IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 5 Ser.5 (May. 2020), PP 16-24
www.iosrjournals.org

Comparison of the Efficacy of Locally Administered Curcuminas A Gel Versus A Pastille, as an Adjunct to Scaling, in the Management of Chronic Gingivitis

Dr. Susannah Thomas[1]*, Dr. Asha Prabhu[2], Dr.Purvi Sampat[3], Dr.Kanchan Jadhav[4], Dr.Sweety Agarwal[5], Dr.Abha Hedaoo[6]

[1]*Department of Periodontology, Dr. G.D. Pol Foundation's Y. M.T Dental college, Kharghar, Navi Mumbai, India. *Corresponding Author*

[2]Department of Periodontology, Dr. G.D. Pol Foundation's Y. M.T Dental college, Kharghar, NaviMumbai,India.

[3]Department of Periodontology, Dr. G.D. Pol Foundation's Y. M.T Dental college, Kharghar, NaviMumbai,India.

[4]Department of Periodontology, Dr. G.D. Pol Foundation's Y. M.T Dental college, Kharghar, NaviMumbai,India.

[5] Department of Periodontology, Dr. G.D. Pol Foundation's Y. M.T Dental college, Kharghar, NaviMumbai,India.

[6]Department of Periodontology, Dr. G.D. Pol Foundation's Y. M.T Dental college, Kharghar, Navi Mumbai, India.

Corresponding Author: Dr. Susannah Thomas

Abstract:

Aim: *To clinically compare the efficacy of locally administered curcumin as a gel versus a pastille, as an adjunct to scaling, in the management of chronic gingivitis.*

Materials and Method: *A total of* ***52 subjects*** *were divided into two groups:* ***Group A*** *(****26*** *subjects) who were prescribed -* ***Curcumin Oral gel*** *(Curenext® oral gel/Abbot Pharmaceuticals) post scaling twice a day for 3 weeks. and* ***Group B*** *(****26*** *subjects) who were prescribed -* ***Curcumin pastille*** *(Dennkur Soft Curcumin Pastilles/DenteksORTurmgel™ Turmeric Lozenges* /Gelnova Laboratories) post scaling, twice a day for 3 weeks.*

Clinical parameters included: (*Evaluated at baseline (pre-scaling) and 14 & 21 days (post scaling).)*
Plaque index (PI) (Loe H, 1967), Gingival Index (GI) (Loe H and Silness J, 1963), Sulcus Bleeding Index (SBI) (Muhlemann H.R and Son S, 1971). Visual examination of side effects was also assessed.

Results:

1. There was a statistically significant difference seen with intra group comparison of the variables at various time intervals for both group A and group B ($p<0.05$)

2. There was a statistically non-significant difference seen with intergroup comparison of all the variables ($p>0.05$). However, from ***14 to 21 days*** *there was a statistically* ***significant reduction****in* ***gingival index of Group B*** *as compared with Group A. ($p= 0.014$).*

3. Greater patient compliance was seen in Group B and side effects like oral mucosal erosions or ulcerations and burning sensation were seen in 4 cases in Group A.

Conclusion:Group B (Curcumin Pastille) *showed* ***more favourable results*** *as far as the* ***anti-inflammatory effect*** *and* ***patient compliance*** *and had less* ***side effects*** *when compared to Group A (Curcumin Gel).*

Key words: *Curcumin,Chronic Gingivitis, Scaling, Gel, Pastille*

Date of Submission: 29-04-2020 Date of Acceptance: 13-05-2020

I. Introduction

Gingivitis is a form of periodontal disease that is prevalent in most children and adult populations. [1] Bacterial plaque is the primary aetiological agent in gingivitis. Mechanical plaque control, like **scaling and root planing (SRP)**, is the first recommended step in the management of gingivitis and periodontitis. Many chemical agents have been tested as adjuncts to mechanical methods which can reduce plaque-associated gingivitis. Chlorhexidine, Triclosan, Povidone iodine and various phenolic compounds have been used successfully as anti-plaque agents. However, side-effects such as allergy, discolouration of teeth and unpleasant taste can occur when these chemicals are used for an extended period of time.[1] Discolouration can involve the tongue as well.[2]

Hence, a need was felt for an alternative medicine which was not only safe and economical but could also provide a product readily available within the traditional Indian setup.[3]

