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Nocturnal Enuresis

ANKIT MANGLA

Uncontrolled leakage of urine at an inappropriate time and place after 5 years of age is known as incontinence.

Primary Nocturnal enuresis (NE) is enuresis in a child who has previously been dry for less than 6 months. Secondary enuresis is enuresis in a child who has previously been dry for at least 6 months. Monosymptomatic enuresis is enuresis in a child without any (other) lower urinary tract symptoms. Non-monosymptomatic enuresis is enuresis in a child with (other) lower urinary tract symptoms, such as daytime urgency, frequency, holding manoeuvres. Prevalence of Nocturnal enuresis is 15% in 5-year-old, 7% in 7-year-old, 5% in 9-year-old, 2% in 15-year-old. Fewer than 1/3rd of the parents of a bedwetting child consults a doctor.

IMPACT OF PRIMARY NOCTURNAL ENURESIS

- **Psychological well-being:** It results in substantial feeling of shame, anger and inferiority, dangerous impairment of self-esteem, inability to socialize impacting outdoor activities and fear of public discovery haunts sufferers.
- **Parental Concern:** NE imparts an emotional impact on child and effects the child's social relationships leading the parents to think if their child is normal. Parental concern also includes removing the smell from the bedroom, keeping it a secret and the extra washing,

A family history of bedwetting strongly predicts bedwetting in children. As per literature, 73% of children affected by bedwetting have first degree relatives with a history of bedwetting, the age of attaining dryness is delayed by 1.5 years if both parents have a history of bedwetting, risk of bedwetting is 5-7 times higher if one parent has a history of bedwetting and 11.3 times higher if both parents are affected. The gene responsible is ENURI 1 gene (AD) and chromosomes 8, 12, 13.

KEY PATHOGENIC MECHANISMS UNDERLYING NOCTURNAL ENURESIS

Nocturnal Polyuria

- Nocturnal urine production > 130% of expected bladder capacity (EBC) for age (normally decreases to 50% of daytime) +/- Reduced or abnormal bladder reservoir function at night.

Bladder Function Problems

- Functional bladder capacity (FBC) is vital for NE, Bladder capacity: {Age (in years) + 2} x 30 ml, in enuretics, nighttime BC is lower, but in non enuretics: 1.6 - 2 times larger than day time BC. There can be detrusor over activity in absence of Lower urinary tract symptoms. Constipation and urinary tract infections can cause detrusor over activity.

CONSERVATIVE MANAGEMENT

- Timed voiding - voiding every 3-4 hours (discourage holding), Voiding immediately upon rising in morning and before bed, Adequate hydration, Distribute fluid intake (40% morning, 40% afternoon, 20% evening).
- Treat constipation, Proper positioning on the toilet seat, encourage child to take time on toilet to empty completely, Encourage physical activity - discourage TV / Computer for long duration, motivational therapy like Star charts should be started.
- Alarm Therapy: 60-70% Effective but labour extensive, Moisture sensor and alarm which rings when child wets, Conditioning - teaches child to wake to a full bladder before wetting, May be used in combination with DDAPV and/or oxybutynin, 30-40% subjects discontinue therapy.
- Dry Bed training: Waking the child on a schedule of decreasing intervals over several nights, The child is made to change clothes and bedding (if wet), and walk to the toilet if voiding is required.
- Motivational Therapy: Combination of providing reassurance, emotional support, eliminating guilt, and rewarding the child for dry nights, Cleaning after bedwetting should not be performed as a punishment, avoidance of dairy products, fruits



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juices, and fluids 2 hours before bedtime, voiding just before bed.

PHARMACOLOGICAL THERAPY OF ENURESIS: OXYBUTININ AND TOLTERODINE

- Primarily to treat children with daytime urgency or frequency as well as night-time enuresis, Small capacity bladder when Neurogenic component is ruled out, Children with PMNE only where primary treatment has failed, Act mainly by suppressing detrusor over activity.
- Side effects include flushing, blurred vision, constipation, tremor, decreased salivation and decreased ability to sweat.
- WHO & NICE has now endorsed that Imipramine cannot be recommended for treatment of PNE.
- Desmopressin: Pharmacologic therapies for nocturnal enuresis decrease the frequency of enuresis and temporarily resolve symptoms until spontaneous resolution occurs, the response rate to desmopressin therapy is 60%–70%, but relapse rates are high. The NE indication has been withdrawn from the

intranasal spray in most countries due to unpredictability of dosing and increased risk of hyponatremia. The combination of an enuresis alarm with desmopressin may be superior to the use of desmopressin alone. Children with Nocturnal Polyuria are most likely to benefit from desmopressin since lower nocturnal vasopressin levels have been demonstrated in a large percentage of patients, making substitution with desmopressin, a rational first-line treatment for children with MNE and NP.

One must rule out the following before starting enuresis treatment: Constipation/Encopresis, Recurrent UTI's: Reflux disorders, Abnormal urine analysis, Sleep disorders : OSA , Underlying DM / DI, Neuropsychiatric conditions like ADHD & Learning disabilities, Spinal dysraphism / lower limb weakness / patulous anus, Failure to thrive : Renal tubular acidosis, Bony deformities due to CKD / RTA, Deranged RFT, USG KUB and Hypertension.

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Effect of Air Pollution on the Occurrences and Death of COVID-19

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Air contamination continues to be the leading environmental risk factor for all causes of death, leading to substantial years of lives and economic decline adapted to incapacity increased deaths in air pollution in past pandemics, in 1918, Spanish Flu and in 2003 with SARS-CoV-1. The host susceptibility and respiratory virulence are increased and viral clearance is decreased. Therefore, there is a question about the effect of air contamination on the current 2019 coronavirus pandemic (COVID-19). History and research have until now been concerned with the huge potential consequences of the COVID-19 air pollution pandemic. In order to validate this correlation, more epidemiological and environmental research is necessary. Moreover, countries must leverage air emissions reduction funds to benefit their wellbeing and enhance their possible impact on future pandemics.

KEYWORDS: COVID-19, Air Pollution, Particulate Matter (PM), Household Air Pollution (HAP)

INTRODUCTION

The Earth is currently affected by a global health crisis, which this year is estimated to cause 4.2 million or more deaths; that of air pollution. The most significant environmental risk factor for all-cause mortality is contaminated air. The risk is increased at least 100 million disability-adjusted (DALY) which USD225 billion annually and has also raised by cancer, chronic pulmonary and cardiovascular disease.¹ The morbidity caused by air pollution and its effect on today's condition should not be ignored in the middle of our alarming coronavirus pandemic. Mortality from air pollution, especially during pandemics, cannot be understated. The devastating 1918 Spanish Influenza Pandemic saw a 10% increase in mortality in large coal-capacity cities. Patients who were living in regions of elevated air pollution indices (API) had a 200% higher relative risk of mortality than people in areas with low API during the new century pandemic of serious respiratory syndrome related to Coronavirus-1 (SARS-CoV-1 in 2003).² However, 91% of the world's population remains in regions outside the minimum air pollution standards of the World Health Organization. Therefore, is there a doubt whether air emissions will affect current 2019 coronavirus pandemic (COVID-19)?

Effects of air pollutants on host susceptibility to infection: Air pollutants increase host susceptibility to respiratory virus infections by increasing viral receptor sepsis and decreasing surfactant intake.³

It also reduces viral clearance by deteriorating the antigen and phagocytoses caused by macrophages, expression of normal, cytotoxic T cells and the proliferation of viral products, which adversely affect the capacity of the host to respond properly to infections. Moreover, air pollution increases the virulence of respiratory diseases. The minimum infectious dose of murine cytomegalovirus has decreased by 100 and the infection of rhinovirus has increased as the viral receptor is increased. In Italy, there has been a rise in NO₂ environmental standards, along with a 4 percent spike in acute respiratory infections.³ Particles of less than 2.5 μm (PM_{2.5}) in diameters can mitigate the spread of the virus by inducing alveolar macrophage releases of IL-1, IL-6 and TNF-α to cause significant pro-inflammatory conditions.

