

SURVEY ON USE OF DENTAL GEL CONTAINING CLOVE OIL FOR THE TREATMENT OF PERIODONTAL DISEASE

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ABSTRACT

This aimed to study the survey report on Use of Dental gel containing clove oil for the treatment of Periodontal disease. This survey estimates public awareness towards oral health. Also the frequency of the population suffering from periodontal/gum disease. This helps to check the knowledge of public about periodontal disease. It estimate method followed by public to overcome dental problems, highlight awareness towards oral hygiene. There are many periodontitis risk factors in society. It estimates market formulation requirements to decrease oral problems and increase health safety. This study also understands the public point of view towards causative factors and causative elements responsible for periodontal disease. Also evaluate patient compliance status with dental gel formulation. Clove oil has a wide spectrum of antibacterial activity against a number of periodontal pathogens, hence it is selected for the treatment of periodontitis. The periodontal disease commonly refers to inflammatory diseases that are plaque induced i.e. gingivitis and periodontitis. Gingivitis, the moderate stage of disease caused by an accumulation of supragingival plaque and characterized by swelling, light bleeding and redness of the marginal gingival. Gingivitis is associated with a change in the microflora, shifting from a Gram-positive anaerobic flora to a more Gram negative one. Periodontitis, a more severe stage of periodontal disease, results in the resorption of the alveolar bone and detachment of the periodontal ligament supporting tooth.

KEYWORDS: Periodontal disease, Clove oil, Dental gel, Gingivitis, Oral health.

INTRODUCTION

Periodontal disease is recognized as a major public health issue throughout the world and occurs in all groups, ethnicities, races, genders and at socioeconomic levels. It is characterized by inflammation and degeneration of the gums, supporting bone, periodontal ligament and cementum and accumulation of bacterial pathogens, mainly within the periodontal pockets.^[1] Periodontitis is an inflammatory response to the overgrowth of anaerobic organisms such as *Porphyromonasgingivalis*, *Prevotella intermedia*, *Fusobacteriumnucleatum*, *Campylobacter rectus*, *Prevotellamelaninogenica* and *Actinobacillusactinomycetemcomitans*. The conventional method for treatment the periodontal disease like oral, topical and systemic dosage forms have the major disadvantages like superinfection, low or non-compliance, low gingival crevicular fluid levels of

antibiotics, systemic side effects, short duration and high relative cost.^[2]

PERIODONTAL DISEASE AND ITS TYPES

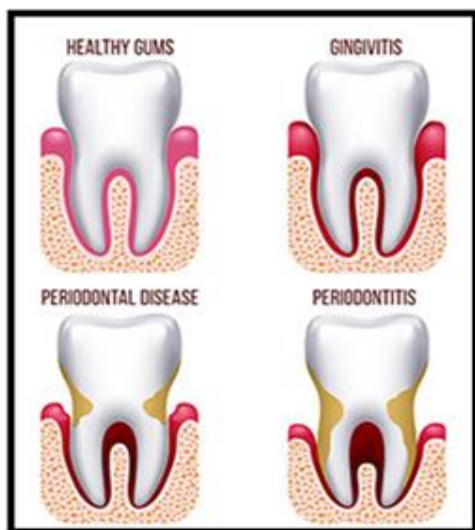
Periodontal disease is considered a major public health problem throughout the world. Good daily oral hygiene plays a vital role in maintaining healthy teeth and gums. Periodontal disease can occur in all age groups, ethnicities, races and genders. Periodontal diseases including gingivitis and periodontitis are serious infections which can lead to tooth loss when left untreated. The word periodontal literally means "around the tooth." Periodontal diseases are infections of the bone and gums that bound and support the teeth. In its early phase called gingivitis, gums can become inflamed and red, and they may bleed too in severe conditions. In its more severe form, called periodontitis, the gums can draw away from the tooth, bone can be lost, and the teeth may get loosened or even fall out.

