Innovations

"Association between Periodontics and Oral Potentially Malignant Disorders (OPMD)"

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Abstract: *Periodontitis is an inflammatory condition that affects the structures that support the teeth, which may further lead to the risk of teeth loss, the assessment of periodontitis is done based on the indicators such as periodontal ligament space (PDL), bone loss radio graphically, bleeding on probing, mobility of tooth. Among the Oral Potentially malignant disorders (OPMD), verrucous leukoplakia has the highest risk of malignancy transformation. Oral Cancer is the eighteenth most commonly occurring cancer worldwide with squamous cell carcinoma being the most common. Treatment of OPMD and periodontitis primarily involves medical management such as Anti-oxidants, multi-vitamins, and photobiomodulation, if not feasible then surgical management such as cryotherapy is advised. Periodontitis has a strong association with OPMD, Early diagnosis and appropriate treatment in collaboration with periodontitis and oral medicine specialists can lead to a significant prognosis.*

Keywords*: Periodontitis, Gingivitis, Fibrosis, Leukoplakia, Lichen Planus, Oral potentially malignant disorders.*

Introduction:-

Oral Cancer is the eighteenth most commonly occurring cancer worldwide with squamous cell carcinoma being the most common, chronic inflammation of periodontium is considered to be a risk factor predisposing to Oral Potentially Malignant Disorders (OPMD), around 10 to 20 percent of cases of tumors in humans initiate with an inflammatory process (Bhat et al., 2019). Periodontitis is an inflammatory condition that affects the structures that support the teeth, which may further leads to the risk of tooth loss. The assessment of periodontitis is done

based on the indicators such as periodontal ligament space (PDL), bone loss radiographically, bleeding on probing, mobility of tooth (Colonia-Garcia et al., 2020). Periodontium-based infective organism such as Porphyromonas gingivalis which is a gram-negative bacterium has a higher predilection for malignant transformation of oral tissue (Speight et al., 2018).A study done in the Pomerania region of Europe has shown the presence of leukoplakia as a posthumous occurrence of gingival bleeding (Bray et al., 2018). A study done by Feller et al. in 2013 has shown an association between periodontitis and OPMD which is suggestive of an inflammatory-immune pathway (Kinane et al., 2017). Habitual association of tobacco smoking and chewing is seen as a strong causative agent in the occurrence of periodontitis, along with commonly occurring oral potentially malignant disorders such as leukoplakia, lichen planus, oral submucous fibrosis, and most importantly erythroplakia (Bhat et al., 2015).

Pathophysiology of OPMD:-

Among the OPMD, verrucous leukoplakia has the highest risk of malignancy transformation. A study done by Paul et al. (2017) has shown that about 39% to 98% of cases have turned into malignancy. The lesion may appear like a flat-plaque type leukoplakia which makes it difficult to diagnose. As the stage progresses, there will be a non-homogenous or verrucous appearance in the latent stage, hence proven to be a risky variety of OPMD. Incisional biopsy is very important in establishing the type of leucoplakia, level of dysplasia and features such as presence of wide bulbous rete pegs, verruciform surface pattern and simple hyperkeratosis (Warnakulasuriya, 2018; Dilhari et al., 2016; Müller, 2018). This leukoplakia can be differentiated from the other types based on the multifocal appearance i.e. proliferative and recurrent, persistent lesions (Ojeda et al., 2020; Nadeau & Kerr, 2018). The presence of the human papillomavirus in the pathogenesis of OPMD is noted, especially in leukoplakia cases (about 24% of cases in comparison to 10% of normal cases) (Warnakulasuriya, 2021).

Association between oral leukoplakia and periodontitis:-

Studies pertaining to the association of leukoplakia and periodontal diseases done by Sivaharini et al. (2021) have shown the presence of Generalised chronic periodontitis in about 55% of patients and Generalised chronic gingivitis in 45% of patients. Age wise predilection has shown the higher incidence of lesions in between 50 to 80 years of age, with further literature stating chronic periodontitis has a high trigger factor towards the development of leukoplakia into oral squamous cell carcinoma (Shridhar et al., 2021). Proper oral hygiene especially using electric oscillating toothbrushes, using fluoridated toothpaste, along with interdental flossing is advised. Leukoplakia is a lesion affecting almost 1-2% of the world's population and is higher in individuals with smoking habits rather than non-smokers. Tobacco cessation counselling is the first line of treatment against the development of leucoplakia. The periodontist or oral

