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Awareness on types of suture materials used in post operative surgery among dental practitioners

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Abstract:
Surgical suture is a medical device used to hold body tissues together after an injury or surgery. Application generally involves using a needle with an attached length of thread. A number of different shapes, sizes, and thread materials have been developed. Surgical knots are used to secure the sutures.
Aim: The main aim of this study is to analyse the awareness on types of suture material used in post operative surgery among the dental practitioners.
Materials and method: This cross sectional study is based on the awareness of suture materials. Questionnaires were prepared and distributed to the students of an institution. The study group consisted of 200 students of both genders. The resulting data was analysed using the statistical SPSS software.
Results: Among the 200 total patients, 39.80% of them were males and 60.20% of them were females. About 52.58% of the practitioners are aware of the suture materials used and the correlation test shows that the 44.28% females are more aware than the males.
Conclusion : There are newer suturing procedures and materials available in the market like cyanoacrylates, polydioxanone etc..Notwithstanding, the decision of suture material depends upon the degree of the injury and the decision of the specialist. This survey concludes over the limitations that specialists are aware of the suture material especially the females are more aware than males about the recently used suture material in the practises but the the usage of them is a big question mark which may be due to the expenses, trial and errors issues.

Keywords: Suture material, silk, Polydioxanone, Absorbable, non absorbable, novel method, innovative technique.

Introduction:

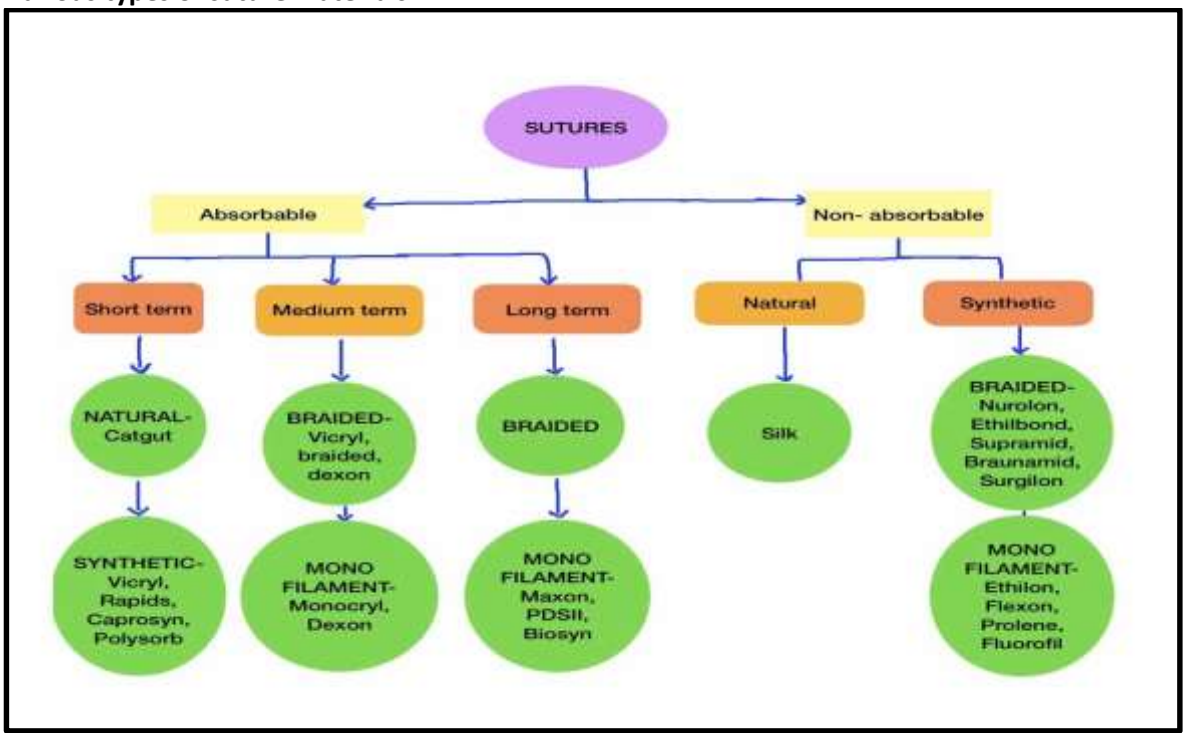
Sutures play a significant role in wound healing after intervention, permitting the reapproximation of tissues separeted by an injury, the advancement of primary healing, and the control of hemorrhage; subsequently, suture material should be chosen cautiously [1]. Specifically, sutures used in oral and maxillofacial procedures act uniquely in contrast to those utilized in different pieces of the body in view of body tissues involved, the constant presence of salivation, the high degrees of vascularization, and capacities related with speech, and swallowing [2]. In spite of the fact that suturing appropriately requires a sound comprehension of the science of wound healing and some finest [3]. There are different kinds of suture materials used for injury. With an advancement in the mid 20th century, synthetic suture materials were introduced in the dental field. One of the first synthetic threads (nylon) was developed in the mid 1930s)[4].

Later the main polyester filaments were presented which became known as Dacron. Polyglycolic acid (PGA) was found during the 1950s, but because of its affectability to degradation by hydrol-sis, it is quickly

reabsorbed. This reaction can be slowed back by covering it with different polymers, for example, polycaprolactone and calcium stearate [5]. A combina-tion of 90% PGA and 10% L-lactide was delivered in 1974 as polyglactin 910. The suture is commer-cially known as Vicryl. Later in 1982 an all the more gradually debasing polymer polydioxanone was delivered as the suture PDS. This suture held significant strength out to about a month and a half in contrast with the 2–3 weeks shown by Vicryl [6]. New nonabsorbable suture materials additionally showed up in this time period. A polypropylene suture was introduced in 1969 (Prolene). The sutures are mostly classified as absorbable-non absorbable, interlaced monofilament, synthetic natural. Normally used suture materials in injuries include silk, polyglactin, nylon, and propylene [7,8]. Notwithstanding, the decision of suture material depends upon the degree of the injury, sort of the constructions in question and decision of the specialist [9]. Some of the recently available suturing procedures and materials in the market, for example, staples, adhesives tapes, cyanoacrylates, caprosyn, V-Loc etc…[10]. But the dental practitioners need to know the usage of the existing sutures which could perform an operation in quicker and minimum time [11].

However, sutures are the most favoured technique utilized by the specialists for conclusion of the injury. The suture plays a great role in tooth extraction. The impact of suture material on extraction wounds has been clearly seen in many studies. Absence of sutures delays the wound healing, and some suture materials may impact cell proliferation. Hence, the suture material used to be biocompatible to produce a more limited and less extreme inflammatory process, during the exudative period of inflammation [12]. Many intra and extra oral studies reveal the majority of synthetic suture material in relation to biocompatibility. Suture can interfere with ideal wound healing and can bring about the development of scar tissue, in this manner diminishing the elasticity of the injury site. Our team has extensive knowledge and research experience that has translated into high quality publications [13–25,26–30,31,32]. The main aim of this study was to evaluate the awareness of currently existing various types of suture materials among the dental practitioners.