Medicinal herbs have been used as a treatment modality since ages in many parts of the world and have been variedly used throughout the human history.[4]**Turmeric** is indigenous to Southeast Asia and has been cultivated and used in India since 2500 years.It is a traditionally used remedy for skin, stomach, liver ailments etc. The Latin name, ***Curcuma longa***, is derived from the Persian word, **'kirkum'**, which means **saffron,** in reference to the rhizomes vibrant yellow-orange color.[5,6,7]Components of turmeric are named **curcuminoids.** The active constituents of turmeric are the flavonoid curcumin (diferuloylmethane) which comprises 0.3-5.4% of raw turmeric and various volatile oils including tumerone, atlantone, and zingiberone. Other constituents include sugars, proteins, and resins.[1]

Curcumin has biological activities as

a.a pro-oxidant and an antioxidative agent[8,9,10]
b. an anti-inflammatory agent[11]
c. an immunomodulator[12]
d. an anti tumorogenic agent[13,14,15]
e. a healing agent[16]
f. an antimicrobial agent[17]&
g. a photosensitizer through its photodynamic effect[18,19]

To overcome the adverse effects caused by the presently used chemical agents, curcumin can be employed in the management of gingivitis.[6]Because of curcumin's rapid plasma clearance and conjugation, its therapeutic usefulness has been somewhat limited, leading researchers to investigate the benefits of complexingcurcumin with other substances to increase systemic bioavailibility.[11]

The **two main forms** that have been **used** are

A. A **Gel** form and
B. A **Pastille** form

A **Gel** is defined as a semi rigid system in which the movement of the dispersing medium is restricted by an interlacing three-dimensional network of particles or solvated macromolecules of the dispersed phase. The rigidity of a gel arises from the presence of a network formed by the interlinking of the particle's gelling agent.[20]
A **Pastille** is defined as, a gelatin-based sweetened and molded medication impregnated with a therapeutic substance intended to be sucked.[21] A pastille has maximum absorption before it reaches the stomach, provides instant relief, buccal absorption bypasses the liver and no water is required for consumption.

Till date, no study had been published to clinically compare the efficacy of locally administered curcumin as a gel versus a pastille, as an adjunct to scaling, in the management of chronic gingivitis. Hence, the present study was conducted.

II. Materials and Method

Study design

This was a single-centre, longitudinal, randomised parallel arm study design.

Source of data

Subjects for the study were selected from those reporting to the Department of Periodontology, Dr. G.D. Polfoundation'sY.M.T dental college and hospital, Navi Mumbai, India. Subjects for the study were selected from May 2017 to August 2018. Approval from the ethical committee of the institute was taken prior to conducting the study.

The subjects were selected on the basis of the following inclusion and exclusion criteria.

Inclusion criteria

1. Subjects, of either sex, within the age group of 18-55 years.
2. Systemically healthy and cooperative subjects.
3. Subjects with minimum of 20 teeth present in the dentition.
4. Subjects with moderate to severe gingivitis having probing depth ≤ 3mm.
   (Subjects with Gingival Index scores 2 or 3; according to Gingival Index byLoe and Silness J,1963)

Exclusion criteria

1. Smokers and tobacco chewers (as per AHA guidelines).
2. Subjects who have taken antibiotics, anti-inflammatory drugs or nutritional supplements in the past 3 months or who are currently on any of these.
3. Pregnant and lactating women and those using oral contraceptive pills

4. Subjects with a history of periodontal therapy undertaken in the past 6 months.
5. Subjects with known hypersensitivity to curcumin.
6. Subjects with dental composite restorations.

Sample size

This was selected using the formula-

Sample size was determined using the mean and standard deviation values from literature using the formula

$$n = \frac{2 (Z_\alpha + Z_\beta)^2 [s]^2}{d^2}$$

where Z_α is the z variate of alpha error i.e. a constant with value 1.96, Z_β is the z variate of beta error i.e. a constant with value 0.84. s-standard deviation. d-size of the effect that is clinically worthwhile to detect.

Methodology

This study was conducted on subjects who give verbal and written consent after being informed about the study protocol. A case history of the subjects participating in the study was recorded.Appropriate tooth brushing technique and frequency of brushing was explained and demonstrated to all the subjects. Subjects were advised to use a similar soft toothbrush and a dentifrice.Ultrasonic scaling was done for all 52 subjects.

The 52 subjects were finally selected depending on the inclusion and exclusion criteria were randomly assigned by the **lottery method** into 2 groups:

In Group A (26 subjects) who were prescribed - **Curcumin Oral gel** (Curenext® oral gel/Abbot Pharmaceuticals) post scaling.

