
Awareness on Resorbable Suture Material Among Dental Students

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Abstract: The aim of this study is to determine the understanding regarding resorbable suture material and its role in dentistry among dental students. To create awareness and determine the understanding of resorbable suture material and its role in dentistry among dental students. This study was conducted based on a questionnaire which consisted of 10 questions through a web-linked application called Survey Monkey. A convenient sample size of 100 consecutive dental students who are currently practicing in Chennai participated in the study. As an overall result, most of the participants are aware of resorbable suture material and their role in dentistry. As a conclusion, the awareness on resorbable suture material also its role and development among dental students in Chennai is adequate but certain knowledge has to be brushed up among them for a higher level. Furthermore, they need to be trained on these grounds to help them treat their patients with more consent and awareness.

Keywords: suture; material; resorbable; dental; student

INTRODUCTION

It is important for an effective wound closure in order to achieve success of any surgical procedure. If there is an incomplete closure it tends to separate the edges, providing a potential pathway for bacterial contamination leading to infection and scarring (Kurtzman *et al.*, 2005). However, as an alternative the tissue adhesives and staples are being used now but sutures are still the mainstream for a wound closure. There are many types of materials and suturing techniques described in so many previous literature. The determination of sutures origin will help in appreciation of contemporary suture usage (Silverstein, 2005).

A suture material should have an ideal characteristic such as comfortable in handling, incite small amount of tissue reaction, should not promote bacterial growth, tensile strength has to be high, should be able to hold knots effectively, ease in sterilization, should have no electrolytic, capillary, allergenic or carcinogenic action and should be absorbed after serving its function. There is no single suture encompassing all these properties and different sutures are required depending upon the tissue involved (Bakr *et al.*, 2016).

The choice of the suture material is based on the biological interaction of the materials employed, the tissue configuration, and the biomechanical properties of the wound. Sutures are found in different colors which indicators the usage of it in certain cases for distinguishing the different anatomical structures. The colour enhances suture visibility, even if steeped in blood, making stitch removal easier. For a instead, in vascular surgery to differentiate between artery and suture strings, sutures appear in bright colours (Silverstein, 1999).

A suture material is also elastic to enhance the material to regain its initial length after stretching. This helps to stretch oedematous tissue, at the same time its original length and shape on remission of the oedema is maintained (Andreasen, Andreasen and Andersson, 2018). During placement of suture in tissue the suture material should pass smoothly through it and has to function as a coefficient of friction. This capacity is known as suture glide (Ying and Kun, 2016). The suture material which has a high coefficient of friction allows a saw effect as they pass through the tissues. Therefore, these two criteria have an inversely proportional relationship where a low coefficient of friction will always be the preference although there is a disadvantage (high tendency of slipping) (Kim *et al.*, 2011).

Classification of suture material has 3 major categories. It started with absorbable or non-absorbable, monofilament or multifilament and whether they are made from natural or synthetic material (Silverstein, 2005).

Braided or multifilament sutures have a number of strands woven together whereas the non-braided sutures cause less reactivity in the body (Silverstein, 1999). They are less prone to becoming infected due to its minimal grooves and rough surface which allows tissues to adhere. However it has a disadvantage to loosen at the surgical knot with the lack of grip (Selvig *et al.*, 1998).

An absorbable suture rapidly undergo degradation and lose their tensile strength as soon as possible after healing. In catgut suture the absorption takes place enzymatically whereas hydrolytically, in absorbable synthetic polymers (Capperauld, 1989). Half- life in suturing material gives a meaning of time needed for the tensile strength to reduce to half its original value. Also, dissolution time is the time taken for elapse before a suture is completely dissolved. These times in sutures are associated with factors such as thread thickness, type of tissue, and the general condition of the patient (Bush and Bayat, 2007).

Currently, the most available absorbable sutures are Vicryl, plain catgut, chromic catgut, dextron and collagen (Manor and Kaffe, 1982). Catgut suture materials are also known as plain gut suture materials. It is prepared from beef in the United States and sheep or goats in India and Pakistan. In the current era, there is a modification made on this material to enhance the timing of suture and retain its strength in the body (Rodeheaver *et al.*, 1983). It is known as the chromic gut because it is a treated catgut suture with chromium salts to cross-link the collagen molecules (Guhagarkar, 2012).