Various types of suture materials :



Materials and method:
A descriptive cross-sectional study was done to analyse knowledge and awareness among dental students. A survey questionnaire had been used to collect data from the people. The ethical approval of the current study was obtained from the institutional ethical board. The survey was conducted among 200 dental practitioners. A self-administered questionnaire of 20 closed ended and open questions were prepared and distributed among dental students through online based survey forms “google forms'. The method of sampling that was done is simple random sampling. The collected data was tabulated in Microsoft excel. The responses were collected, tabulated in the excel sheet and analysed. Data entered in SPSS software (statistical package for social studies) version 22.0 (IBM corporation) and the results were represented in a Bar graph. Chi square test was used to analyse and compare the educational level of students and their knowledge and awareness on celiac disease. The independent variables are age, sex, locality and the dependant variables are awareness and knowledge of suture materials.

Results:
The results were obtained from the survey which was completed with 200 participants. Out of which, figure 1 represents the 39.80% (79 members) male population and 60.20% (120 members) female population. Figure 2 represents the awareness on types of suture material involving silk of 1.49% and nylon 0.50% and of both is 98.01% . Figure 3 represents the awareness of absorbable suture materials like Monoacryl,vicryl, catgut except nylon in which Monocryl is responded by 19.09% and catgut is responded by 29.35%, vicryl is responded by 0.50% and nylon is responded by 50.25%. Figure 4 represents the awareness of non-resorbable suture materials like silk, prolene, nylon except vicryl in which prolene is responded by 27.86%, Silk is responded by 1.99%, Nylon is responded by 7.46% and the Vicryl is responded 62.69%. Figure 5 represents the awareness on the type of suture which provides long term tissue support in which the resorbable is of 17.41% and non resorbable is of 82.59%. Figure 6 represents the awareness on the type of suture material used for post impaction in which silk is 18.41%, Nylon is 20.90%, Catgut is 46.77% and the vicryl is 13.93%. Figure 7 represents the awareness of suture used for post surgery is Nylon which is responded by 79.60% and nylon can’t be used is responded 20.40% . Figure 8 represents the awareness on the disadvantages of polydioxanone suture is said to be prolonged resorbable time which is responded by 75.12% and lesser stimulation of tissue reaction is responded by 6.97% and 2.99% responded to tensile strength, remaining 14.93% responded to all the above. Figure 9 represents the awareness of recent types of suture materials. 52.48% responded as they are not aware and the remaining 47.52% responded that they are aware. Figure 10 represents the awareness on the usage of cyanoacrylate. 52.17% responded as they are not aware of cyanoacrylate and the remaining 47.83% responded that they are aware of cyanoacrylate.

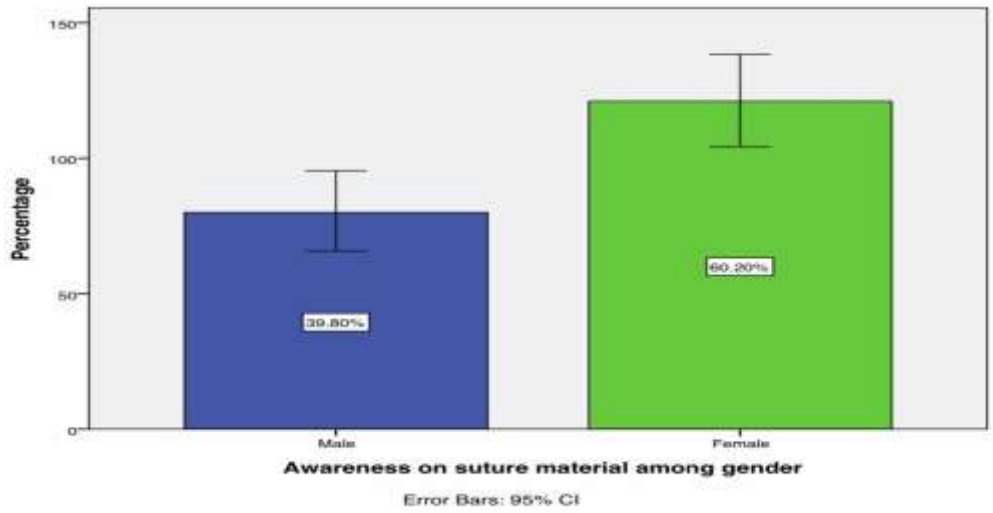


Figure 1: Pie chart represents the awareness about the suture materials among the gender distribution. It includes the male population of 39.80%(Blue) and female population of 60.20% (Green). The gender population shows that the females are more aware of suture materials when compared to males.

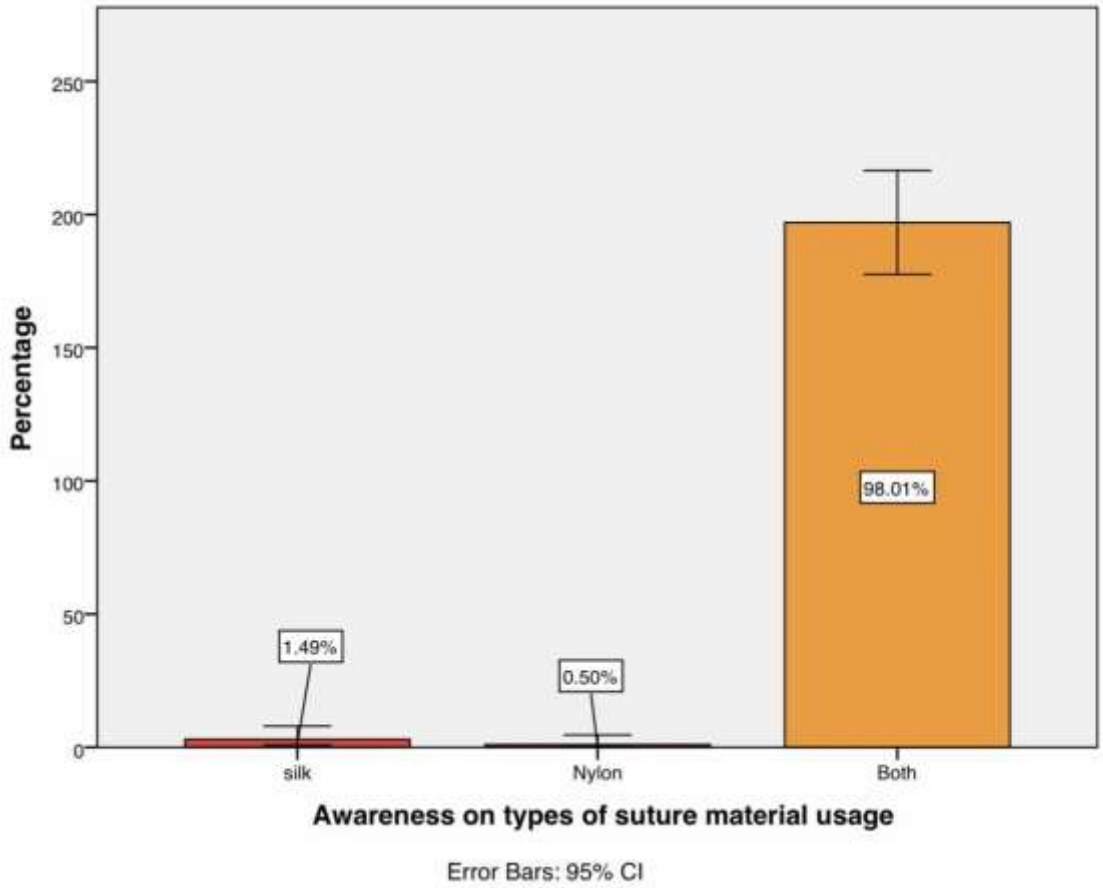


Figure 2: Pie chart represents the awareness on types of suture material. Majority of the population 98.01% responded as both silk and nylon (orange) and some 1.49% responded silk (Red) and remaining 0.50% responded nylon (purple).

