Original Article

DOI: 10.7860/JCDR/2026/88847.23901

Dentistry Section

Comparative Analysis of Microbial Adherence on Resorbable and Non-resorbable Braided Suture Materials in Periodontal Flap Surgery: A Randomised Clinical Study

SUDIPTA GHOSH[1], HAIMANTI GHOSH[2], DIBYENDU KUMAR KUNDU[3], SHIBENDU BISWAS[4], ABHIJIT CHAKRABORTY[5]

ABSTRACT

Introduction: It is very essential to achieve stable wound closure during the initial stages of periodontal flap surgery wound healing, not just accurate surgical technique. For proper periodontal healing, several factors are required, such as proper flap adaptation, immobilisation of flap, and maintaining clot stability. For that purpose, different types of suture materials are routinely used to secure the flap and to achieve adequate tissue adaptation. But after placement of sutures in oral environment, they are exposed to saliva, dental plaque and a complex microbial environment. For this reason, sutures can experience bacterial adhesion and the formation of biofilm, which could affect the healing process.

Aim: This study aims to evaluate and compare microbial colonisation on resorbable and non-resorbable braided suture materials used in periodontal flap surgery and to assess their influence on postoperative wound healing and plaque accumulation.

Materials and Methods: This randomised clinical study with microbiological evaluation of suture-associated bacterial adherence included 38 systemically healthy patients requiring undisplaced periodontal flap surgery. Patients were randomly allocated into two groups. In Group-A, flap closure was performed using 4-0 braided silk sutures, whereas in Group-B, 4-0 braided polyglactin 910 sutures were used. On postoperative Day 7 and Day 14, suture segments were retrieved and immediately transferred for microbial analysis. To assess the condition of the clinical sites and postoperative healing, routine clinical parameters were evaluated during follow-up visits. The primary outcome measure was microbial adherence to suture materials, quantified as Colony-Forming Units (CFU). Statistical analysis was performed using the Independent Samples t-test for comparison of continuous variables and Fisher's Exact Test for comparison of categorical variables.

Results: The study demonstrated higher bacterial colonisation on polyglactin 910 (Vicryl) sutures (Group-B) compared with silk sutures (Group-A) at both postoperative time intervals. On Day 7, the higher mean bacterial load observed in the Vicryl group was not statistically significant (p=0.425). However, on Day 14, Vicryl sutures exhibited significantly higher mean CFU values compared with silk sutures (p=0.044). No postoperative infection, suppuration, or other adverse complications were observed at the surgical sites during the follow-up period.

Conclusion: The findings of the present study indicate that both braided suture materials are prone to progressive bacterial colonisation in the oral environment, regardless of whether they are resorbable (polyglactin 910) or non-resorbable (silk). Although polyglactin 910 demonstrated significantly higher bacterial colonisation at the 14th postoperative day, both materials showed comparable clinical healing outcomes. Therefore, selection of suture materials for periodontal flap surgery should consider not only microbial adherence characteristics but also handling properties, surgical requirements, and patient-related factors.

Keywords: Bacterial adhesion, Biofilm, Colony-forming units, Oral microbiota, Periodontal surgery, Sutures, Wound healing

INTRODUCTION

In periodontal flap surgery, suturing constitutes a critical component of the procedure, and the choice of suture material plays an important role in clinical outcomes. Beyond technical execution, sutures have significant biological implications that extend beyond simple wound closure. Appropriate suturing facilitates favourable wound healing by ensuring close tissue adaptation, maintaining wound stability, and protecting the developing blood clot. In periodontal procedures, where successful healing largely depends on early clot stability, even minor disturbances in tissue adaptation may adversely influence treatment outcomes [1].