It is a local infection with primary bacterial etiology in the gingival crevices, which affects the structural organs surrounding the teeth like periodontal ligament, connective tissue and bone. The warm and moist pocket environment fastens the growth of gram-negative, anaerobic bacteria that proliferate in the subgingival space. The most important and most prevalent anaerobic gram-negative bacteria in the subgingival area are *Actinobacillus actinomycetemcomitans* (Aa), *Porphyromonas gingivalis* (Pg), *Prevotella intermedia* (Pi), and *Tannerella forsythensis* (Tf).^[4]



ETIOLOGY OF PERIODONTITIS

The undetectable, sticky film called plaque mainly composed of bacteria stays on the teeth for more than two or three days, and can harden under the gum line into tartar (calculus). Tartar makes it very difficult to remove plaque and acts as a bacterial reservoir. Longer the plaque and tartar remains on the teeth, they cause irritation and inflammation of gingiva, which leads to pocket development between the gums and teeth. The pockets deepen and more bacteria builds up, which causes infection and eventually leads to loss of tissue and bone.^[4]



Types of Periodontitis

1. Mild periodontitis (gingivitis)
2. Moderate periodontitis
3. Advanced periodontitis

4. Refractory periodontitis

Common Pathogens Of Periodontitis

1. *T.forsythia*
2. *P.intermedia*
3. *F.nucleatum*
4. *A.actinomycetocomitans*

SIGNS AND SYMPTOMS

- Red, swollen or tender gums
- Gums that bleed when brushing or flossing
- Receding gums
- Deep pockets (the space between the gums and the teeth)
- Metallic taste
- Tooth sensitivity for no apparent reason
- Loose or shifting teeth
- Abscesses
- Pus around gums and teeth
- Chronic bad breath

DIAGNOSIS

At a dental visit, a dentist or dental hygienist will:

1. Examine your gums and note any signs of inflammation.
2. Use a tiny ruler called a "probe" to check for and measure any pockets around the teeth. In a healthy mouth, the depth of these pockets is usually between 1 and 3 millimetres. This test for pocket depth is usually painless.
3. Ask about your medical history to identify conditions or risk factors (such as smoking or diabetes) that may contribute to gum disease.

The dental professional may also:

4. Take an x-ray to see whether there is any bone loss.
5. Refer you to a periodontist. "Periodontists are experts in the diagnosis and treatment of gum disease and may provide you with treatment options that are not offered by your dentist".^{[5][6][7][8][9][10][11]}

TREATMENT

Periodontitis can be treated by various ways, based on its stiffness. Periodontitis management is to completely clean the bacterial pockets to prevent more harm. Periodontitis supervision can be carried out by a periodontist, dentist and dental hygienist with a strict daily routine of good oral care.

Treatment for Periodontitis can be done by two methods

1. Mechanical Therapy:
2. Systemic Antibiotic Therapy:

On the basis of surgical/non surgical treatment

(I). Surgical treatment

- Gingivectomy
- Gingivoplasty

(II). Non-surgical treatment

1. Dental cleaning
2. Scaling and root planing.^{[12][13][14][15]}

ROLE OF CLOVE AND CLOVE OIL

Common Names:- Cloves, Caryophyllus, Clovos, Caryophyllus

Botanical Names:- *Eugenia caryophyllus*, *Syzygiumaromaticum*

Cloves are the aromatic dried buds of a tree (*Eugenia caryophyllata* also sometimes *Syzygiumaromaticum*) used as a spice in virtually all the world's cuisine. The flower buds are at first of a pale colour and gradually become green, after which they develop into a bright red, when they are ready for collecting. Cloves are harvested when 1.5–2 cm long, and consist of a long calyx, terminating in four spreading sepals, and four unopened petals, which form a small ball in the center.^[16]

Antibacterial activity

Clove is known to possess antibacterial properties and is used in various dental creams, tooth pastes, mouth washes, and throat sprays to cleanse bacteria. It is also used to relieve pain from sore gums. In dentistry, eugenol in combination with zinc oxide is used for temporary filling of cavities. Clove is an anodyne (an agent that soothes or relieves pain) for dental emergencies.

