

Influence of Myricetin and Quinidine on Absorbable Suture

Theiva chandran R,

Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University,
Chennai-77, Tamil nadu, India.
Email: 151801085.sdc@saveetha.com.
Ph.no:8072961010.

***Dr.Rubin S John**

Senior Lecturer,
Department of Oral Surgery ,
Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University,
Chennai - 77, Tamil nadu, India.
Email-rubinjohn90@gmail.com
Phone no.:6306258601.

Dr.Anju Cecil

Senior Lecturer,
Department of periodontitis ,
Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University,
Chennai - 77, Tamil nadu, India.
E.mail- anju.cecil@gmail.com.

Dr. Rajalakshmanan Eswaramoorthy,

Department of Biomaterials,
Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences,
Saveetha University,
Chennai 600 077, Tamil Nadu, India.

***Corresponding Author:**

Dr.Rubin S John
Senior Lecturer,
Department of Surgery,
Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences,

Saveetha University,
Chennai - 77, Tamil nadu, India.

[Email-rubinjohn90@gmail.com](mailto:rubinjohn90@gmail.com)

Phone no.:6306258601.

ABSTRACT:

Introduction

Absorbable stitches are degraded by the tissue digestion through proteolytic enzymatic disintegration. Coating the suture of substances with special properties like myricetin and quinidine improves the sutures properties.

Materials and methods

It includes preparation of the extract of myricetin and quinidine and further analysis with several tests.

Results and discussion

The antioxidant activity of myricetin is high and quinidine is less, but combined effect has a good synergistic effect but the anti-inflammatory activity of myricetin, quinidine and combination does not change drastically.

Conclusion

Thus it is clear that consumption of food containing quinidine can uplift the effect of myricetin coated absorbable sutures.

Keywords-Myricetin, quinidine, Vicryl, PGA, SEM analysis

INTRODUCTION:

Absorbable stitches (1,2) keep their rigidity for however long it is expected over the required healing time. Lined up with the rising strength of the tissue, they are degraded by the tissue digestion through proteolytic enzymatic disintegration until they are totally disintegrated. Absorbable sutures are ideal for internal wounds and in dentistry they are mostly used in case of requirement of sutures for impaction procedures and OGS procedures where it takes a lot of work and time to remove sutures and sometimes for comfortability.

Since this research deals with dentistry PGA (3,4) and Vicryl are the choice of absorbable sutures taken into consideration due to its wide use for suturing in dentistry. Polyglycolic Acid Suture is an absorbable, sterile, synthetic suture which was one of the first Synthetic absorbable suture introduced in early 1970s. PGA Sutures are braided and coated composed of polymers made from 100% Homo-Polymer of glycolide. Vicryl (5,6) is an absorbable, synthetic, usually braided suture. A monofilament version is also available. It is indicated for soft tissue approximation and ligation (7). The suture holds its tensile strength for approximately two to three weeks in tissue and is completely absorbed by acid hydrolysis within 56 to 70 days. (8)

Myricetin is one of the key constituents of various human foods (9) and beverages including Vegetables, teas and fruits and is recognised mainly for its anti-oxidant and anti-inflammatory properties. Myricetin is a member of the flavonoid class of poly phenolic compounds. (10) Common dietary sources include vegetables including

tomatoes, fruits like oranges, nuts, berries, teas and red wine. Quinidine is an alkaloid extracted from the bark of the cinchona tree. It is also recognised to have a little anti-inflammatory effect. (11,12)

This research involves the use of myricetin and quinidine for coating the absorbable sutures PGA and Vicryls to check for the influence of the above compounds on the absorbable sutures.

MATERIALS AND METHOD

100 mg of cinchona is immersed in ethanol to obtain the quinidine extract. Myricetin extract is prepared using guava leaves. Both the extracts were kept in two test tubes separately. PGA and Vicryl were cut into 6 pieces of which 3 were 1.5 mm and 3 were 10 mm respectively. These pieces were immersed in the respective extracts for 6 hours followed by air dry. The standards used were ascorbic acid for antioxidant and diclofenac for anti-inflammatory respectively.

