

INFLUENCE OF RUTIN AND QUINIDINE ON ABSORBABLE SUTURES

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Abstract

Suture materials play an important role in healing of wounds, enabling reconstruction and reassembly of tissue separated by a surgical procedure or a trauma, and at the same time facilitating and promoting healing and haemostasis [1]. The success of the surgical treatment is influenced by the proper closure and stabilization of surgical wound margins. Silk, is the one of the earliest sutures used for centuries, but it has some disadvantages of contamination. Now-a-days, Vicryl suturing material is the commonly used material in oral surgery, because it does not allow adherence of plaque and is well suited for handling. In this study, two suture materials are compared based on their properties when coated with Rutin and Quinidine.

Material and Methods: Two absorbable sutures (vicryl and pga) were taken. The extraction of reserpine and rutin was done. Both the extracts were kept in two test tubes separately. The sample was sent to scanning electron microscopy, tensile strength ie. mechanical testing, degradation of ph 7.2 and ph 4.4, anti inflammatory and antioxidant activity was done. The results were placed in excel sheets and graphs were obtained.

Results and discussion: Absorbable sutures are ideal for internal and deep wounds and generally one of them loses most of its tensile strength in 1 to 3 weeks and is fully absorbed within 3 months. In this study Vicryl and PGA was used and which was incorporated into rutin and reserpine. Vicryl and PGA sutures have shorter and longer-term stability. However, may be used for longer-term applications of wound closure, tendon repair and arthroplasty

Conclusion: The study demonstrated that the PGA were stronger and had greater tensile strength than the Vicryl. Rutin shows better anti inflammatory action and antioxidant property than Quinidine.

Keywords: Suture, Vicryl, PGA, Quinidine, Rutin

INTRODUCTION

Sutures have been used from the dawn of human knowledge of surgery, which is as old as mankind itself. The most varied suture materials have been employed throughout history to close and stitch surgical wounds (1). Inflammation, cell proliferation, matrix deposition, and tissue remodeling are all elements of the well planned and well-coordinated process of wound repair. (2) Until the wound develops enough tensional strength to prevent dehiscence, sutures serve to maintain tissue proximity. (3) The success of the surgical treatment is influenced by the proper closure and stabilization of surgical wound margins. (4) The behavior of sutures used in oral and maxillofacial surgery depends on the quality of the tissues involved, the presence of saliva, and particular bacteria. The oral cavity is a distinctive region due to its high amount of vascularization and masticatory, phonetic, and respiratory activities. (5)

PGA (Dexon), a polyglycolic acid, is a common absorbable suture material nowadays. A synthetic, braided polymer is called PGA(6). PGA is far less reactive and, in experiments, more resistant to infection from contaminating bacteria than plain or chromic catgut. PGA maintains at least half of its tensile strength for 25 days and has exceptional knot security.(7) The major downside of PGA is that it when wet and has a high coefficient of friction(8). A braided synthetic polymer called Polyglactin-910 (Vicryl) is employed for deep closures. When compared to PGA, it has comparable dry tensile strength but retains in vivo strength for a little bit longer. PGA has better knot security, though.(9)

A cinchona tree alkaloid that is generated from the tree's bark. It is utilized as an antimalarial medication and is the active component of cinchona preparations, which have been used for this purpose for centuries.(10)Quinine has been utilized in conventional cold remedies for its use as a mild antipyretic and analgesic. It was frequently used as a flavoring and bitter agent, and it is still effective in the treatment of babesiosis. Due to its direct effects on the muscle membrane and sodium channels, quinine is also helpful in treating several muscular illnesses, particularly nocturnal leg cramps and myotonia congenita. Quinidine is a type IA antiarrhythmic medication used to treat irregular heartbeats. The length of the action potential is lengthened by the medication.(11)

In numerous foods, including buckwheat, apricots, cherries, grapes, grapefruit, plums, and oranges, rutin is a naturally occurring flavonoid. Patients with capillary fragility, varicose veins, bruises, or hemorrhoids frequently utilize it. It is an essential part of food's nutrition. (12)Buckwheat contains rutin, also known as rutoside, quercetin-3-rutinoside, and sophorin, a citrus flavonoid glycoside. The plant *Ruta graveolens*, which also contains rutin, is where the word "rutin" originates. It is a glycoside chemically made of the disaccharide rutinose and the flavonol aglycone quercetin. It has shown a variety of pharmacological effects, including anti-inflammatory, anti-cancer, cytoprotective, vasoprotective, neuroprotective, and cardioprotective effects.(13,14).