Antimicrobial activity

Cloves represent one of Mother Nature's premier antiseptic. Clove oil was found to be more effective than sodium propionate (standard food preservative) against some food borne microbes. Clove oil was found to be very effective against *Staphylococcus* species. *Aspergillusniger* was found to be highly sensitive to the clove oil. Essential oil of clove, dispersed (0.4% v/v) in a concentrated sugar solution, had a germicidal effect against various bacteria (*S. Aureus*, *KlebsiellaPneumoniae*, *Pseudomonas aeruginosa*, *Clostridium perfringens*, *E.coli*) and *Candida albicans*.^{[17][18][19]}

Antiviral activity

Clove is a potent antiviral agent. Eugenol isolated from clove buds showed antiviral activity against Herpes Simplex virus at a concentration of 10 µg /ml.^[20]

Miscellaneous uses

Clove is used to flavor Pharmaceuticals. Clove oil is used to flavor tooth pastes. The leaf oil is used to impart fragrance to perfumes and soaps. In Indonesia, cloves are mixed with tobacco in the proportion of 1: 2 to make a cigarette called Kretek. Clove is used to make pomanders (thin skinned oranges, lemon and apples are pierced with a large needle to make holes for studding clove inside the concentric holes).

ORAL HEALTH STANDARDS

Minimum Standards for Dental Care and Treatment

- Ensure that patients receive consistently high quality care and treatment. All dental professionals should abide by these standards.
- To help the public decide which dental service to choose. This outlines the quality of service the public can expect.

These standards deliberately differ in format from other independent healthcare standards. There are several reasons for this. These standards seek to achieve a commonality of good dental practice driven from patient perceptions and expectations. They set out what can be expected of the professionals who provide dental services and they can be used to assess the performance of dental services. The standards have been categorised under the corresponding quality theme.

Principle's

1. Understand your own oral health needs.
2. Develop, then follow, a daily oral health routine.
3. Brush, floss, and rinse daily.
4. Eat a balanced diet and limit snacking.^[31]

QUESTIONNAIRE

Survey on use of Dental gel containing clove oil for the treatment of periodontal disease

Personal details

Email address

1. Your Name

2. Address

3. Gender

- Female
- Male
- Prefer not to say
- Other:

4. How old are you?

- 1 to 20
- 21 to 30
- 31 to 40
- 41 to 50
- Over 51

5. How would you describe your dietary habits?

- I tend to eat irregularly and with little variety.
- I would describe my diet as normal.
- I maintain a balanced diet and am concerned that my food is prepared fresh.

6. Does anyone in your family (parents or siblings) suffer from gum disease?

- Yes
- No
- Maybe

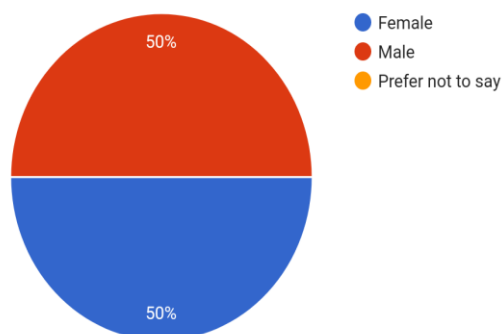
7. How often do you visit a dentist?

- I try to avoid visiting a dentist.

