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Comparison Of Gingival Overgrowth Status Between Drug Induced And Inflammatory Gingival Overgrowth.

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ABSTRACT:

Aim:

To compare the gingival overgrowth status between drug induced and inflammatory gingival overgrowth..

Introduction:

A swelling of the gingiva is known as gingival overgrowth. This disorder is also known as gingival hyperplasia or hypertrophy. They are classified according to their etiology, pathogenesis, location, scale and extent. Drug-induced gingival overgrowth and inflammatory gingival overgrowth are the two most common forms. Plaque deposition is the primary cause of inflammatory gingival overgrowth. Gingival overgrowth caused by drugs is also a serious problem. Overgrowth. Drugs such as calcium channel blockers, anticonvulsants and immunosuppressants are often responsible for drug-induced

Materials and method:

The research was carried out at a university which was a retrospective study. Gingival overgrowth was observed in the general population. Case sheets of patients were obtained from DIAS for analysis.The data was then collected using SPSS tools for statistical analysis. A comparison was also made between drug-induced gingival overgrowth and inflammatory-induced gingival overgrowth, taking into account the age, gender, and location affected in the oral cavity.

Result:

Gingival overgrowth caused by inflammation (59.38%) was more prevalent than drug induced gingival overgrowth (40.63%).

Conclusion:

This study reveals that gingival overgrowth caused by inflammation was more prevalent than drug induced gingival overgrowth. Effective oral hygiene is especially important for managing gingival overgrowth caused by chronic inflammation. For medication-induced gingival overgrowth, physicians may be able to substitute the medication to reduce the risk of developing gingival overgrowth. For gingival overgrowth associated with systemic condition, management of the underlying systemic condition usually results in a partial or complete resolution of gingival overgrowth.

Keywords:

Calcium channel blockers, phenytoin induced overgrowth, Inflammatory gingival overgrowth, alternate medications , gingival enlargement, innovative indices

INTRODUCTION:

Oral mucosa is continuously exposed to external and internal stimuli, resulting in a variety of diseases ranging from developmental to chronic.As a result, it manifests a wide variety of diseases, from developmental to reactive to inflammatory to neoplastic (1). The reactive hyperplastic lesions are the most commonly found oral mucosal lesions in humans.These overgrowth are a result of irritation or a minor injury, such as calculus, chewing, fractured teeth, lodged food, overextended denture flanges, and overhanging restoration (2). An overgrowth of gum tissue around the teeth is known as gingival hyperplasia. This disorder can be caused by a variety of factors, but it's most often a symptom of improper

oral hygiene or a side effect of certain medications .Gingival overgrowth is a common symptom of gum disease that can be induced by gingival inflammation, fibrous overgrowth, drugs or a combination of all of these (3).It is a multifactorial disease that arises as a result of interactions between the host and the environment, or as a result of various stimuli.It may be caused by plaque, be associated with systemic hormonal abnormalities, or be a symptom of multiple blood dyscrasias, such as leukaemia, thrombocytopenia, or thrombocytopathy.These overgrowth can cause functional issues such as mastication difficulties, difficulty in speech, aesthetic and psychological issues (4). Gingival overgrowth is a debilitating condition that can have a negative impact on your oral health. The presence of swollen, bleeding gums is one of the more common symptoms of this disease(5). Tender gums, irritation, discomfort, bad breath, and plaque accumulation on teeth are all signs of gum overgrowth.In more serious cases, the gums can fully cover the teeth, causing problems with hygiene and alignment. It would be difficult to clean the teeth if they are covered . Gum disease can become more likely as a result of this (6). If gingival overgrowth begins at a young age, it can interfere with tooth eruption, or the process by which the teeth emerge from the gums and become visible.Inflammation is a common cause of gingival (gum) overgrowth. It may also be caused by drugs, as a side effect of taking them (7). Overgrowth may be caused by a variety of drugs . Anti-seizure medications, immunosuppressants, calcium channel blockers, and medications for high blood pressure and other heart problems. When a person avoids taking the prescribed drug, the disease usually stops (8). Inflammatory gum overgrowth, systemic causes, and inherited gingival fibromatosis are some of the other causes.Gingival overgrowth is a condition that develops as a result of inflammation. Plaque accumulation on the teeth from food, bacteria, and bad hygiene practises are common causes of inflammation . The gums may become tender and red, and bleeding may occur as a result of the inflammation. This condition can be improved with proper hygiene procedures such as frequent flossing and active brushing.Gingival overgrowth may also be caused by physiological factors (9). Gum overgrowth may be caused by pregnancy, hormonal imbalances, and some diseases like leukaemia. HIV, asthma, anaemia, Crohn's disease, lymphoma, and vitamin deficiencies are all diseases or disorders that may induce gum overgrowth. If the root cause has been addressed, the condition normally improves (10). HGF (hereditary gingival fibromatosis) is a rare oral disease that causes gum overgrowth over time. It usually starts in infancy, but it may not become apparent until adulthood. An overproduction of collagen causes gingival overgrowth in this condition. The gums can cover large portions of the tooth surfaces or fully cover them in some cases of this condition (11). Inflammatory overgrowth is usually either generalised or localised. Plaque-induced and non-plaque-induced inflammatory overgrowth are also possible. Plaque-induced plaque may be generalised, whereas non-plaque-induced plaque is limited to contributing etiological causes such as restorations that impinge on the gingiva or prosthetics that are restricted to a single tooth (12). Drug-induced overgrowth, on the other hand, is commonly widespread. Gingival lobulations develop over time and may be inflamed or fibrotic in appearance. Gingival overgrowth makes plaque management impossible, leading to a secondary inflammatory mechanism known as combined gingival disease.There are two forms of gingival overgrowth that are induced by drugs, fibrotic and inflammatory (13). Elevated, a matricellular protein known to be reliable for fibrosis, is a fibrotic form. TGF-increases drive CTGF/CCN2 (current molecular mechanisms unknown), but TGF-as-a-therapeutic target appears to be promising.In the presence of inflammatory mediators (such as PGE2), CTGF is not down regulated, unlike other tissues' fibroblasts (such as the kidney), which have their CTGF levels reduced by the same PGE2 (14). Seymour et al.