The aim of this study is to show that, suture materials coated with rutin and Quinidine when used intraorally increases the effectiveness of various properties. As these secondary metabolites are naturally present in the day to day food we intake and doesn't cause any side effects when used intraorally.

MATERIALS AND METHOD:

Artificial saliva preparation:

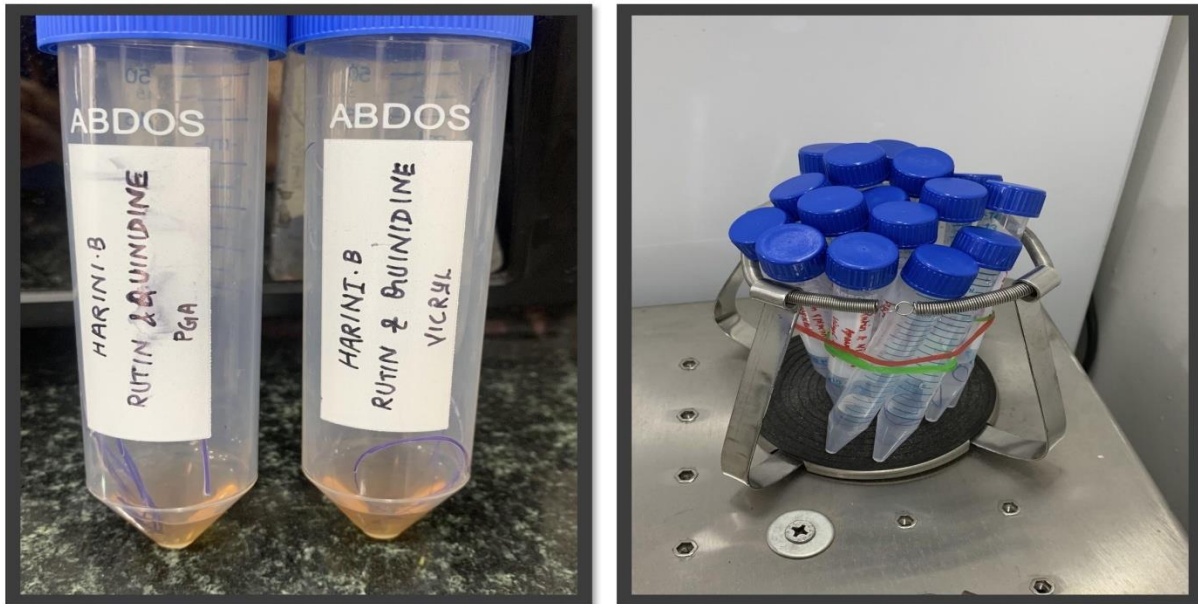
The artificial saliva of 1000ml was prepared by the mixture of 8.035g of sodium chloride,0.355g of sodium bicarbonate, 0.0225 of potassium chloride,0.231g of potassium hydrogen phosphate,0.311g of magnesium chloride,40ml of 1.0M hydrochloric acid ,0.292g of calcium chloride,0.072g of sodium sulphate,6.118g of Trizma base and 1M hydrochloric acid,the prepared saliva was divided into 2 separate beakers of 500ml with 7.4ph and 500ml with 4.4ph.

Preparation of extract and coating on suture:

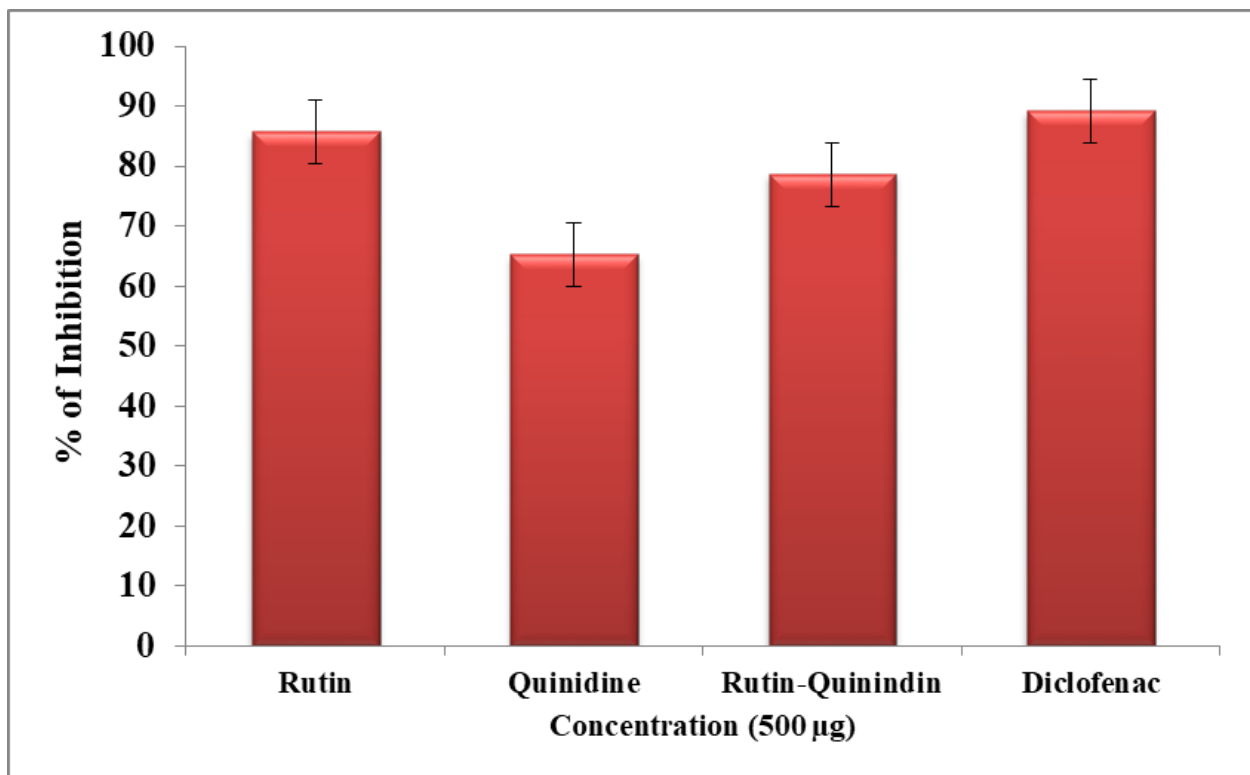
Rutin and Quinidine extracts were kept in two test tubes separately for analysing its influence on PGA and Vicryl which is used as sample sutures for this study.

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 threads measuring 10 cm were used for analysing the tensile strength and the threads measuring 1.5cm were used for analysing. The sample's were sent to scanning electron microscopy,

tensile strength ie.mechanical testing, degradation of ph 7.2 and ph 4.4, anti inflammatory and antioxidant activity was done. A total of five samples were analysed for PGA and vicryl.The results were placed in excel sheets and graphs were obtained.