There are also new synthetic absorbable polymers such as polyglycolic acid and polylactic acid were developed commercially (Hosomi *et al.*, 2020). Synthetic suture materials got their trade name according to the corporation, materials, or scientists who formulated them. It is mentioned below :

- Mersilene – based on the name of founder, Dr George Merson and Terylene. It is a common European trade name for polyester.
- Ethiflex suture – A polyester suture which is a flexible polytetrafluoroethylene coating placed to improve the handling properties.
- Ethibond – Trade name for a polyester suture with a coating that is tightly bonded to the suture made by Ethicon, Inc.

Early braided polyester sutures were taken over by nylon suture due to better handling (Narayanan *et al.*, 2012). Therefore, this study was conducted to determine the awareness of absorbable suture materials among dental students. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J *et al.*, 2018; Menon *et al.*, 2018; Prabakar *et al.*, 2018; Rajeshkumar *et al.*, 2018, 2019; Vishnu Prasad *et al.*, 2018; Wahab *et al.*, 2018; Dua *et al.*, 2019; Duraisamy *et al.*, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma *et al.*, 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi *et al.*, 2020; Samuel, Acharya and Rao, 2020)

MATERIAL AND METHODS

A convenient sample size of 100 consecutive dental students who are currently pursuing in Saveetha Dental College, Chennai participated in the study. A cross-sectional observational online based study was conducted. Questionnaire was constructed on the Survey Monkey website with dichotomous questions. The questionnaire consists of 10 questions as shown below. A link containing these questionnaires was shared with all the participants and required them to answer the questions. All the responses were analysed and recorded.

Questions

1. Do you use absorbable suture in the clinic on a daily basis?
2. The first absorbable suture material is catgut?
3. Absorbable suture materials are usually made up of collagen, silk, hair?
4. Absorbable sutures are used as an alternative to traditional neck lifting?
5. Absorbable suture material provides zero support to the wound during healings?
6. Polyglactin 910 suture has lactide and glycolide with calcium stearate coating?
7. Polysorb is a polyester monofilament suture?
8. Polysorb is produced from Lactomer copolymer?
9. Recent innovation in absorbable suture is caprosyn?
10. V-loc is a barbed suture which requires knots for wound closure?

RESULTS AND DISCUSSION

According to graph 1, it shows that 60% of the participants claim that they use absorbable sutures in the clinic on a daily basis, whereas the remaining 40% of them do not use them on a daily basis. When questions were asked in the form of a statement to determine the knowledge of participants, most of them seemed to be aware

of this suture material. According to graph 2, 79% of the participants agreed that catgut was the first absorbable suture material commercially. Remaining 21% of them disagreed with this statement.

According to graph 3 majority which is 84% of the participants, answered correctly by choosing the option “true” when the statement about absorbable suture material was made up of collagen, silk and hair. Remaining 16% of them answered that the statement was wrong and chose the option “false”. Only 69% of the participants are aware that absorbable suture material is the alternative for traditional neck lifting. Remaining 31% of them had no clue about the statement. it is represented in graph 4.

In graph 5 we can see that almost half (47%) of the participants answered wrongly for questions asked about whether absorbable suture do not support wound closure. Only 53% of them answered correctly by choosing the option “false” for the statement stating that this suture material provides support to the wound during the healing process. In graph 6 80% of the participants had the knowledge regarding polyglactin 910 which has lactide and glycolide with calcium stearate coating. Remaining 20% of them were not aware of this polyglactin. When asked about polysorb material only 62% of them were aware of this material. Remaining 38% of them assumed that polysorb is a polyester monofilament suture, which is absolutely wrong. However, 65% of them are aware that polysorb is a product of lactomer copolymer. Remaining 35% of them disagreed with this statement. which are represented respectively in graph 7,8.

According to graph 9, caprosyn was the recent innovation of absorbable suture and it is agreed by 70% of the participants. Remaining 30% of them were unaware of this material. Finally when asked whether V-Loc is a barbed suture which requires knots for wound closure about 74% of the participants correctly disagreed with the statement as it is a wrong statement. Yet, 26% of them who were not aware of the material agreed to the statement. it is represented in graph 10.

