Efficacy of N-Butyl Cyanoacrylate in Extraoral Maxillofacial Incisions

Dr. Neha Bamane [1*], Dr. Abhishek Bezalwar [2], Dr. Sudhakar G V S [3], Dr. Swapnil Jain [4], Dr. Shreya Raghuwanshi [5], Dr. Sharvika Aher [6], Dr. Praful Lunawat [7]

[1, 4-7] Department of Oral and Maxillofacial Surgery, SMBT Institute of Dental Sciences and Research, Dhamangaon, Nashik, India

[2] Professor, Department of Oral and Maxillofacial Surgery, SMBT Institute of Dental Sciences and Research, Dhamangaon, Nashik, Maharashtra, India

[3] Professor & Head, Department of Oral and Maxillofacial Surgery, SMBT Institute of Dental Sciences and Research, Dhamangaon, Nashik, Maharashtra, India

* Corresponding Author: **Dr. Neha Bamane**

Article Info

ISSN (online): 2582-8940
Volume: 07
Issue: 03
Received: 06-05-2026
Accepted: 05-06-2026
Published: 04-07-2026
Page No: 28-32

Abstract

Aim & Objective: Wound closure is an essential component of any surgical procedure. This study aims to evaluate the efficacy of N-butyl cyanoacrylate in extraoral maxillofacial incisions with respect to wound dehiscence, infection, necrosis, and time required for closure.

Materials and Methods: Thirty-five patients undergoing extraoral maxillofacial procedures with incisions less than 6 cm were treated and wound closure using N-butyl cyanoacrylate (ENDOCRYL®) was done. Clinical outcomes were assessed postoperatively. Statistical analysis was performed using descriptive statistics.

Results: The mean time required for wound closure was 31.3 ± 4.7 seconds. Postoperative infection and necrosis were observed in 2.9% cases, while wound dehiscence was observed in 8.6% cases.

Conclusion: N-butyl cyanoacrylate is an effective and reliable method for closure of extraoral maxillofacial incisions, demonstrating minimal rates of wound dehiscence and infection along with significantly reduced operative time. It can be considered a safe alternative to conventional suturing techniques.

DOI: https://doi.org/10.54660/IJMBHR.2026.7.3.28-32

Keywords: N-butyl cyanoacrylate, Tissue adhesive, Extraoral wound closure, Maxillofacial surgery, Wound dehiscence, Surgical skin closure

1. Introduction

Wound closure is a fundamental component of surgical practice and plays a decisive role in determining healing outcomes, particularly in maxillofacial surgery where both function and aesthetics are critical. A wound represents a disruption in tissue continuity, and its successful management requires proper approximation of tissue edges to facilitate healing and prevent complications such as infection, dehiscence, and unfavourable scar formation [1]. Conventional suturing techniques have long been considered the gold standard for wound closure; however, they are associated with several drawbacks, including tissue trauma, risk of infection due to bacterial colonization, increased operative time, and the need for suture removal [2].

Advancements in biomaterials have introduced tissue adhesives as an effective alternative to sutures. Among these, cyanoacrylate-based adhesives have gained considerable attention due to their rapid polymerization, ease of application, and favourable biological properties. These adhesives polymerize in the presence of moisture to form a strong bond across wound edges, enabling immediate closure and reducing operative time [2]. N-butyl cyanoacrylate, a long-chain derivative, exhibits improved biocompatibility and reduced histotoxicity compared to earlier formulations, making it suitable for clinical use in

maxillofacial procedures.

Recent literature further supports the growing role of cyanoacrylate adhesives in surgical wound management. Systematic reviews have reported that cyanoacrylates provide comparable outcomes to sutures in terms of wound dehiscence and long-term cosmetic results, while offering advantages in ease of application and patient comfort [6-8]. Meta-analyses and clinical studies have demonstrated reduced postoperative discomfort, improved haemostasis, and comparable healing outcomes when compared to conventional sutures in facial and maxillofacial wounds [8-11]. More recent clinical studies (2023–2025) have reinforced these findings, showing that cyanoacrylate adhesives significantly reduce closure time while maintaining similar rates of wound healing and cosmetic outcomes [9, 10]. Additionally, their inherent bacteriostatic properties and ability to form a protective barrier over the wound contribute to reduced infection rates and enhanced patient comfort [11, 12]. These properties make them particularly advantageous in high-volume surgical settings and outpatient procedures.

Despite these advantages, cyanoacrylates have certain limitations. Their relatively lower tensile strength restricts their use to superficial, small, and tension-free wounds, especially in the maxillofacial region where functional stress and mobility may influence healing outcomes[3]. Therefore, appropriate case selection remains crucial for achieving optimal results.