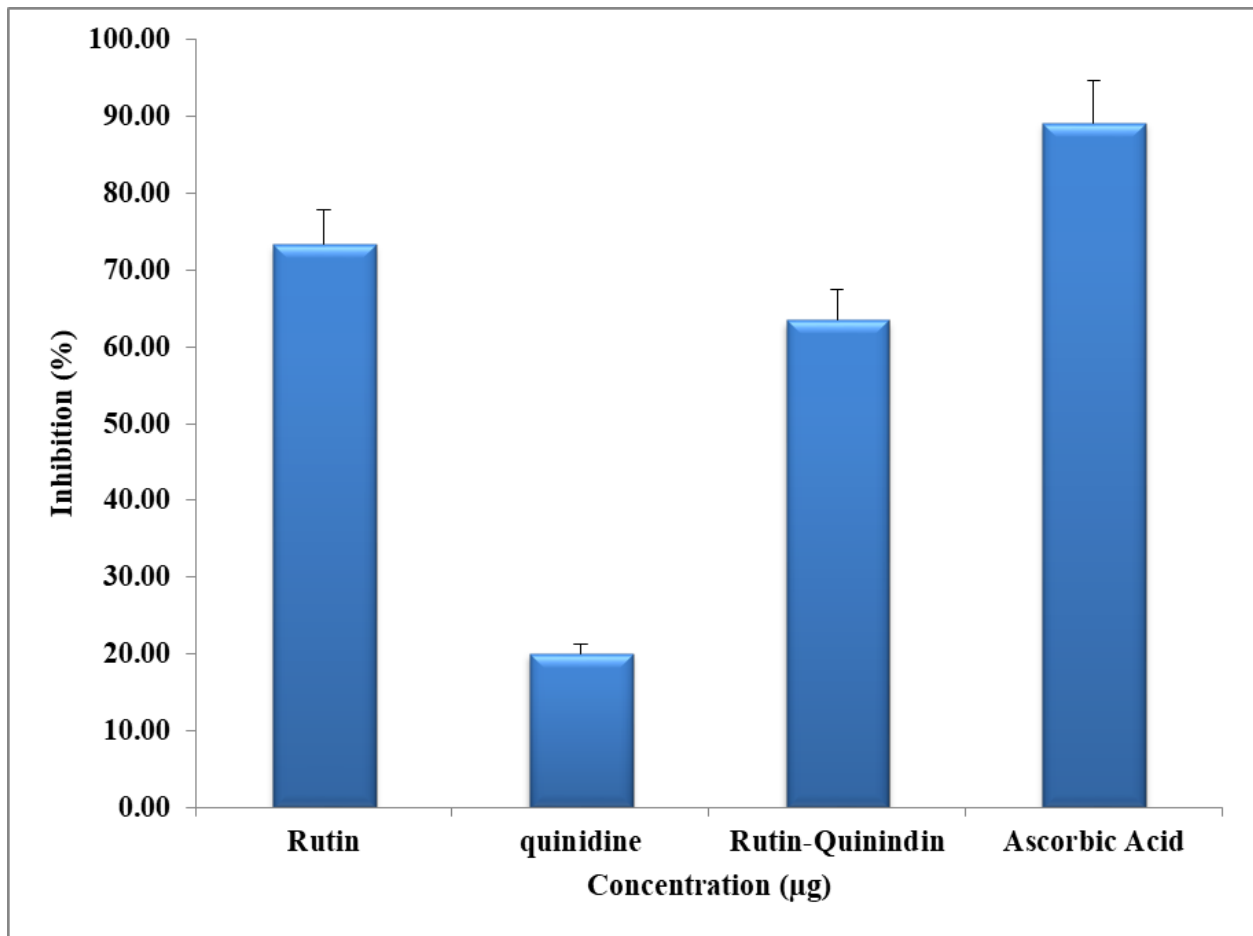


RESULTS:



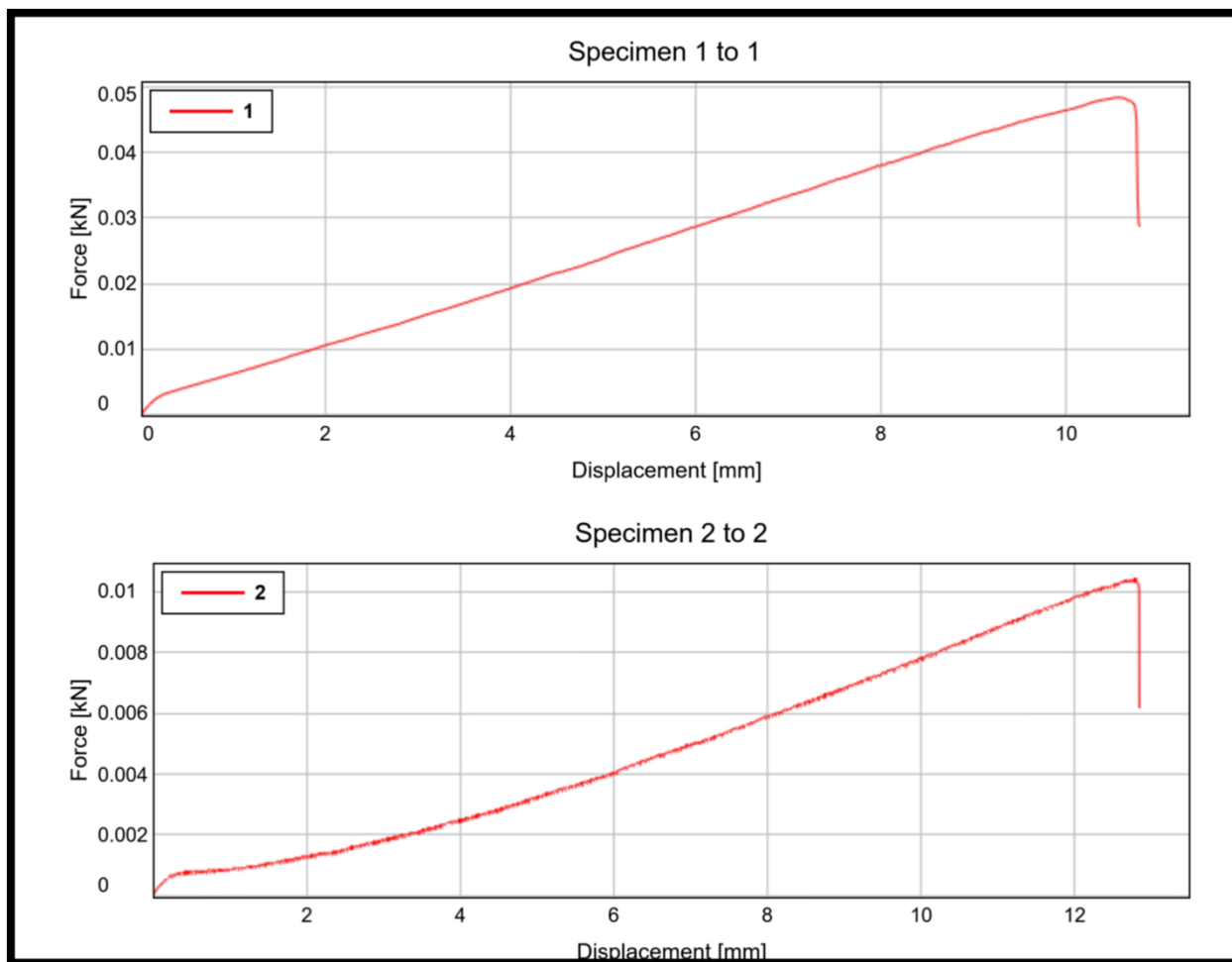
Graph:1 The above bar graph shows Anti Inflammatory activity with X- axis showing percentage of inhibition and Y- axis showing Concentrations of Rutin and Quinidine.

Diclofenac is the standard used, Rutin shows increased inhibition when compared to Quinidine separately. Quinidine along with Rutin also shows good anti inflammatory activity.



Graph:2 The above bar graph shows Anti Oxidant activity with X- axis showing percentage of inhibition and Y- axis showing Concentrations of Rutin and Quinidine.

Ascorbic Acid is the standard used, Rutin shows increased inhibition when compared to Quinidine.



Graph:3 Line graph showing the increase in tensile strength in PGA which gets extend upto 0.04kN and Vicryl which gets extends upto 0.01 kN