proposed the genetic predisposition hypothesis for DIGO etiopathology in 1996 . This is supported by the fact that when on the same medication, some people experience gingival overgrowth. Gingival overgrowth is caused by a variety of factors. Plaque buildup and plaque-induced inflammation tend to be contributory factors, and the incidence of gingival overgrowth is proportional to plaque buildup and plaque-induced inflammation.Decreased FA absorption by gingival fibroblasts due to decreased cation-dependent folic acid (FA) active transport results in improvements in matrix metalloproteinase metabolism and the inability to activate collagenase (15). Owing to a lack of collagenase, this results in an accumulation of connective tissue and collagen.Gingival overgrowth is classified according to the degree of overgrowth as follows: Grade 0: There are no visible symptoms of gingival overgrowth. overgrowth Grade I: Interdental papillae overgrowth; Grade II: Interdental papilla and marginal gingiva overgrowth and Grade III: Crown overgrowth covering three-quarters or more of the crown.There is no standard gingival index which would measure the gingival overgrowth of drug induced and inflammatory induced simultaneously .There has been no comprehensive literature on the pathogenesis, clinical manifestations, or treatment of affected patients to date (16). There is a need for exposition to improve our understanding of existing drugs and familiarise us with newer drugs.The aim of this study is to draw together all of the available information on drug-induced gingival overgrowth and inflammation induced overgrowth and to improve treatment concepts.Our team has extensive knowledge and research experience that has translate into high quality publications.(17–29),(30–34) (35) (36)

MATERIALS AND METHODS:

Study setting:

This research was conducted at a university. This research is retrospective in nature conducted from June 2019 - February 2021. DIAS was used to create case sheets for patients who visited the dental hospital. The participants in this study were all diagnosed with gingival overgrowth. All the case sheets included in this study were approved and reviewed. Also, cross verification of data was done by photographs. The institutional ethical committee at Saveetha Dental College gave their approval.

Sampling:

Patients with gingival overgrowth (n=32) were categorised. To determine the cause of gingival overgrowth, each patient's history was extensively examined. The gingival status of each patient was obtained in order to determine if the overgrowth was caused by inflammation or by a medication. Case sheets with missing data and repetitive cases were not included in this report. For each gingival overgrowth, sorting was performed separately based on age, gender, and site affected in the oral cavity. To reduce sampling bias, the data were cross-verified by another reviewer.

Statistical analysis:

For analysis, the excel sheet was converted to the Spss software. The association and correlation with age, gender as independent variables and form of overgrowth, and clinical site as dependent variables were investigated using the Chi-square test.

RESULTS:

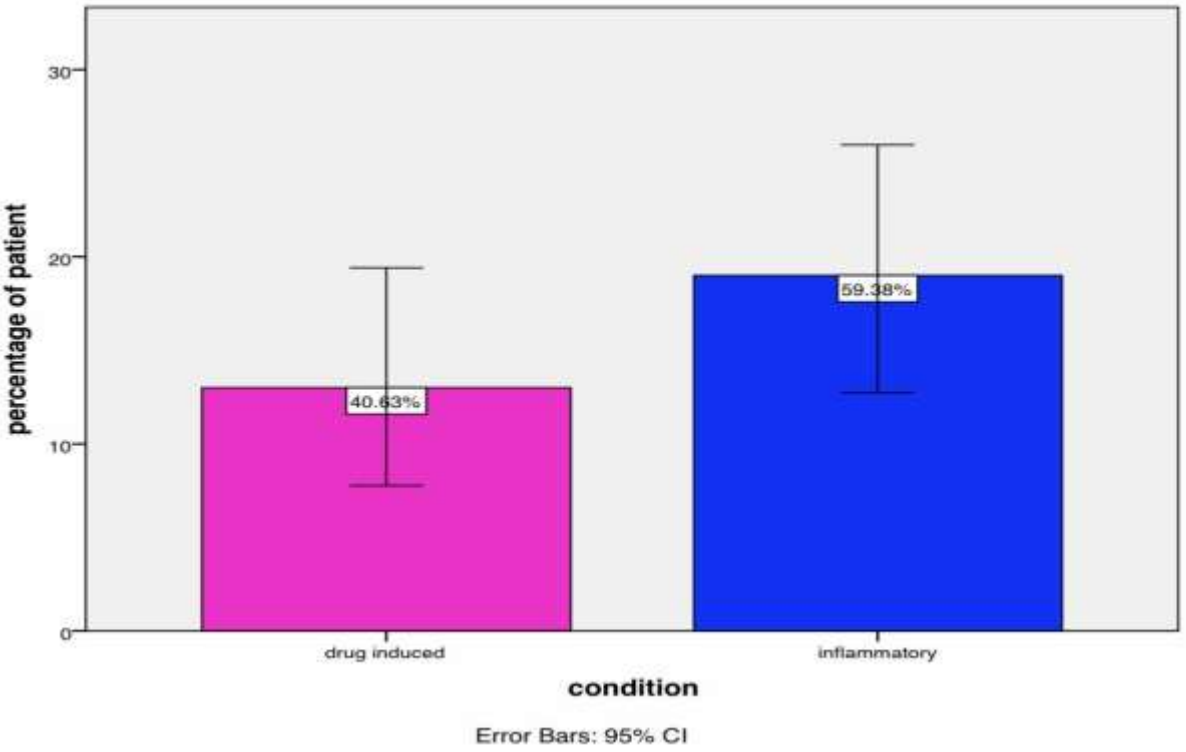

Figure 1: Bar chart depicting the distribution of drug induced and inflammatory induced gingival overgrowth. Pink colour represents inflammatory gingival overgrowth and blue colour represents drug induced gingival overgrowth. Highest prevalence of gingival overgrowth is inflammatory cause which is about 59.38% followed by drug induced which is about 40.63%.

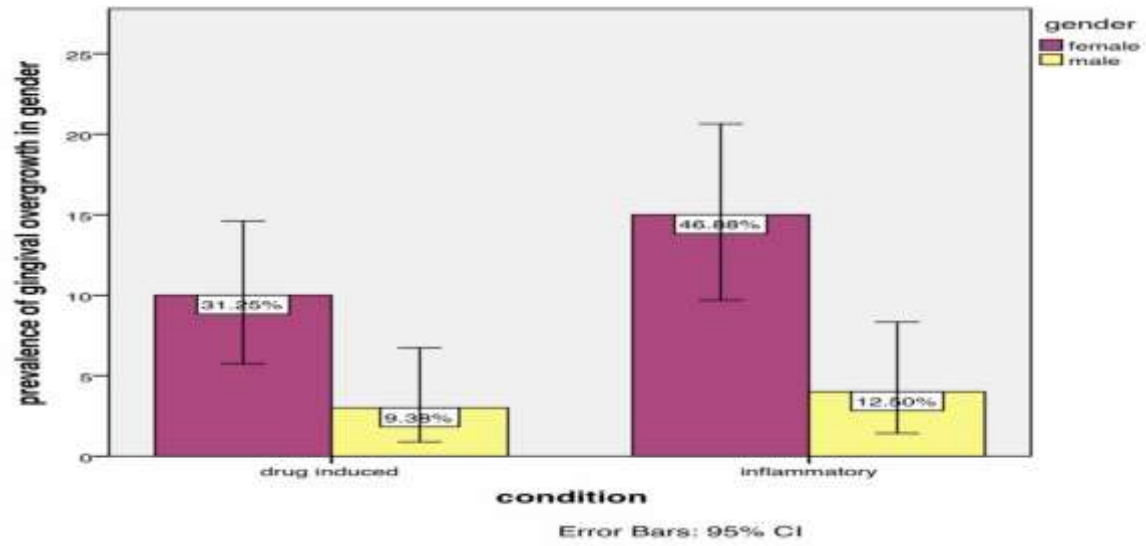

Figure 2: Bar graph depicting the association of gender with drug induced and inflammation gingival overgrowth. X axis represents the condition inducing gingival overgrowth and Y axis represents the gender

of the study population which includes male (purple) and female (yellow). Inflammatory induced gingival overgrowth is high among females (46.88%) when compared to males (12.50%). Drug induced overgrowth is also high in females (31.25%) when compared to males (9.38%). This was found to be a statistically insignificant P value = 0.892, P=>0.05. So, from this graph we can interpret that inflammatory gingival overgrowth was more prevalent when compared to drug induced gingival overgrowth with more prevalent in females (46.88%) when compared to males.