Despite these advantages, the placement of sutures introduces a foreign material into the oral environment, which is characterised by high microbial load and continuous functional stress. The oral cavity represents a complex polymicrobial ecosystem [2], providing favourable conditions for microbial proliferation due to constant moisture, stable temperature, and readily available nutrients. This environment promotes rapid biofilm formation on suture materials. Immediately after placement, sutures are covered by a conditioning film composed primarily of plasma proteins such as fibrinogen, fibronectin, and albumin [1,2]. This process of protein adsorption is beneficial for haemostasis and wound stabilisation, as it promotes platelet adhesion and fibrin clot formation [3]. However, it also alters the surface characteristics of the suture, facilitating bacterial adhesion and biofilm formation [4]. Thus, mechanisms that support wound healing may simultaneously promote microbial colonisation.

The structural characteristics of suture materials significantly influence bacterial adherence. Multifilament or braided sutures possess interstices that can trap oral fluids and microorganisms through capillary action [4,5]. Once bacteria penetrate these spaces, their removal becomes difficult, promoting biofilm development. In contrast, monofilament sutures demonstrate reduced bacterial adherence; however, their handling properties and knot security may be suboptimal for certain periodontal surgical procedures [4,5].

Silk has been widely used as a standard suture material in periodontal surgery due to its excellent handling characteristics and knot stability.

However, being a non-absorbable material, it requires removal and may elicit a greater degree of tissue reaction compared to certain synthetic alternatives [6]. Polyglactin 910, a synthetic braided resorbable suture, was developed to overcome these limitations by eliminating the need for removal while maintaining favourable handling properties. Nevertheless, as absorbable sutures remain in situ during gradual hydrolytic degradation, they may be exposed to the oral microbial environment for a longer duration [7].

Previous studies evaluating bacterial adherence to different suture materials have reported inconsistent findings [4,8]. Some investigations have demonstrated higher bacterial colonisation on silk, possibly due to its natural fibre composition, whereas others have reported comparable levels of colonisation among braided sutures, suggesting that suture structure may play a more significant role than chemical composition [5,8].

In periodontal practice, microbial adherence to sutures assumes particular importance in patients with systemic conditions, compromised healing potential, or in procedures involving tissue regeneration. In such scenarios, microbial contamination may compromise graft materials and impair wound healing [9,10]. Despite its clinical relevance, there remains limited clinical and microbiological evidence comparing resorbable and non-resorbable braided sutures in periodontal flap surgery. Therefore, the present study was designed to address this gap by providing a comparative evaluation under clinical conditions.

Accordingly, the present study aimed to quantitatively assess bacterial adherence to braided silk and braided polyglactin 910 sutures following periodontal flap surgery, and to evaluate their influence on clinical healing.

MATERIALS AND METHODS

This study was designed as a randomised clinical study conducted in the Department of Periodontics at Guru Nanak Institute of Dental Sciences and Research, Kolkata, West Bengal, India, from November 2019 to April 2021 after obtaining approval from the Institutional Ethics Committee (IEC approval no: GNIDSR/IEC/19-22/22, dated 21/11/2019). Patients were randomly allocated into two groups using a computer-generated randomisation method. The microbiological evaluator was blinded to the group allocation. All participants received detailed information regarding study procedures, limitations, benefits of treatments and signed informed consent forms prior to participation. The study adhered to ethical principles outlined in the Declaration of Helsinki guidelines (2013).

Inclusion criteria: Patients were selected for the study based on the following inclusion criteria:

- Systemically healthy individuals without conditions such as diabetes, hypertension, hormonal disorders, or any disease requiring immunosuppressive therapy or corticosteroids;
- Age between 18 and 60 years;
- Absence of nutritional or neurological disorder;
- No history of antibiotic therapy with in the past three months;
- Patients who need periodontal flap surgery (probing depth >5 mm after Phase I therapy);
- Only cases involving undisplaced periodontal flap surgery;
- Good oral hygiene maintenance.

Exclusion criteria:

- Patients below 18 years and above 60 years;
- Patients with systemic or immunomodulatory diseases;
- Patients with a history of antibiotic therapy within the past three month;
- Smokers or individuals with deleterious oral habits;
- Pregnant or lactating women;
- Patients with poor oral hygiene.