- I go for an annual dental check-up.
 - I visit the dentist regularly and also receive professional tooth cleaning.
8. Have your gums already been treated?
- I have received no treatment.
 - My last gum treatment was over 10 years ago.
 - A treatment has already been conducted, but there was no regular follow-up.
 - A treatment was conducted, and since then there have been regular follow-ups.
9. Please provide assessment on the movability of your teeth.
- I have never noticed any increase in tooth movability.
 - The position of my teeth has changed.
 - Some teeth are loose.
 - I have already lost teeth due to increased loosening or gum problems.
10. Do you have any tooth replacement history?
- I do not have any tooth replacement.
 - I have several crowns, bridges or implants.
 - I have removable dentures(false teeth)
11. Do you know about periodontal disease(Gum disease)?
- Yes
 - No
 - Maybe
12. If yes, Then the periodontal disease is caused by which microorganism?
- Bacterial colonies
 - Fungal colonies
 - Virus
 - Parasite
13. Best way to protect yourself against periodontal disease and other oral diseases is
- Brushing twice a day
 - Maintaining proper oral hygiene
 - Both
 - Not required
14. What are the symptoms of periodontal disease ?
- Gum bleeding
 - Gum degradation
 - Weakness of teeth
 - All of the above
15. Which formulation has the best bioavailability pattern against periodontal disease infection (Gum disease)?
- (Dental-Gum) Gel
 - Liquid preparations
 - Parenteral Injections
 - Tablets
 - Other:
16. Periodontal disease frequently targets which type of teeth in the dental set?
- Incisors
 - Canines
 - Premolars
 - Molars
17. Clove having a property in the treatment of which type of disease?
- Ocular problem
 - Muscular problem
 - Cardiovascular problem
 - Dental-Gum problem
18. Which Property of dental gel containing clove oil is essential for gum disease treatment?
- Antibiotics/Antimicrobial
 - Anti Inflammatory
 - Antipsychotics
 - Antiepileptic
19. Does the market require any formulations that can cure periodontal disease?
- Yes
 - No
 - Maybe
 - Not Yet
20. Which of the following challenges are expected in formulation of dental gel containing clove oil?
- Maintaining the pH of the gel
 - Tonicity adjustment
 - Physicochemical stability
 - All of the above

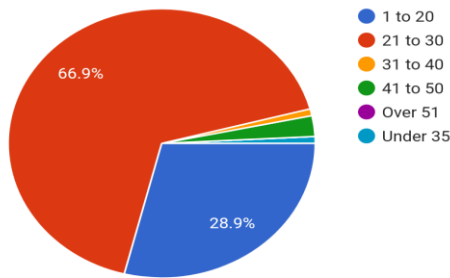
3. Gender

120 responses



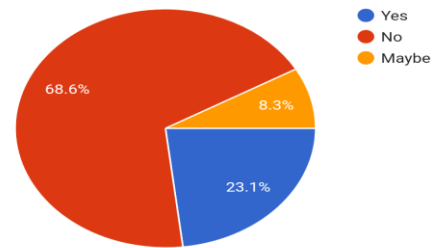
4. How old are you?

121 responses



6. Does anyone in your family (parents or siblings) suffer from gum disease?

121 responses



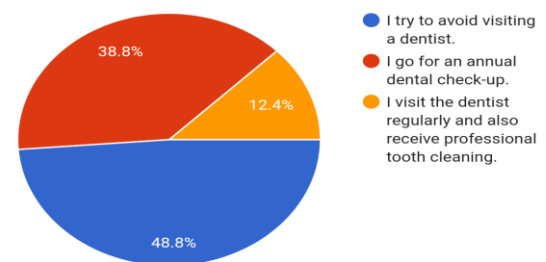
DATA ANALYSIS OF RESPONSES

Table 1: Demographic characteristics of the survey data.

Demographic factors	Category	Number of responses	Total %
Gender	Male	60	50
	Female	60	50
Age	1 to 20	35	28.9
	21 to 30	81	66.9
	31 to 40	1	0.8
	41 to 50	3	2.5

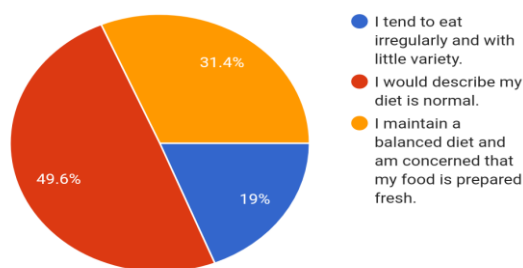
7. How often do you visit a dentist?