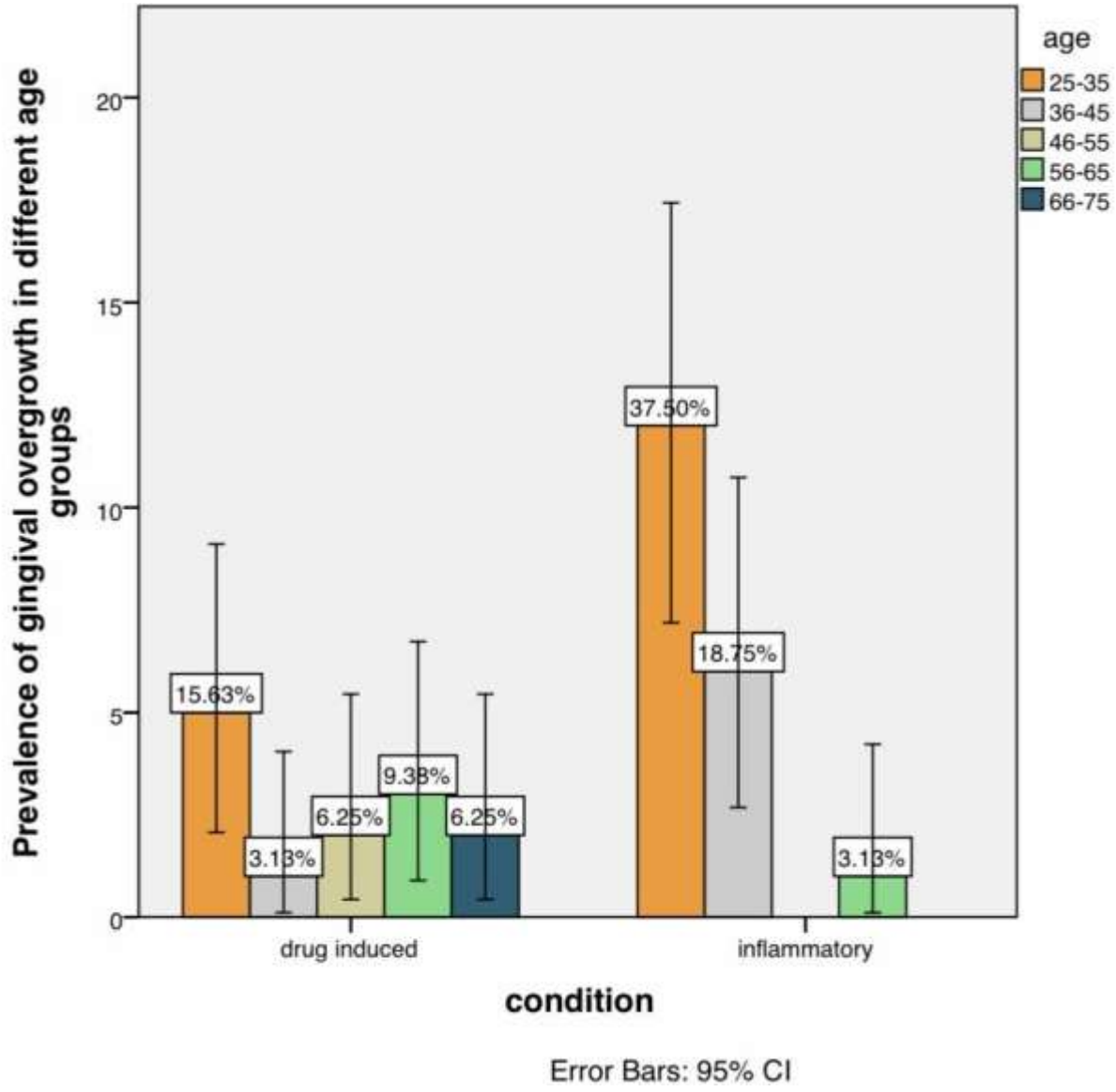

Figure 3: Bar graph depicting the association between type of gingival overgrowth (drug induced and inflammatory) ang age group of the population. X axis represents the condition inducing gingival overgrowth and Y axis represents the age of the study population which includes 25-35 years (orange), 36-45 years (grey), 46-55 years (brown), 56-65 years (green), 66-75 years (dark green). Inflammatory gingival overgrowth is high among the age group of 25-35 years with 37.50% . In drug induced gingival overgrowth age group of 25-35 years (15.63%) was found to be most affected. This was found to be a statistically significant P value = 0.030, P=<0.05. So, from this graph we can interpret that inflammatory

gingival overgrowth was more prevalent in the age group of 25-35 years (37.50%) when compared to other age groups.