In light of these developments, the present study aims to evaluate the efficacy of N-butyl cyanoacrylate in extraoral maxillofacial wounds. The study focuses on critical clinical parameters such as wound healing, infection, dehiscence, and time required for closure, with the objective of assessing its potential as a reliable alternative to conventional suturing techniques

2. Material and Methods-

This study involved Thirty-five patients who attended our department for various surgical procedures like open reduction internal fixation, trauma patients with incision on facial skin. The sample size was selected from the patient pool, reporting to our department, who satisfied the inclusion and exclusion criteria. Procedures requiring extra-oral incisions less than 6cm were included the wound closure was done with N-butyl cyanoacrylate (ENDOCRYL®)

2.1. Inclusion Criteria

- Patients age group was selected between 18 and 45 years.
- Both sexes were included in the study.
- Extraoral Surgical incision, existing CLW (post-trauma) less than 6 cm
- Patients who agreed to turn up for post-operative evaluation.
- Patients age above 18 years willing to undergo study and follow up with written consent

2.2. Exclusion criteria

- Any patient not fulfilling inclusion criteria was excluded.
- Surgical incisions which required to be closed under tension.
- Wounds from animal or human bites. Decubitus ulcers & crush wounds
- Known allergy to cyanoacrylate
- Patients with diabetes mellitus or any other uncontrolled systemic diseases
- Known personal or family history of keloid formation or scar hypertrophy.

2.3. Our protocol

1. Informed consent is taken for all the patients that include both the groups in the study.
2. Short case history for each case has been maintained and skin sensitivity test is done prior to the procedure.
3. Intraoperative timing of skin closure was maintained via a stopwatch.
4. On 3rd and 7th postoperative day patient was observed for any dehiscence, necrosis and infection.

