International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 9; Issue 12 (C); December 2020; Page No.23482-23485
DOI: http://dx.doi.org/10.24327/ijcar.2020.23485.4651

Short Communication

EVALUATION OF 3.5% ETHANOL EXTRACT OF BEE PROPOLIS GEL IN CONTROLLING PLAQUE AND GINGIVITIS

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A R T I C L E I N F O

Article History:

Received 13th September, 2020
Received in revised form 11th October, 2020
Accepted 8th November, 2020
Published online 28th December, 2020

Key words:

Bee propolis, Gingiva, Plaque Index, Gingival index

A B S T R A C T

Background: Propolis commonly known as bee glue, is a wax-cum-resin substance collected by honeybees from various plant sources. Active ingredients from the propolis are flavonoids, phenolics, terpenes, cinnamic acid, caffeic acid, fatty acids, vitamin A, B complex vitamins and essential oils. Due to these compositions it has wide range of biological activities including antibacterial, antiviral, fungicidal, anti-inflammatory as well as antioxidative. **Aim:** To study effect of bee propolis in controlling plaque & gingivitis by using 3.5% ethanolic extract of bee propolis in Gel form. **Materials and Method:** Purposive samples were selected which comprised of 30 adult patients, both women and men. Group I included 15 patients who were kept on local application of propolis gel without following oral prophylaxis. Group II included 15 patients who were kept on local application of propolis gel after scaling and polishing. Base-line indices were scored & recorded in both groups. In both groups score were recorded at end of second, third & fourth week. All patients were asked to apply 3.5% propolis gel to gingiva & teeth surface twice daily in morning after brushing & at night prior sleeping. **Results:** Plaque and Gingival index was assessed among the Groups at baseline, at 2nd week, 3rd week & at 4th week. The highly significant difference was found amongst the groups ($p<0.00$). **Conclusion:** The present study showed evidence of the efficacy of 3.5% ethanolic extract of Indian propolis is used in controlling plaque & gingivitis.

INTRODUCTION

Propolis or `bee glue' is a sticky, resin containing matter, collected from the cracks in sheath of trees and leaf buds to cover and lock the small perforations in honeycombs and thus safeguarding from intruders. This is partially digested resin by bee salivary enzymes mixed with beeswax to smooth the hive and totally different from beebread or royal jelly albeit it contains some pollen. [1, 2]

Propolis may be fade yellow-green to dark brown in colour and it stains the honeycomb which extracted in honey. Hardness and Brittleness of propolis changes to soft & sticky when it is warm.[2] It is mainly composed of resin and vegetable balsam and wax. It also contains essential and aromatic oils, pollen and other substances including organic debris in small amount.[2, 3] Gingivitis and periodontitis are the commonly occurring oral diseases after dental caries. Microbes found in plaque on teeth are the main causative factor in gingival & periodontal diseases.

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Infection with periodontal pathogenic bacteria at subgingival site can lead to the local production of inflammatory cytokines that leads to further destruction of the periodontal bone.[4,5] Achieving the optimum gingival and periodontal health through proper oral hygiene method is of prime importance. Propolis possesses antiseptic, antimycotic, bacteriostatic, antiviral, astringent, anti-inflammatory, wound healing, tissue regeneration and antioxidant properties.[6,7] Therefore, this study was planned to evaluate the effectiveness of 3.5% ethanoic extract of propolis gel in the control of plaque & gingivitis.

MATERIALS AND METHOD

The present study was conducted in the department of Oral Medicine & Radiology; Sharad Pawar Dental College & Hospital, DMIMS (DU), Sawangi (M), Wardha, after approval from Institutional Ethics Committee. Purposive samples were selected which comprised of 30 adult patients, both women and men. Modified Turesky plaque index and Loe & Silness gingival index was utilized in present study. Plaque disclosing agent was used for better recording of plaque (Erythrosine-Plaqkcee from ICPA India). Patients with plaque index more than 1.0 & gingival index more than 0.5 was included in the present study. Group I included 15 patients which were placed