121 responses



5. How would you describe your dietary habits?

121 responses



8. Have your gums already been treated?

121 responses

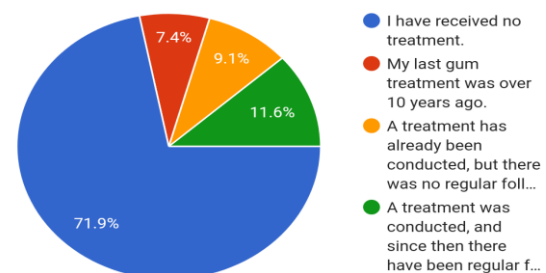
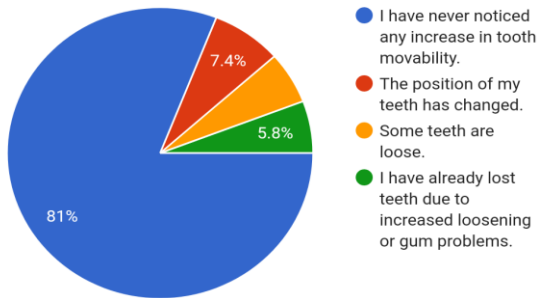


Table 2: Study of general oral health and dietary habits.

Data related to oral health and dietary habits	Category	Number of responses	Total %
How would you describe your dietary habits?	I tend to eat irregularly and with little variety	23	19
	I would describe my diet is normal	60	49.6
	I maintain a balanced diet and am concerned that my food is prepared fresh.	38	31.4
Does anyone in your family (parents or siblings) suffer from gum disease?	Yes	28	23.1
	No	83	68.6
	May be	10	8.3
How often do you visit a dentist?	I try to avoid visiting a dentist.	59	48.8
	I go for an annual dental check-up.	47	38.8

	I visit the dentist regularly and also receive professional tooth cleaning.	15	12.4
Have your gums already been treated?	I have received no treatment.	87	71.9
	My last gum treatment was over 10 years ago.	9	7.4
	A treatment has already been conducted, but there was no regular follow-up.	11	9.1
	A treatment was conducted, and since then there have been regular follow-ups.	14	11.6

9. Please provide assessment on the movability of your teeth.
121 responses



10. Do you have any tooth replacement history?
121 responses

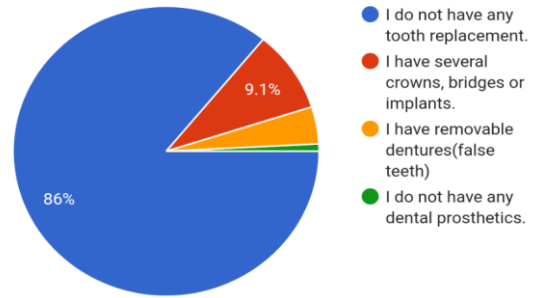
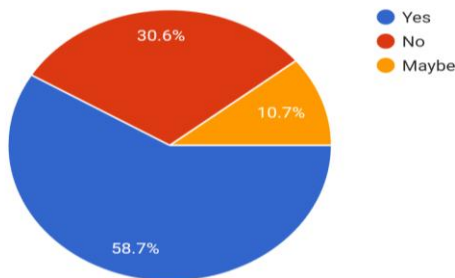


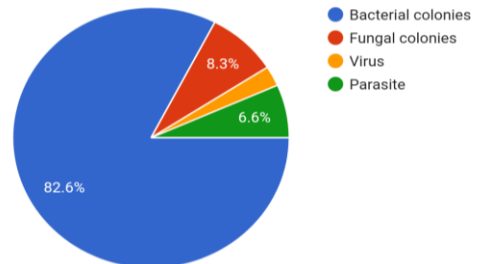
Table 3: Study of condition of teeth in population.

Data related to condition of teeth	Category	Number of responses	Total %
Please provide assessment on the movability of your teeth.	I have never noticed any increase in tooth movability.	98	81
	The position of my teeth has changed.	9	7.4
	Some teeth are loose.	7	5.8
	I have already lost teeth due to increased loosening or gum problems.	7	5.8
Do you have any tooth replacement history?	I do not have any tooth replacement.	104	86
	I have several crowns, bridges or implants.	11	9.1
	I have removable dentures (false teeth)	5	4.1
	I do not have any dental prosthetics	1	0.8