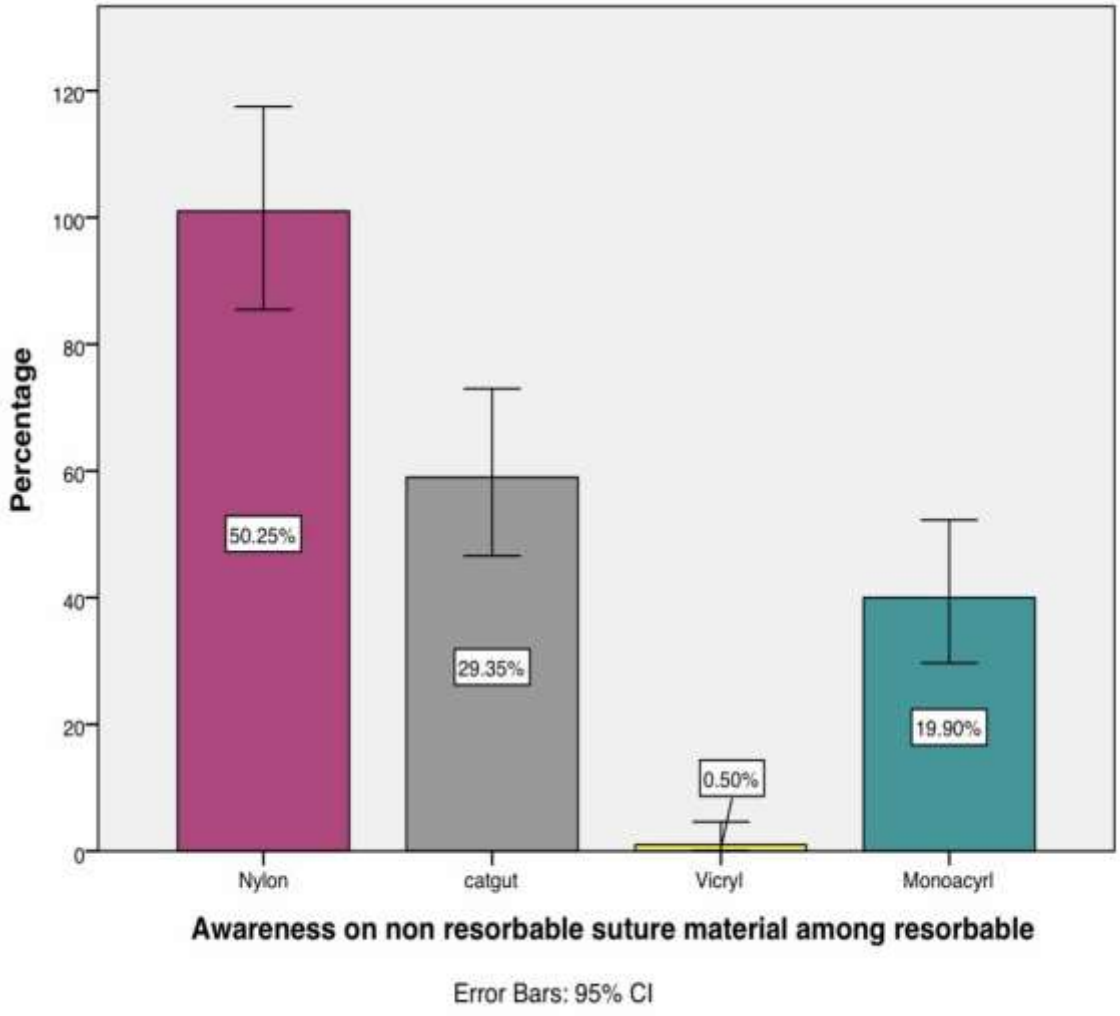


Figure 3: Pie chart represents the awareness on non resorbable suture material among the resorbable. Majority of the population 50.25% responded as nylon
(Pink) and some 19.90% responded as Monoacryl (Blue) and 29.35% responded catgut (grey) and remaining 0.50% responded Vicryl (yellow).

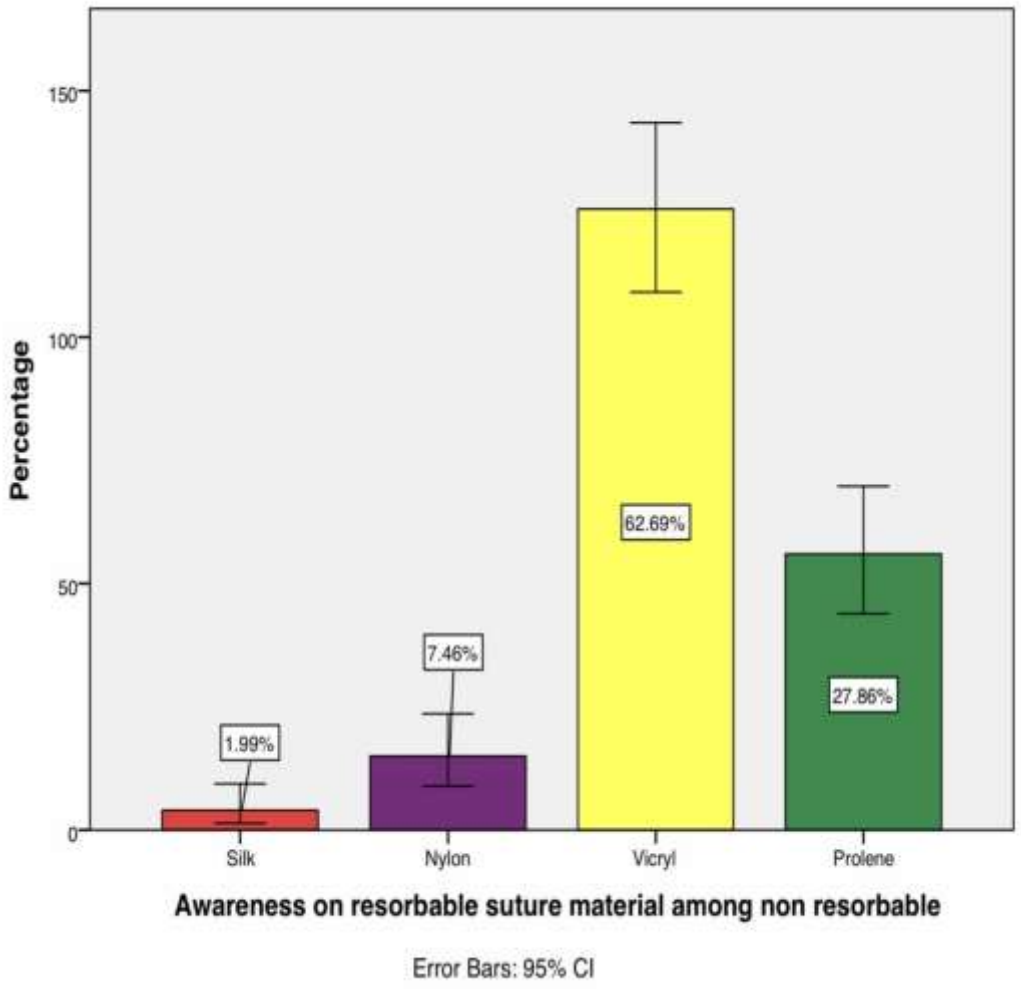


Figure 4: Pie chart represents the awareness on resorbable suture materials among the non resorbable. Majority of the population 62.69% responded as Vicryl (Yellow) and some 27.86% responded as prolene (green) and 1.99% responded silk (red) and the remaining 7.46% responded nylon (Violet).

