and economically efficient compared to other techniques (22). This technique also helps to localize anatomical landmarks and provides vertical bone dimensions. But the drawbacks are that image distortion and mistake in image may occur and it only provides 2 dimensional image does not provide 3 dimensional image (buccolingual view)ofthe bone (23). OPG's are used for determining the bone density, as a relationship between mandibular bone mineral density and skeletal areas in evaluating osteoporosis has been shown (24).

ISSN No:-2456-2165

VII. CONCLUSION

The aim of this review was to find the correlation between diabetic mellitus and residual ridge resorption ,concludes that diabetic patient had more residual ridge resorption compared to non-diabetic patients. This reinforces the necessity of dental practitioners to have knowledge about systemic conditions like diabetic mellitus and its correlation with clinical findings, given that these may influence individuals dental treatment planning.

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