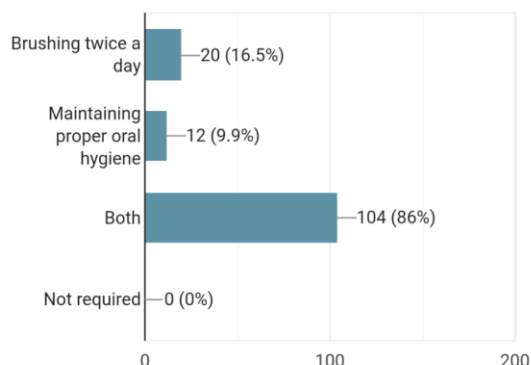
11. Do you know about periodontal disease (Gum disease)?
121 responses



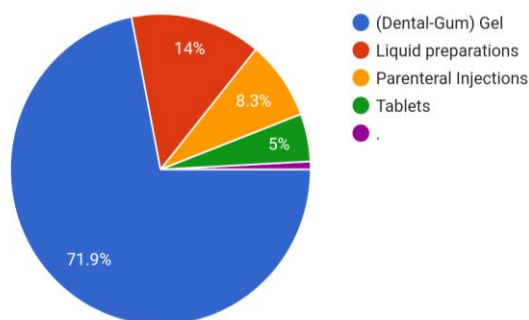
12. If yes, Then the periodontal disease is caused by which microorganism?
121 responses



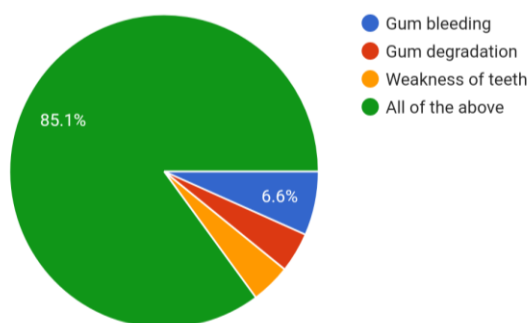
13. Best way to protect yourself against periodontal disease and other oral diseases is
121 responses



15. Which formulation has best bioavailability pattern against period...fection (Gum disease)?
121 responses



14. What are the symptoms of periodontal disease ?
121 responses



16. Periodontal disease frequently target which type of teeth in dental set?
121 responses

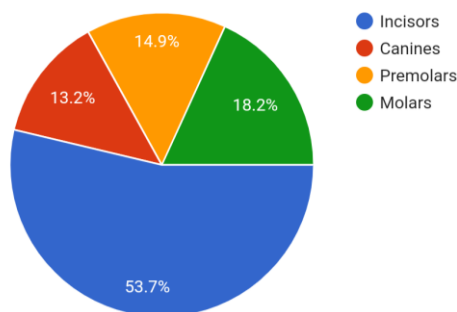
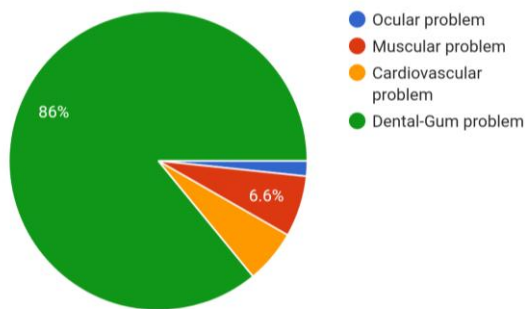


Table 4: Study of survey data related to Periodontal Disease.

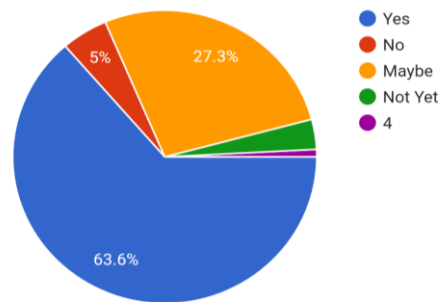
Data related to Periodontal Disease	Category	Number of responses	Total %
Do you know about periodontal disease(Gum disease)?	Yes	71	58.7
	No	37	30.6
	May be	13	10.7
If yes, Then the periodontal disease is caused by which microorganism?	Bacterial colonies	100	82.6
	Fungal colonies	10	8.3
	Virus	3	2.5
	Parasites	8	6.6
Best way to protect yourself against periodontal disease and other oral diseases is	Brushing twice a day	20	16.5
	Maintaining proper oral hygiene	12	9.9
	Both	104	86
	Not required	0	0
What are the symptoms of periodontal disease ?	Gum bleeding	8	6.6
	Gum degradation	5	4.1
	Weakness of teeth	5	4.1
	All of the above	103	85.1
Which formulation has best bioavailability	Dental gum gel	87	71.9