This can lead to a minimization of pigmentation. The resulting inflammation will result in damage to the pulmonary morbidity and asthma (PMD) and an increase in susceptibility to cardiac disease, not just because asthma can be caused by heart disease, but because it modifies the autonomous process and accelerates atherosclerosis. In addition, the Enzyme 2 receptor (ACE₂) transforming angiotensin is regulated by high sub chronic exposure to particles that play a major role in the airborne epithelial infestation of the SARS-CoV-2 virus.⁴ A statistically significant link was also seen between ARDS and air



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quality such as PM_{2.5}, ozone, and in particular adults in the elderly. The ARDS has also been seen. For COVID-19, the high death rate of ARDS is significant.⁵

Household air quality predisposal: The impact of household air contaminants (HAP) on sensitivities to respiratory infections is sometimes overlooked. HAP accounts for almost 16% of the worldwide burden of environmental waste. Their consequences can also not be underestimated, as 3.55 million deaths occurred in 2010. In tandem with contiguous smoking tobacco, a third of the world uses strong fuel for cooking and heating, which can intensify inflammatory illnesses and lead to acute lower respiration issues. HAP can cause dysregulation of antioxidants: oxidizing ratio, reduction of antioxidants and the promotion of oxidant tension. This alteration in the natural lung is possible to lead to an increased risk of pulmonary infections and the defence mechanism of HAP for combating lung infections is also being altered. Cigarette smoke for example will increase the receptor-dependent connection between *streptococcus sp.* and the respiratory epithelium. The level of HAP deprivation, and the total spread of poverty and HAP, is indissolubly linked to low socioeconomic conditions. The risk of these exposures could be higher, particularly in developing and urban poor people in rich countries throughout the world, with more extreme COVID-19 outbreak.⁶

Early proof of COVID-19: So far the history and science of the COVID-19 pandemic have been directed at an immense impact in future for air pollution. Any of the most devastated countries, including China, Northern Italy and New York, have an index of poor air quality. In northern Italy Lombardy and Emilia-Romagna are especially important as one of the most polluted regions in Europe. In this region, the mortality rate was 12% compared with 4.5% elsewhere in Italy.⁷ In reality, the increase in the mortality rate of COVID-19 was found to increase by 8% in the US, and by 15% in New York alone, over more than 3,000 counties.⁵ The frequency and mortality of COVID-19 is likely to be optimistic as with pandemics. This theory needs more epidemiological tests. In four European countries, Italy, France, Spain and Germany, study recently measured tropospheric NO₂, which is an atmospheric pollution marker. Synthesis of pro-inflammatory cytokines that are linked with increased COVID-19

mortality was associated with prolonged sensitivity to NO₂ to background conditions such as high blood pressure. 78% of all deaths in Italy and Spain revealed that air quality was concentrated, around five fatality hotspots found.⁷ In England, London and the Midlands with the largest concentration of air pollutants had highest injury and fatality rates.⁸ The contrary has been seen in regions with less air pollution to endorse this idea. Indeed, SARS-CoV-2 RNA was isolated from particulates in a sample in Bergamo, Northern Italy, which indicated a level playing field to the air quality particle matter for COVID-19. This can be used as a possible reason for higher COVID-19 load in high air quality areas as well as a proxy for recovery of diseases.⁹

Imperative measures: The evidence above should be a wake-up call to policymakers concerned with global health. Many environmental authorities have failed to react to air pollution, particularly when air pollution is increasingly seen to have an effect on past, present, and nearly certain future pandemics. The Paris Agreement, which calls for climate change to have less of an impact, is a central part of their success. In order to mitigate the impacts of COVID-19 and improve human wellbeing, but also to curb climate change, it is now necessary to consider the worldwide linkages of climate and air pollution as well as to reduce air pollutants by aggressive and more relevant policies.

CONCLUSION

The relation between air pollution and mortality is a sobering glimpse into the unprecedented economic and social upheaval caused by SARS-CoV-2. The Paris Agreement, which alone reduces pollution and saves up to a million lives every year, should remain confirming its commitment to the global war on climate change. Countries should maximize funding for reducing air emissions, implement innovative satellite imaging pollution management technology and build cross-sector pollution protection networks for betterment of health and enhancing potential effects on current and future pandemics.

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Comparison of Scalpel and Diode Laser in Management of Gingival Enlargement: A Case Report

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Inflammatory gingival enlargement is an excessive growth of gingival tissue due to inflammation in response to plaque accumulation. Enlargement of gingiva hampers the efficiency of daily oral hygiene practices which in turn accumulates more plaque, thus causing inflammation. Phase I therapy, consisting of scaling and root planning only reduces the inflammatory component of the enlarged gingival tissues but the fibrotic gingival enlargement remaining thereafter is then removed surgically by gingivectomy. Apart from the conventional scalpel gingivectomy, many other treatment modalities such as gingivectomy by lasers and electrocautery are now being widely used in the field of surgical periodontal therapy. This case report describes the management of gingival enlargement in relation with gingivae of maxillary teeth by administering separate treatment modalities i.e. diode laser and conventional scalpel gingivectomy.

KEYWORDS: Gingival Enlargement, Gingivectomy, Diode Laser, Scalpel

INTRODUCTION

Chronic inflammatory gingival enlargement occurs in response to plaque accumulation. The enlarged gingiva compromises proper oral hygiene maintenance.¹ The first step towards management of gingival enlargement is motivating the patient regarding good oral hygiene and mechanical removal of plaque and calculus. When gingival enlargement is not resolved after successful completion of non-surgical therapy, surgical excision of gingiva is then the choice of treatment. It can be performed by using different methods i.e. by using scalpel, laser or electrocautery. Gingivectomy helps to reduce pocket depth which in turn provides access for efficient removal of remaining plaque and calculus.² In the recent times, LASER (light amplification by stimulated emission of radiation) is widely used in periodontology for several procedures involving oral hard and soft tissues.

Advantages of laser include less intraoperative bleeding, shorter operating time and a bactericidal effect on tissues. Many surgeons have achieved effective results by using lasers in several periodontal surgical procedures like removal of excessive soft tissue, pocket epithelium elimination and detoxification of root surfaces.³

This case report is an effort to access the differences among Diode laser and scalpel in the management of gingivectomy.

CASE REPORT

A 25-year-old female patient, previously undergoing orthodontic therapy reported to the Department of Periodontology and Implantology with localized gingival enlargement in the upper anterior region. After thorough scaling, gingivectomy was planned for the patient involving the upper teeth.

To access different treatment modalities, it was decided to treat tooth number 11-16 using diode laser and tooth number 21-26 using conventional scalpel technique [figures 1(a)-(c)]. Presurgical preparation consisted of scaling, reinforcement of instructions regarding proper oral hygiene and routine blood investigations. The tissues were given local infiltration anesthesia and gingivectomy procedure was performed on teeth 21-26 with scalpel (with 15 number blade) and a wall of soft tissue was excised till the base of pocket (figure 2). Teeth 11-16 were operated with diode laser of wavelength 940 nm, power of 3W, pulsed contact mode, with pulse interval and length of 0.1 ms, scanning an area of about 1 cm², while keeping the tip of laser perpendicular to surface of tissue (figure 3). A soaked cotton was placed to obscure the effects of laser onto the sites not treated by laser. Post-operative instructions were explained to the patient (figure 4).

At one year follow up after lock down opened up, we saw that healing was comparable with no signs of



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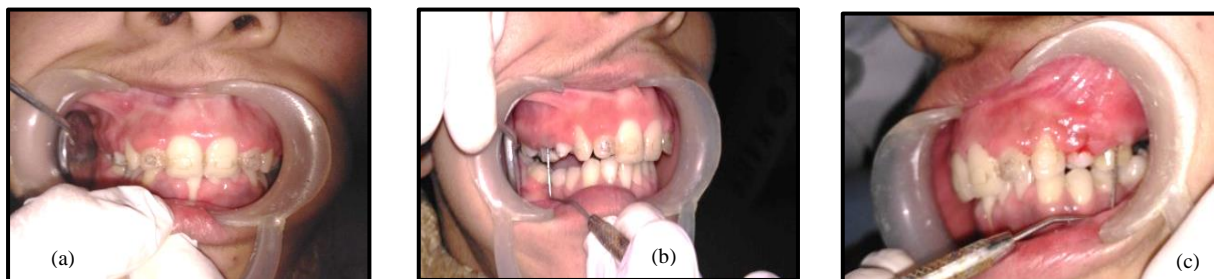


Figure 1(a). Preoperative view of maxillary gingiva; **1(b).** Preoperative view Right side; **1(c)** Preoperative view Left side

enlargement and on examination, probing and plaque accumulation was not seen. It was also observed that after surgical procedure, patient had understood and was practicing good oral hygiene.