Subjects were advised to apply **Curcumin Oral gel** (Curenext® oral gel/Abbot Pharmaceuticals) on the gums **twice a day** for **3 weeks**, **after brushing**. They were instructed to leave the gel in the mouth for at least 10 minutes after application and thereafter rinse with water to clear any residual medication.

The clinical parameters mentioned below were evaluated at **baseline** (pre scaling) and after the **14th** and the **21st** day (post scaling).

In Group B (26 subjects) who were prescribed - **Curcumin pastille**

(Dennkur Soft Curcumin Pastilles/Denteks)

OR

(Turmgel™ Turmeric Lozenges* /Gelnova Laboratories) post scaling

Subjects were advised to suck slowly (not to chew) on a **curcumin pastille** (Dennkur Soft Curcumin Pastilles/Denteks) OR (Turmgel™ Turmeric Lozenges* /Gelnova Laboratories) **twice a day** for **3 weeks**.

The clinical parameters mentioned below were evaluated at **baseline** (pre scaling) and after the **14th** and the **21st** day (post scaling).

The clinical parameters assessed were:

Clinical parameter	**Author /year**	**Timeline of assessment**
Plaque Index (PI)	**Loe H (1967)** [22]	Baseline (pre scaling) and on the 14th and 21st day (post scaling).
Gingival Index (GI)	**Loe H and Silness J (1963)** [23]	Baseline (pre scaling) and on the 14th and 21st day (post scaling).
Sulcus Bleeding Index (SBI)	**Muhlemann H.R and Son S (1971)**[24,25,26]	Baseline (pre scaling) and on the 14th and 21st day (post scaling).

A questionnaire was prepared and completed by the interviewer as an aid in evaluating patient compliance for both groups at the end of the study period.All the observations of the study were recorded by a single examiner.Visual examination of any side effects, such as, oral mucosal erosions or any allergic reaction, staining of teeth, discolouration of the tongue and an alteration of taste were also recorded at each follow up.

There was no conflict of interest related to this study.

Statistical procedures:

Data obtained was compiled on a MS Office Excel Sheet (v 2010). Data was subject to statistical analysis using Statistical package for social sciences (SPSS v 21.0, IBM). Normality of data was checked using Shapiro-Wilk test. Data followed a normal distribution hence parametric tests have been used for statistical comparisons. Comparison of numerical values between the 2 groups was done using t test. For intra group comparison repeated measures ANOVA had been used followed by Tukey's Post Hoc test. Comparison of change in numerical values over time intervals from baseline or initial values between the 2 groups was done using t test. For all the statistical tests, $p < 0.05$ was considered to be statistically significant.

III. Results

Age:

On comparison of mean age between Group A (Gel) and Group B (Pastille) there was a **statistically non significant difference** seen for inter group comparison of mean age of the subjects ($p>0.05$). **(Table 1)**

Gender:

On comparison of frequencies of gender between Group A (Gel) and Group B (Pastille) there was **a statistically non significant difference** seen for frequencies of gender of the subjects ($p>0.05$) between the groups. **(Table 2)**

Plaque Index (PI)[22]:

In **Group A,** on **intragroup** comparison, there was a **statistically significant reduction** in PI scores **over baseline, 14, 21 days** ($p<0.05$). **(Table 3)**

In **Group B,** on **intragroup** comparison, there was a **statistically highly significant reduction** in PI scores**over baseline, 14, 21 days** ($p<0.01$). **(Table4)**

On **inter group** comparison**, at all time intervals t**here was a **statistically non significant difference** seen for the PI scores between the 2 groups. ($p>0.05$) **(Table 5)**

Gingival Index (GI)[23]:

In **group A,** on **intragroup** comparison, there was a **statistically highly significant reduction** in GI scores**over baseline, 14, 21 days**($p<0.01$) **(Table 6)**

In **group B,** on **intragroup** comparison, there was a **statistically highly significant reduction** in GI scores**over baseline, 14, 21 days (**$p<0.01$). **(Table 7)**

On **inter group** comparison**, at all time intervals t**here was a **statistically non significant difference** seen for the GI scores between the 2 groups. ($p>0.05$).**(Table 8).**

However, from **14 to 21 days** there was a statistically **significant reduction**in gingival index **of Group B** as compared with Group A. ($p= 0.014$)**(Table 9)**

Sulcus Bleeding Index (SBI)[24,25,26]:

In **group A,** on **intragroup** comparison, there was a **statistically highly significant reduction** in SBI scores **over baseline, 14, 21 days (**$p<0.01$)**. (Table 10)**

In **group B,** on **intragroup** comparison, there was a **statistically highly significant reduction** in SBI scores **over baseline, 14, 21 days (**$p<0.01$)**(Table 11)**

On **inter group** comparison, **at all time intervals t**here was a **statistically non significant difference** seen for the SBI scores between the 2 groups. ($p>0.05$)**(Table 12)**

Visual examination/Side effects:

Group A- Curcumin Gel:

1. **Oral mucosal erosions or ulcerations** were seen in **4 subjects** in **Group A (Gel)** during the study period
2. **One subject** reported **severe burning sensation** after initial usage of the gel and was lost to follow up, hence **excluded** from the study.
3. No staining of teeth, discolouration of tongue or alteration of taste was observed.

Group B- Curcumin Pastille:

1. No report of ulcerations due to usage of pastille was observed.
2. No burning sensation reported.
3. No staining of teeth, discolouration of tongue or alteration of taste was observed.

Questionnaire:

Palatability: Overall, both the curcumin gel (Group A) and the curcumin pastille (Group B) were palatable except for 2 subjects in each group.

Compliance: Overall, greater compliance was observed in the curcumin pastille (Group B) compared to the curcumin gel (Group A).

Feeling of freshness: Overall, greater feeling of freshness was reported in the curcumin pastille (Group B) compared to the curcumin gel (Group A). Six subjects in the curcumin pastille group (Group B) reported strong flavour of the pastille.

Difficulties experienced: Nine subjects in the curcumin gel (Group A) reported difficulty in spreading or lack of adherence of the gel over their gums.

Tables:

Age:Table 1- Comparison of mean age between Group A (Gel) and Group B (Pastille).

	Groups	N	Mean	Std. Deviation	Std. Error Mean	T value	p value of t test
Age	A (Gel)	26	22.50	2.354	.462	0.385	0.702#
	B (Pastille)	26	22.27	1.951	.383		

= non significant difference (p>0.05)

Gender:Table 2- Comparison of frequencies of gender between Group A (Gel) and Group B (Pastille).

		Groups				
		A(Gel)	**B**(Pastille)	**Total**	**Chi square value**	**p value of chi square test**
Gender	Females	19	18	37	0.094	0.760#
	Males	7	8	15		
	Total	26	26	52		

= non significant difference (p>0.05)

Plaque Index (PI):

Table 3- Plaque Index - Intra group comparison for Group A (Curcumin Gel Group) at baseline, 14 and 21 days.

	Time	N	Mean PI	Std. Deviation	Std. Error Mean	F value	p value of Repeated measures ANOVA
PI	Baseline	26	.96	.529	.104	4.265	.018*
	14 Days	26	.67	.394	.077		
	21 Days	26	.63	.383	.075		

* = statistically significant difference (p<0.05)

Table 4- Plaque Index - Intra group comparison for Group B (Curcumin Pastille Group) at baseline, 14 and 21 days

	Time	N	Mean PI	Std. Deviation	Std. Error Mean	F value	p value of Repeated measures ANOVA
PI	Baseline	26	1.04	.454	.089	6.707	.002**
	14 Days	26	.68	.382	.075		
	21 Days	26	.68	.397	.078		

** = statistically highly significant difference (p<0.01)

Table 5- Plaque Index – Inter group comparison at baseline, after 14 and 21 days

Time interval	Groups	N	Mean PI	Std. Deviation	Std. Error Mean	T value	p value of t test
PI Baseline	Group A (Gel)	26	.96	.529	.104	-0.606	0.547#
	GroupB(Pastille)	26	1.04	.454	.089		
PI 14 Days	Group A (Gel)	26	.67	.394	.077	-0.061	0.952#
	Group B(Pastille)	26	.68	.382	.075		
PI 21 Days	Group A (Gel)	26	.63	.383	.075	-0.438	0.664#
	Group B(Pastille)	26	.68	.397	.078		

= non significant difference (p>0.05)

Gingival index (GI):

Table 6- Gingival Index - Intra group comparison for Group A (Curcumin Gel Group) at baseline, 14 and 21 days

	Time	N	Mean GI	Std. Deviation	Std. Error Mean	F value	p value of Repeated measures ANOVA
GI	Baseline	26	1.45	.466	.091	82.260	.000**
	14 Days	26	.39	.357	.070		
	21 Days	26	.23	.269	.053		