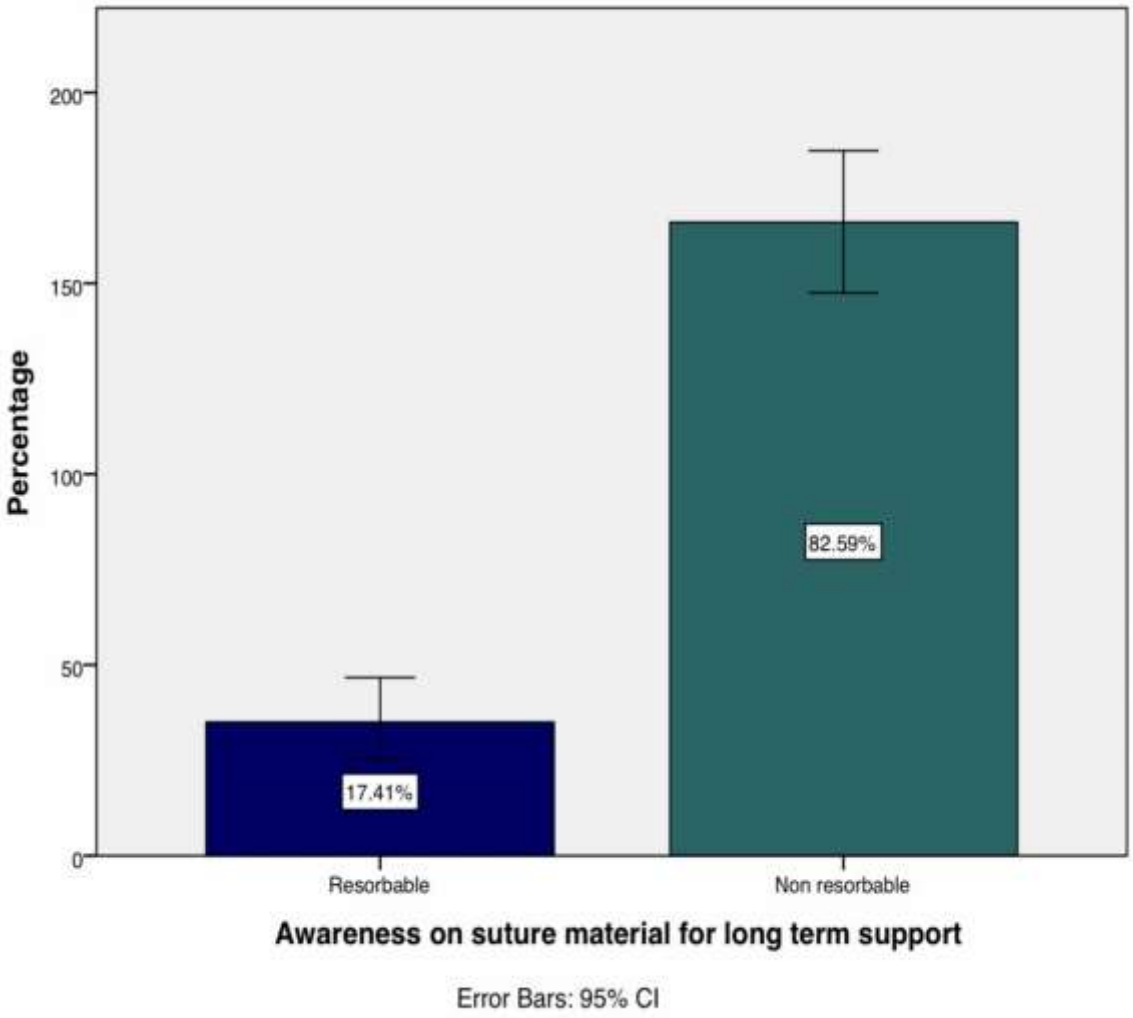


Figure 5: Pie chart represents the awareness on sutures material providing long term tissue support. Majority of the population 82.59% responded non resorbable (green) and remaining 17.41% responded resorbable (blue).

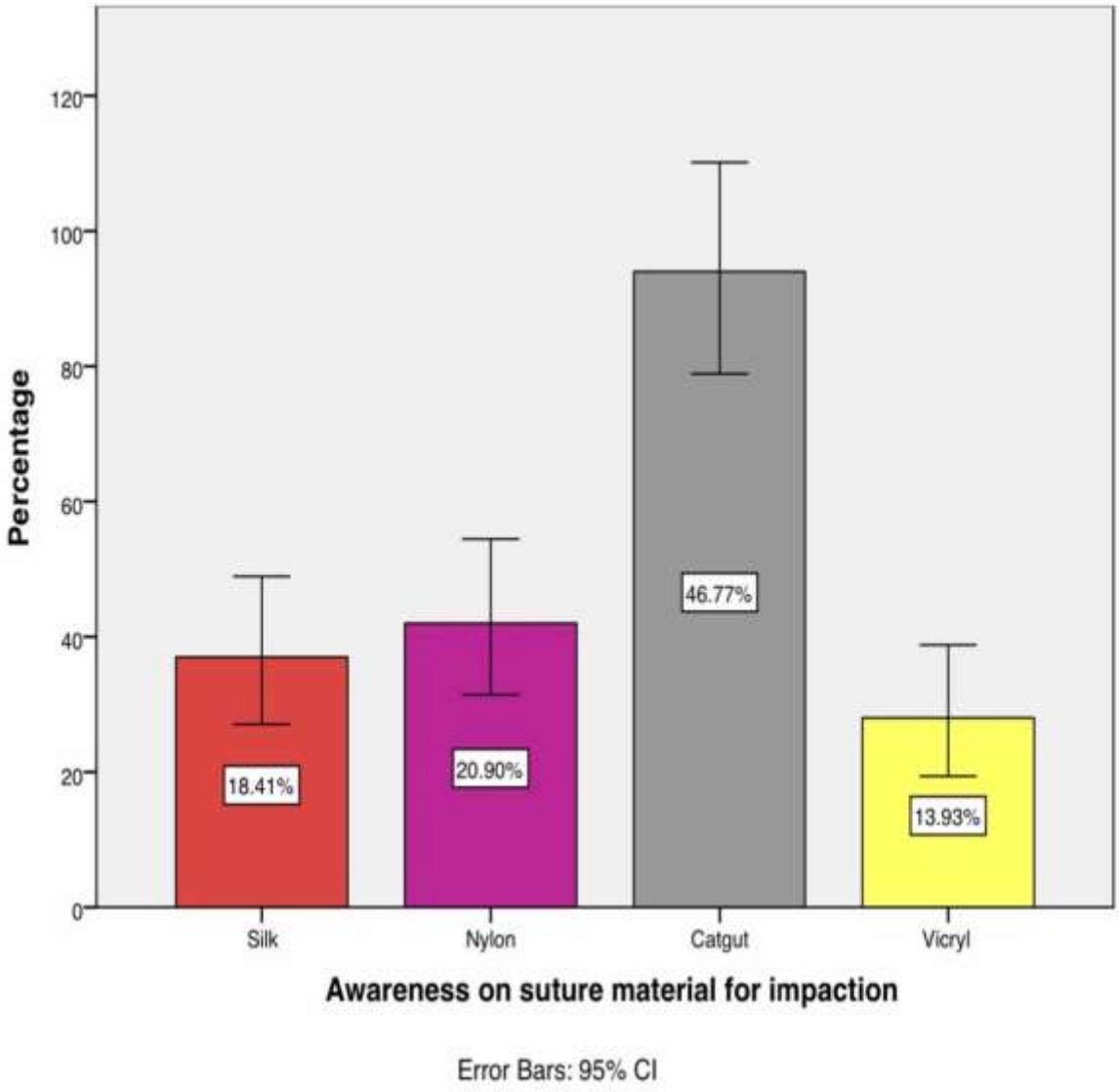


Figure 6: Pie Chart represents the awareness of suture material used for post impaction. Majority of the population 46.7% responded as catgut (Grey) and some 20.90% responded as nylon (pink) and 18.41%responded silk (red) and remaining 13.93% responded Vicryl (yellow).