pattern against periodontal disease infection (Gum disease)?	Liquid preparation	17	14
	Parenteral injection	10	8.3
	Tablets	6	5
	Other	1	0.8
Periodontal disease frequently target which type of teeth in dental set?			
	Incisors	65	53.7
	Canines	16	13.2
	Premolars	18	14.9
	Molars	22	18.2

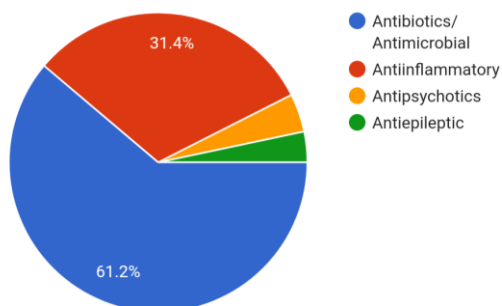
17. Clove having a property in the treatment of which type of disease?
121 responses



19. Do market requires any formulations that can cure periodontal disease?
121 responses



18. Which Property of dental gel containing clove oil is essential for gum disease treatment?
121 responses



20. Which of the following challenges are expected in formulation ...el containing clove oil?
121 responses

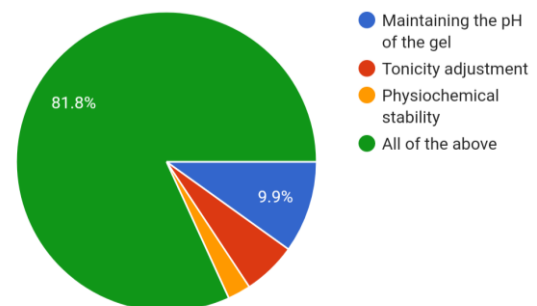


Table 5: Study of survey data of dental gel containing clove oil.

Data related to Dental gel containing clove oil	Category	Number of responses	Total %
Clove having a property in the treatment of which type of disease?	Ocular Problem	2	1.7
	Muscular Problem	8	6.6
	Cardiovascular problem	7	5.8
	Dental gum problem	104	86
Which Property of dental gel containing clove oil is essential for gum disease treatment?	Antibiotic/Antimicrobial	74	61.2
	Anti-inflammatory	38	31.4
	Antipsychotic	5	4.1
	Antiepileptic	4	3.3
Do market requires any formulations that can cure	Yes	77	63.6
	No	6	5

periodontal disease?	May be	33	27.3
	Not yet	4	3.3
	Other	1	0.8
Which of the following challenges are expected in formulation of dental gel containing clove oil?			
	Maintaining the pH of the gel	12	9.9
	Tonicity adjustment	7	5.8
	Physiochemical stability	3	2.5
	All of the above	99	81.8

RESULT

From the survey we came to know that participants considered oral health to play an important role, in reference to general health and believed that an equivalent attention should be paid to oral health problems including other general health problems. Among various oral diseases, periodontitis is cited as of high priority. Furthermore, the participants placed a better value on gingival health than on dental health due to the vital role of the gums in tooth retention. Individual's gave importance to their oral health as they found oral hygiene is the most important part to achieve a healthy life. Knowing the importance of oral health care participants came to the conclusion that the dental clove gel will be very useful and will be very much beneficial in dental care.

Moreover, in reference to periodontitis, the participants mentioned that they're not affected by any gum disease, some participants mentioned that they visit the dentist for an annual dental check-up and that they don't have treated gums, loose teeth, infection of gums, tooth loss, and tooth replacement as important symptoms of periodontitis. They also mentioned that they're conscious of periodontitis and its causative agents. And henceforth they will be very much cautious and will keep on following the standards and principles put forward by the ADA & IDA retrospectively.