** = statistically highly significant difference (p<0.01)

Table 7- Gingival Index - Intra group comparison for Group B (Curcumin Pastille Group) at baseline, 14 and 21 days

	Time	**N**	**Mean GI**	**Std. Deviation**	**Std. Error Mean**	**F value**	**p value of Repeated measures ANOVA**
GI	Baseline	26	1.38	.261	.051	130.309	.000**
	14 Days	26	.30	.274	.054		
	21 Days	26	.29	.305	.060		

** = statistically highly significant difference (p<0.01)

Table 8– Gingival Index - Inter group comparison at baseline, after 14 and 21 days

Time interval	**Groups**	**N**	**Mean GI**	**Std. Deviation**	**Std. Error Mean**	**T value**	**p value of t test**
GI Baseline	Group A (Gel)	26	1.45	.466	.091	0.701	0.487#
	Group B(Pastille)	26	1.38	.261	.051		
GI 14 Days	Group A(Gel)	26	.39	.357	.070	1.077	0.287#
	Group B(Pastille)	26	.30	.274	.054		
GI 21 Days	Group A(Gel)	26	.23	.269	.053	-0.665	0.509#
	Group B(Pastille)	26	.29	.305	.060		

= non significant difference (p>0.05)

Table 9– Gingival Index- Inter group comparison change in variables from baseline to 14 and 21 days

Time interval	**Groups**	**N**	**Mean GI**	**Std. Deviation**	**Std. Error Mean**	**T value**	**p value of t test**
GI Baseline-14D	Group A (Gel)	26	1.06	.233	.046	-0.263	0.793#
	Group B(Pastille)	26	1.08	.346	.068		
GI Baseline-21D	Group A (Gel)	26	1.22	.305	.060	1.286	0.204#
	Group B(Pastille)	26	1.09	.399	.078		
GI 14-21 D	Group A (Gel)	26	.16	.221	.043	2.098	0.014*
	Group B(Pastille)	26	.01	.284	.056		

* = statistically significant difference (p<0.05)

= non significant difference (p>0.05); D- Days

Sulcus bleeding index (SBI):

Table 10- Sulcus Bleeding Index - Intra group comparison for Group A (Curcumin Gel Group) at baseline, 14 and 21 days

	Time	**N**	**Mean SBI**	**Std. Deviation**	**Std. Error Mean**	**F value**	**p value of Repeated measures ANOVA**
SBI	Baseline	26	.80	1.075	.211	8.702	.000**
	14 Days	26	.17	.228	.045		
	21 Days	26	.13	.201	.039		

** = statistically highly significant difference (p<0.01)

Table 11- Sulcus Bleeding Index - Intra group comparison for Group B (Curcumin Pastille Group) at baseline, 14 and 21 days

	Time	**N**	**Mean SBI**	**Std. Deviation**	**Std. Error Mean**	**F value**	**p value of Repeated measures ANOVA**
SBI	Baseline	26	.74	.658	.129	18.337	.000**
	14 Days	26	.16	.256	.050		
	21 Days	26	.11	.102	.020		

** = statistically highly significant difference (p<0.01)

Table 12- Sulcus Bleeding Index - Inter group comparison at baseline, after 14 and 21 days

Time interval	**Groups**	**N**	**Mean SBI**	**Std. Deviation**	**Std. Error Mean**	**T value**	**p value of t test**
SBI Baseline	Group A (Gel)	26	.80	1.075	.211	0.248	0.806#
	Group B (Pastille)	26	.74	.658	.129		
SBI 14 Days	Group A (Gel)	26	.17	.228	.045	0.155	0.878#
	Group B (Pastille)	26	.16	.256	.050		
SBI 21 Days	Group A (Gel)	26	.13	.201	.039	0.366	0.716#
	Group B (Pastille)	26	.11	.102	.020		

= non significant difference (p>0.05)

IV. Discussion

Plaque Index (PI)[22]:

Intragroup Comparison

The plaque inhibitory action of **curcumin gel** noted in the present study, is in accordance with its efficacy in various studies of **gingivitis and periodontitis** over different time intervals reported by **Dave DHetal(2018)[27]**; **Roopa DAetal (2016)[28]; Hugar SSetal (2016)[29]; Sharma V, Kalsi DS (2016)[30];Farjana HNetal(2014)[1]**.