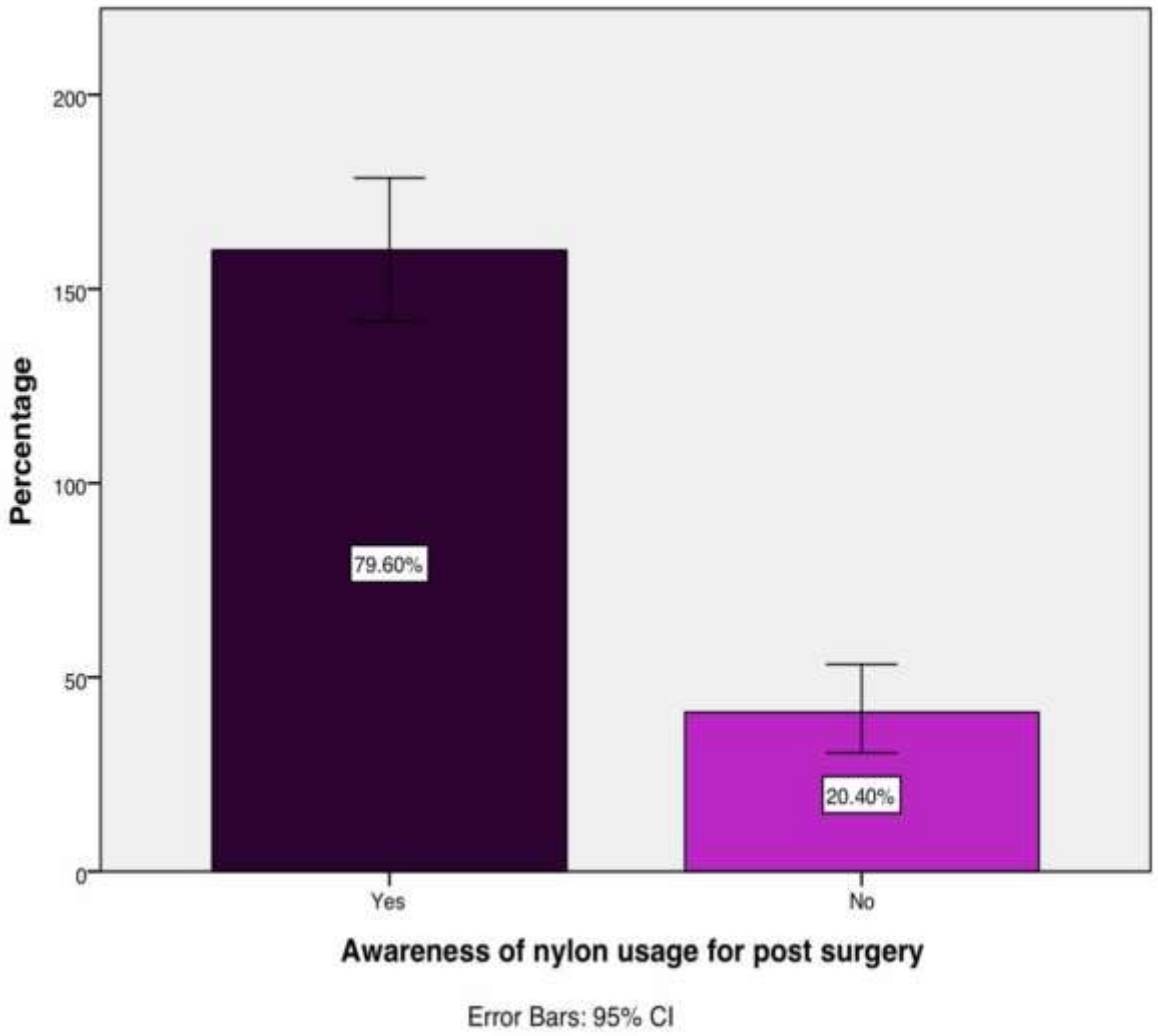


Figure 7: Pie chart represents the awareness on nylon advisable for post surgery.
Majority of the population 79.60% responded Yes (Purple) and the remaining 20.40% responded No (Pink).