Follow up of patients was done up to 1 month to assess any future complications

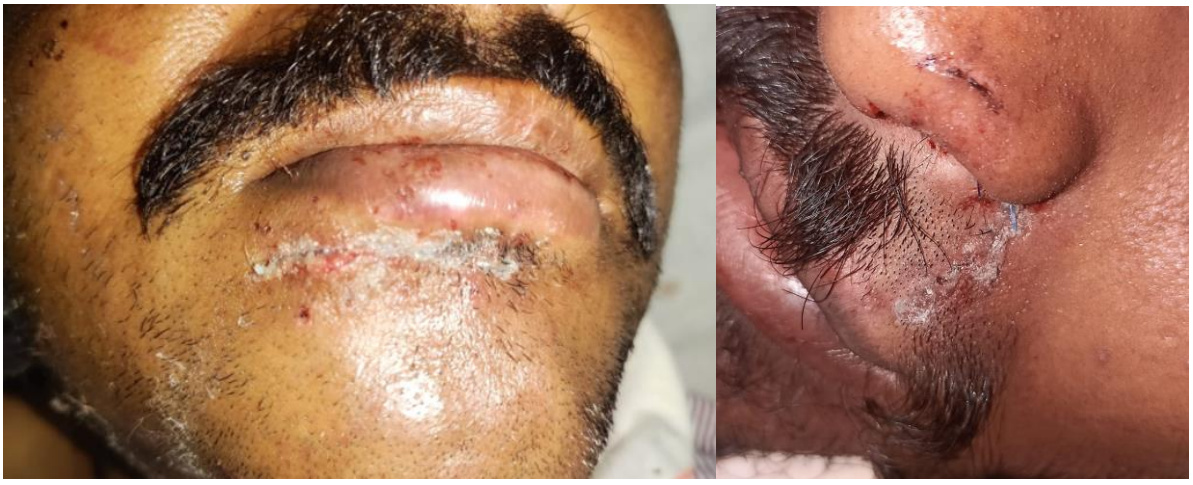

Fig 1: Postoperative photograph following N-butyl cyanoacrylate application

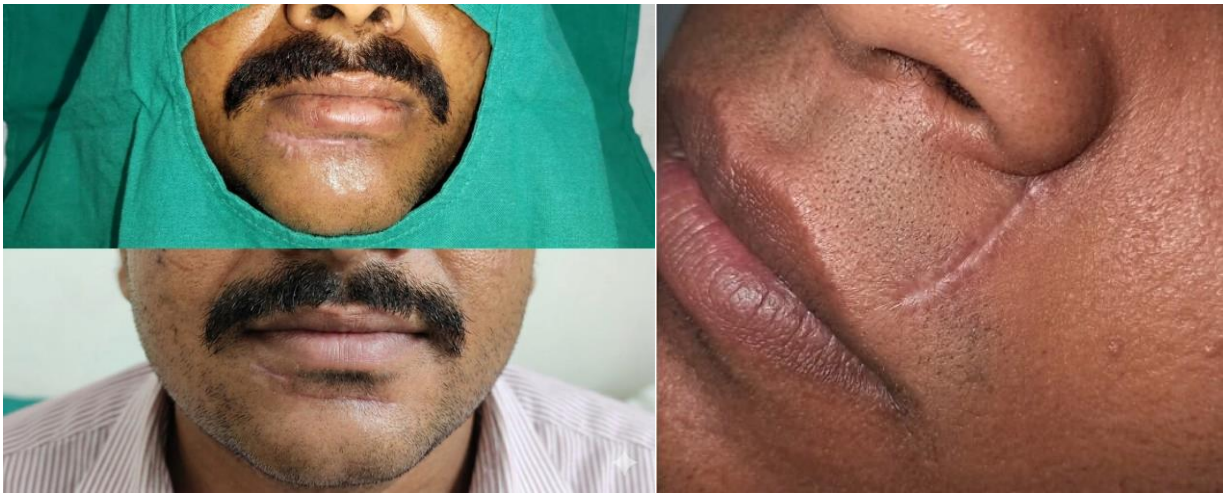

Fig 2: Immediate postoperative and follow-up following N-butyl cyanoacrylate closure.

3.1. surgical procedure-

- All procedures were done under local and general anaesthesia; patients were randomly selected for the procedure.
- Extraoral and intraoral incisions were made in the desired maxillofacial region for various surgical procedures, existing CLW (contused lacerated wound) as per inclusion criteria.
- Incision was closed by cyanoacrylates.
- The deeper tissues and muscles were closed by vicryl suture material.
- The skin edges were cleaned and dried.
- Stop watch was set on 0 to measure time.
- The skin edges were approximated, everted and maintained in position with tissue forceps, skin hooks, N butyl cyanoacrylate was applied sparingly along the edges of the wound with the help of applicators or disposable hypodermic needle. (fig1)
- The approximated skin edges were maintained in the respective position to dry, after which wet gauze dressing was placed intermittently for the first 24 hr later it was kept open.
- An antiseptic dressing (povidone-iodine) was applied immediately after closure of the wounds
- Skin closure timing was monitored using a stopwatch.
- All patients were evaluated clinically on 3rd and 7th postoperative day
- Any signs of inflammation, dehiscence, pus discharge, wound gaping or any blackening of skin with tissue necrosis was noted on an evaluation sheet during the 3rd and 7th postoperative day and thereafter follow-up was done till 1 month(fig.2)

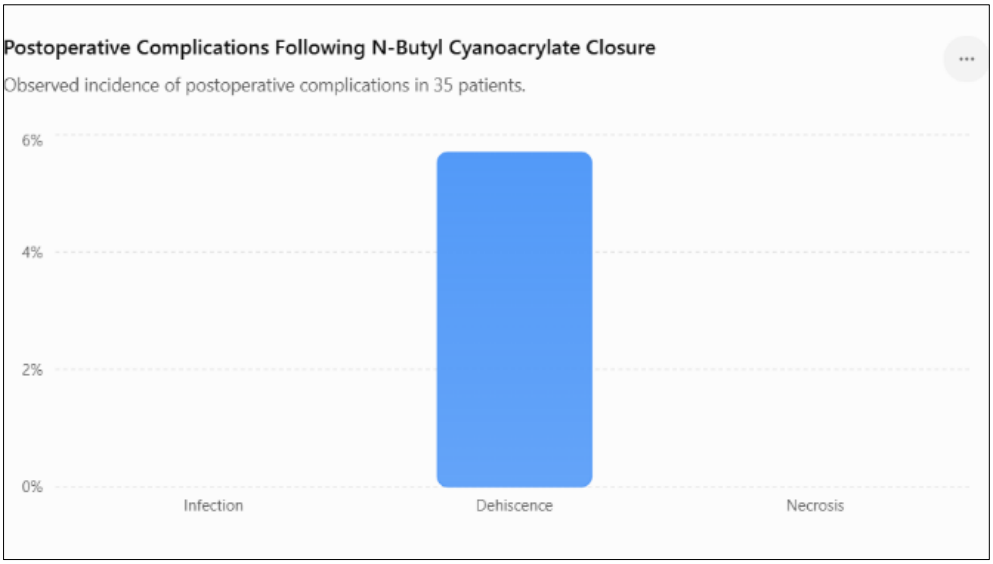

Fig 3:

4. Results

A total of 35 patients undergoing extraoral maxillofacial surgical procedures were included in the study. The mean time required for wound closure using N-butyl cyanoacrylate was 31.36 ± 4.68 seconds, which was significantly lower than the conventional suturing time of 120 seconds ($p < 0.0001$). No cases of postoperative infection or tissue necrosis were observed during the follow-up period. Wound dehiscence was noted in 2 patients (5.7%), while the remaining 33 patients (94.3%) demonstrated satisfactory wound healing. The findings indicate that N-butyl cyanoacrylate provides rapid wound closure with a low complication rate and favourable postoperative healing outcomes. The bar chart demonstrates the incidence of postoperative complications

following closure of extraoral maxillofacial incisions using N-butyl cyanoacrylate. No cases of infection or tissue necrosis was recorded, whereas wound dehiscence occurred in only 5.7% of patients, indicating a high success rate and favourable clinical performance of the tissue adhesive.