However, **Maha M. A. Nasraetal (2017)[31]**in their study stated that curcumin in its novel drug delivery system is an excellent candidate for periodontal disease treatment but shows lower significance where plaque reduction is considered.

Till date, there is no published study stating the effects of curcumin pastille in the use of gingivitis and periodontitis.

Intergroup Comparison

Till date, no study has been published to clinically compare the efficacy of locally administered curcumin as a gel versus a pastille, as an adjunct to scaling, in the management of chronic gingivitis and/or periodontitis.

Gingival Index (GI)[23]:

Intragroup Comparison

The anti-inflammatory action of **curcumin gel** noted in the present study, is in accordance with its efficacy in various studies of **gingivitis and periodontitis** reported by **Roopa DA etal (2016)[28];Hugar SSetal (2016)[29]; Sharma V, Kalsi DS (2016)[30];Farjana HN etal (2014)[1]**. and a review article by**Jurenka JS (2009)[11]**. However, **Mishra Aetal (2015)[32] concluded that** further studies with a larger sample size are required to attribute the effect of topical gel application on gingival status.

Till date, there is no published study stating the effects of curcumin pastille in the use of gingivitis and periodontitis.

Intergroup Comparison

From **14 to 21 days** there was a statistically **significant reduction**in gingival index **of Group B** as compared with Group A. (p= 0.014)**.**

In **Group A (Curcumin Gel)** post brushing subjects were instructed to leave the gel in the mouth for at least 10 minutes after application and thereafter rinse with water to clear any residual medication. It was observed that this routine could be disrupted if the subject was having a hectic day or in a hurry to leave his/her house for work.

In **Group B (Curcumin Pastille)** the curcumin pastille could be carried along with the subject as per his/her work schedule and sucked slowly during the day. This could probably be the reason for greater compliance and statistically **significant reduction**in gingival index **of Group B** as compared with Group A from 14-21 days.

Till date, no study has been published to clinically compare the efficacy of locally administered curcumin as a gel versus a pastille, as an adjunct to scaling, in the management of chronic gingivitis and/or periodontitis.

Sulcus Bleeding Index (SBI)[24,25,26]:

Intragroup Comparison

The anti-inflammatory action of **curcumin gel** noted in the present study, is in accordance with its efficacy in various studies of **gingivitis and periodontitis** reported by **Dave DH etal (2018)[27]**; **Roopa DA etal (2016)[28]; Hugar SSetal (2016)[29]; Sharma V, Kalsi DS (2016)[30];Farjana HN etal (2014)[1]**and a review article by**Jurenka JS (2009)[11]**.However, **Mishra Aetal(2015)[32] concluded that** further studies with a larger sample size are required to attribute the effect of topical gel application on gingival status.

Till date, there is no published study stating the effects of curcumin pastille in the use of gingivitis and periodontitis.

Intergroup Comparison
Till date, no study has been published to clinically compare the efficacy of locally administered curcumin as a gel versus a pastille, as an adjunct to scaling, in the management of chronic gingivitis and/or periodontitis.

Visual examination:
Group A- Curcumin Gel-
Oral mucosal erosions or ulcerations were seen in **4 subjects** in **Group A (Gel)** during the study period. **One subject** reported **severe burning sensation** after initial usage of the gel and was lost to follow up, hence **excluded** from the study.These results are **not in conjunction** with studies by **Kaur Hetal(2018)[33];Roopa DAetal (2016)[28] andFarjana HNetal(2014)[1]** who stated that experimental gel did not show adverse reactions.
Group B- Curcumin Pastille-
Till date, there is no published study stating the side effects of curcumin pastille in the use of gingivitis and periodontitis.
Chattopadhyay Ietal(2004)[34]in their article stated that the **safety of curcumin** and its various forms has been studied with positive results. It has been observed that very high doses of curcumin of upto 400 mg/kg and longer duration of upto 8 weeks did not cause any adverse effects in rats but lead to reduction in the TNF–α and IL-6 levels in rats.
Livada Retal(2017)[17] in their review article stated that, furthermore, allergic reactions to curcumin such as rash or urticaria have been reported and patients with allergies to plants in the ginger family or curcuma genus are most susceptible to these side effects. Patients who are allergic to yellow food coloring, which is often derived from turmeric, should also avoid curcumin.