According to a similar study conducted by Jannathul et al, (Harini, Dhanraj and Anandhi, 2017) the dental practitioners were not aware and lacked knowledge about absorbable suture materials in dentistry. However, in the present study majority of the dental students were aware of the absorbable suture material and were having adequate knowledge regarding it. Another similar study by Lakshya et al, (Surendra Menon and Pajanivel, 2017) revealed that sufficient and satisfied knowledge also responses were obtained from dental students and dental practitioners regarding absorbable suture and its management in dentistry. According to them their participants need to be trained more with suturing techniques regardless of absorbable suture material. This study gave almost the same results as the current study.

In a previous study by Engler et al, (Oláh, 1990) showed that chromic catgut suture shows delayed hypersensitivity reactions to this material are difficult to diagnose post-operatively. About 87% of dental practitioners are aware that delayed hypersensitivity reactions to this material are difficult to diagnose post-operatively. Few similar studies also revealed that the usage of absorbable suture in dentistry such as catgut suture, ease the healing and handling process. In present study about 76% of the dental students were aware of uses of absorbable suture in dentistry.

A study by Rogers et al, (Rogers, 1974) revealed that about 46% of the dental students were aware that catgut suture is made up of silk, collagen and hair. In present study 84% of dental students are aware that catgut suture is made up of silk, collagen and hair. A study revealed by Grier et al, (Benicewicz and Hopper, 1991) showed that 65% absorbable suture has been successfully used for deep sutures in hepatic, renal and splenic wounds as well as ligation of ovarian and uterine stumps. Absorbable suture material is commonly used as a continuous subdermal stitch. Plain catgut would be contraindicated, however, due to its in tense tissue reaction underlying the skin. 93% of this study showed that catgut suture is used for hepatic, renal and splenic wounds. In the analysis of the Grant et al, (Grant, 1986) there was no significant difference between the two groups in short term pain. A meta-analysis by Mouzas et al, (Mouzas and Yeadon, 1975) revealed that significant evidence that absorbable suture material is associated with less short term pain, reduction in the use of analgesia and less suture dehiscence. However, the long term effects of this material are less clear. Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

CONCLUSION

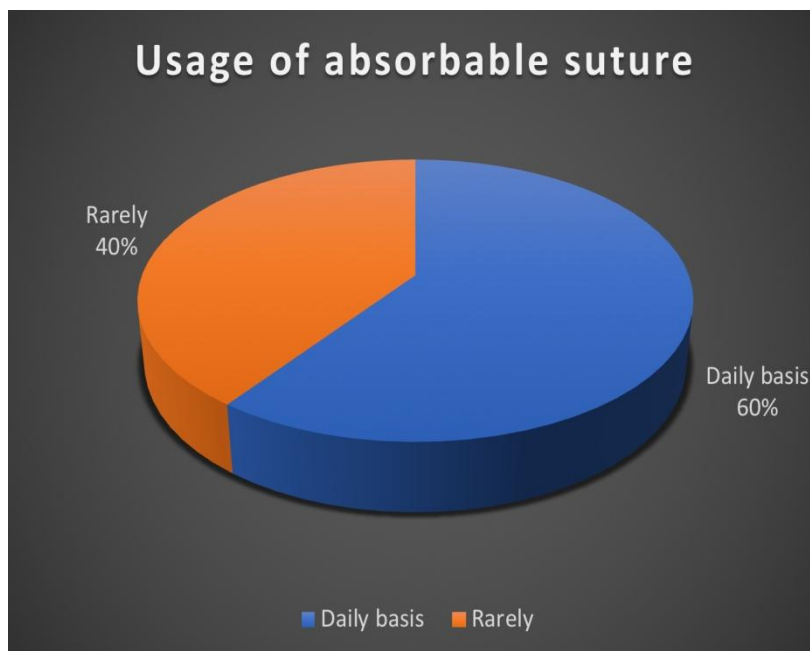
Majority of the dental students within the study were aware of the absorbable suture materials and had adequate knowledge regarding this topic. Those who lack knowledge regarding this are suggested to improve their knowledge by attending dental education programs and highlight the absorbable suture in dentistry. However, this study was limited to one particular district which is Chennai, Tamilnadu and only 100 participants. Further, study should be conducted in a larger scale area and sample size to get a proper overview regarding this topic within the dental students concerning the new advent technologies.