Sample size estimation: The sample size for the present study was calculated to detect a statistically significant difference between two independent groups using a two-sided hypothesis test. The parameters for sample size estimation were derived from a pilot study conducted on 10 subjects prior to the main investigation. Based on the pilot study findings, the standardised effect size (Cohen's d) [11] was calculated using the pooled standard deviation.

$$\text{Effect Size (d)} = \text{Mean Difference}/SD_{pooled} = 1.33/1.46 = 0.91$$

This corresponds to a large effect size.

The sample size was then calculated with the following statistical assumptions:

- Type I error (α)=0.05
- Statistical power (1-β)=80%
- Two-tailed test

Based on these parameters, the minimum required sample size was calculated to be 19 participants per group, resulting in a total sample size of 38 patients.

Methodology and Parameters Studied

The study involved two types of intraoral suture materials. 19 patients were selected for each group to compare microbial colonisation on different suture materials in patients undergoing an undisplaced periodontal flap surgery as outpatients. The microbiological part of the study was conducted in the Department of Microbiology at the same institution.

A total of 38 patients, who had no systemic or immunomodulatory diseases, were randomly allocated into two groups using a computer-generated randomisation sequence. Allocation concealment was achieved using sequentially numbered, opaque, sealed envelopes, which were opened at the time of surgery.

Group-A: Patients who underwent flap surgery with 4-0 non-resorbable braided silk sutures (Mersilk™, Ethicon, Johnson & Johnson Pvt., Ltd., India).

Group-B: Patients who underwent flap surgery with 4-0 resorbable braided polyglactin 910 sutures (Vicryl®, Ethicon, Johnson & Johnson Pvt., Ltd., India).

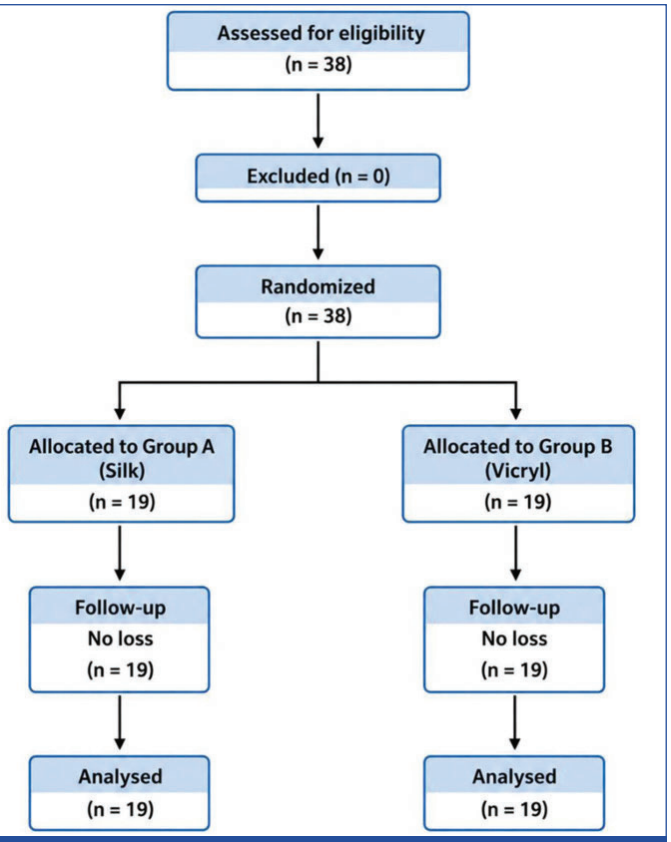
Surgical procedures: The surgical procedures were performed under 2% Lignocaine (1:80,000 adrenaline) using local infiltration at the surgical sites. Following flap reflection, meticulous debridement and root planing were carried out. The flaps were repositioned and secured using interrupted suturing technique, ensuring close adaptation of the flap margins without tension. Care was taken to maintain uniform suture placement in all cases to standardise the procedure. No periodontal dressing was applied, as dressing materials could interfere with microbial analysis.

Suture samples were collected at two postoperative time points (7th and 14th days). In each patient, multiple sutures were placed, and different suture segments were removed at each time point to allow independent microbial assessment without disturbing the remaining sutures.