Questionnaire: Till date, no study has been published to clinically compare the efficacy of locally administered curcumin as a gel versus a pastille, as an adjunct to scaling, in the management of chronic gingivitis and/or periodontitis.In this study the following was noted:
Palatability-Overall, both the curcumin gel (Group A) and the curcumin pastille (Group B) were palatable except for 2 subjects in each group.
Compliance-Overall, **greater compliance** was observed in the**curcumin pastille (Group B)** compared to the curcumin gel (Group A). The curcumin pastille could be carried along with the subject as per his/her work schedule and sucked slowly during the day. This could probably be the reason for greater compliance seen in Group B (Curcumin Pastille).
Feeling of freshness-Overall**, greater feeling of freshness** was reported in the**curcumin pastille (Group B)** com1pared to the curcumin gel (Group A). This could be because of the spearmint oil ingredient present in the pastille.
Difficulties experienced- Nine subjects in the**curcumin gel (Group A)** reported **difficulty in spreading** or **lack of adherence** of the gel over their gums. These results are **not in conjunction** with studies by**Roopa DAetal(2016)[28] andFarjana HNetal (2014)[1]** who stated that experimental gel had a good patient acceptance.

Possible Limitations of the study are:
There is an individual variation and person-specific plaque development and viscosity of saliva.An ideal study should include a cross-over design in the same individual with adequate washout period.

V. Conclusion

Therefore, on the basis of this study we conclude that **Group B (Curcumin Pastille)** showed **more favourable results** as far as the **anti-inflammatory effect**, **patient compliance** andminimal **side effects** were considered.

Definitive conclusions on the effectiveness of locally administered curcumin as a gel versus a pastille, as an adjunct to mechanical plaque control will have to come from well-designed interventional studies with a larger sample size. Measures should be taken to reduce the side effects and improvise the material properties and compliance of theCurcuminpreparations.The sample size of the study is less and further studies with a larger sample size including patients diagnosed with chronic periodontitis needs to be carried out to reach a definitive conclusion.

References

[1]. Farjana HN, Chandrasekaran SC, Gita B. Effect of Oral Curcuma Gel in Gingivitis Management - A Pilot Study. Journal of Clinical and Diagnostic Research. 2014; 8(12): ZC08-ZC10.
[2]. Lindhe J, Lang NP, Karring T. Clinical Periodontology and Implant Dentistry. 5th edition. Blackwell Munksgaard; 2008.
[3]. **3.**Newman MG, Takei HH, Klokkevold PR, Carranza FA. Carranza's Clinical Periodontology. 10th edition. Saunders Elsevier; 2006.
[4]. **4.**Mathur V, Tijare M, Desai A, Gupta S, Kallianpur S. Curcumin – Oral Cure from The Indian Curry. Inter. J. of Pharmacotherapy. 2014; 4(3):137-140.