RESULTS AND DISCUSSION

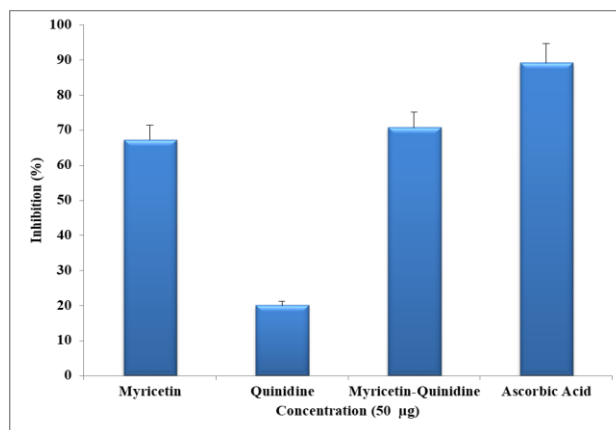


Fig1-It represents the antioxidant activity of myricetin, quinidine and the combination of both in comparison to Ascorbic acid.

From the above data, it is clear that the antioxidant activity of myricetin is high which is 68 and in the case of quinidine it is low with a value of 19. But when combined together these show a significant synergistic effect with a value slightly higher than the Myricetin which is 72. This in turn shows the significant advantage of combining the both which greatly influences the anti-inflammatory efficacy of the absorbable suture. This method helps us to minimize postoperative complication like swelling.

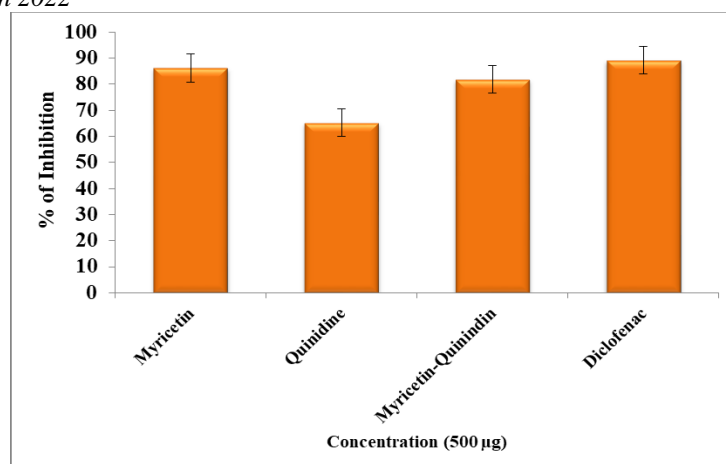


Fig 2-It represents the anti-inflammatory activity of myricetin ,quinidine and the combination of both in comparison to Diclofenac.

From the above data ,it is clear that the anti-inflammatory activity of myricetin with value 87 and quinidine with value 67 is high ,but no comparison with its counterpart in anti-inflammatory activity where the synergic effect is high . The combined effect had an anti-inflammatory activity of value 82 .Thus showing no significant synergistic effect with higher value .

In both scenarios the anti-inflammatory and the antioxidant value of myricetin ,quinidine and the combination of both in comparison were comparative Diclofenac and ascorbic acid respectively.