All sample sutures were processed immediately after collection. No transport media was used, as all samples were collected and processed within the Department of Microbiology, on the same campus. A standardised 1 cm length of suture, excluding knots due to their known propensity for higher microbial accumulation [5], was obtained from each sample for microbiological analysis [Table/Fig-1].

Parameters evaluated:

- Primary parameter: Microbial adherence on suture materials (CFU count)
- Secondary parameter: Wound healing index at different postoperative intervals.



[Table/Fig-1]: CONSORT flow diagram showing participant selection, randomisation, allocation to suture groups, follow-up, and final analysis.

Microbial Analysis

Following retrieval, each suture sample was immediately transferred into sterile tubes containing 10 mL of sterile 0.9% normal saline. The sample was vortexed for five minutes at 2500 rpm to release the microorganisms adhered to the suture material. Serial dilutions of the suspension (10^{-2} to 10^{-8}) were then prepared.

After that bacterial counts were determined using the spread-plate technique on Columbia Blood Agar Plate (Hi-Media M144). A 0.1 mL sample of the diluted solution was carefully placed in the centre of the agar plate and spread evenly using a sterile glass spreader. The plates were left undisturbed for a few minutes to allow the sample to absorb, then they were inverted and incubated at 37°C for 24 hours. Colony counting was performed after 48 hours. Each plate was visually examined, and colonies were counted systematically to avoid duplication. The bacterial load was calculated using the standard formula [12]:

Number of cells per mL=number of colonies×dilution factor

Since 1 cm of suture material was immersed in 10 mL of saline, the bacterial count obtained from the suspension represented the microbial load on that length of suture and was expressed as CFUs per centimetre (CFU/cm). Data were analysed statistically to compare intra-group and inter-group differences.

Healing Index (HI)

Postoperative wound healing was assessed using the Healing index (HI) described by Landry RG et al., (1988) [13]. The index evaluates tissue colour, response to palpation, presence of granulation tissue, and incision margin closure to determine the quality of healing following periodontal flap surgery.

Visible plaque index

Dental plaque accumulation was assessed using the Visible Plaque Index (VPI) proposed by Ainamo J and Bay I (1975), based on the presence or absence of visible plaque at the gingival margin [14]. In this index, the buccal, lingual, mesial, and distal tooth surfaces were examined and recorded as either positive or negative according to the presence of clearly visible plaque. This method is widely used because of its simplicity and reproducibility, with plaque recorded dichotomously as present or absent.

STATISTICAL ANALYSIS

Descriptive statistics were used to summarise the data, including mean, standard deviation, and median. The independent sample t-test was applied to compare bacterial counts (CFU/cm) between the two groups. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) Statistics for windows, version 28.0 (IBM Corp., Armonk, NY, USA).

RESULTS

A total of 38 participants were included in the study, with 19 patients in each group. The mean age of the study population was 40.63±11.15 years, ranging from 18 to 59 years. Among the participants, 17 were males (44.7%) and 21 were females (55.3%), with comparable distribution between Group-A (silk) and Group-B (polyglactin 910) [Table/Fig-2].

Variables		Group-A	Group-B	p-value
Age (Mean±SD)		37.53±11.22	43.74±10.45	0.086
Gender distribution	Male	9 (47.4%)	8 (42.1%)	1.000
	Female	10 (52.6%)	11 (57.9%)	

[Table/Fig-2]: Demographic variables.
Independent t-test was used for comparison of age, whereas Fisher's-exact test was used for comparison of gender distribution

Clinical Findings (Wound Healing Index)

The wound healing index was evaluated at 7 and 14 days postoperatively. Inter-group comparison revealed no statistically significant difference between the two groups at either time point (p > 0.05; Day 7, p=0.984; Day 14, p=0.986). No postoperative infection, suppuration, or adverse tissue reactions were observed in either group during the follow-up period [Table/Fig-3].