[5]. Cikrikci S, Mozioglu E, Yılmaz H. Biological activity of curcuminoids isolated from *Curcuma longa*. Rec Nat Prod. 2008; 2:19–24.
[6]. Chaturvedi TP. Uses of turmeric in dentistry: An update. Indian J Dent Res. 2009; 20:107–9.
[7]. Chainani-Wu N. Safety and anti-inflammatory activity of curcumin: A component of turmeric (*Curcuma longa*). J Altern Complement Med. 2003; 9:61–68.
[8]. Sharma RA, Gescher AJ and Steward WP. Curcumin, the story so far. European Journal of cancer. 2005; 41:1955-1968.
[9]. Nawaz A, Khan GM, Hussain A, Ahmed A, Khan A and Safdar M. Curcumin, A natural product of biological importance. Gomal University Journal of Research. 2011; 27(1): 07-14.
[10]. Rai B, Kaur J, Jacobs R and Singh J. Possible action mechanism for curcumin in precancerous lesions based on serum and salivary markers of oxidative stress. J oral Sci. 2010; 52:251-256.
[11]. Jurenka JS. Anti-inflammatory properties of curcumin, a major constituent of *Curcuma longa*, A review of preclinical and clinical research. Alter Med Rev. 2009; 14(2):141-153.
[12]. Varalaksmi CH, Ali AM, Pardhasaradhi BVV, Srivastava RM, Singh S et al., Immunomodulatory effects of curcumin: in-vivo. IntImmunopharmacol. 2008; 8:688-700.
[13]. Gaurishankar S and Das T. Anti-cancer effects of curcumin, cycle of life and death. Cell division. 2008; 3:1-14.
[14]. Palve YP and Nayak PL. Curcumin, A wonder anticancer drug. Int J Pharm Biom. 2012; 3(2):60-69.
[15]. Lin CL and Lin JK. Curcumin, A potential cancer chemopreventive agent through suppressing NF-κBsignaling. J Cancer Mol.2008; 4(1):11-16.
[16]. Panchatcharam M, Miriyala S, Gayathri VS and Suguna L. Curcumin improve wound healing by modulating collagen and decreasing reactive oxygen species. Molecular and Cellular Biochemistry. 2006; 290(1-2):87-96.
[17]. Livada R, Shiloah J, Tipton DA, Dabbous MK. The Potential Role of Curcumin in Periodontal Therapy: A Review of the Literature. Journal of the International Academy of Periodontology. 2017; 19(3):70–79.
[18]. Haukvik T, Bruzell S, Kristensen S, Tonnesen HH. A screening of curcumin derivatives for antibacterial phototoxic effects Studies on curcumin and curcuminoids**.** XLIII. Pharmazie. 2011;66:69-74.
[19]. Dovigo LN, Carmello JC, de souza Costa CA, Vergani CE, Brunetti IL, Bagnato VS, Pavarina AC. Curcumin mediated Photodynamic Inactivation of *Candida albicans* in a murine model of Oral Candidiasis. Med Mycology. 2013; 51:243-51.
[20]. Rathod HJ and Mehta DP. A Review on Pharmaceutical Gel**.** International Journal of Pharmaceutical Sciences. 2015; 1(1):33-47.
[21]. Mosby's Medical Dictionary, 9th edition. © 2009, Elsevier.
[22]. Loe, H. The gingival index, the plaque index and the retention index systems. Journal of Periodontology. 1967; 38:610-616.
[23]. Loe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. ActaOdontol Sc. 1963; 21:533-551.
[24]. Ciancio SG. Current status of indices of gingivitis. J ClinPeriodontol. 1986; 13: 375-378.
[25]. Engelberger T, Hefti A, et al. Correlations among papilla bleeding index, other clinical indices and histologically determined inflammation of gingival papilla. J ClinPeriodontol. 1983; 10: 579-589.
[26]. Muhlemann HR, Son S. Gingival sulcus bleeding - A leading symptom in initial gingivitis. HelvOdontActa. 1971; 15: 107-113.
[27]. Dave DH, Patel P, Shah M, Dadawala SM, Saraiya K, Sant AV. Comparative evaluation of efficacy of oral curcumin gel as an adjunct to scaling and root planing in the treatment of chronic periodontitis. Adv Hum Biol. 2018; 8:79-82.
[28]. Roopa DA, Singh S, Gupta S, Pandey YN, Goswami A, Johari S. Curcumin: A Herbal Approach in the Management of Gingivitis. Rama Univ J Dent Sci. 2016; 3(1):1-5.
[29]. Hugar SS, Patil S, Metgud R, Nanjwade B, and HugarSM. Influence of application of chlorhexidine gel and curcumin gel as an adjunct to scaling and root planing: A interventional study. J Nat SciBiol Med. 2016; 7(2): 149–154.
[30]. Sharma V, Kalsi DS. Effects of topical application of *Curcuma longa* extract in the treatment of early periodontal diseases. Indian J Dent Sci. 2016; 8:118‑23.
[31]. Maha M. A. Nasra, Heba M. Khiri, Heba A. Hazzah&Ossama Y. Abdallah. Formulation, in-vitro characterization and clinical evaluation of curcumin in-situ gel for treatment of periodontitis. Drug Delivery. 2017; 24(1):133-142.
[32]. Mishra A, Harshitha B, Reddy K. Comparative evaluation of adjunctive use of four commercially available antimicrobial topical gels in chronic gingivitis: A clinical study. JOADMS. 2015; 1(3):19-25.
[33]. Kaur H, Grover V, Malhotra R, Gupta M. Evaluation of Curcumin Gel as Adjunct to Scaling & Root Planing in Management of Periodontitis– Randomized Clinical & Bio-chemical Investigation. Infectious Disorders - Drug Targets. 2018; 18:1.
[34]. Chattopadhyay I, Biswas K, Bandhopadhyay U, Banerjee R. Tumeric and curcumin: Biological actions and medicinal applications. Current science 2004; 87:44-53.

Dr. Susannah Thomas, et. al. "Comparisonof the Efficacy of Locally Administered Curcumin as A Gel Versus A Pastille, as an Adjunct to Scaling, in the Management of Chronic Gingivitis."*IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(5), 2020, pp. 16-24.