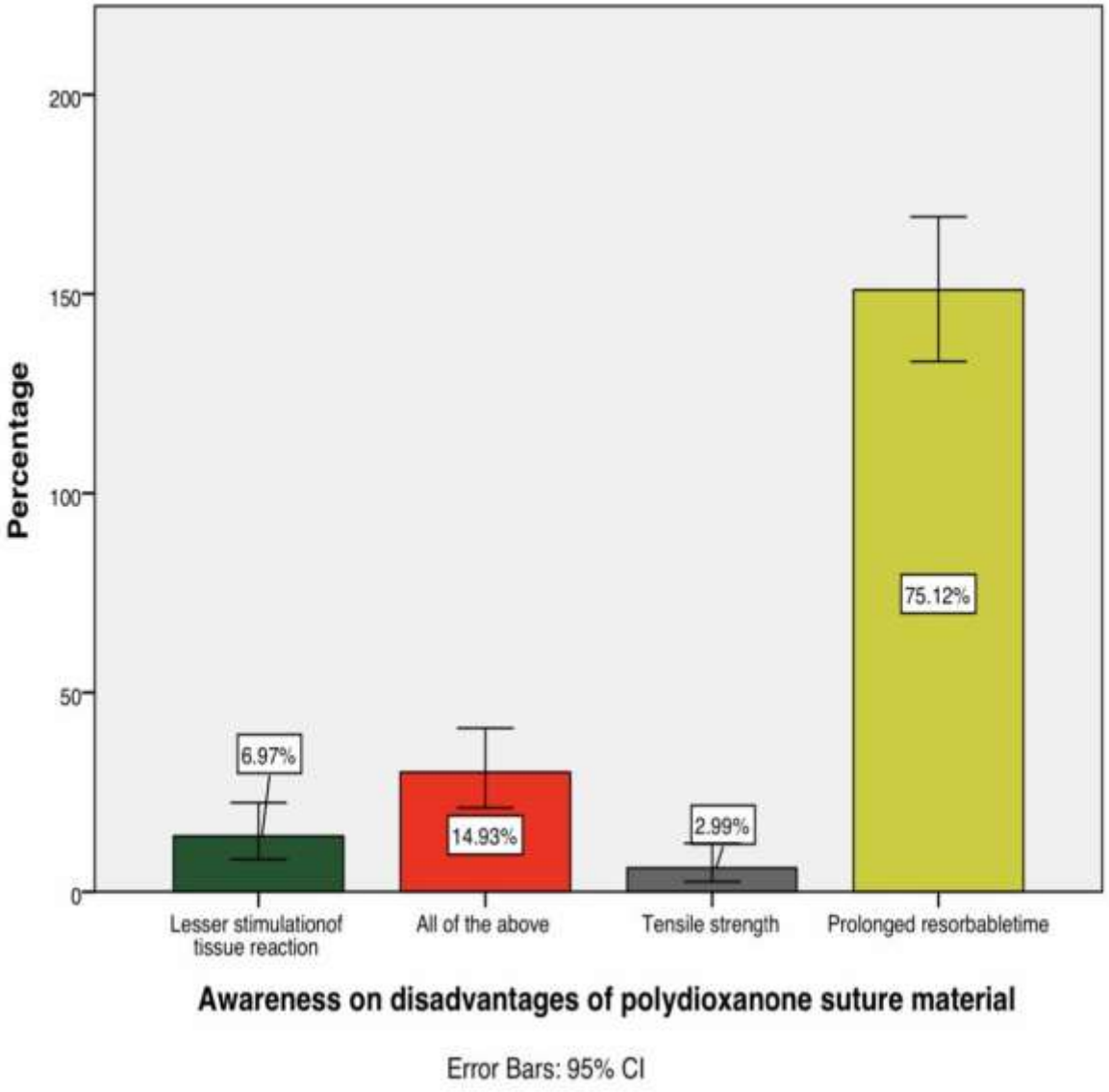


Figure 8: Pie chart represents the awareness on disadvantages of polydioxanone suture material. Majority of the population 75.12% responded as prolonged resorbable time (yellow) and some 6.97% responded as lesser stimulation of tissue reaction (green) and 2.99% responded to tensile strength (grey) and remaining 14.93% responded to all the above (red).

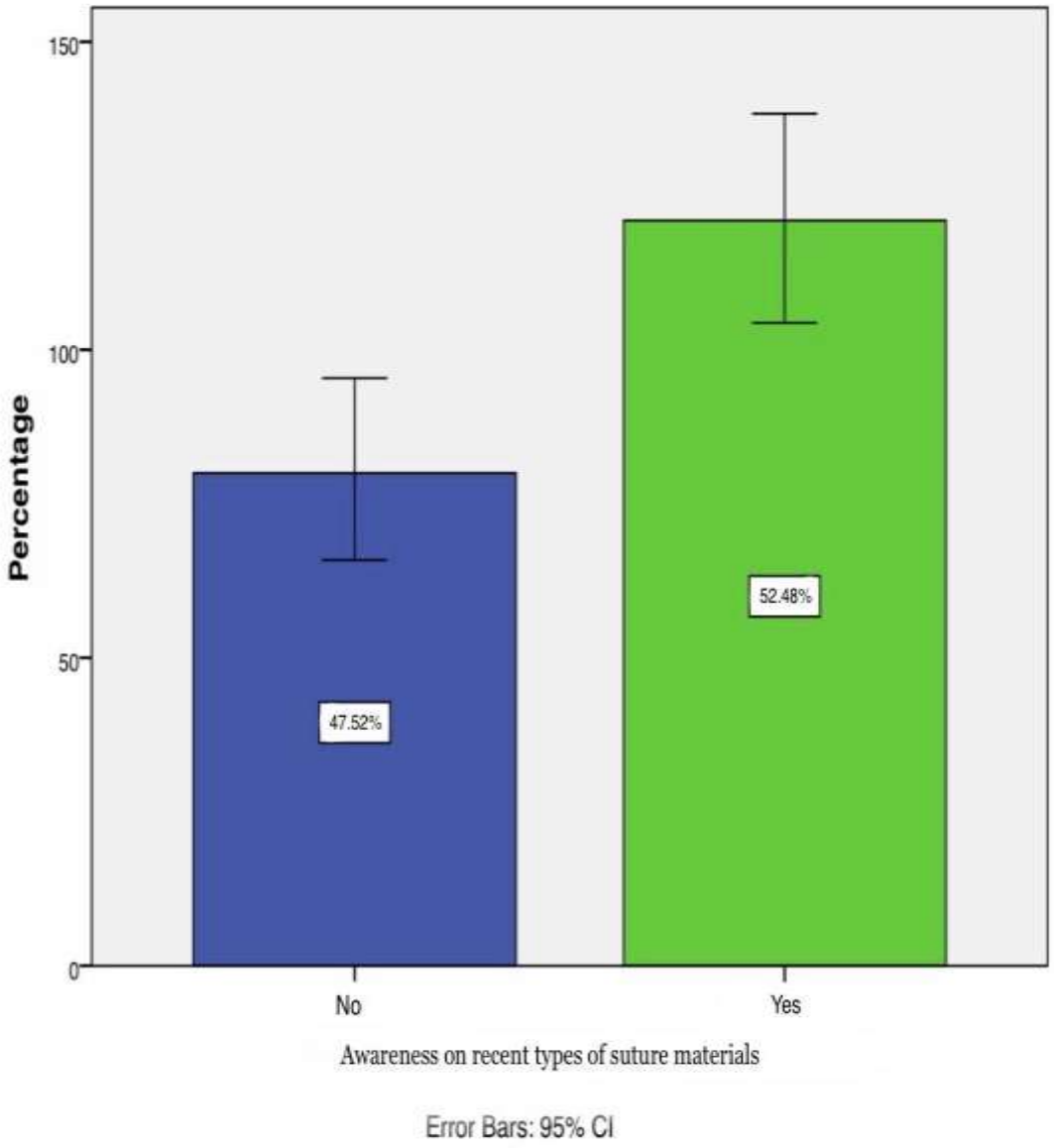


Figure 9: Pie chart represents the awareness of recent types of suture materials. Majority of the population 52.48% responded as they are not aware (blue) and the remaining 47.52% responded that they are aware (green).