medicine specialist would advise the use of topical or systemic antibiotics, followed by scaling and maintenance of oral hygiene using a fluoridated toothbrush and chlorhexidine mouthwash to prevent further accumulation of plaque and subsequent formation of calculus (Herreros-Pomares et al., 2021). Association between the presence of any of the two following bacterium such as Fusobacterium nucleatum, Porphyromonas gingivalis, and Prevotella intermedia in both leukoplakia and periodontitis has been shown in a study done by Krithiga et al.(2021), especially in men and women between the age of 21 - 70 years (Sivaharini et al., 2021).The study done by Peter Meisel et al. (2012), had experimented around a decade ago, is the only presenting article that shows the strong evidence of an association between leukoplakia and gingivitis or any other periodontal manifestation. Clinical attachment loss and bleeding on probing seen in both periodontitis and gingivitis is associated with an increased risk of malignancy especially in the presence of leukoplakia in a dose-dependent way along with the habits of smoking. One of the most important biomarker is the increased levels of C-Reactive Protein (CRP) and low-density lipoproteins (LDL), as previously mentioned the dose-dependent increase in smoking habits, frequency of years and the level of oral hygiene is directly proportional to the increase in malignancy transformation of leukoplakia, and also its association with periodontitis (Mittal et al., 2022; Meisel et al., 2012).The attachment loss was more than 4mm in cases of leukoplakia with periodontitis, also the number of sites of bleeding of probing was also very high when compared with non-leukoplakia cases. The risk approximately becomes 3 times more in cases with both smoking and alcoholism, as it induces the transformation from leukoplakia state to malignancy (Speight et al., 2018; Gunathilake et al., 2021).

Association between oral lichen planus and periodontitis:

A study done by Sharika et al. (2021) has shown an association of periodontitis in individuals with betel nut chewing habits and in about 75% of the study samples showing high risk in patients with lichen planus/lichenoid reaction. The higher prevalence being the male population with least illiteracy (about 33%, rest 25% being professionals) and this is mainly attributed to the less oral hygiene status being the predisposing factor. The hygiene status of these individuals with OHI-S taken, showing moderate to poor scores and the age predilection is between 40-59 years respectively, in cases of proliferative verrucous leucoplakia. The species that are highly associated with periodontitis are Firmicutes (about 36.8%), followed by Bacteroidetes (about 17.2%) being the major contributors (Liu et al., 2021). Also study done by Narendra et al. (2016) showed an increase in the rate of periodontal progression in patients with lichen planus due to the difficulty in performing various periodontal procedures due to the increase in burning sensation and sensitivity in these patients. In particular, erosive type of oral lichen planus patients have comparatively higher rates of gingival inflammation and periodontal problems with CPITN score of 2.9 when compared

with healthy controls who have a score of 1.1 (Rai et al., 2016). Since there are difficulties in differentiating pemphigus from Mucous membrane Pemphigoid and Linear IgA disease, the patients should primarily stop the precipitating factors such as smoking, alcohol usage. Desquamative gingivitis is commonly seen in lichen planus patients, however, studies reported minimal evidence regarding the interrelation between desquamative gingivitis and periodontitis (Macklis et al., 2020). Few of the studies strongly support the association of oral microbes in cases with oral lichen planus and periodontitis, especially Pseudomonas, Granulicatella, and Leptotrichia. Erosive lichen planus cases have more of these opportunistic organisms, as there is a lack of oral hygiene due to the pain and irritation while brushing. Since the epithelial barrier disrupted by the above said microorganism especially Leptotrichia, in the presence of Erosive OLP, Erosive OLP manifests, a higher rate of a higher rate of plaque accumulation and gingival inflammation results, proceeding into periodontitits (Li et al., 2020). In the subgingival plaque level, Aggregatiacter actinomycetemcomitans and Porphyromonas gingivalis are present in large numbers in comparison with the above opportunistic organisms (Nunes et al., 2022; Kavarthapu&Gurumoorthy, 2022).

Association between oral submucous fibrosis and periodontitis:

Studies have shown the association of periodontitis in patients with habits of Kharra(which is a combination of tobacco and betel nut) chewing which is found common among the Vidarbha region of Maharashtra. This is often accompanied by 'odynophagia' which is a medical term used for patients having painful swallowing, unlike dysphagia which is difficulty in swallowing.Though both the conditions might overlap with each other, the presence of dysphagia can be seen most commonly in older individuals, while odynophagia has number of medical causes (Dodani et al., 2012). The main process that occurs is the cholinergic effect of Arecolin which in conjunction with the saliva (calcium salts) increases the calculus formation which will further increase the accumulation of plaque (Sharma et al., 2018).

Other studies done by Shiras et al. (2018) showed the presence of Community Periodontal Index (CPI) level 2 and 3 which corresponds to higher retention factors such as poor oral hygiene and habits leading to increased retention of plaque and subsequent calculus formation, and CPI 3 indicates pocket formation of 4 - 5mm in patients with smokeless tobacco chewing habits, which together clearly indicates the presence of severe periodontal destruction and poor OHI levels. The above conditions are considered to be environmental factors but along with the patient's age, microbial contents/composition of the plaque, genetic factors, systemic factors, teeth-related factors, behavioral and social factors, play a major role in the gingival and periodontal status of the patient (Ray et al., 2019).