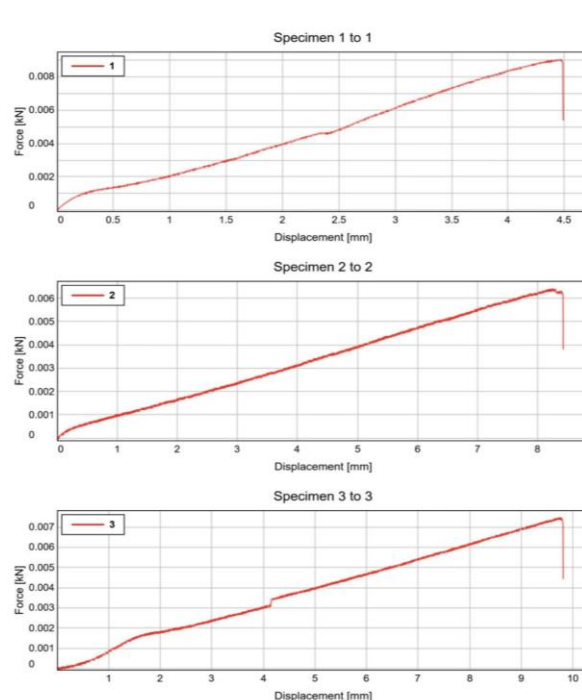


Fig-3- Represents the Displacement values of specimen 1,specimen2,specimen 3

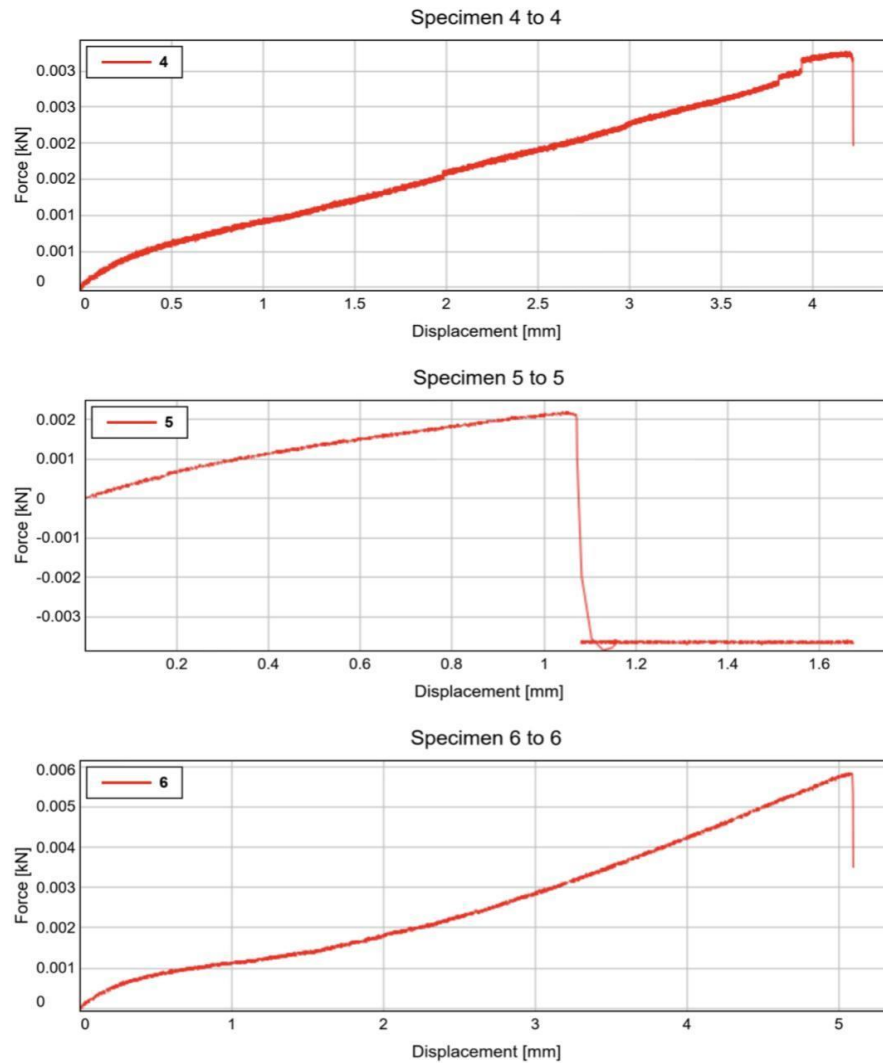


Fig-4- Represents the Displacement values of specimen 4,specimen 5, specimen 6.

	Specimen Name	Tensile stress at break (standard)(MPa)
1	PGA	1394.06
2	Vicryl	963.89
3	Vicryl 4.4	1121.79
4	Vicryl 7.2	492.96
5	PGA 4.4	-564.94
6	PGA 7.2	910.76

Table 1 -It describes the Specimen Name and tensile stress at break (standard)(MPa)

	Maximum Force (N)	Tensile stress at Tensile strength(MPa)	Tensile strain (Displacement)at break (standard)%
1	9.05	1405.12	8.97
2	6.42	980	16.85
3	7.46	1161.18	19.62
4	3.27	506.34	8.44
5	2.19	342.25	3.35
6	5.86	911.08	10.19

Table 2 -It describes the specimen's maximum strength,tensile stress and tensile stain .