Figure 2. Gingivectomy with scalpel & granulation tissue removal

DISCUSSION

It was observed that diode laser provides adequate hemostasis and accurate incision margins. Postoperative advantages of laser includes lack of pain, swelling and less scar tissue formation and good and uneventful wound healing.⁴ The wounds induced by laser heal via reparative matrix proteins synthesis. These matrix proteins in the tissues resist against laser ablation and their slow removal and replacement from the tissues causes less tissue scarring and wound contraction in laser treated areas.⁵



Figure 3. Gingivectomy with laser

For postoperative pain and discomfort, no significant difference was noted in the first two days, laser treated tissues generally exhibit less pain which can be attributed by the formation of protein coagulum formed on wound surface, thus acting as a biological dressing and sealing off the nerve endings.⁶



Figure 4. Immediate postoperative view

Duration of surgical procedure was less with when compared with the treatment done by scalpel. Excellent hemostasis and good vision of the field was obtained during diode laser surgery.

Though the results of laser treatment for gingivectomy are favorable, larger sample sizes are required for study in order to get more elaborate effects of laser therapy so that lasers are frequently used in several periodontal procedures, thus allowing favourable results with minimal patient morbidity. Healing after laser gingivectomy is still controversial as some researchers have reported delayed healing of tissues compared to scalpel gingivectomy^{7,8,9} whereas some studies shows that healing of laser wound is either similar to the scalpel or have an accelerated healing.¹⁰

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Low Level Laser Therapy (LLLT) in the Effective Management of Recurrent Aphthous Ulcers (RAU): Clinical Case Reporting 3 Patients: A Case Series

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Low-Level Laser therapy (LLLT) was employed for the treatment of three patients diagnosed with recurrent aphthous ulcers (RAU's). The patients presented with recurrent aphthous ulcers in the region of floor of the mouth and buccal mucosa. The three patients with RAU's were provided with a wavelength of 946nm starting the use at 320µm fibre optic at a distance of 1-3 mm, peak power of 2W, frequency 10 Hz with no tissue contact in circular motion from outside to inside for 2 cycles with 100% duty for 30s for 3 consecutive days. The LLLT made possible an effective improvement in the reduction of pain and size associated with ulcers. It proved to be a safe and cost effective therapy in the management of recurrent aphthous ulcers.

KEYWORDS: Recurrent Aphthous Ulcers, Low Level Laser Therapy, Aphthae

INTRODUCTION

In terms of population, India is the second largest country in the world with more than 1.3 billion populations. Despite being fastest growing economy, it stands way behind in terms of education, standard of living and health.¹ Oral health is a critical but overlooked component of overall health and well-being among adults.² Despite being largely preventable, oral diseases are highly prevalent throughout the life course and have substantial negative effects on individuals.^{3,4,5} In modern society, a number of diseases have been on the rise with changing lifestyles or environmental influences including diet and psychoemotional stress. Such impact may continue to the development and prevalence of various diseases including arteriosclerosis, cancer, chronic liver disease/ cirrhosis, chronic obstructive pulmonary disease (COPD), diabetes, hypertension, heart diseases, stroke, recurrent aphthous stomatitis, asthma, obesity, depression and vascular dementia.^{6,7}

In an otherwise healthy individual, there are few conditions that develop in the oral mucosa. Aphthous ulcerations, commonly referred to as "canker sores," are the most prevalent oral mucosal lesions which affects the population more than 20%. The term "aphthous" is derived from a Greek word "aphtha" which means ulceration.⁸ Recurrent aphthous stomatitis (RAS) has been described under three different clinical variants as classified by Stanley in

1972. Mikulicz's aphthae are the mild RAS or mild aphthous ulcers, major RAS also known as periadenitis mucosa necrotica recurrens or Sutton's disease, and Herpetiform ulceration characterized by recurrent crops of multiple ulcers which may be up to 100 in number.⁹

It is a distinct oral condition of unknown etiology characterized by the spontaneous emergence of more than 2 bouts of oral ulcers per year, not associated with an underlying systemic abnormality.¹⁰ The outbreak of RAS are associated with hereditary, psychological and socioeconomic stresses; nutritional deficiencies; hormonal fluctuations; and immunologic deficiencies.¹¹⁻¹⁶ There is some evidence that suggests RAS ulcers are related to modified immunologic defenses or may be symptoms of several pathogens, rather than one. Due to the indeterminant aetiology of these lesions, it is often difficult to find a definitive cure.^{17,18,19}

Several agents are helpful in the management of aphthous ulcers including antibiotics, anti-inflammatory, immune modulators, anesthetics and alternative products.²⁰ In most patients, topical agents including over the counter preparation such as antiseptic mouthwashes are recommended.²¹ Topical agents enhances reparative and regenerative processes, contributes to activation of aerobic metabolic



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processes and oxidative phosphorylation, increases oxygen consumption in vitro and stimulate the transport of glucose into the cells.

Currently used topical antibacterial, anti-inflammatory, immunomodulatory or symptomatic treatments for the condition are neither 100% reliable nor efficacious. There is currently no single well-established treatment for these common mouth ulcers, and none of the existing treatments accelerate the healing process.²¹⁻²⁵

Recently, lasers have been used to treat various forms of oral lesions including RAS because of its biomodulation, analgesic effect by stimulation of healing process, promoting immediate relief of pain without an overdose of medication or side-effects and prevention of recurrence.^{8,26} Studies have suggested that low-level laser therapy (LLLT) has the potential to treat aphthous ulcer and related lesions. It is a safe and clinically effective therapy for treating RAS which also provides time benefit to the patients.⁸ This measure of treatment gives the dentist an interesting opportunity to expand the range of services offered in the practice and to alleviate the discomfort of patients quickly and easily.

The clinical case reports of the subjects reported with aphthous ulcer describes and analyzes the diagnosis and/or the management of one or two patients acts as the first line of evidence in health care. This case series is a powerful source to disseminate information on unusual clinical syndromes, disease associations, unusual side effects to therapy, or response to treatment. Case reports regarding aphthous ulcers and their treatment may be used as a means to teach health sciences students. Therefore, the aim of this paper is to critically appraise and epitomize clinical studies to ascertain whether laser therapy is an effective treatment option for treating aphthous ulcer through this case series.

CASE REPORTS

Three patients with the chief complaint of recurrent painful ulcers in the oral cavity came to the institutional department of Oral Medicine and Radiology. On clinical examination, oral ulcers of different dimensions were observed having erythematous halo on buccal mucosa, labial mucosa, tongue, floor of the mouth etc. The diagnosis of recurrent aphthous ulcers was made on the basis of detailed medical history and the clinical criteria given

by Natah et al. in 2004. A meticulous history was taken to eliminate other ulcerative conditions such as Crohn's disease, celiac disease, neutropenia, HIV infection, and Behcet's syndrome. An informed consent was taken and an information sheet consisting of all the details of the procedure was provided to all the patients.

All the patients reported with the recurrent history of aphthous ulcers were provided with Low Level Laser Therapy (LLLT) for three consecutive days of wavelength 940nm diode laser, which was started using 320µm fiber optic at a distance of 1-3 mm from the lesion. It was provided with circular motion from the periphery of the ulcer to the center for 2 cycles with 100% duty for 30 seconds. The estimation of reduction in pain was done using VAS score 0 to 10 and in size of the ulcer using divider and ruler with an accuracy of 1 mm. The recordings were made just before the treatment, the next day and third day of the laser therapy.

CASE I

A 78-year-old patient presented an 8 week history of episodes of recurrent aphthous ulcers on the labial mucosa [figure 1(a)]. Patient had difficulty in speech and while eating. The size of the ulcer was 2.5 mm in length and 5.5 mm in width. The ulcer was not associated with any type of discharge and was tender on palpation. The patient used various chemotherapeutic aids such as topical anaesthetics for the management of aphthous ulcer, but the lesion recurred. He was provided with the laser therapy and lesion was observed for healing [figure 1(b)]. The readings of the reduction in ulcer pain and size are given in table 1.