Management of oral potential disorders:

The first and foremost treatment perspective for OPMD is cessation of habits. For patients with habits of areca nut chewing, proper cessation counselling can be brought about by 3 major steps such as 1)Smoking cessation centers with intensive therapy sessions 2) Self-help or interventions can be provided by health care professionals using Cognitive Behavioural Therapy (CBT) 3) Anti-depressants and Nicotine Replacement Therapy (NRT). Tobacco cessation can be mainly done by 5 "A's" and 5 "R's" which includes Ask, Advice, Assess, Assist, and Arrange; Relevance, Risk, Rewards, Repetition, Roadblocks. In total, this approach can range anywhere between 5 to 15 mins and has shown to be on the best method (Arakeri et al., 2017). Withdrawal symptoms includes anger, depression, constipation, and increased appetite followed by weight gain, restlessness, craving, and headaches. Anti-depressants such as Nortriptyline and Bupropion are immensely helpful in the withdrawal of cessation symptoms such as depression, and weight gain after cessation. Nicotine patches, nicotine sprays, nicotine gums, and nicotine inhalers are the other alternative approach. Diabetes mellitus is one of the main aggravating factors apart from smoking or any other tobacco habits, to induce periodontitis or any other gingival manifestation. This is mainly due to impaired immune function resulting in impaired neutrophil function or the hyper-responsive macrophage activity, resulting in increased production of cytokines.Hence, management using Biguanides (metformin-500) or along with Sulfonylureas(glimepiride) before and after oral prophylaxis, can help to prevent the aggravation of periodontitis (Gururaj et al., 2021).

Management of leukoplakia begins with medical management, using retinoid analogs (Vit-A) via systemic routes. Other anti-oxidants specifically lycopene, green tea, and turmeric in the form of topical applications have proven to be an effective treatment in preventing further malignant transformation. In addition, multivitamins has always been the efficient method of treatment of leukoplakia with mild to moderate levels of dysplasia (Deliverska& Petkova, 2017).

When the lesions showsno reduction in the size or diameter of the leukoplakic patch and no signs of resolution symptomatically or objectively, surgical management of the lesion is advised (Adisakwattana, 2017). Apart from the medical management, photo-biomodulation has been shown to be effective in decreasing the clinical signs or the reduction in the size of the leukoplakia patch.

When leukoplakia appears on the tongue (which is one of the most common places of occurrence), then a biopsy cannot be done. Surgical management of leukoplakia includes Cryosurgery, laser surgery or conventional surgery (Kwon et al., 2021).

The First line of treating the patient in cases of lichen planus is 'educating the patient regarding various manifestations and the recurrent nature of the lesion. The two most important aspect of treating lichen planus is 1)Reducing the stress of the patient using anti-depressants such as alprazolam in high anxiety or stress patients and The removal of local factors such as sharp cusps, fractured denture or any uneven restoration that may impinge on the lesion and may aggravate the recurrence of the lesion. 2)Topical steroidal therapy such as triamcinolone acetonide in patients with mild levels of Oral lichen planus can be given, even before the above said treatment. Systemic steroidal therapy is of prime importance in this auto-immune disorder, examples include Predisolone (5gm taken initially upto 20mg/day). At the end of every treatment, the patient should be reminded again regarding the recurrent nature of the diseaseand on every single visit, the lesion and symptoms of the patient should be observed. The steroidal therapy should not be stopped at any point of time, if happens, would double or triple the level of impact of the lesion and would end up in life-threatening conditions. When the steroidal therapy crosses 2 to 3 weeks and when the size and symptoms of the lesion are reduced, default tapering of the drug dosage should be done (Geletko et al., 2022). Since, the current article is indicative of the extent of poor periodontal status of these patients, maintenance of oral hygiene becomes a prior importance. Frequent oral prophylaxis in poor oral hygiene index patients along with the frequent usage of chlorhexidine mouthwash is strongly recommended.

The periodontal management includes scaling alone in patients with less than 5mm periodontal pocket. Patients with pocket measurements more than 5mm should definitely undergo scaling and root planning, in areas where accessibility is difficult then the usage of an automated machine such as an ultrasonic scaler and a piezoelectric scaler is recommended. Various studies have recommended the use of piezoelectric scalers, as they do not cause discomfort to the patient in terms of high sound, high-pressure water splashing during procedure and higher sensitivity caused during the procedure. Meanwhile, the only disadvantage of is that the lateral aspect of the piezoscaler alone is being used, unlike the ultrasonic scaler, which uses all the sides available (Shaik et al., 2016).

Conclusion:-

Studies have proved the occurence of Periodontitis among the commonly occurring Oral Potentially Malignant disorders such as Oral Submucous Fibrosis, Oral Lichen planus, and Oral Leukoplakia. There are also other OPMDs such as Discoid Lupus erythematosus, Actinic Chelitis, and Verrucous hyperplasia, but these are not associated with periodontitis or gingival lesions. Periodontal conditions can be maintained by the usage of manual or automated oral hygiene

methods, and the premalignant lesions are treated by both medical and surgical management. Major factor in treating the condition is the removal of local factors, which can occur due to improper brushing technique, improper oral maintence without the usage of mouthwash and dental floss and removal of irritants such as sharp cusps of teeth. Hence patient education and knowledge regarding the signs and symptoms of the conditions, and teaching the importance of consultation with Periodontist and Oral medicine specialist improves the positive treatment outcomes.

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