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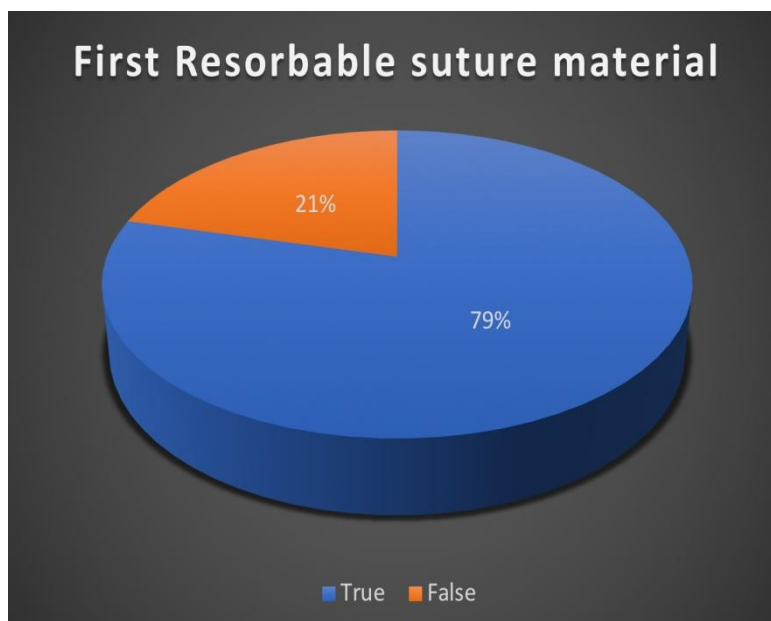
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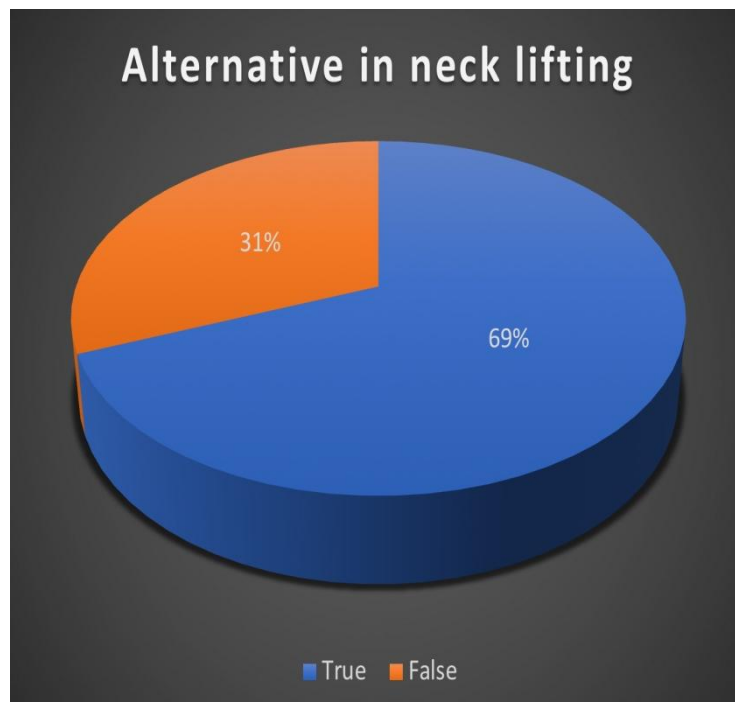
Graph 1 shows the percentage of participants who use absorbable suture on a daily basis. It shows that 60% of the participants claim that they use absorbable sutures in the clinic on a daily basis, whereas the remaining 40% of them do not use them on a daily basis. When questions were asked in the form of a statement to determine the knowledge of participants, most of them seemed to be aware of this suture material.