Time Point	Score	Group-A (n=19)	Group-B (n=19)	p-value
Day 7	1	5 (26.3%)	6 (31.6%)	0.984
	2	8 (42.1%)	7 (36.8%)	
	3	4 (21.1%)	4 (21.1%)	
	4	2 (10.5%)	2 (10.5%)	
Day 14	1	1 (5.3%)	1 (5.3%)	0.986
	2	3 (15.8%)	4 (21.1%)	
	3	8 (42.1%)	7 (36.8%)	
	4	7 (36.8%)	7 (36.8%)	

[Table/Fig-3]: Inter-group comparison of wound healing index (HI) scores at Day 7 and Day 14.
Inter-group comparison was performed using Fisher's-exact test

Plaque Accumulation

All patients exhibited visible plaque accumulation on the suture materials at both the 7th and 14th postoperative days.

Microbial Analysis

Microbial analysis revealed that all retrieved suture samples (100%) demonstrated bacterial growth at both postoperative time points, indicating consistent microbial colonisation in the oral environment [15].

In Group-A (silk sutures), the mean bacterial load increased from 10.63±12.09 × 10^7 CFU on Day 7 to 11.68±6.47 × 10^7 CFU on Day 14. However, this increase was not statistically significant (p=0.731) [Table/Fig-4].

Similarly, in Group-B (polyglactin 910 sutures), the mean CFU count increased from 13.47±9.47 × 10^7 CFU on Day 7 to 16.63±8.03 × 10^7 CFU on Day 14. This rise was also not statistically significant (p=0.214) [Table/Fig-5].

Group	Time point	Mean±SD	p-value
Group-A (Silk)	Day 7	10.63±12.09	0.731
	Day 14	11.68±6.47	

[Table/Fig-4]: Intra-group comparison of bacterial load (Silk).

Group	Time point	Mean±SD	p-value
Group-B (Vicryl)	Day 7	13.47±9.47	0.214
	Day 14	16.63±8.03	

[Table/Fig-5]: Intra-group comparison of bacterial load (Vicryl).

At the 7th postoperative day, the mean bacterial count in Group-B (1.3474×10^8 CFU) was higher than that in Group-A (1.0632×10^8 CFU), showing a difference of approximately 2.84×10^7 CFU (~26.7% higher). However, this difference was not statistically significant (p=0.425). The lack of significance may be attributed to the variability within the groups, as indicated by the relatively large standard deviations. At the 14th postoperative day, Group-B continued to exhibit higher bacterial counts (1.6632×10^8 CFU) compared to Group-A (1.1684×10^8 CFU), with an absolute difference of approximately 4.95×10^7 CFU (~42.4% higher). This difference was statistically significant (p=0.044), indicating greater bacterial colonisation in the polyglactin 910 group at this time point [Table/Fig-6].

Time point	Group	Mean CFU ($\times10^8$)	Standard deviation ($\times10^8$)	p-value
Day 7	Silk (Group-A)	1.0632	1.2093	0.425
	Vicryl (Group-B)	1.3474	0.9471	
Day 14	Silk (Group-A)	1.1684	0.6473	0.044
	Vicryl (Group-B)	1.6632	0.8030	

[Table/Fig-6]: Inter-group comparison of bacterial load.

DISCUSSION

The present randomised clinical and microbiological study was conducted to evaluate and compare microbial colonisation on two commonly used braided suture materials- non-resorbable silk and resorbable polyglactin 910 following periodontal flap surgery. Sutures play a fundamental role in periodontal wound healing by maintaining flap adaptation, stabilising the blood clot, and facilitating primary wound closure [7]. However, once placed in the oral cavity, suture materials are constantly exposed to saliva, dental plaque, food debris, and a diverse microbial environment. This exposure promotes bacterial adhesion and subsequent biofilm formation on the suture surface, which may influence postoperative healing and tissue response [3,5].

The findings of the present study demonstrated that bacterial colonisation occurred on all retrieved suture samples at both postoperative intervals, indicating that microbial adherence to intraoral sutures is a consistent and clinically relevant phenomenon [8]. In both groups, the mean bacterial load increased from Day 7 to Day 14, suggesting progressive microbial accumulation with increased intraoral exposure time. Although this increase was not statistically significant within either group, the trend observed in both silk and polyglactin 910 sutures supports the concept of progressive oral biofilm maturation over time [15].