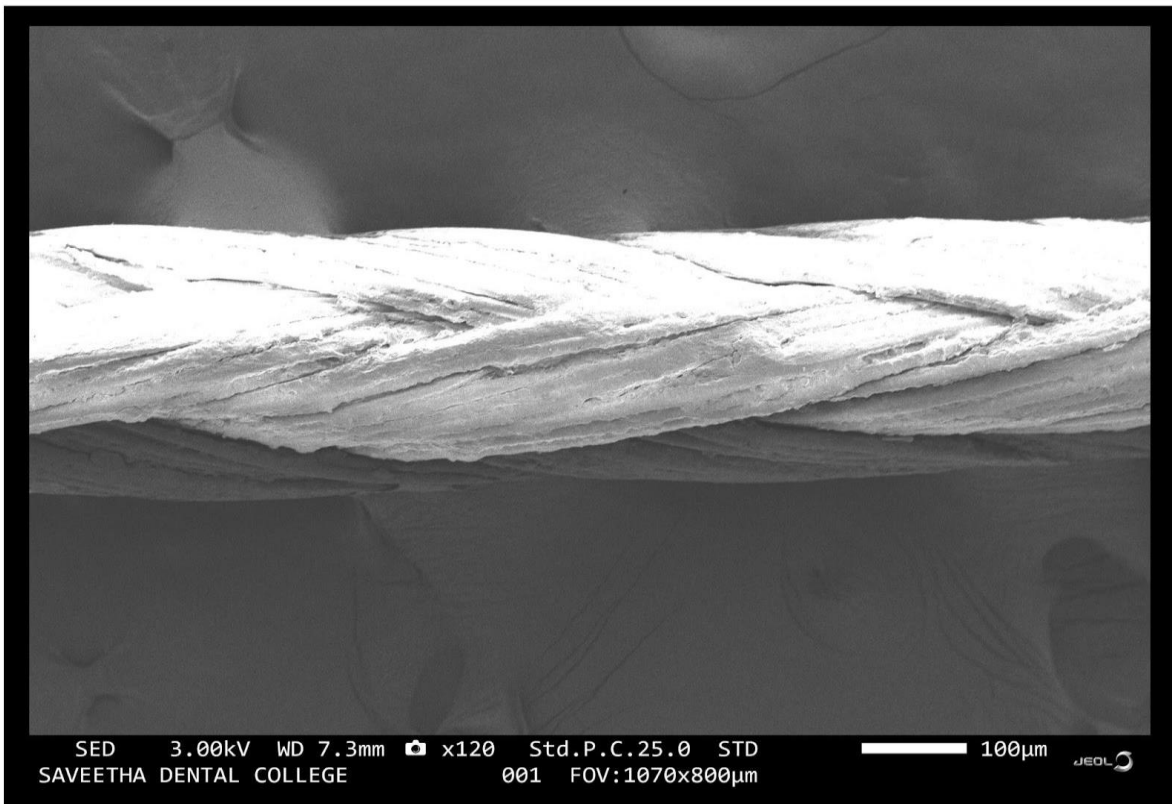
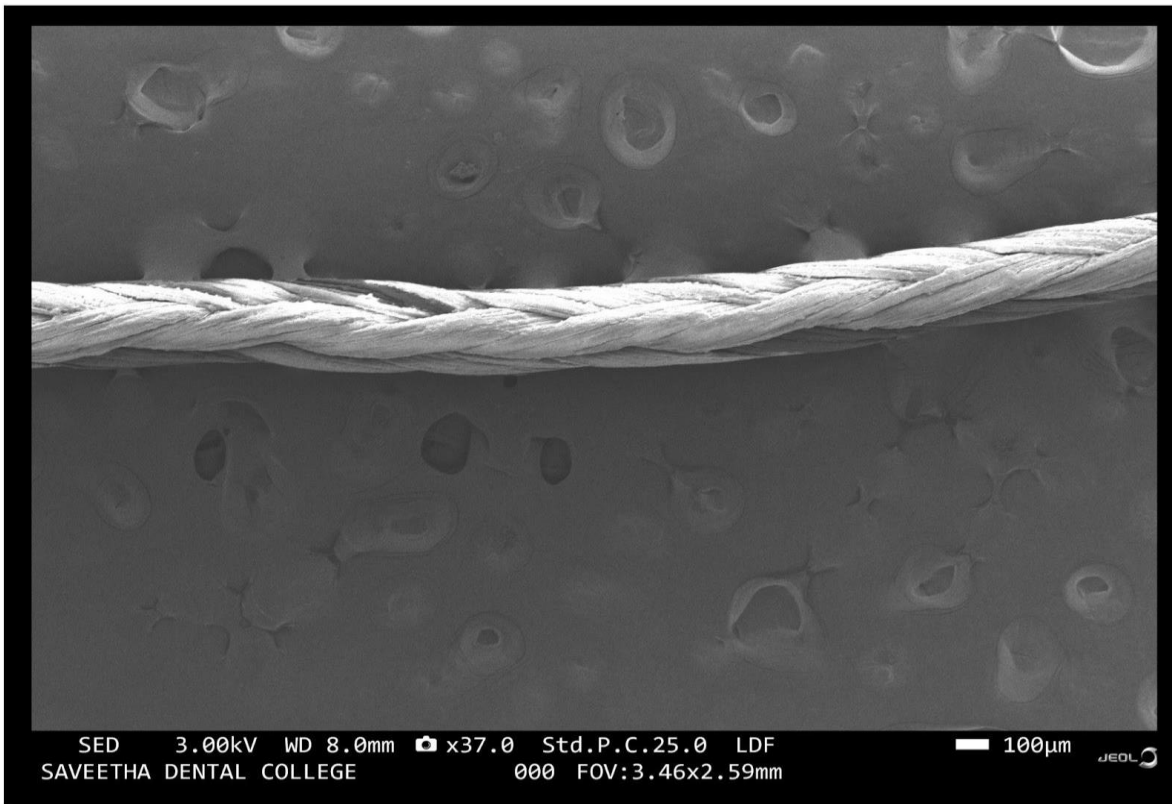


Figure 1: Coated PGA on absorbable sutures shows SEM analysis at 37.0x, 120x and 80.0x on platinum treated sample.