	SCORES		
	Day 1	Day 2	Day 3
Size of the ulcer (in mm)	2.5 x 5.5 mm	2.5 x 4.5 mm	1.5 x 4 mm
Pain perceived (scale 0-10)	10	7	0

Table 1. Ulcer pain and size score at three-point times (Case I)

CASE II

A 23-year-old patient presented a 3 months history of recurrent aphthous ulcers on the floor of the mouth [figure 2(a)]. She had difficulty while chewing and

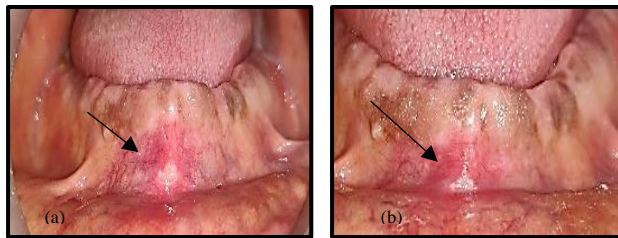


Figure 1. Case I (a) Pre-treatment and (b) Post-treatment

speaking. The size of the ulcer was 4 mm in length and 6 mm in width. The ulcer was very tender to palpate. She tried various home remedies for treating aphthous ulcers but it kept on recurring. She was provided with low level laser therapy. She reported that ulcer started to heal early than the previous times and also there was immediate reduction in pain after the first exposure to the laser therapy [figure 2(b)]. The readings of the reduction in ulcer pain and size are given in table 2.

	SCORES		
	Day 1	Day 2	Day 3
Size of the ulcer (in mm)	4 x 6 mm	3 x 5 mm	2.5 x 4 mm
Pain perceived (scale 0-10)	10	6	0

Table 2. Ulcer pain and size score at three-point times (Case II)

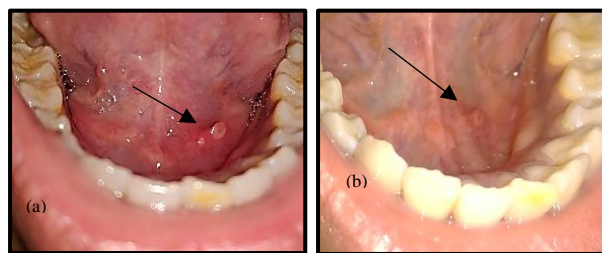


Figure 2. Case II (a) Pre-treatment and (b) Post-treatment

CASE III

A 42-year-old patient reported a history of 2 months recurrence of aphthous ulcers on the ventral surface of the tongue [figure 3(a)]. He faced difficulty to speak, drink and while chewing. The size of the ulcer was 6 mm in length and 3 mm in width. The ulcer was round with erythematous halo. It was not associated with any type of discharge and was highly tender to palpate. The medical and family history were not of any contribution. The patient used pharmacological modes such as topical application of lignocaine and systemic

vitamin B complex, which caused no improvement in discomfort and pain of the aphthous ulcer. He was given treatment using low level laser therapy to heal the lesion. He reported complete relief of pain and significant reduction in size of ulcer in 4 days and there was no discomfort. There were no side-effects reported of LLLT in the patient [figure 3(b)]. The readings of the reduction in ulcer pain and size are given in table 3.

	SCORES		
	Day 1	Day 2	Day 3
Size of the ulcer (in mm)	6 x 3 mm	4 x 2.5 mm	3 x 1.5 mm
Pain perceived (Scale 0-10)	10	3	0

Table 3. Ulcer pain and size score at three-point times (Case III)

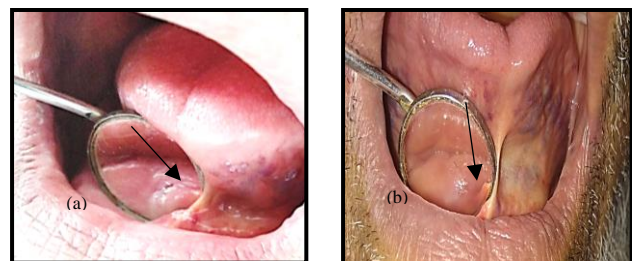


Figure 3. Case III (a) Pre-treatment and (b) Post-treatment

DISCUSSION

The aphthous ulcers may occur in the oral cavity due to differential reasons. While evaluating the patients with oral symptoms, Infection-causing ulceration in the mouth should also be considered. A common infection, particularly in patients with HIV infection and aphthae is herpes. Other viral, bacterial, treponemal and fungal agents have the potential to cause mouth ulcers. Several autoimmune diseases may mimic benign aphthous ulcers. Behçet's syndrome is an autoimmune vasculitis that causes recurrent oral and genital ulcerations, uveitis and retinitis. Lupus erythematosus, bullous pemphigoid and pemphigus vulgaris are other diseases that may involve ulceration of the mouth. In all of these conditions, the associated symptoms should be elicited to make a differentiation from benign recurrent aphthae.²⁷

Numerous agents aids in the management of aphthous ulcers including antibiotics, anti-inflammatory,

immune modulators, anaesthetics and alternative products.⁶ Topical agents enhances reparative and regenerative processes, provides to activation of aerobic metabolic processes and oxidative phosphorylation, increases oxygen consumption and stimulate the transport of glucose into the cells.⁷ Pertaining to pain relief, one mechanism that has been proposed is modulation of pain perception by modification of nerve conduction via the release of endorphins and enkephalins.⁸ The main purpose of treatment is to decrease pain and size of the ulcer.⁹ The results of the study conducted showed that Low Level Laser Therapy has the magnitude of reducing the pain intensity and size of aphthous ulcers. Healing is the main characteristic of LLLT including three main factors. First, there is an increment of adenosine triphosphate (ATP) production, as laser is considered to raise the production of ATP, leading to a boost in mitotic activity and to an increase in protein synthesis by mitochondria, resulting in greater tissue regeneration in the repair process. Second, there is a stimulus to microcirculation, which increases the delivery of nutritional elements associated with increased speed of mitosis, facilitating cell multiplication. Finally, new vessels are formed from pre existing vessels.⁹ A study conducted by De Souza et al. in 2010 revealed that 75% of the patients reported a reduction in pain in the same session after laser treatment and total regression of the lesion occurred after 4 days.²⁸ Khademi et al. found similar benefits of quicker healing and reduced pain after using low levels of laser treatment on RAS.²⁹ Similarly the LLLT study was effective in relieving pain and reducing the healing time during the treatment of aphthous ulcers conducted by Aggarwal et al.³⁰

Hence it summarizes, as there are no medications, the side effects and risk of overdosage could also be prevented. Hence, it can be concluded that LLLT is a safe and clinically effective therapy for treating RAUs, which also provides time benefit to the patients. The outcomes from the present study which stand out are, the immediate and lasting pain relief, and the accelerated ulcer healing. Limitation of the study includes subjective evaluation of pain perception. Though healing occurs through medications and laser therapy but mainly depends on host immune response and microbe interaction.

CONCLUSION

LLLT employed as a treatment measure for the management of recurrent aphthous ulcers in the

current case report not only provided instant pain relief but a rapid decrease in the size of the lesion was also seen. It is safe, clinically effective therapy for treating RAU, which also provides time benefit to the patients.

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Customized Attachment for Cheek Plumper: A Case Report

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The goals of replacement of teeth with a complete denture are not limited to only providing the patient with the ability to chew food comfortably. Due to the increasing demands and consciousness of the patients regarding esthetics, prosthodontist must emphasize on not just the function but also overall appearance of the patients. The loss of support of the facial musculature is of great concern in treating completely edentulous patients. Sunken cheeks are one of the major consequences of flaccid facial musculature. The incorporation of cheek plumpers in the dentures has improved the appearance of patients with such conditions. They are non-invasive and straightforward to fabricate. Various attachments may be used for this purpose depending upon the case present. This case report involves 2 cases with different techniques for the attachment of detachable cheek plumpers.