The increase in bacterial colonisation from Day 7 to Day 14 observed in both groups is consistent with the natural pattern of oral biofilm development. Following placement, suture materials become coated with salivary glycoproteins and plasma-derived proteins, forming a conditioning film that facilitates early bacterial attachment [1,2]. Initial microbial adhesion is followed by bacterial proliferation, extracellular matrix production, and gradual maturation of the biofilm architecture. Flemmig TF and Beikler T emphasised that oral biofilms are highly organised microbial communities capable of rapid colonisation on available intraoral surfaces [15]. Similarly, Javed F et al., discussed the interaction of suture materials with oral tissues and fluids, highlighting their potential role as retentive surfaces for bacterial accumulation [3]. Therefore, the progressive increase in bacterial load observed from Day 7 to Day 14 in the present study is consistent with the biological behaviour of oral microbial biofilms.

The present findings are also in agreement with the observations of Banche G et al., who reported rapid and consistent microbial adherence on different intraoral suture materials following dental surgical procedures [8]. Their study demonstrated that bacterial colonisation intensifies with prolonged exposure of sutures to the oral environment, irrespective of the material used. Similarly, Otten JE et al., reported that braided suture materials exhibit increased bacterial retention due to the presence of interstices between filaments, which provide favourable niches for microbial accumulation and protection from mechanical cleansing [5]. These studies support the current observation that bacterial colonisation increased over time in both groups.

In the inter-group comparison, the present study demonstrated that polyglactin 910 sutures exhibited higher mean bacterial counts than silk sutures at both postoperative intervals. Although the difference at Day 7 was not statistically significant, a statistically significant increase in bacterial load was observed in the polyglactin 910 group at Day 14. These findings suggest that while both braided suture materials support microbial colonisation, polyglactin 910 may permit greater bacterial accumulation during prolonged intraoral exposure. Several factors may explain the comparatively higher bacterial counts observed in the polyglactin 910 group. Polyglactin 910 is an absorbable braided suture material that undergoes hydrolytic degradation during the healing period. This degradation process may alter the surface characteristics of the material, increase surface irregularities, and create additional retentive areas for microbial adhesion [7]. As the material gradually breaks down within the tissue environment, its prolonged interaction with saliva and plaque may further facilitate microbial accumulation. Burkhardt R and Lang NP emphasised that the physical and structural characteristics of suture materials can influence wound healing and bacterial retention, particularly in the plaque-rich oral environment [7].

The braided configuration of both silk and polyglactin 910 sutures is another important factor contributing to bacterial adherence. Braided sutures contain multiple intertwined filaments that create capillary spaces capable of retaining fluids and microorganisms. Katz S et al., demonstrated that bacterial adherence is significantly greater on multifilament sutures compared with smoother materials because the filament interstices facilitate microbial entrapment and protection [4]. Similarly, Otten JE et al., reported that braided suture materials exhibit higher bacterial colonisation due to increased surface area and capillarity [5]. These structural characteristics likely contributed to the substantial bacterial growth observed in both groups in the present study.

Another important observation of the present study was that all patients exhibited visible plaque accumulation on the suture materials at both postoperative intervals. This finding further supports the concept that sutures act as plaque-retentive factors within the oral cavity [5,8]. Ainamo J and Bay I emphasised the importance of visible plaque assessment in evaluating oral hygiene and plaque accumulation around intraoral structures [14]. The presence of plaque on all sutures in the present study likely contributed to the universal bacterial growth observed in microbiological analysis. The oral cavity provides a favourable environment for microbial proliferation because of constant moisture, nutrient availability, and the presence of diverse microbial species [15]. Therefore, plaque accumulation on sutures appears to be an expected finding during the postoperative healing phase.

Despite the differences in bacterial colonisation between the two groups, no postoperative infection, suppuration, or adverse inflammatory tissue response was observed during the follow-up period. In addition, the wound healing index scores did not show any significant difference between the groups at either Day 7 or Day 14.