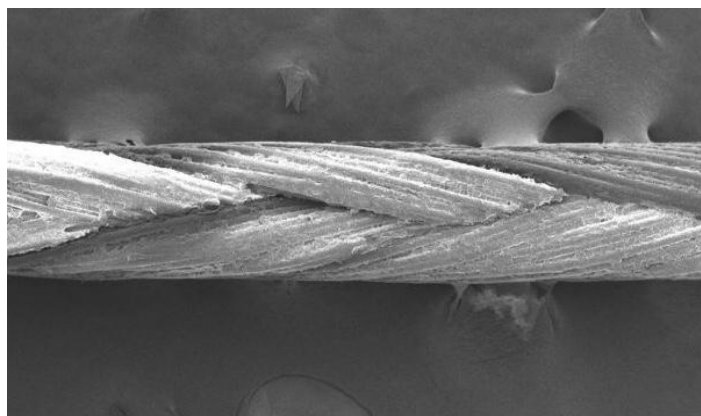


Fig 5 -represents the sem analysis of quinidine

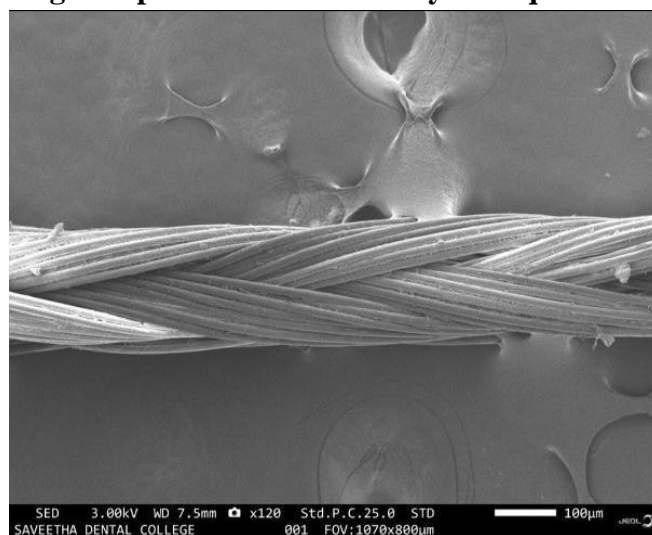


Fig 6 -represents the sem analysis of myricetin

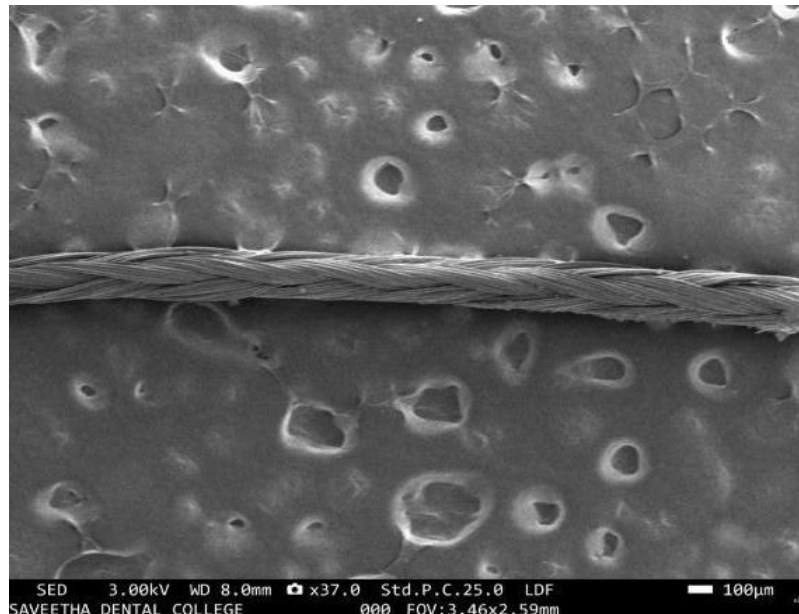


Fig-7 represents the control group

DISCUSSION

Mohammed imran et al (13) in his study has explained about the biological potentials of myricetin and how it maintains a steady healthy body. He has also explained about the percentage of myricetin in various food items. His article significantly explains how we can improve the synergistic effect explained in the current article. Harald Ritter in his study explains the legacy of quinidine and its properties while concentrating more on antiarrhythmic. This explains that it has good antioxidant properties while having less anti-inflammatory properties. This also explains the importance of quinidine in this research.

Racey et al (5) in his study has explained about the tensile strength of vicryl and suggested about the equilibrium existing between the wound gaining strength and the suture losing its tensile strength so it leads to ideal healing. This also shows the reason for choosing vicryl suture over other absorbable suture. Ragupathy et al (14) speaks about the unique properties of PGA like its predictable absorption rate, its strength and its non-reactive property with the tissues. This shows that PGA is nearly the gold standard for absorbable sutures.

Agraharam G et al in his study has expressed his views on the flavonoids Myricetin and its synergistic effect. This also explains that coating of absorbable sutures with myricetin is advantageous only when the food intake based on its synergistic components is favourable. This causes the difficulty in availability of food resources favorable for the above mentioned suture varieties. This also compels the patient to adapt to a particular food habit which is not practically possible. (15)

CONCLUSION

Thus it is clear that consumption of food containing quinidine can uplift the effect of myricetin coated absorbable sutures and vice versa. This way we can improve the properties of absorbable suture thereby improving the standards of sutures.