KEYWORDS: Detachable Cheek Plumper, Denture Esthetics, Sunken Cheeks, Unconventional Dentures

INTRODUCTION

The replacement of missing teeth should not be the sole purpose of prosthetic rehabilitation of a completely edentulous patient. Restoration of all the functions along with esthetics must form the ultimate aim of the clinician. As the age progresses, loss of subcutaneous fat and elasticity of the tissue causes the cheeks to become slumped. Usually, certain facial structures get support from denture flanges, but sometimes the denture flange does not provide adequate support to the facial musculature and requires additional support.¹

According to Jamieson CH², “fitting the personality of the aged patient is often more difficult than fitting the denture to the mouth.” Proper extension of denture borders during the complete denture fabrication may help to achieve most of the esthetics by providing proper support to the musculature. But in some cases due to prolonged edentulism patient presents with sunken cheeks. In such cases the need to add extra support in the form of cheek plumpers may be required. Conventional cheek plumper is single-unit prosthesis with extension near the premolar-molar region that supports the cheek.³ Such designs have a disadvantage as it adds extra bulk to the denture leading to its frequent dislodgement during speech and function. To overcome these limitations, detachable cheek plumpers have been used in the past which have provided improved results. This case series includes

two cases of cheek plumpers with different attachments based on the requirement of the case. A written consent was obtained from both cases prior to writing the manuscript.

CASE REPORT 1

A 60-year-old female patient, completely edentulous, reported to the Department of Prosthodontics with the chief complaint of missing teeth. Upon taking case history it was noted that the patient was edentulous for 4 years and had not worn any dentures previously. The overall appearance of the patient was malnourished with sunken cheeks leading to poor esthetics. Patient’s expectation with the denture included, adequate function as well as esthetics. All the steps for a complete denture fabrication were followed till the try in stage. The patient had a class 3 ridge relation and due to the prognathic mandible the musculature adjacent to the maxilla wasn’t well supported. Cheek plumper was planned for the patient at the try in stage but due to very shallow flanges and compromised space, the available attachment choices for the detachable cheek plumper were not satisfactory.

A customized attachment was hence fabricated for the patient using autopolymerising acrylic resin and 21 gauge orthodontic wire. Cheek plumper was made using impression compound and it was moulded according to the movements of the patient’s facial



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muscles. Once satisfactory fullness was achieved the cheek plumper was retrieved from the denture base and orthodontic wires were incorporated in it. Two wires were bent to make a J loop and the longer arms were embedded in the compound. An acrylic sleeve was fabricated over the arm projecting outside the plumper. After complete polymerisation of resin, the sleeve was checked for smooth gliding over the wires for insertion and removal. This acrylic sleeve was kept narrow corresponding to the decreased flange height. After marking the rough dimensions, a window was then cut in the denture to fit the acrylic sleeve block. The position of the cheek plumper was checked with the acrylic block engaged within the window (figure 1).



Figure 1. Wires Incorporated in the Cheek Plumper Made with Impression Compound. Corresponding Sleeves Fabricated with Autopolymerizing Acrylic Resin

Once confirmed, the acrylic block was incorporated in the denture using autopolymerising acrylic resin. The cheek plumpers were flaked and dewaxing was done followed by packing with heat cure acrylic resin. Finishing and polishing was done for the cheek plumper as well as the denture with the acrylic sleeve (figure 2). The attachment system was checked once again and the patient was trained for removal, cleaning and reinsertion of the attachment. The patient was satisfied with the final outcome (figure 3). This method of attachment is conservative as it requires minimal space and also cost friendly as it can be fabricated easily with materials readily available to the dentist.



Figure 2. Dimensions Marked and Window Created in the Denture to Insert the Acrylic Sleeve Block



Figure 3. Patient's Appearance Without the Cheek Plumpers (Left) And with The Cheek Plumper Attached to the Denture (Right)

CASE REPORT 2

A 38-year-old patient reported to the Department of Prosthodontics; with the chief complaint of missing teeth leading to poor esthetic appearance. Case history revealed patient lost his anterior teeth 6 months back and posterior teeth 2 years back and never got them replaced. It was noted on extraoral examination that patient had sunken cheeks which were not esthetic and since the patient belonged to a younger age group, he was conscious regarding the same and sought improved esthetics.

Conventional steps for a complete denture were followed till the try in stage. Impression compound was adapted on the sides of the maxillary and mandibular denture base on the buccal aspect (figure 4). Patient was asked to make functional movements for moulding the impression compound. The esthetics was evaluated and required adjustments were made. Patient's consent was obtained for final fabrication of the dentures with the cheek plumpers. Since the cheek plumpers were bulky, hollow cheek plumpers were planned for the patient to reduce the weight of the prosthesis. Dewaxing was done followed by lost salt technique for the packing stage (figure 5). After the final processing, a hole was made on the surface of the cheek plumpers where the attachment was to be placed. This same hole was used for washing out the salt crystals from the plumper. Push button attachments were used to attach cheek plumper with denture base. Two 2mm deep and 5mm diameter holes were made on the posterior flange of the maxillary denture base and 1 hole of similar dimensions was made in the mandibular denture. The male part of the push button was attached to the denture base, and female part was attached to the cheek plumper with the help of auto-polymerizing resin (figure 6). Finishing and polishing was performed



Figure 4. Cheek Plumpers In Impression Compound Attached to Maxillary and Mandibular Dentures, Modified According to Patient's Functional Movements



Figure 6. Cheek Plumpers in Heat Cure Acrylic Resin with Push Button Attachments



Figure 5. Flasking And Acrylization of the Cheek Plumpers using the "Lost Salt Technique"



Figure 7. Patient's Appearance without the Cheek Plumpers (Left) and with the Cheek Plumper Attached to the Denture (Right)

and the patient was given post-operative instructions (figure 7).

DISCUSSION

Denture esthetics is not only limited to the SPA concept where the emphasis is always given upon the selection of the form, shape, shade of teeth given in a denture. It is more about harmonization between the artificial and natural tissues.⁴ Loss of subcutaneous fat and elasticity of the connective tissue produces the hollow cheeks seen in the aged. Cheek plumpers or cheek lifting appliances have been used previously for the purpose of improving esthetics and psychological profile in patients. Conventional cheek plumpers, when used, add to the weight of the prosthesis, can cause muscle fatigue, and make the denture unstable.⁵ They also make insertion and removal of the prosthesis difficult, particularly for patients with xerostomia.⁶ The space that exists between the cheek and the denture flange along with the height of flange varies from patient to patient.¹ Hence the type of cheek plumper attachments that must be used in case of detachable cheek plumpers is a decision which is to be made by the operator. In the present case, detachable cheek

plumper prosthesis were planned to reduce weight of the final prosthesis and they allow the patient to remove them when and if required. Lost salt technique was incorporated in fabrication of plumpers to further reduce the weight of the prosthesis. Clinical magnets as attachments are good options and may be used but since they are expensive and not affordable for every patient, alternatives such as push-button attachments or the ones fabricated from easily available material, like autopolymerising resin and stainless steel wires, make affordable and quick means to attach cheek plumper to the denture.⁷

CONCLUSION

This case report describes a simple, effective and inexpensive treatment to improve facial appearance in patients with sunken cheeks. The attachment using acrylic sleeve and stainless steel wire is easy to make with readily available material and may be used in patients with narrow flanges. The lost salt technique is used to create hollow plumpers in cases where cheek plumpers are placed in both the maxillary and mandibular denture, to reduce the overall weight of the prosthesis for the comfort of the patient.

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Effectiveness Of 1.2% Simvastatin Gel as an Adjunct to Non-Surgical Therapy in The Treatment of Chronic Periodontitis: A Split Mouth Randomized Controlled Trial

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BACKGROUND: Periodontitis is an inflammatory disease that results in bone resorption creating bony defects, which may cause tooth loss.
AIM: The present study aimed to evaluate the effectiveness of 1.2% Simvastatin gel as an adjunct to non-surgical therapy to treat chronic periodontitis (CP).
MATERIALS AND METHOD: 25 patients with 50 sites were categorized into two treatment groups: scaling and root laning plus 1.2% Simvastatin, and Scaling and Root Planing with placebo. Clinical parameters; site-specific plaque index, modified sulcus bleeding index (mSBI), pocket probing depth (PD), and relative attachment level (RAL) were recorded at baseline, 3, 6, and 9 months.
RESULTS: Mean PD reduction and mean RAL gain was found to be greater in Simvastatin group than the placebo group, at 3, 6, and 9 months.
CONCLUSION: Locally delivered Simvastatin was found to be effective in the treatment of Chronic Periodontitis (CP).
KEYWORDS: Simvastatin, Local Drug Delivery, Chronic Periodontitis, Inflammation, Statins

INTRODUCTION

Periodontitis is a chronic infectious disease of the supporting tissues of the teeth. Bacterial infection can cause periodontal tissues to become inflamed and eventually destroyed by the inflammatory process. If we do not treat the disease, teeth lose their ligamentous support to the alveolar bone. Once the alveolar bone is resorbed, the teeth become mobile and are eventually lost.¹ In almost all types of periodontitis, both the oral microflora and the human response play significant purpose in the commencement and progression of these diseases.