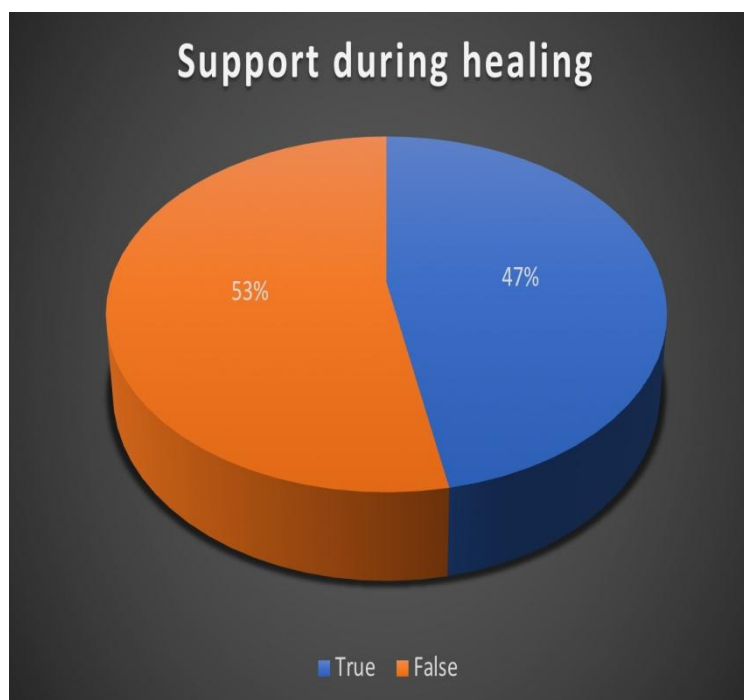
Graph 2: According to graph 2, 79% of the participants agreed that catgut was the first absorbable suture material commercially. Remaining 21% of them disagreed with this statement. When asked by the participants the reason for choosing false many thought silk was the first used absorbable suture material. Silk itself is a non absorbable suture material by silk is used while preparing a resorbable suture.



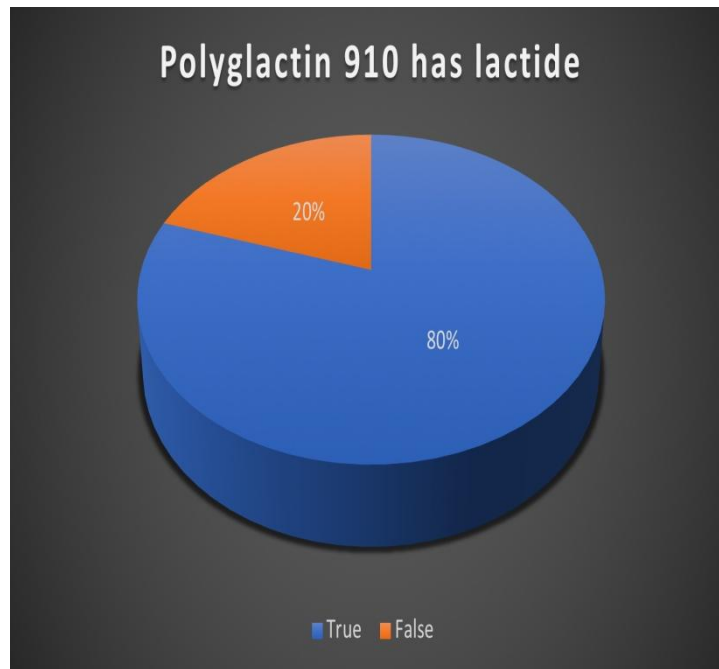
Graph 3: The third question was "Absorbable suture materials are usually made up of collagen, silk, and hair". According to graph 3 majority which is 84% of the participants, answered correctly by choosing the option "true" when the statement about absorbable suture material was made up of collagen, silk and hair. Remaining 16% of them answered that the statement was wrong and chose the option "false". The reason 16% of the participants chose false as the answer is because the question had silk and hair as a component along with collagen. collagen is resorbable whereas silk and hair are non resorbable. Using silk and hair increases the strength of the suture material.