Although bacterial accumulation increased over time, it did not appear to adversely affect the clinical healing outcomes. These findings are consistent with previous studies suggesting that periodontal wound healing is influenced by several local and host-related factors in addition to bacterial colonisation [7,9]. Factors such as flap stability, tissue vascularity, and postoperative plaque control play important roles in achieving favourable healing outcomes. In the present study, all participants were systemically healthy and followed routine postoperative care instructions throughout the follow-up period, which may explain the absence of postoperative complications despite the presence of bacterial colonisation on the sutures [7,9].

From a clinical perspective, the findings of the present study suggest that both silk and polyglactin 910 braided sutures remain acceptable options for periodontal flap surgery. Although polyglactin 910 demonstrated significantly greater bacterial colonisation at Day 14, both materials showed comparable clinical healing outcomes. Therefore, the choice of suture material should not rely solely on microbial adherence characteristics. Other clinically relevant factors such as handling properties, knot security, tensile strength, tissue reaction, ease of manipulation, patient comfort, and surgeon preference should also be considered during material selection [3,7].

Recent developments in suture technology have focused on reducing bacterial adherence and minimising the risk of surgical site infection. Antimicrobial-coated sutures have shown promising results in reducing bacterial colonisation and improving postoperative healing. Onesti MG et al., reviewed the effectiveness of antimicrobial-coated sutures and reported their potential role in reducing surgical site infections [16]. Similarly, Karde P et al., demonstrated reduced bacterial colonisation with antibacterial-coated resorbable sutures following periodontal flap surgery [17]. Such advances may be particularly beneficial in medically compromised individuals, patients with poor plaque control, or surgical procedures involving higher infection risk.

The present study possesses several strengths. It evaluated two commonly used braided suture materials under standardised clinical conditions using both clinical and microbiological parameters. Random allocation of participants helped maintain comparability between the groups. In addition, assessment of bacterial colonisation at both Day 7 and Day 14 allowed observation of changes in microbial accumulation over time following periodontal flap surgery.

Limitation(s)

Certain limitations of the study should also be considered. The sample size was relatively small, which may limit the generalisability of the findings. Only braided suture materials were included, while monofilament sutures were not evaluated. Moreover, microbiological analysis was restricted to quantitative CFU assessment, and species-level identification of microorganisms was not performed. Future studies with larger sample sizes, longer follow-up periods, and advanced microbiological methods may provide a more detailed understanding of the relationship between suture materials and microbial colonisation in periodontal surgery.

CONCLUSION(S)

Within the limitations of the present study, both resorbable (polyglactin 910) and non-resorbable (silk) braided sutures demonstrated comparable clinical healing outcomes following periodontal flap surgery. Bacterial colonisation was observed on both suture materials and showed an increasing trend over time. Although polyglactin 910 exhibited significantly higher bacterial colonisation at the 14th postoperative day, this difference was not associated with adverse clinical healing outcomes. Therefore, the selection of suture material in periodontal flap surgery should be based not only on microbial adherence characteristics but also on factors such as handling properties, tissue response, surgical requirements, and patient-related considerations.