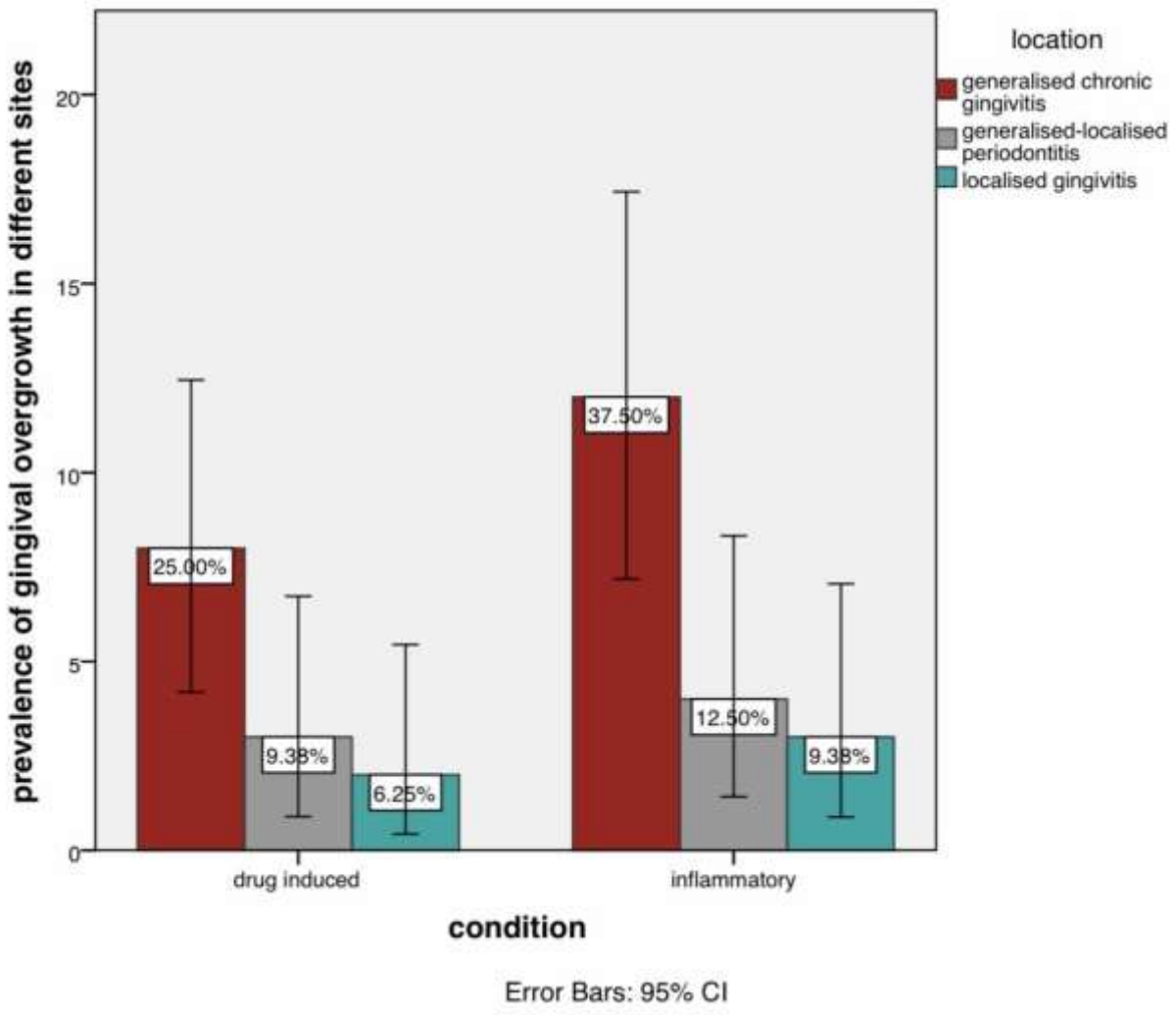

Figure 4: Bar graph depicting the association between site affected and type of gingival overgrowth. X axis represents the type inducing gingival overgrowth (drug induced and inflammatory) and Y axis represents the site affected in the study population which includes generalised chronic gingivitis (red), localised gingivitis (dark green) and generalised chronic gingivitis with localised periodontitis (grey). Inflammatory induced gingival overgrowth mostly occurs as generalized chronic gingivitis (37.50%) followed by generalised chronic gingivitis with localised periodontitis(12.50%) and localised gingivitis (9.38%). Drug induced gingival overgrowth mostly occurs as generalized chronic gingivitis (25%) followed by generalised chronic gingivitis with localised periodontitis(9.38%) and localised gingivitis (6.25%). This was found to be a statistically insignificant P value = 0.991, P=>0.05. So, from this graph we can interpret that inflammatory gingival overgrowth was more prevalent as generalised chronic gingivitis (37.50%)