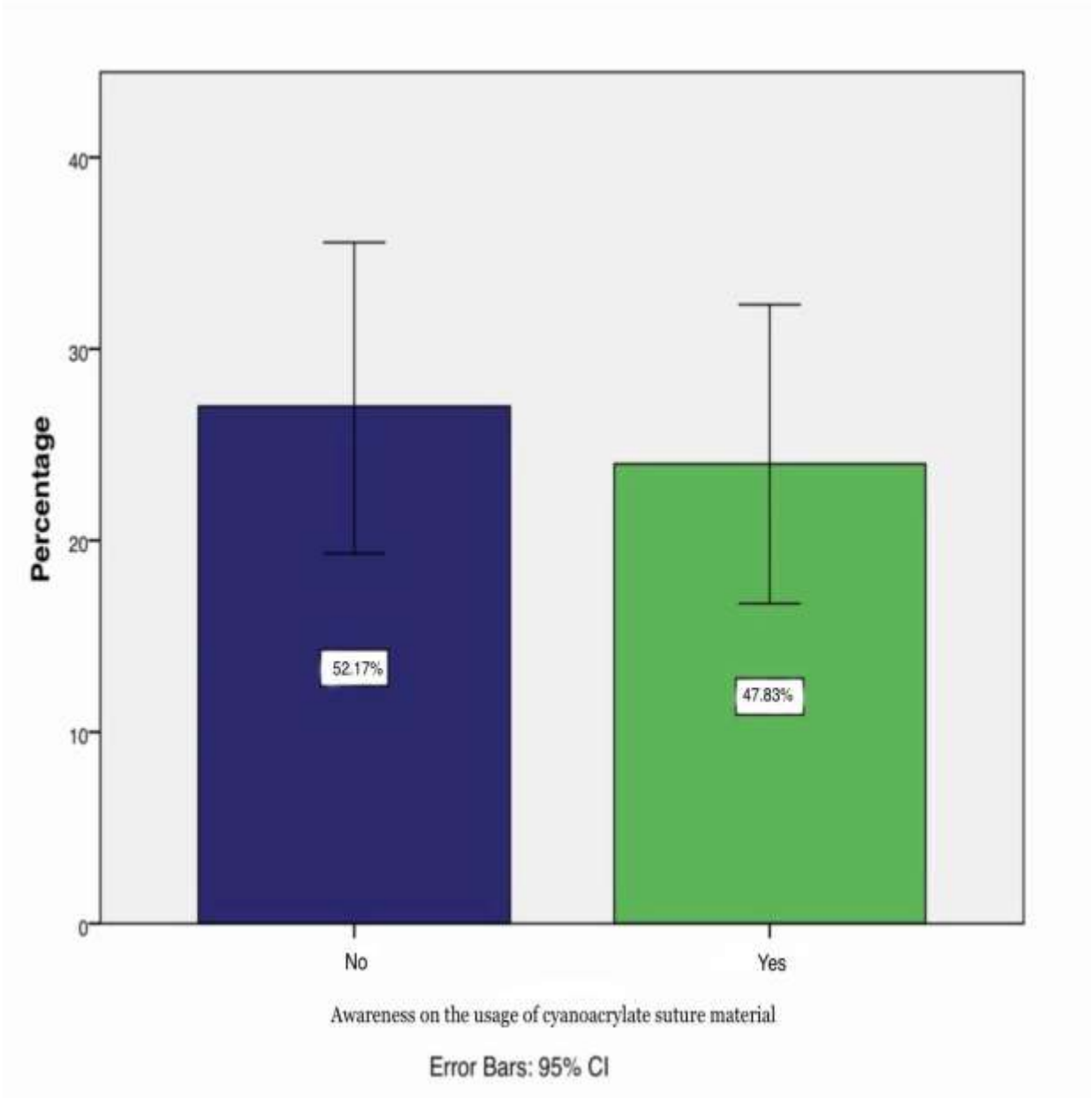


Figure 10: Pie chart represents the awareness on the usage of cyanoacrylate. Majority of the population 52.17% responded as they are not aware of cyanoacrylate (blue) and the remaining 47.83% responded that they are aware of cyanoacrylate (green).

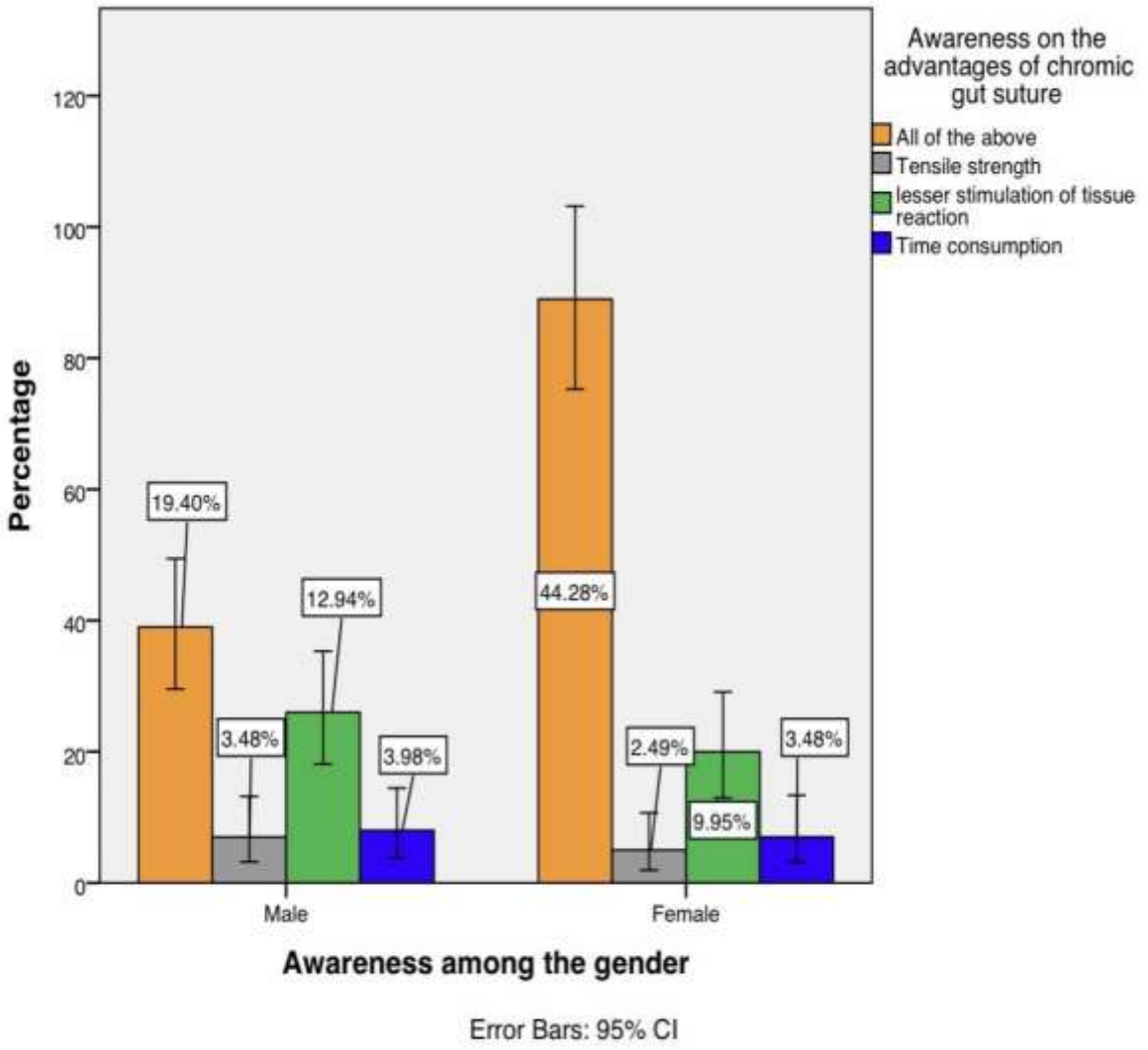


Figure 11: The graph shows the association between the awareness among the gender distribution and the awareness of the advantages of chromic gut suture. The X axis represents the awareness among the gender population and the Y axis represents the awareness percentage on the advantages of chromic gut suture . In this graph, the grey colour represents tensile strength and green colour represents the lesser stimulation of tissue reaction and blue colour represents the time consumption and orange colour represents All of the above. Awareness about the suture material is more among the females than males. Pearson's chi square test, P- 0.005, P >0.05, statistically significant.