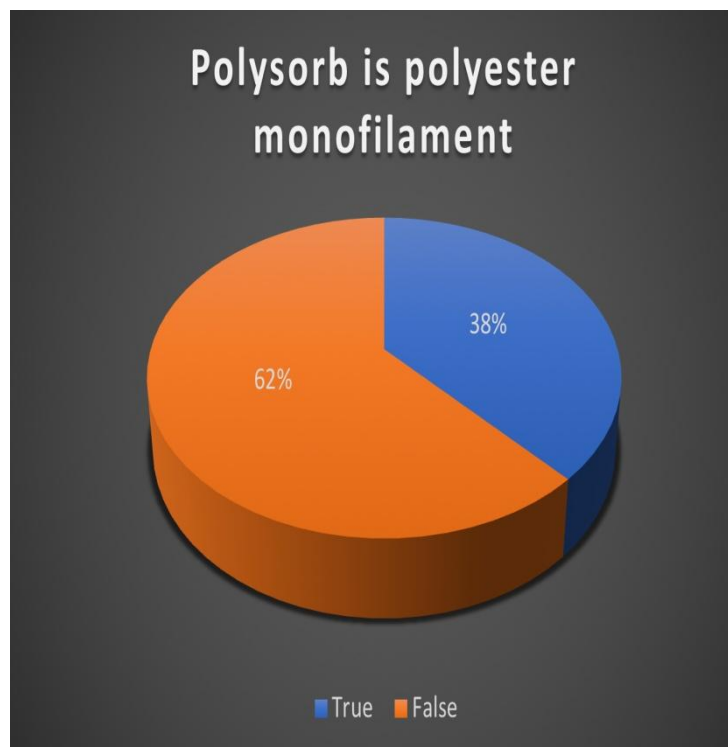
Graph 4: Only 69% of the participants are aware that absorbable suture material is the alternative for traditional neck lifting. Remaining 31% of them had no clue about the statement. it is represented in graph 4. The reason for choosing absorbable suture for any aesthetic procedure is minimal to no scar procedure is possible. Neck lifting is an aesthetic correction procedure and a scar to treat after the procedure is double the work by using absorbable suture this burden can be lifted off the operator's shoulder.



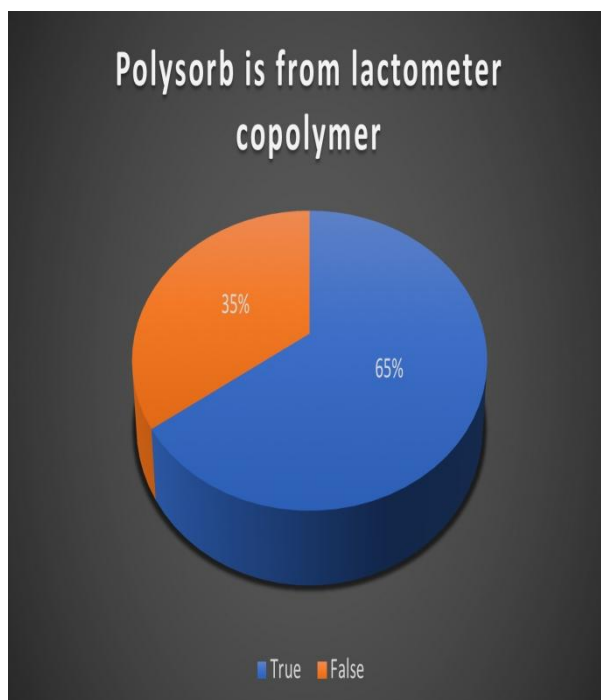
Graph 5: In graph 5 we can see that almost half (47%) of the participants answered wrongly for questions asked about whether absorbable suture do not support wound closure. Only 53% of them answered correctly by choosing the option "false" for the statement stating that this suture material provides a good support with good tensile strength to the wound during the healing process.