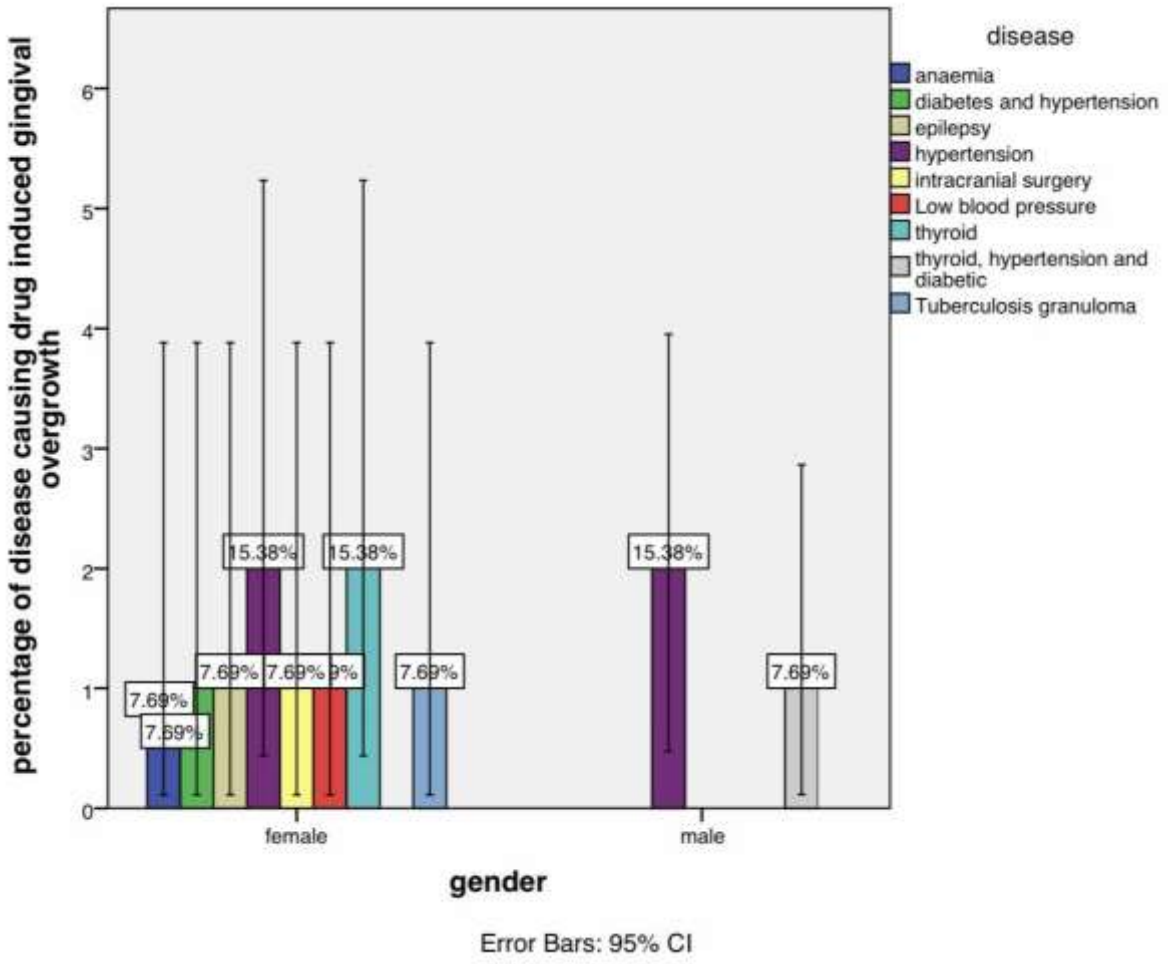

Figure 5: Bar graph depicting the percentage of disease causing drug induced gingival overgrowth. X axis represents the gender of the study population and Y axis represents the percentage of disease condition causing drug induced gingival overgrowth which includes anemia (blue), diabetes with hypertension (green), hypertension (purple), epilepsy (brown), intracranial surgery (yellow), low blood pressure (red), thyroid (blue), tuberculosis granuloma (dark blue) and combination of three (thyroid, hypertension, diabetes) (grey). The gingival overgrowth is highest in females and males, with hypertension in males with 15.38% (purple) and in females with thyroid condition with 15.38%(blue) and hypertension (15.38%)(blue). This was found to be a statistically insignificant P value = 0.498, P=>0.05. So, from this graph we can interpret that the most common cause of drug induced gingival overgrowth was due to hypertension in males and hypertension , thyroid in females.