Use of adjunctive various host-modulating agents like non-steroidal anti-inflammatory drugs, subantimicrobial dose doxycycline, bisphosphonates, selective estrogen receptor modulators, resolvins, lipoxins, to mention a few, are estimated. More recently, statins, which are hypolipidemic drugs of choice, are being explored as anti-inflammatory and osteoinductive agents. The anti-inflammatory effects that are postulated to provide cardioprotective benefits beyond those attributable to the hypolipidemic effects alone are referred to as pleiotropic effects.²

5-hydroxymethylglutaryl-CoA reductase inhibitors, usually referred to as statins, decrease cholesterol levels by inhibiting cholesterol biosynthesis. This will, in turn, reduce the chances of cardio-vascular issues, as do other drugs that reduce the cholesterol levels in serum. Their activity essentially consists of

competitively inhibiting 3-hydroxy-3 methyl glutaryl co-enzyme A reductase (HMG CoA) that will inhibit cholesterol synthesis. It is evident that statins exert several vascular actions that are not lipid lowering.³ Statins have proven to have significant anti-oxidative and anti-inflammatory properties.⁴

It has pleiotropic effects and anti-inflammatory property, that is associated with the reduction in isoprenoids that is accountable for post-translational modification of proteins.⁵ Among these proteins, the reduced prenylation and small G-proteins activity (Ras, Rho) appears significant. At a minimum, the effects include a reduced inflammation in vessels by inhibiting the macrophage activation and proliferation; inhibition of secretion of MMP- matrix metallo-proteinases; inhibition of smooth vascular muscle proliferation and platelet activation; promotion of neovascularization through direct angiogenesis or mobilization of endothelial progenitor cells; antioxidant effect through downregulation of angiotensin 1 receptor expression and inhibition of Nicotinamide Adenine Dinucleotide Phosphate (NADPH) oxidase activity.^{6,7}

The protective cardiovascular effect partly comes from anti-inflammatory property such as Inhibiting TNF- α and MMP-9. MMP-9 and TNF- α are responsible for tissue destruction in chronic periodontitis. Moreover, statins are believed to increase bone formation



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by stimulating the bone morphogenetic protein-2 production.⁸ Hence, it seems possible that statins might be protective against cardiovascular problems and chronic periodontitis. Various animal studies showed Simvastatin (SMV) aids in bone regeneration and shows anti-inflammatory effect when delivered or applied locally.⁹

Our study has been designed to assess the efficacy of locally delivered drug of Simvastatin 1.2% into the deep periodontal pocket stimulating a substantial increase in pocket probing depth (PPD) reduction, relative clinical attachment level (CAL) gain as compared to the placebo gel as an adjunct to (SRP) scaling and root planing in the management of Periodontitis.

MATERIALS AND METHODS

Source of data: The investigation was a comparative assessment of the efficiency of an indigenously developed Locally Delivered Drug (LDD) simvastatin conducted out in the Department of Periodontics, in ITS Dental College. After ethical approval was given, written informed consent was signed by all study participants. The study was carried out from January 2018 to December 2018.

Formulation and in vitro evaluation of gels containing simvastatin: Methylcellulose in situ gel was prepared by adding biocompatible solvent to the appropriate amount of methylcellulose. The solution was heated to 50–60 °C and then agitated with mechanical shaker in order to get a clear solution. A pre-determined amount of Simvastatin was poured to the solution and then dissolved fully. A homogeneous phase of polymer, solvent, and drug. A 1.2% SMV in-situ gel was ready.

Local Drug Delivery: For standardization, 10 mL prepared SMV gel (1.2 mg/ 0.1 mL) was injected into the pockets using a syringe with a blunt cannula (figure 2). Patients were directed to abstain from chewing hard or sticky foods, brushing near the treated areas or using any interdental aids for one week. Adverse effects were noted at recall visits, each patient was reinstructed for proper oral hygiene procedures at recall visits, where any supragingival deposits were removed.

Selection Criteria: Patients with PD \pm 5 mm or relative CAL \pm 4 mm with no history of periodontal therapy or use of antibiotics in the last 6 months, with presence of atleast 20 teeth, were included. The periodontal



Figure 1. Pre-Operative Records of Indices and Clinical Parameters

parameters were assessed at six sites per tooth using a periodontal probe. Individuals with known systemic disease, patients with known or suspected allergy to the Simvastatin, those on systemic Simvastatin therapy, individuals with hyperlipidemia or individuals who process a lipid-reducing diet, individuals with Aggressive periodontitis, patients who use tobacco, alcoholics, immunocompromised individuals, and pregnant or lactating females were not included in the study. Also, teeth with furcation defects, gingival recession, endodontic (pulpal) involvement, and third molars were excluded.



Figure 2. Local Drug Delivery – 1.2 % Simvastatin in the Pocket after SRP

25 patients were able to fit in the inclusion criteria with 50 sites. All the parameters- site specific plaque index, modified sulcular bleeding index, pocket probing depth, relative attachment level were checked at baseline. (figure 1). Random allotment was done using the coin toss method, and groups were assigned. Group 1 was the control Group, where the scaling and root planing were done along with placebo gel placement. Group 2 included patients where along with scaling and

root planing, 1.2 % Simvastatin gel was placed. COE pack was placed for 1 week. All the parameters were rechecked at 3 months and 6 months (figure 3).



Figure 3. Recoding of All the Parameters At 3 Months, And 6 Months

Statistical Analysis: Statistical investigation of the data was carried out using Statistical Package for the Social Sciences (SPSS) software 16. Student's paired t-test was applied to test the mean changes in scores at different time points within each study group. (ANOVA) One-way analysis of variance was carried out to compare the mean scores between different study groups. Tukey's "honestly significant difference" procedure was carried out to identify the significant groups if the test of significance in one-way ANOVA was significant. $P < 0.05$ was considered as the level of significance in this study.

RESULT

Twenty-five (two sites per participant) subjects were able to complete the study (table 1) All participants accepted the drug very well with no complications or adverse reactions to the drug. Soft tissues healed uneventfully, and no major visual differences were noted.

The two groups revealed improvement in site-specific PI score, but there wasn't statistical substantial difference in site-specific PI score among the 2 groups at any visit (tables 1 & 2). This specifies that both the groups kept comparable levels of dental hygiene during the study. mSBI in the both groups showed no difference at baseline, but it was considerably reduced in the SMV group compared with placebo group at 3 and 6 months ($P < 0.05$) (table 1). Clinical parameters- (PPD) pocket probing depth and relative CAL also showed no substantial difference between the 2 groups at baseline. However, the SMV group showed significantly greater PD pocket depth reduction and

VARIABLE	GROUP 1 (N=10)	GROUP 2 (N=10)	P-VALUE
Age (year)	32.50± 8.182	32.50± 8.121	1.000
Site specific Plaque index	2.8± 0.2261	2.14± 0.1845	0.634
Modified sulcular bleeding index	1.31± 0.1080	1.37± 0.1287	0.465
Probing depth	5.20± 0.516	5.40± 0.445	0.645
Relative attachment level	08.70± 0.675	08.90± 0.756	0.543

Table 1. Subjects and their periodontal defect characteristics at baseline [Values are presented as mean ± SD; Group 1: Control site: SRP was performed, with placement of placebo gel; Group 2: Test site: SRP was performed with placement of 1.2% Simvastatin gel in the pockets.]

relative CAL gain at 3 and 6 months compared to the control group at $P < 0.001$ (table 3).

DISCUSSION

Our present research evaluated the clinical efficiency of 1.2 % SMV in- situ gel in adjunctive measure to SRP (scaling and root planing) in treatment of patients with CP and showed substantial enhancement in parameters compared to the placebo gel. There are very few studies recording the use of 1.2 % SMV gel as local drug delivery to treat patients with periodontitis. Therefore, a straightforward comparison with other studies is not practical.