DISCUSSION

Our study showed an overall favourable attitude toward and appreciation of periodontal health and fairly good knowledge with reference to the prevention of periodontitis among the participants. While the foremost important preventive methods like good oral hygiene, diet, and regular dental visits were acknowledged, the participants showed a good level of knowledge of the aetiology of periodontitis. Especially, they will differentiate between the aetiology, symptoms, and prevention of cavity and periodontitis.

Based on their viewpoints and beliefs about periodontal health and illness, a major theme emerged during this study: "common perception of periodontal health and illness".

Common Perception

The participants generally held the view that poor oral hygiene is the cause of periodontal disease, but they were aware of the relevant role of dental plaque. Most of the

participants knew that maintaining a balanced diet will be effective in preventing periodontal disease. Hereditary weak gum/tooth structure was considered as a predisposing factor for periodontal disease. The results show that there is no confusion between perceptions of healthy gums and healthy teeth among peoples.

Even though some of the participants chose to visit a dentist mainly only when symptoms occurred, a finding common in many societies, and some agreed that regular dental visits could be effective in preventing periodontal disease.

CONCLUSION

This qualitative study provides useful information on perceptions of periodontal health and illness as well as attitudes towards the prevention of gum disease among peoples. Our findings indicate a substantial need for oral health education to improve their knowledge and change their attitudes, especially to achieve a deeper understanding of the development and prevention of periodontal disease.

As per our survey data analysis, we found that a lot of people are conscious of their oral health. Everyone wants to take care of their oral health but they're unable to follow regularity in oral hygiene because of a busy life schedule and work stress. This is often the most reason much of the present population is affected by oral and gum disease. By this survey, we try that individuals get conscious of the utilization of gel formulation of oil of cloves and its effectiveness in the treatment of oral gum disease and also to provide the data and knowledge about the treatment of oral gum disease and maintenance pathway of oral hygiene. and that we are trying to find formulation development of oil of cloves which is playing important role within the non-surgical treatment of periodontal disease. It's also an enormous requirement for such sorts of formulation within the market because tons of individuals having a fear of facing surgery hence this gel formulation of clove oil are a future solution for non-surgical treatment in periodontitis. Clove is a natural ingredient having antimicrobial, antioxidant properties which are effective to kill bacterial colonies. Which are liable for periodontitis. Periodontal diseases also are mainly liable for other diseases like respiratory diseases, diabetes, GIT diseases etc.

FUTURE SCOPE

As of now we know the oral health conditions and standards, public prefer, there comes an urgent need for the indulgence of new oral habits into the daily routine for the betterment and wellness of the oral health. Due to the busy schedule of every individual now- a -days they don't pay a very good attention towards their oral health and then later suffer from serious pain in the tooth and swelling of the gums etc. which when not given attention would be life threatening and could lead to many serious dental problems.

Coming to the lifestyle which the generation follows will definitely cause them problems with oral health as they do not visit dentists routinely and do not follow the norms to keep the hygiene up to date. Therefore the dental gel formulation comes to the limelight. This dental clove gel will make the life of an individual suffering from periodontal disease very simple. The person suffering from periodontal disease had to undergo surgery but after this innovation in dentistry the person can simply undergo non surgical treatment that is he/ she can simply apply the gel which will give them relief from the pain and will destroy the accumulated plaque on their tooth.

In short we can say that the dental clove gel will be very much efficient for each and every individual in all aspects as it has wide use and provides various other helps in maintaining the oral hygiene. Periodontics is a dynamic profession that includes advanced treatment, planning and a wide variety of treatment methods ranging from conventional to advanced therapies. It is a comprehensive speciality study that provides opportunities in academics, it is a clinical practice that is evidence based and driven by sound scientific knowledge and covers a way for newer frontiers in research.

This suggests that there will be very much scope and would be very much efficient for the welfare of the public all over the nation and would be the best development in the dentistry area.

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