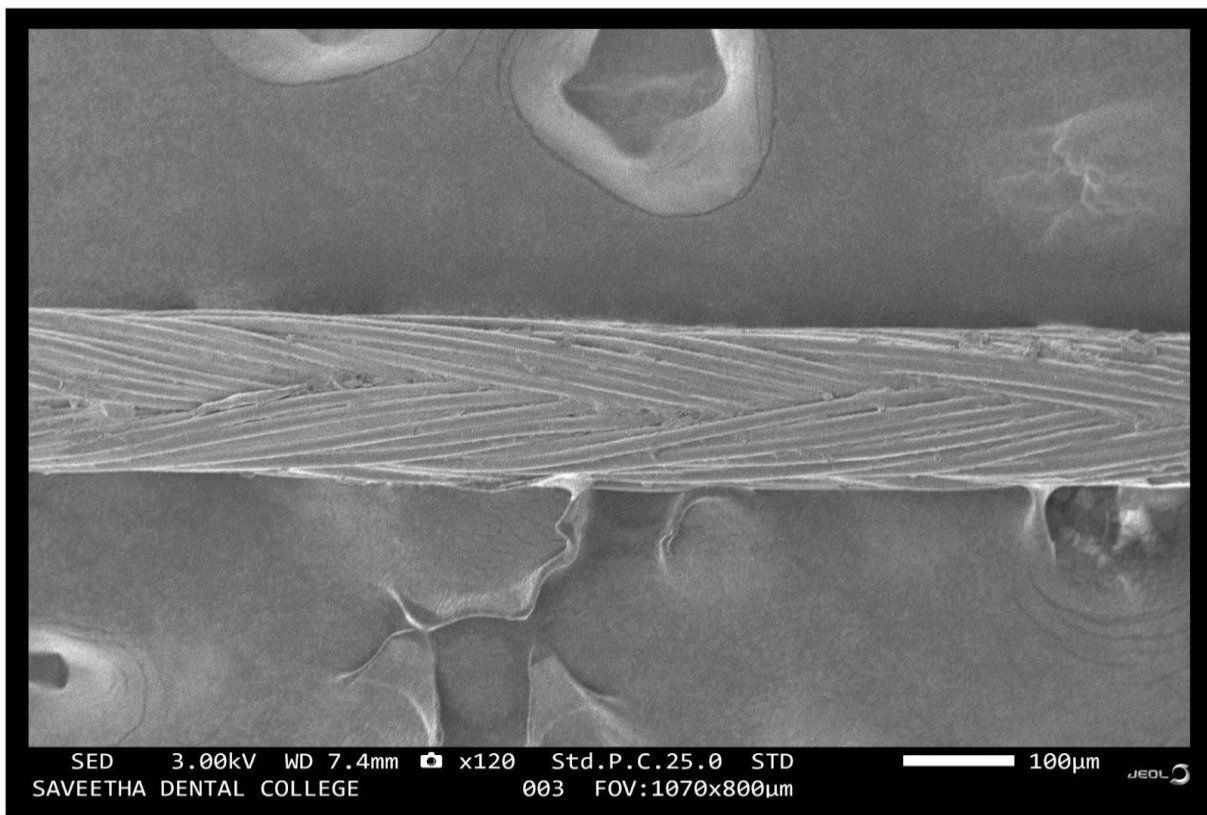
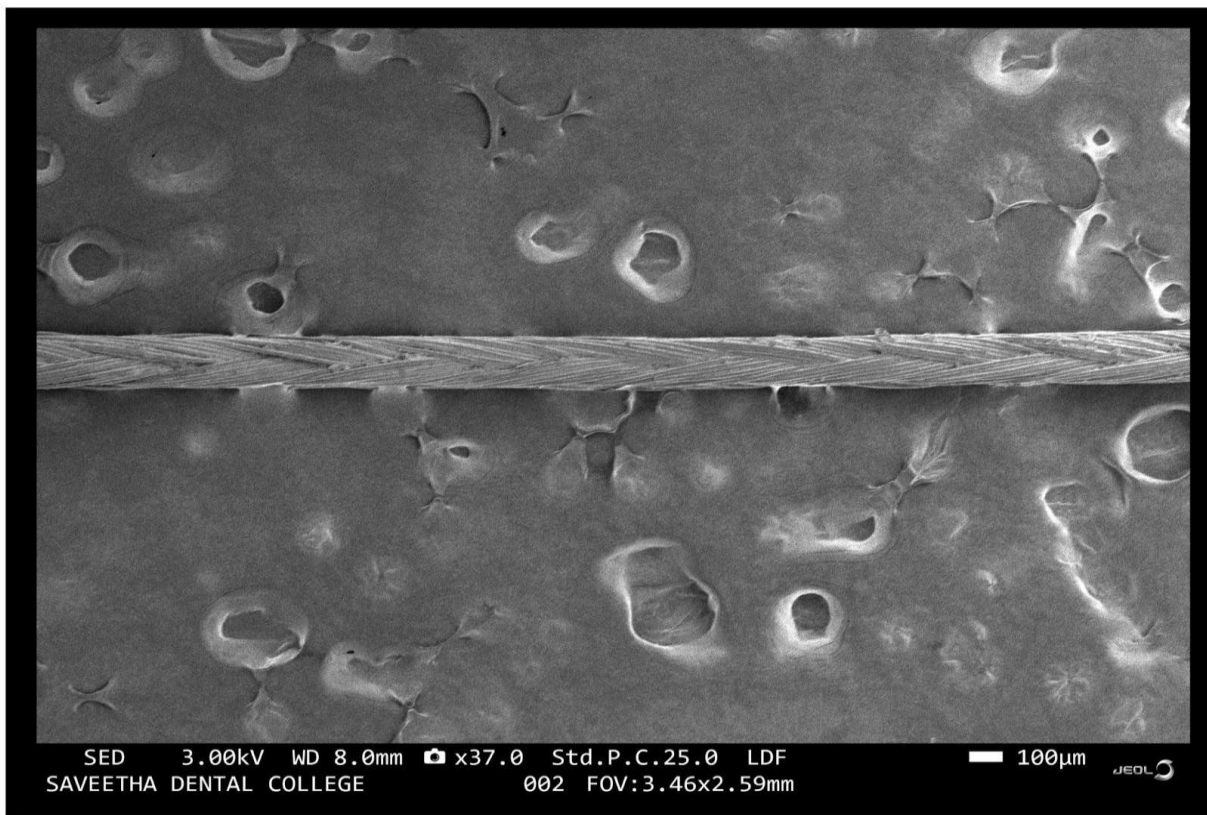