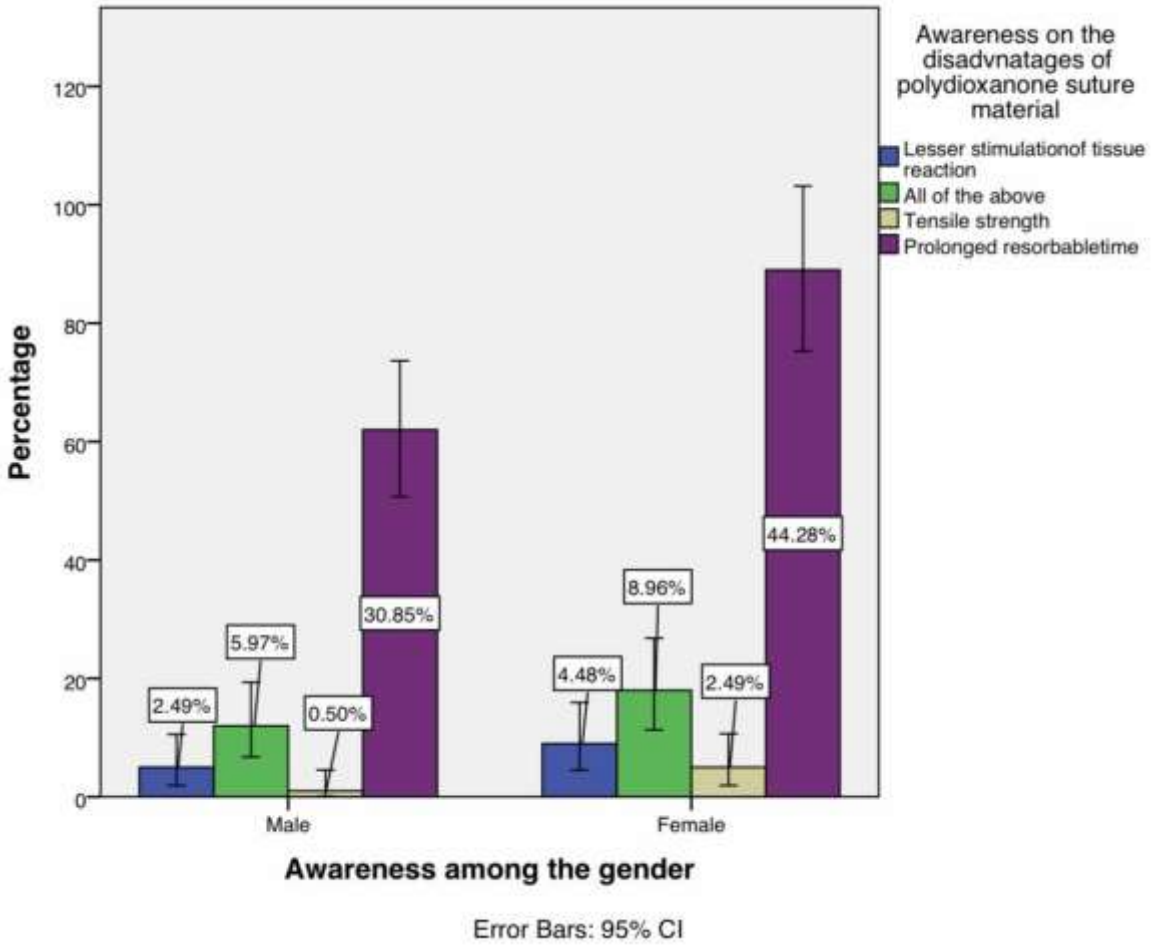


Figure 12: The graph shows the association between the awareness among the gender distribution and the awareness of the disadvantages of polydioxanone suture material. The X axis represents the awareness among the gender population and the Y axis represents the awareness percentage on the disadvantages of polydioxanone suture material. In this graph, the grey colour represents tensile strength and blue colour represents the lesser stimulation of tissue reaction and purple colour represents the prolonged resorbable time and green colour represents All of the above. Awareness about the suture material is more among the females than males. Pearson's chi square test, P-0.673,P >10.05, statistically insignificant.

Discussion:

Suture materials are accessible for dental and clinical surgeries; however, it is fundamental for specialists to know about the idea of the suture material, the biological cycles of healing, and the connection of the suture material with the connecting tissues. Suture that are put after a medical procedure are part of the way embedded in tissue and halfway washed in salivation, with a mean centralization of around 7.5*108 microorganisms/mL. Suture in gingival and oral mucosa may henceforth deliver delayed tissue reactions as an outcome of persistent convergence of microbial defilement along the suture channel [33,34,35]. Durdey and Bucknall, found that Synthetic suture material delivers prolonged tissue reactions and harbors a large amount of monofilament suture material. Many clinicians favor synthetic suture material on the grounds that monofilament suture material is more difficult to control, displays poor knot security, and has a sharp

end that closes oral tissues[36]. Traditionally, silk has been the most utilized suture material for dental and a few other surgeries. Despite the fact that silk is economical and simple to deal with as other non absorbable suture material[37].

As indicated by a comparative study directed by Jannathul et al, (Harini, Dhanraj and Anandhi, 2017) the dental professionals didn't know and have less knowledge about absorbable suture materials in dentistry. In our present study, figure 3 shows the dominant part of the dental practitioners knew about the absorbable suture material and were having sufficient information with respect to it [38]. Another comparative examination by Lakshya et al, 2017 revealed that adequate and sufficient knowledge was obtained from dental specialists in regards to absorbable suture and its administration in dentistry .

In a previous study by Engler et al, 1990 reported that chromic catgut suture had delayed hypersensitivity reactions that are difficult to diagnose post-operatively. Few similar studies also showed that the usage of absorbable suture in dentistry such as catgut suture, has quicker healing duration and is easy to handle for the suturing procedure. In our current study, the correlation graph shows awareness on the advantages of chromic catgut suture where the females are more aware regarding the knowledge on catgut sutures [39].

In vitro results recommended that silk produces less fluid motion than is delivered by other braided sutures, and it appears to transmit microbes less frequently than other suture materials [40]. Bresnahan et al. studied the rigidity of laceration closed using cyanoacrylate and subcutaneous sutures, percutaneous sutures, and a blend of percutaneous and subcutaneous sutures. Thus in our study the figure 9 shows the unawareness of cyanoacrylate usage among the dental practitioners. The combination of percutaneous and subcutaneous tissue suture showed the prognosis.

Absorbable sutures like polyglactin are preferred sutures for intraoral suturing [41]. This is used because of the property of self absorbability and the better knot stability to withstand the oral environment and the forces applied while biting and the phonetics [42]. For extraoral suturing, monofilament synthetic non absorbable suture like nylon and polypropylene are used in maxillofacial areas as they give excellent outcomes; however, the knot stability is poor and requires multiple knots.

The limitation is that the many other studies assess the biomechanical properties of sutures. Most of these studies assess material properties of specific suture knots, pull out strength or comparison of one type of suture versus other material. However, this doesn't assess the biomechanical properties of most common suture materials. However, this study was limited to few dental practitioners and only 200 participants. Further, study can be conducted in a larger area and sample size to get a proper overview regarding this topic within the dental practitioners concerning the new advent technologies.

Conclusion:

Notwithstanding, the decision of suture material depends upon the degree of the injury and the decision of the specialist. This survey concludes over the limitations that practitioners are aware of the suture material used in the practises in which the females practitioners are more aware compared to males as my survey included more of the female participants but the the usage of recent suture material is a big question mark which may be due to the expenses, trial and errors issues. Those who have less knowledge on this are requested to improve their knowledge by attending dental education programs which highlights the recent types of suture materials in dentistry.

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Conflict of interest:

The authors declare no conflict of interest.

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