The mean site-specific plaque index in the group -1 (control group at baseline was 2.8 ± 0.2261 mm, after 3-months was 1.35 ± 0.1945 mm, and 1.30 ± 0.1945 mm after 6 months. The mean reduction in site-specific plaque index from the baseline to 3 month and 6 months was statistically significant in our control group. The mean site-specific plaque index at baseline was 2.14 ± 0.1845 mm, after 3 months was 1.18 ± 0.1370 mm, and 1.05 ± 0.1347 mm after 6 months in the test group. The test group showed a statistically significant mean reduction in site-specific plaque index from baseline to 3 and 6 months. The site-specific plaque index of both groups reduced throughout the time intervals. However, the SMV group displayed a more substantial reduction in the site-specific plaque index in the test group than the control group (Group-1) upon

	VARIABLE	BASELINE	3 MONTHS	6-MONTH	BASELINE -3 MONTHS DIFFERENCE	p-VALUE	BASELINE -6 MONTHS DIFFERENCE	p-VALUE
Plaque Index	GROUP 1	2.8±0.2261	1.35±0.1945	1.30±0.1945	1.45±0.031	0.0045	1.5±0.195	0.0048
	GROUP 2	2.14±0.1845	1.18±0.1370	1.05±0.1347	0.96±0.047	0.0023	1.09±0.137	0.0032
	p-value	0.634			0.0036		0.0043	
Modified Bleeding Index	GROUP 1	1.31±0.1080	1.16±0.0589	1.03±0.0876	0.15±0.049	0.0042	1.16±.020	0.0045
	GROUP 2	1.37±0.1287	0.73±0.1566	0.57±0.1703	0.64±0.027	0.0024	0.8±0.111	0.00324
	p-value	0.465			0.0032		0.003	

Table 2. Plaque Index and Modified Bleeding Index scores at baseline, 3 months and 6-month after SRP. [Values are presented as mean ± SD]

intergroup comparison.

In the control group, the mean modified sulcular bleeding index at baseline was 1.31±0.1080 mm. After 3 months it was 1.16±0.0589 mm and after 6 months was 1.03±0.0876 mm. The control group showed substantial reduction in mean modified sulcular bleeding index from baseline to 3 months, and then to 6 months. In the test group, the mean modified sulcular bleeding index at baseline was 1.37±0.1287 mm. After 3 months it was 0.73±0.1566 mm and after 6 months, 0.57±0.1703 mm. A statistically substantial mean reduction occurred in the test group's modified sulcular bleeding index from baseline to 3 and 6 months. A decrease in the mean modified sulcular bleeding index was noted in both groups from baseline to the different time intervals. However, the SMV group displayed a more significant reduction in the mean modified sulcular bleeding index in the test group than the control group on the intergroup comparison.

In our present study – group 1 (control group), the mean Pocket Probing Depth (PPD) at baseline was 5.20±0.516 mm. After 3 months it was 3.80±0.542 mm and after 6 months was 3.70±.583 mm. The control group showed a statistically significant mean reduction in mean pocket probing depth from baseline to 3 months and 6 months. The test group showed a mean pocket probing depth at baseline of 5.40±0.445 mm. After 3 months it was 3.20±0.243 mm and after 6 months it was 2.84±.766 mm. The test group displayed a statistically significant mean reduction of pocket probing depths from baseline throughout our specified time intervals. A decline in the mean pocket probing depths were recorded in both groups from baseline to till both the time intervals. However, the SMV group displayed a more substantial reduction in the test group than the control group on the intergroup comparison.

In the control group, the mean relative (rCAL) clinical attachment level at baseline was 08.70±0.675mm. Subsequently 3 months later it was 7.20±0.632 mm and after 6 months it was 6.84±0.223 mm. The control group showed a significant change in mean relative clinical attachment level from baseline to 3 and 6 months. The mean (rCAL) relative clinical attachment level in the test group at baseline was 08.90±0.756 mm. 3 months later, it was 6.90±0.483 mm and after 6 months it was 6.63±0.236 mm. The Group 2 showed statistically substantial changes in the mean (rCAL) relative clinical attachment level from baseline to 3 and 6 months. A reduction in the (rCAL)relative clinical attachment level have been noted in 2 groups from baseline to the different time intervals. However, the SMV group displayed a more significant reduction in the test group than the control group on the intergroup comparison.

The test group - 2 shows a more drastic decrease in indices, (PPD) pocket probing depth, and (Rcal) relative attachment level than the control group. The gingival bleeding index reduced from baseline to 6 months, suggesting that simvastatin has an anti-inflammatory effect. A comparable anti-inflammatory effect of SMV was noted by Lindy et al.¹⁰ in patients with chronic periodontitis on systemic statin therapy. The patients taking statins had 37% fewer periodontal pockets than those not taking statin medication. Sakoda et al.¹¹ demonstrated the anti-inflammatory effect of SMV on oral epithelium cells, evidently involving Rac1 guanosine triphosphatase inhibition, and noted reduced IL-6 and IL-8 production. However, the scores of PI were also lower for both the respective groups. Considering that both groups had better plaque control (table 2), any reduction of gingival bleeding may be attributable to the better plaque control only and not by using the SMV.

	Variable	Baseline	3 Months	6-Month	Baseline -3 Months Difference	P Value	Baseline -6 Months Difference	P-Value
Pocket Probing Depth	GROUP 1	5.20±0.516	3.80±0.542	3.70±.583	1.40±0.026	0.048	1.5±0.067	0.0049
	GROUP 2	5.40±0.445	3.20±0.243	2.84±.766	2.20±0.202	0.032	2.56±0.245	0.0036
	P-value	0.645			0.0038		0.0048	
Relative Attachment Level	GROUP 1	08.70±0.675	7.20±0.632	6.84±0.223	1.5±0.043		1.86±0.45	0.048
	GROUP 2	08.90±0.756	6.90±0.483	6.63±0.236	2.00±0.273		2.27±0.48	0.032
	P-value	0.543			0.0032		0.0045	

Table 3. Clinical parameters: Pocket Probing Depth and Relative Attachment Level at baseline, 3 months and 6-month after SRP

Similarly, PPD reduction was significant from baseline to 6 months and substantial difference among all groups at any interval of time. The reduction in the RALs at the end of the 6 month period was statistically relevant for the test groups and a less significant reduction for the control group, suggesting a more consistent outcome with statins, even though there is a noticeable difference among the three groups at any stage. Similar effects were recorded in the studies by Thorat and Pradeep^{12,13} and Rao et al.¹⁴, who reported significant favorable alterations in the PPD and attachment levels in the Group -2 in contrast with the control group.

The sound effects of SRP are profound about clinical improvement and microbial suppression that the remaining dynamic range of disease expression or margin for additional clinical improvement is too small to measure the effects of any additional therapy. Thus, using anti-inflammatory drugs adjunctively to debridement therapy is ill-advised from an experimental design standpoint.² Although this combined therapy may ultimately be preferred for those who possess a hyper-inflammatory phenotype, it is not ideal from a regulatory or drug development standpoint. Logically, this places the timing for such drugs either before the disease develops, as a preventive measure, or after debridement. Research has proved the dual relationship between periodontal disease and hyperlipidemia. It may very well prove that systemic disease can predispose to an oral infection, and once this oral infection is significant, it can exacerbate the systemic disease.^{15,16} Periodontitis leads to worsening of lipid metabolism. Likewise, periodontal inflammation is related with the worsening

of a hyperlipidaemic state by increasing the gingival crevicular fluid and proinflammatory cytokines.¹⁸ In a study conducted to assess the effect of improved periodontal health following periodontal treatment on metabolic lipid control of patients on anti-lipemic treatment, it was seen that enhanced periodontal health can affect metabolic control of hyperlipidemia and can be considered as an adjunct to the measures of hyperlipidemic patient care which are standardly used.¹⁸ Hence, statin as an adjunct to SRP may play a role in management of CP as well as hyperlipidemia.

Comparing systemic regimen with local delivery, the latter may offer essential benefits in terms of few adverse reactions and better patient compliance, as stated in the previous study.¹⁹

CONCLUSION

This study demonstrates that locally delivered gel of 1.2% SMV into periodontal pockets, periodontitis patients stimulates a substantial benefits in the PD reduction, Clinical attachment gain as opposed to placebo gel as an adjunctive measure to SRP. Hence this will take periodontal healing in patients at risk for periodontal destruction in a new direction. Nevertheless, long-term, multicentre randomized, controlled clinical trials are necessary to establish the clinical, histological, and radiographical consequence on bone formation in those affected by chronic periodontitis.