Figure 2: Coated Vicryl on absorbable sutures shows SEM analysis at 37.0x, 120x and 80.0x on platinum treated samples.

DISCUSSION:

Previous studies have shown various suture materials used in oral surgery based on their properties and usage. Studies have compared absorbable and non absorbable suture materials based on their properties and many articles have stated vicryl, PGA, Nylon has good properties based on the tissue reactions(14). However, silk has been mostly used as suture material for dental procedures. Studies on oral tissue reactions to sutures have revealed constant inflammatory reactions, which are most prominent with silk and cotton and minimal with others including nylon, polyester, poliglecaprone 25 and PGA(15).

Several in-vitro studies are present in literature regarding tensile strength of suture materials but only few studies have been done in oral cavity. Also literature, very few studies had compared various dimensions of each suture material tested. Till date, research information in regards to the efficacies of different materials stays debatable and changing. Thus, the present study focuses on the exploring the influence of the secondary metabolites on the suture materials. Rutin individually shows significant anti inflammatory and anti oxidant activity when compared to Quinidine. In combination rutin and Quinidine have shown significant synergistic anti-inflammatory and antioxidant activity. These materials also serve as better materials for dental treatment. PGA shows increased tensile strength when compared with Vicryl (Graph:3). The degree of degradation is higher in case of Vicryl suture after coating when compared to PGA suture.

These suture materials when coated with rutin and quindine affects the properties of the individual suture materials. As these secondary metabolites are naturally present in the day to day food we intake, their influence on the intraorally used absorbable sutures is explained in this study.

CONCLUSION:

According to the results obtained, the anti-inflammatory activity of the Rutin along with Quinidine shows good influence. Antioxidant activity there is no great influence of Quinidine separately, but together it shows good influence. PGA shows good tensile strength when compared to vicryl.

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