REFERENCE

1. Absorbable Versus Non-absorbable Sutures [Internet]. 1942. 25 p. Available from: https://books.google.com/books/about/Absorbable_Versus_Non_absorbable_Sutures.html?hl=&id=qvDhtwAACAAJ
2. Shalaby SW, Burg KJL. Absorbable and Biodegradable Polymers [Internet]. CRC Press; 2003. 304 p. Available from: <https://play.google.com/store/books/details?id=13qmDwAAQBAJ>
3. Iwao A, Yagi M, Imamura Y, Higashi A, Moriuchi Y, Kashiya K, et al. Intraoperative obturator nerve injury reconstructed using a PGA-collagen tube: Three case reports. *Gynecol Oncol Rep* [Internet]. 2022 Jun;41:100977. Available from: <http://dx.doi.org/10.1016/j.gore.2022.100977>
4. Awasthi N, Ramanna PK, Lahiri B, Das A, Ravi RV, Mishra D. Impact of Fluoridated Mouthwashes on Strength and Durability of Three Different Synthetic Absorbable Suturing Materials: An Study. *J Contemp Dent Pract* [Internet]. 2022 Apr 1;23(4):431–6. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35945837>
5. Racey GL. Vicryl* (Polyglactin) Synthetic Absorbable Suture: A Clinical and Histologic Study in Oral Mucosa [Internet]. 1974. 114 p. Available from: https://books.google.com/books/about/Vicryl_Polyglactin_Synthetic_Absorbable.html?hl=&id=XtRUXwAACAAJ
6. Symposium Wound Healing, Surgical Site Infection, and Vicryl Plus Antibacterial Suture: Madrid, Spain, May, 2002 [Internet]. 2002. 102 p. Available from: https://books.google.com/books/about/Symposium_Wound_Healing_Surgical_Site_In.html?hl=&id=RTj8vgEACAAJ
7. Nadafpour N, Montazeri M, Moradi M, Ahmadzadeh S, Etemadi A. Bacterial Colonization on Different Suture Materials Used in Oral Implantology: A Randomized Clinical Trial. *Front Dent* [Internet]. 2021 Jul 23;18:25. Available from: <http://dx.doi.org/10.18502/fid.v18i25.6935>
8. Bista D, Byanju R, Gautam MA. Sutureless Glue Free Versus Sutured Limbal Conjunctival Autografts in Primary Pterygium Surgery. *Nepal J Ophthalmol* [Internet]. 2021 Jul;13(24):95–104. Available from: <http://dx.doi.org/10.3126/nepjoph.v13i2.31347>
9. Zhao Z, Chen Y, Li X, Zhu L, Wang X, Li L, et al. Myricetin relieves the symptoms of type 2 diabetes mice and regulates intestinal microflora. *Biomed Pharmacother* [Internet]. 2022 Sep;153:113530. Available from: <http://dx.doi.org/10.1016/j.biopha.2022.113530>
10. Myricetin Attenuates Osteoarthritis by Blockade of the IL-1 β /MAPK Pathway [Internet]. 2018. Available from: https://books.google.com/books/about/Myricetin_Attenuates_Osteoarthritis_by_B.html?hl=&id=E_fVvQEACAAJ

11. Spicer LJ, Schütz LF. Effects of grape phenolics, myricetin and piceatannol, on bovine granulosa and theca cell proliferation and steroid production in vitro. *Food Chem Toxicol* [Internet]. 2022 Sep;167:113288. Available from: <http://dx.doi.org/10.1016/j.fct.2022.113288>
12. Zhou P, Zhao XN, Ma YY, Tang TJ, Wang SS, Wang L, et al. Virtual screening analysis of natural flavonoids as trimethylamine (TMA)-lyase inhibitors for coronary heart disease. *J Food Biochem* [Internet]. 2022 Aug 9:e14376. Available from: <http://dx.doi.org/10.1111/jfbc.14376>
13. Imran M, Saeed F, Hussain G, Imran A, Mehmood Z, Gondal TA, et al. Myricetin: A comprehensive review on its biological potentials. *Food Sci Nutr* [Internet]. 2021 Oct;9(10):5854–68. Available from: <http://dx.doi.org/10.1002/fsn3.2513>
14. T R M, Pal S, K R AK, Bhat P, Raghupathy RK. A comparative microbiological study of polyglycolic acid and silk sutures in oral surgical procedures. *Minerva Dent Oral Sci* [Internet]. 2021 Dec;70(6):239–47. Available from: <http://dx.doi.org/10.23736/S2724-6329.21.04515-0>
15. Agraharam G, Girigoswami A, Girigoswami K. Myricetin: a Multifunctional Flavonol in Biomedicine. *Curr Pharmacol Rep* [Internet]. 2022 Jan 10;8(1):48–61. Available from: <http://dx.doi.org/10.1007/s40495-021-00269-2>