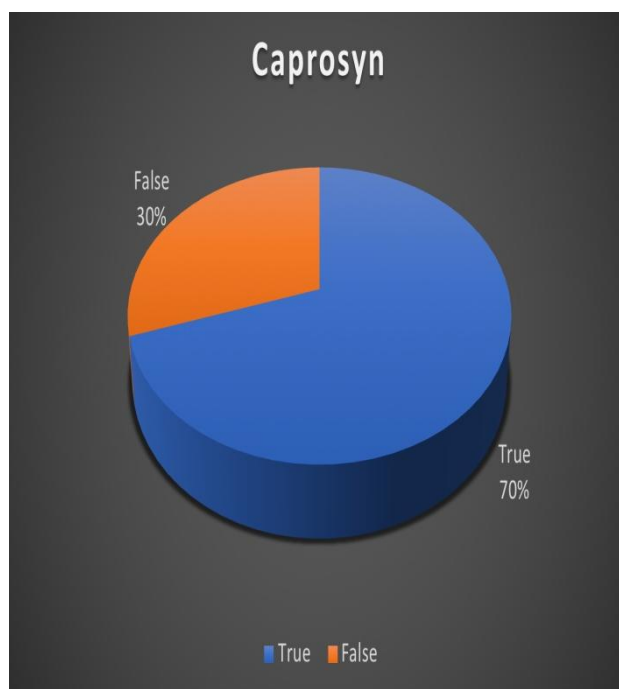
Graph 6: In graph 6 80% of the participants had the knowledge regarding polyglactin 910 which has lactide and glycolide with calcium stearoyl lactylate coating. Remaining 20% of them were not aware of this polyglactin. polyglactin 910 is a sterile, synthetic, absorbable, suture used in surgeries. The absorption time for this is considered as 90% glycolide and 10% L-lactide. Both lactide and glycolide are derived from acids lactic acid and glycolic acid respectively.



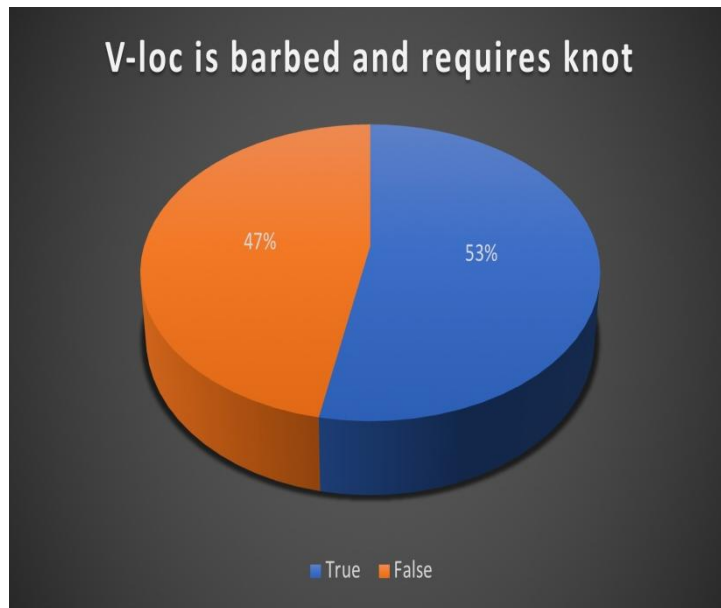
Graph 7: When asked about polysorb material only 62% of them were aware of this material. Remaining 38% of them assumed that polysorb is a polyester monofilament suture, which is absolutely wrong. which are represented respectively in graph 7. polysorb is a polyester monofilament suture is not used widely in dentistry it is used more in ophthalmic practice.



Graph 8: When asked about polysorb material only 65% of them are aware that polysorb is a product of lactomer copolymer. Remaining 35% of them disagreed with this statement. It is represented in Graph 8. It is prepared by coating the suture with a mixture of glycolide copolymer and calcium stearoyl lactylate. polysorb is a Lactomer copolymer. The absorption time for this is considered as 90% glycolide and 10% L-lactide. Both lactide and glycolide are derived from acids lactic acid and glycolic acid respectively.



Graph 9: According to graph 9, caprosyn was the recent innovation of absorbable suture and it is agreed by 70% of the participants. Remaining 30% of them were unaware of this material. Caprosyn is a durable polymer material, which is monofilament, quick absorbing also due to its construction it can easily pass through tissue for better ligation and tissue approximation. It helps in fast recovery of patients.



Graph 10: Finally when asked whether V-Loc is a barbed suture which requires knots for wound closure about 74% of the participants correctly disagreed with the statement as it is a wrong statement. Yet, 26% of them who were not aware of the material agreed to the statement. It is represented in graph 10. The brabs in the V-loc suture minimizes the slip back of suture thus no knots are required reducing the operators work.