DISCUSSION:

An overgrowth of gum tissue surrounding the teeth is known as gingival hyperplasia. This can be caused by a variety of factors, but it's most commonly a sign of poor dental hygiene or a side effect of certain drugs.This study was conducted to compare the gingival status between drug induced gingival overgrowth and inflammation gingival overgrowth. Patients with gingival overgrowth visited the dental college were randomly selected (n=32). Then the cases were sorted according to the type of gingival overgrowth in

which total drug induced overgrowth cases was 13 and inflammatory gingival overgrowth cases was 19. From this study we estimated the prevalence of drug induced and inflammatory gingival overgrowth in which inflammatory gingival overgrowth (59.38%) was found to be more prevalent than drug induced gingval overhgrowth (40.63%). (Figure 1). According to a prior study, the prevalence of inflammatory overgrowth was found to be 0.1 % in 40,000 patients, whereas drug-induced enlargement was found to be 0.03 %. This might be owing to a long-standing bacterial plaque that causes continual irritation, resulting in neutrophil infiltration and its consequences . A total of 215 (14.3 %) children with gingival enlargement were found in another investigation in which 13 (6.05%) were caused by drugs, 198 (92.09%) were caused by inflammation, and 4 (1.86%) were caused by unknown causes (37).The inflammatory reaction that occurs when plaque (a collection of food debris and bacteria) accumulates on the teeth causes gingival overgrowth, which can be localised or generalised (38). This is caused by the patient's failure to maintain proper oral hygiene. Fortunately, good oral hygiene procedures (tooth brushing, flossing) to remove plaque and irritants from the teeth normally remedy this condition (39).

The relation between gender with drug induced and inflammation gingival overgrowth was analysed from this study (Figure 2). There was no significant relation between both. Inflammatory induced gingival overgrowth is high among females (46.88%) when compared to males (12.50%). Another research indicated that the prevalence of gingival enlargement in female children (15.1%) was higher than in male children (13.4%), indicating that gingival enlargement is inflammatory-induced. With increasing age, the frequency of gingival overgrowth rose. In contrast to this study, another research indicated that the prevalence of nifedipine-induced gingival overgrowth is 6.3 %, and males are three times more likely than females to acquire clinically significant overgrowth (40). According to previous research, drug-induced overgrowth was more common in males, whereas inflammatory overgrowth was more common in females. Females, on the other hand, are more likely than males to have gingival overgrowth due to puberty (41). Owing to the effect of female sex hormones on the gingival connective tissue, conditional overgrowth , such as overgrowth during puberty and pregnancy, is limited to the female population. Progesterone promotes the development of inflammatory mediators, while oestrogen is primarily responsible for blood vessel changes (42). The hormones cause gingival edoema, or an increased inflammatory response to dental plaque, by increasing vascular permeability. Changes in the subgingival microbiota, such as a rise in Prevotella intermedia, may also occur. Prevotella intermedia is believed to get its nutrients from female sex hormones (43).

The association between age and type of gingival overgrowth (drug induced and inflammatory) was seen (Figure 3). But there was no significant association. Inflammatory condition induced gingival overgrowth is high among the age group 25-35 with 37.50% In a recent case study, a 35-year-old female patient complained of gingival overgrowth and bleeding at Ataturk University Department of Periodontology. Gingival inflammatory overgrowth was discovered during a clinical evaluation (44). In another case study, a 35-year-old man had gingival overgrowth after receiving a liver transplant and using cyclosporine A to avoid rejection of the new organ. Recent studies state that overgrowth caused by a drug Younger people were more likely to have phenytoin-induced overgrowth , whereas older people were more likely to have calcium channel blockers-induced overgrowth. Children and adults under the age of 30 were more vulnerable to phenytoin-induced gingival overgrowth, according to the report (45). According to another study, phenytoin-induced overgrowth is more common in young adults. These are close to the findings of our current research. According to a study on amlodipine-induced gingival overgrowth, the condition is

more common in the elderly, which is close to our findings (46).

The association between site affected and type of gingival overgrowth (drug induced and inflammation gingival overgrowth) (Figure 4). Inflammatory induced gingival overgrowth mostly occurs as generalized chronic gingivitis (37.50%). Another study, similar to this one, discovered the prevalence of gingivitis and periodontitis at various sites. Chronic gingivitis (2.2%), localised mild chronic periodontitis (6.3%), localised moderate chronic periodontitis (12.0%), localised severe chronic periodontitis (4.2%), generalised mild chronic periodontitis (10.9%), generalised moderate chronic periodontitis (14.7%), and generalised severe chronic periodontitis (4.2%).Females with periodontal disease are more likely than males to develop inflammatory-based systemic illnesses (47). Another research found that 46.6 % had localised chronic gingivitis and 2.2 % had widespread chronic gingivitis. A gingival condition would be classified as localised when 30 % of the teeth are affected, and generalised when 30 % of the teeth are affected by gingival inflammation, in the same way as chronic periodontitis is defined.In contrast to this current study, a recent research found that inflammatory enlargement was classified as widespread or localised, with less than 40% of participants having widespread gingival enlargement. This demonstrates that inflammatory enlargement is limited to a specific area . The possibility of stopping or modifying the drug must be considered . Carbamazepine and valproic acid are two alternatives to phenytoin that have been shown to have a lower effect on gingival overgrowth. When contrasted to nifedipine, diltiazem and verapamil cause less gingival overgrowth. Since there are fewer choices for cyclosporin replacement, it is more difficult.Since there are fewer choices for cyclosporin replacement, it is more difficult (48). Tacrolimus can be used in place of cyclosporin, and the use of azithromycin in conjunction with cyclosporin has been shown to reduce the severity of DIGO . Plaque management should be the first step in the care of gingival overgrowth, proper oral hygiene, and competent plaque removal, including tooth surface cleaning (49). Improved oral hygiene is the first line of defence against gingival overgrowth, ensuring that irritative plaque is extracted from around the necks of the teeth and gums .When chronic inflammatory gingival overgrowth contains substantial fibrotic components that do not react to or shrink when subjected to scaling and root planing, the excess tissue is surgically removed, most often by a procedure known as gingivectomy (50). Improved oral hygiene and plaque management are also essential in DIGO to help reduce any inflammatory factor that may be leading to the overgrowth. Stopping drug treatment or switching to another drug is what it takes to reverse and avoid drug-induced gingival overgrowth(51).