REFERENCES

[1] Dahlke H, Dociu N, Thurau K. Thrombogenicity of different suture materials as revealed by scanning electron microscopy. J Biomed Mater Res. 1980;14(3):251-68. Doi: 10.1002/jbm.820140307.
[2] Marsh PD. Are dental diseases examples of ecological catastrophes? Microbiology (Reading). 2003;149(Pt 2):279-94. Doi: 10.1099/mic.0.26082-0.
[3] Javed F, Al-Askar M, Almas K, Romanos GE, Al-Hezaimi K. Tissue reactions to various suture materials used in oral surgical interventions. ISRN Dent. 2012;2012:762095. Doi: 10.5402/2012/762095.
[4] Katz S, Izhar M, Mirelman D. Bacterial adherence to surgical sutures. Ann Surg. 1981;194(1):35-41. Doi: 10.1097/00000658-198107000-00007.
[5] Otten JE, Wiedmann-Al-Ahmad M, Jahnke H, Pelz K. Bacterial colonization on different suture materials- a potential risk for intraoral dentoalveolar surgery. J Biomed Mater Res B Appl Biomater. 2005;74B(1):627-35. Doi: 10.1002/jbm.b.30250.
[6] Asher R, Chacartchi T, Tandlich M, Shapira L, Polak D. Microbial accumulation on different suture materials following oral surgery: A randomized controlled study. Clin Oral Investig. 2019;23(2):559-65. Doi: 10.1007/s00784-018-2476-0.
[7] Burkhardt R, Lang NP. Influence of suturing on wound healing. Periodontol 2000. 2015;68(1):270-81. Doi: 10.1111/prd.12078.
[8] Banche G, Roana J, Mandras N, Amasio M, Gallesio C, Allizond V, et al. Microbial adherence on various intraoral suture materials in patients undergoing dental surgery. J Oral Maxillofac Surg. 2007;65(8):1503-07. Doi: 10.1016/j.joms.2006.10.066.
[9] Heitz-Mayfield LJA, Lang NP. Surgical and nonsurgical periodontal therapy: Learned and unlearned concepts. Periodontol 2000. 2013;62(1):218-31. Doi: 10.1111/prd.12008.
[10] Johnson GK, Hill M. Cigarette smoking and the periodontal patient. J Periodontol. 2004;75(2):196-209. Doi: 10.1902/jop.2004.75.2.196.
[11] Sullivan GM, Feinn R. Using effect size-or why the P value is not enough. J Grad Med Educ. 2012;4(3):279-82. Doi: 10.4300/jgme-d-12-00156.1.
[12] Cappuccino JG, Sherman N. Microbiology: A laboratory manual. 10th ed. Boston: Pearson; 2014. p.142.
[13] Landry RG, Turnbull RS, Howley T. Effectiveness of benzydamine HCl in the treatment of periodontal postsurgical patients. Res Clin Forums. 1988;10:105-18.
[14] Ainamo J, Bay I. Problems and proposals for recording gingivitis and plaque. Int Dent J. 1975;25(4):229-35.
[15] Flemmig TF, Beikler T. Control of oral biofilms. Periodontol 2000. 2011;55(1):9-15. Doi: 10.1111/j.1600-0757.2010.00383.x.
[16] Onesti MG, Carella S, Scuderi N. Effectiveness of antimicrobial-coated sutures for the prevention of surgical site infection: A review of the literature. Eur Rev Med Pharmacol Sci. 2018;22(17):5729-39. Doi: 10.26355/eurrev_201809_15841.
[17] Karde P, Sethi K, Mahale S, Mamajiwala A, Kale A, Joshi C. Comparative evaluation of two antibacterial-coated resorbable sutures versus noncoated resorbable sutures in periodontal flap surgery: A clinico-microbiological study. J Indian Soc Periodontol. 2019;23(3):220-26. Doi: 10.4103/jisp.jisp_524_18.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Periodontics, Guru Nanak Institute of Dental Sciences and Research, Kolkata, West Bengal, India.
2. Postgraduate Student, Department of Periodontics, Guru Nanak Institute of Dental Sciences and Research, Kolkata, West Bengal, India.
3. Professor, Department of Periodontics, Guru Nanak Institute of Dental Sciences and Research, Kolkata, West Bengal, India.
4. Reader, Department of Microbiology, Guru Nanak Institute of Dental Sciences and Research, Kolkata, West Bengal, India.
5. Professor and Head, Department of Periodontics, Guru Nanak Institute of Dental Sciences and Research, Kolkata, West Bengal, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Sudipta Ghosh,
Umang Apartment, Madhyamgram, Kolkata, West Bengal, India.
E-mail: ghosh.drsudipta@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 19, 2026
- Manual Googling: May 21, 2026
- iThenticate Software: May 23, 2026 (8%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Mar 09, 2026**
Date of Peer Review: **Apr 03, 2026**
Date of Acceptance: **May 25, 2026**
Date of Publishing: **Jul 01, 2026**