on local application of propolis gel without scaling and polishing. Group II included 15 patients which were placed on local application of propolis gel after scaling and polishing. Base-line indices were scored & recorded in both groups. Base-line score was recorded one week after prophylaxis in group II. In subsequent follow up, both groups score were recorded at end of second, third & fourth week. All patients were asked to apply 3.5% propolis gel to gingival & all teeth surfaces, twice daily, in the morning following brushing & at night prior sleeping. Patients were instructed to report the occurrence of allergic manifestations if any; and stop its local application immediately. All subjects were using tooth brush & paste for cleansing their teeth. Dental hygiene technique modification instructions were not given to both groups & they were allowed to continue their same practices for oral hygiene till the end of fourth week. For the present study 3000 grams raw propolis was obtained from Central Bee Research & Training Institute, Pune & 3.5% ethanol extract was prepared in gel form. For dispensing, 30 grams light protective plastic container was used. Before dispensing the drug, all information regarding the source of drug & its action was provided to all patients. After obtaining written consent patients were included in study group.

The data was analysed with the use of Statistical Package for Social Science (SPSS) version 11.5 (SPSS Inc., Chicago, IL.). The p value was taken as significant when less than 0.05. Mann-Whitney U-test was applied to compare the statistical significance difference between Group I and Group II. Fluctuations in PI & GI score at different interval were estimated with the use of Wilcoxon's sign ranked test.

RESULTS

The mean age of patients in group I was 29.87±9.67 years and in group II it was 30.60±8.64 years. Male to female ratio was 1:2. In present study, effect of Propolis on the oral hygiene status was assessed among the two groups by PI and GI Index score. Before the intervention Group II was undergone scaling and polishing while no prior scaling and polishing was carried out for Group I. Plaque index score was assessed among the Groups at baseline, at 2nd week, 3rd week & at 4th week, showed the highly significant difference ($p<0.001$). Gingival index score among the groups was highly significant at baseline, 2nd week and 3rd week ($p<0.001$), whereas GI value among the groups at 4th week was significantly different ($p<0.01$). Intra-group comparison for Plaque and Gingival index score at baseline and at different interval was carried out among the groups and the difference was found to be highly statistically significant (Table-1).

DISCUSSION

There is an increasing trend to use natural medicine and treatment methods as preventive means of fighting diseases. Bee products are commonly used for many years and that can improve human health through preventions of diseases.[4-7] Apitherapy[4,9] is an eminent treatment protocol by natural compounds which includes pollen, propolis, nectar honey, bee bread, royal jelly, bee venom and beeswax.[1,8] Propolis is exhibited a wide range of properties comprising antibacterial, antifungal, antiviral, antiinflammatory, Immunomodulatory, wound healing, effective against dentinal hypersensitivity and anti-tumour.[6, 9-17]

Systemic administration of Propolis in rat model significantly reduced the periodontitis-related bone loss, proved by morphological and histological evidence.[18] Water extract of 5% of Brazilian green propolis for 1 minute, twice daily, for 90 days is effective in control of plaque and gingivitis without any hazardous effects on oral soft & hard tissue.[19] Mahmoud AS *et al*., conducted clinical trial on the effect of propolis on dentinal hypersensitivity which showed favourable effect in the control of dentinal hypersensitivity with thrice daily application to hypersensitive teeth.[11] 11% ethanolic extract of propolis with calcium hydroxide as well as 11% extract of propolis without ethanol with calcium hydroxide both showed antimicrobial activity against micro-organisms from root canal samples of primary molars.[20] In-vitro studies of intra-canal propolis medicaments showed anti-bacterial action against *E. Faecalis microb* in root canal and in-vivo study proved as effective intra-canal medicament than calcium hydroxide.[21, 22] Kujumgiev *et al*; tested the anti-bacterial activity of 11 propolis samples from divergent geographical areas and reported that all samples regardless of their origin possessed activity against gram-positive bacteria test strains, Candida as well as against avian influenza virus.[6] In a vitro study the seasonal effects on Brazilian propolis were examined for activity on bacterial strains obscured from human infections which showed significant inhibition against Gram-positive bacteria.[12] F.A. Santos *et al*; illustrated the anti-bacterial action of propolis against various anaerobes, including A. actinomycetem comitans, F. nucleatum, P. gingivalis and P. Intermedia ; often associated with destructive periodontitis.[14]
In the present study, 3.5% ethanolic extract of Indian propolis were effective in controlling the plaque & gingivitis. It exhibited notable inhibition in plaque accumulation and minimizing gingival inflammation in both groups when compared to baseline scores indices with second, third and fourth week [Fig.1(a), (b) and 2(a), (b)].