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Distribution of Oral Submucous Fibrosis Cases and Malignant Transformation Rate among Bhutanese Patients Treated at Jigme Dorji Wangchuck National Referral Hospital, Bhutan

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BACKGROUND: Oral Submucous Fibrosis (OSMF) is a chronic, insidious, scarring disease of the mouth often involving the palate, oro-pharynx, pharynx, esophagus, tongue and the buccal mucosa which leads to ulceration, blanching and ultimately limited mouth opening. The aim of the study is to describe the age, gender and district-wise distribution of oral submucous fibrosis cases and to assess the malignant transformation rate among the patients with oral submucous fibrosis who were treated at Jigme Dorji Wangchuck National Referral Hospital, Thimphu, Bhutan.

MATERIALS AND METHOD: This is a descriptive retrospective study. The patients were clinically diagnosed by examining their mouth and by measuring their mouth opening (Inter-incisal height). Patients who had less than 3 fingers mouth opening and diagnosed as Oral submucous fibrosis (OSMF) during these three-year period from 2018 to 2020 were considered for the study.

RESULTS: There were 278 cases in total. Thimphu district had the maximum number of cases followed by Wangduephodrang and Samtse. Gasa and Haa districts had the minimum cases. More males were affected than females. The malignant transformation rate among these patients was 4.3%.

CONCLUSION: Thimphu district had the highest proportion of OSMF cases and was almost equally distributed among genders. Over 90% of the patients reported improvement without surgery while the malignancy transformation rate was 4.3%. The study recommends conducting screening in districts with high burden of OSMF cases for early diagnosis and treatment.

KEYWORDS: Oral Submucous Fibrosis, Distribution, District, Bhutan

INTRODUCTION

Oral Submucous Fibrosis (OSMF) is a chronic, insidious, scarring disease of the mouth often involving the palate, oro-pharynx, pharynx, esophagus, tongue and the buccal mucosa which leads to ulceration, blanching and ultimately limited mouth opening. Epidemiological data and intervention studies suggest that betel nut and its products are the main etiological factors for development of OSMF.¹ Other factors are chillies, lime, tobacco, nutritional deficiencies such as iron and zinc, immunological disorders, collagen disorders, GERD, smoking or chewing tobacco, alcohol and certain syndromic diseases.¹⁻⁴ OSMF is a pre-cancerous condition which has the potential to turn into cancer. It has one of the highest rates of malignant transformation among potentially malignant oral lesions and conditions.⁵

Mouth opening is restricted in this disease along with pain and burning sensation in the mouth. In most of the cases, these are the only reasons patients visit hospital for care and support. The primary aim of the treatment is to increase mouth opening and rendering them asymptomatic while eating.⁶ The normal range of mouth opening differs from person to person, varying

between 40 – 60 mm with an average between 35 – 55 mm which is equal to the width of three fingers.^{7,8} In general, males display greater mouth opening than females.^{7,8} There are numerous classifications used for classifying the severity of mouth opening. Passi D et al., classified the mouth opening as; Grade I- mouth opening up to 35 mm, Grade II- mouth opening between 25-35 mm, Grade III- mouth opening between 15-25 mm and Grade IV where mouth opening is less than 15 mm to nil.⁹

The South East Asian region has a higher prevalence of OSMF compared any other part of the world which can be attributed to habit of chewing betel and betel products.^{1,2} Betel wrapped in betel leaf along with different spices is consumed in parts of India, Bangladesh, Nepal, Pakistan and Thailand. In Bhutan, it is customary to offer betel during functions and festivals, which is chewed by wrapping it in a betel leaf along with lime. However, there is limited data about the topic in Bhutan. Thus, this study describes the age, gender and district wise distribution of oral submucous fibrosis cases and malignant transformation rate among the patients with oral submucous fibrosis



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who were treated at the dental department of JDWNRH from 2018 to 2020.

MATERIALS AND METHOD

This is a retrospective study conducted at Jigme Dorji Wangchuck National Referral Hospital, Bhutan. Jigme Dorji Wangchuck National Referral Hospital (JDWNRH) is the apex hospital in the country and caters to all complex medical, surgical and dental cases referred in from district hospitals. Patients were clinically diagnosed by examining their mouth and by measuring their mouth opening (Inter-incisal height). Patients who had less than 3 fingers mouth opening and diagnosed as Oral submucous fibrosis (OSMF) during the three-year period from 2018 to 2020 were considered for the study. Malignant transformations were confirmed by biopsy and histopathological examinations. Radiographic examination including X-Rays and CT, MRI were also done in confirmed cancer cases to assess the involvement of other structures like the jaw, brain, neck and cervical lymph nodes. Ethical approval for the study was obtained from the Research Ethics Board of Health (REBH), Ministry of Health, Bhutan.

Data analysis: Data collected was double entered and validated using Epi-Data version 3.1 and analyzed using Microsoft Excel. The findings are presented as frequencies and percentages.

RESULT

There were a total of 278 OSMF cases recorded in the past three years. Over half (54.7%) of the participants were male and a majority (77%) of them in the age group 19-59 years (table 1).

VARIABLE	CATEGORY	FREQUENCY	PERCENT
GENDER	Male	152	54.7
	Female	126	45.3
AGE (in years)	< 18	10	3.6
	18-59	214	77.0
	≥ 60	54	19.4

Table 1. Age and gender distribution of OSMF cases (n=278)

Case distribution is presented in table 2. OSMF cases were present in all the twenty districts of Bhutan. Thimphu district had the highest proportion of cases (14%) while Gasa had the lowest proportion (2.2%).

Prognosis / Outcome of the patients is being presented in table 3. Majority (90.6%) of the participants reported improvement without surgery while 4.3 % had transformation to cancer.

DISTRICT	FREQUENCY	PERCENT
Thimphu	39	14.0
Wangduephodrang	28	10.0
Samtse	17	6.1
Trashigang	16	5.7
Mongar	16	5.7
Trashiyangtse	15	5.3
Punakha	14	5.0
Chukha	14	5.0
Pemagatshel	13	4.7
Paro	12	4.3
Trongsa	11	3.9
Sarpang	11	3.9
Tsirang	11	3.9
Dagana	11	3.9
Bumthang	11	3.9
Lhuentse	10	3.6
Samdrupjongkhar	9	3.2
Zhemgang	8	2.9
Haa	6	2.2
Gasa	6	2.2

Table 2. District wise distribution of OSMF cases (n=278)

DISCUSSION

Thimphu had the highest proportion of OSMF cases which can be attributed to larger population as Thimphu is also the capital of Bhutan. The malignancy transformation rate to cancer was 4.3%. There are different studies suggesting malignant transformation rates of OSMF. According to one of the recent studies, it is seen that it has increased from 0.03% to 6.42% in India.¹ According to Chourasia et al. the incidence of malignant transformation to oral squamous cell carcinoma in patients of untreated oral submucous fibrosis is 4.2%.¹⁰ The incidence of oral cancer concomitant with oral submucous fibrosis is found to be 25.77 % by the same study.¹⁰ It was observed that OSMF developed on one side of the buccal vestibule where they kept and chewed betel and tobacco products while the other side was normal.⁴ There is no

OUTCOME	FREQUENCY	PERCENT
Improved without surgery	252	90.6
Improved after Laser Excision	14	5.0
Cancer (Malignant Transformation)*	12	4.3
Death	0	0.0

Table 3. Prognosis/outcome of OSMF cases (n=278), *: confirmed by Biopsy and Histopathological examination

effective treatment for OSMF.³ In OSMF, the incidence of oral cancer is 7.6 per cent for a median 10-year follow-up period. Risk markers for malignant transformation in OSMF include epithelial dysplasia, and p53 tumor suppressor gene mutations.¹¹ In normal patients mouth opening is more in males than females.⁷ However, there was no difference in mouth opening between males and females in diseased condition (OSMF). Early and timely diagnosis and treatment is important for good prognosis of the disease.

CONCLUSION

Thimphu district had the highest proportion of OSMF cases and was almost equally distributed among genders. Over 90% of the patients reported improvement without surgery while the malignancy transformation rate was 4.3%. The study recommends conducting screening in districts with high burden of OSMF cases for early diagnosis and treatment.

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