The association between gender and systemic condition with drugs was explored (Figure 5). There was no statistical difference between the two. The most common cause of gingival overgrowth is medications.The gingival overgrowth is highest in females and males, with hypertension which was 15.38%. In a prior research, 23 of the males (63 %) and 13 of the females (13 %) had gingival overgrowth (36.1 %). Gingival hypertrophy was shown to be more common in men than in women.Because males have a larger frequency of cardiovascular illness than women, case reports and earlier prevalence studies on calcium channel blocker induced gingival overgrowth have a strong male bias. When nifedipine is introduced to gingival fibroblasts in culture, it promotes the conversion of testosterone to 5 dihydrotestosterone, suggesting a relationship to androgen metabolism. In an earlier investigation, it was discovered that A 30-year-old female patient presented to the periodontics department with the major complaint of bleeding gums and a 6-month rise in gum size. Thyroid hormones are crucial in the control of physiologic functions. Thyroid dysfunction is the second most prevalent endocrine system glandular issue, and it is primarily affecting women.There has only been one case report of gingival hyperplasia among previously described

oral symptoms of hypothyroidism. The clinical effects of decreased gingival microcirculation in this condition may jeopardise the first line of defence against periodontal disease (52). The fact that lymphocytes and plasmocytes come into contact with the vascular wall demonstrates that vascular factors cause periodontal injury.In a prior investigation, it was discovered that periodontal treatment for a patient with gingival overgrowth consisted solely of scaling. The patient's gingival status was normal after a year of hormone therapy with thyroid drugs. The development of plaque or gingival inflammation, as well as a patient's genetic predisposition, are linked to drug-induced overgrowth. Patients taking anticonvulsants, immunosuppressants, and calcium channel blockers can experience this side effect (53). Some medications that induce gingival overgrowth include phenytoin, sodium valproate, phenobarbitone, vigabatrin, primidone, mephenytoin, and ethosuximide. Multiple medications are often given together, which can have a synergistic effect and worsen the disease.Drugs like PHT, phenobarbitone, and primidone are metabolised, resulting in gingival tissue overgrowth (54). Phenytoin is the anticonvulsant most often associated with gingival overgrowth and is the medication of choice for the treatment of seizures. Immunosuppressants such as cyclosporine, tacrolimus, and sirolimus have been related to gingival overgrowth, with cyclosporin being the most common (55). Immunosuppressants are commonly used after organ transplantation, such as after renal transplants, and for the treatment of autoimmune diseases such as rheumatoid arthritis.calcium channel blockers includes Nifedipine, nitrendipine, felodipine, amlodipine, nisoldipine, verapamil, and diltiazem are some of these. Hypertension, angina pectoris, and peripheral artery disease are all treated with these medications(56). When patients on immunosuppressants including cyclosporine are switched to nifedipine or diltiazem, they are more likely to experience gingival overgrowth(57).

CONCLUSION:

We may infer from this research that inflammatory overgrowth is more common than drug-induced overgrowth.The prevalence of inflammatory gingival oergrowthis more than drug induced due to evaluation of newer drug that has very minimal effect of gingival overgrowth. On discovery of this alternative drugs the incidence of overgrowth of gingiva has gradualy reduced and inflammatory overgrowth has increased. Gingival overgrowth by drug induced and inflammatory induced can have various pathogenesis leading to this effect. There are several indices to measure the gingival overgrowth by inflammatory induced, and drug induced but not for a combined overgrowth. However, there is no reliable method for measuring both drug-induced and inflammatory-induced gingival overgrowth at the same time. As a result, this study will aid in the creation of new indices which would measure both. So, by forming a gingival index which would measure both drug induced, inflammatory or both at the same time, it will be effective in diagnosing a patient as well as deciding a proper treatment.

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CONFLICT OF INTEREST:

The author declares no conflict of interest.

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