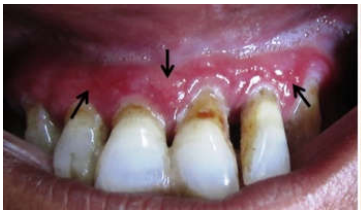
Table 1 PI & GI Index in group I & II

Index	Groups	N	Examination Day (Mann- Whitney Test)				Comparable Days (Wilcoxon's signed rank test)		
			Baseline	2nd week	3rd week	4th week	1:2	1:3	1:4
PI	Group I	15	3.15±0.50	2.01±0.62	1.29±0.64	0.93±0.42	p=0.001	p=0.001	p=0.001
	Group II	15	1.71±0.46	1.12±0.40	0.74±0.29	0.39±0.30	p=0.001	p=0.001	p=0.001
	p-value	30	0.000	0.000	0.001	0.000			
GI	Group I	15	2.25±0.50	1.093±0.48	0.613±0.43	0.360±0.38	p=0.001	p=0.001	p=0.001
	Group II	15	1.53±0.36	0.413±0.42	0.033±0.13	0.033±0.13	p=0.001	p=0.001	p=0.001
	p-value	30	0.000	0.001	0.000	0.010			

P<0.000 Highly Significant; p<0.05 significant

Fig 1(a) showing baseline plaque accumulation

Fig 1(b) showing reduction in plaque score at the end of 4th week



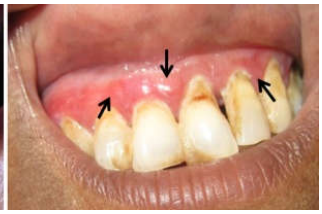


Fig 2(a) **Fig 2(b)**

Fig 2(a) showing baseline gingival inflammation

Fig 2(b) showing reduction in gingival inflammation at the end of 4th week

These findings are probably justified by the antibacterial and anti-inflammatory effects of propolis. The decrease in amount of plaque can be correlated with the decrease in number of micro-organisms and subsequently reduction in the bacterial products which aggravate the gingivitis. The results of 3.5% propolis gel on plaque and gingival indices encouraged anti-inflammatory effect of the propolis. In both groups there wasn't any interference in the oral hygiene practices of the patients enrolled in the study. This approach helped to recognize the effect of propolis gel without achieving optimum oral health. Therefore, the scaling & polishing procedure with local application of propolis gel defiantly improve oral health. Hence, aseptic preparation of 3.5% of ethanol propolis extract was competent enough in the eradication of dental plaque and reduction in gingivitis.

CONCLUSION

The results of this study indicate that, 3.5% ethanoic extract of Indian propolis is useful in the prevention of plaque and gingivitis, without any systemic or local oral mucosal tissue toxic effects. Thus, its safe use as a therapeutic and preventive measure for the control of gingival and periodontal diseases should be encouraged. Future supplementary studies are required to execute clinical trials on large sample to authenticate its usefulness in dentistry.

Conflict of Interest

Authors declare that there are no any conflicts of interest

Financial support and sponsorship

Sanctioned ICMR STS-ID: 2012-02182

Acknowledgement

Our thanks are due to the Ex-Director & Development officer, Central Bee Research and Training Institute, Pune; for providing raw propolis. We are also thankful to Dr. Sameer Ketkar; College of Pharmacy, Bhartiya Vidyapeeth, Pune; for preparation of 3.5% ethanoic extract of propolis gel and Dr. R.M. Borle, Vice- Chancellor DMIMS (DU), for allowing to conduct this study. Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

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How to cite this article:

Dipti Wakode., Rahul R. Bhowate and Mrunal G. Meshram (2020) ' Evaluation of 3.5% Ethanol Extract of Bee Propolis Gel In Controlling Plaque And Gingivitis', *International Journal of Current Advanced Research,* 09(12), pp. 23482-23485. DOI: http://dx.doi.org/10.24327/ijcar.2020. 23485.4651

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