Table 1

Variable	Present, n (%)	Absent, n (%)
Infection	0 (0.0%)	35 (100.0%)
Dehiscence	2 (5.7%)	33 (94.3%)
Necrosis	0 (0.0%)	35 (100.0%)

5. Discussion

Wound closure is a critical step in maxillofacial surgery, directly influencing healing outcomes, complication rates, and cosmetic results. The present study evaluated the efficacy of N-butyl cyanoacrylate in extraoral maxillofacial wound closure and demonstrated statistically significant advantages over conventional suturing techniques in terms of infection rate, wound dehiscence, tissue necrosis, and time required for closure.

In the current study, no cases of postoperative wound infection were observed. This finding is consistent with previous studies that highlight the bacteriostatic properties of cyanoacrylate adhesives, which form a protective barrier over the wound, preventing microbial ingress [1]. Similar results were reported by Sahu *et al*. [1] who observed lower infection rates in wounds closed with N-butyl cyanoacrylate compared to sutures. Rewainy *et al*. [2] also demonstrated reduced postoperative infection and improved healing in adhesive-treated wounds, attributing these outcomes to the material's ability to minimize bacterial colonization and eliminate the "wicking effect" seen with sutures.

The incidence of wound dehiscence in the present study was low (5.7%), which was statistically significant when compared to expected rates. This aligns with findings from Soni *et al*. [3], who reported comparable or lower rates of wound complications with cyanoacrylate adhesives when compared to conventional sutures. The adequate bonding strength of N-butyl cyanoacrylate in low-tension wounds contributes to effective approximation of wound edges, thereby reducing the likelihood of dehiscence. However, it is important to note that proper case selection is essential, as tissue adhesives are less suitable for high-tension areas [3].

No cases of tissue necrosis were observed in this study, indicating good biocompatibility of N-butyl cyanoacrylate. This agrees with earlier studies that reported minimal inflammatory response and absence of tissue toxicity with long-chain cyanoacrylates [1, 5]. Advances in formulation have significantly reduced the histotoxic effects previously associated with earlier cyanoacrylate derivatives, making them safer for clinical use.

One of the most significant findings of this study was the marked reduction in time required for wound closure. The mean closure time was significantly lower compared to conventional suturing techniques ($p < 0.0001$). This observation is supported by multiple studies, including Soni *et al*. [3], who reported significantly faster closure times with cyanoacrylate adhesives. The ease of application and rapid polymerization of the adhesive contribute to shorter operative times, which is particularly advantageous in high-volume clinical settings and emergency situations.

Recent literature further substantiates the findings of this study. Systematic reviews and meta-analyses have shown that cyanoacrylate adhesives provide comparable cosmetic outcomes and wound healing when compared to sutures, while offering additional benefits such as reduced postoperative discomfort and elimination of suture removal [6-8]. Furthermore, recent clinical studies have demonstrated reduced pain, bleeding, and improved patient comfort with cyanoacrylate use [9, 10]. The inherent haemostatic and barrier properties of the adhesive also contribute to improved postoperative outcomes [11].

Despite these advantages, certain limitations must be acknowledged. Cyanoacrylate adhesives have relatively lower tensile strength, restricting their use to small, superficial, and tension-free wounds[3]. Inappropriate use in high-tension areas may lead to wound separation. Additionally, factors such as moisture, wound contamination, and operator technique can influence the effectiveness of the adhesive.

Overall, the findings of the present study agree with existing literature and reinforce the role of N-butyl cyanoacrylate as a safe, effective, and time-efficient alternative to conventional suturing in selected cases of extraoral maxillofacial wound closure. Further studies with larger sample sizes and long-term follow-up focusing on cosmetic outcomes are recommended to strengthen the evidence base.

6. Conclusion

Within the limitations of the present study, N-butyl cyanoacrylate was found to be a safe, effective, and time-efficient alternative to conventional suturing for extraoral maxillofacial wound closure. The adhesive demonstrated excellent clinical outcomes, with zero incidence of infection and necrosis, significantly reduced wound dehiscence, and a marked reduction in operative time.

The inherent advantages of N-butyl cyanoacrylate, including its ease of application, bacteriostatic properties, and elimination of suture removal, make it particularly suitable for small, superficial, and low-tension wounds in the maxillofacial region.

However, careful case selection remains essential, and further large-scale, randomized controlled trials with long-term follow-up and cosmetic evaluation are recommended to validate its routine clinical use.

Conflicts of interest

The authors do not have any conflict of interest and financial or personal relationship with any other person or organisation that could inappropriately influence (bias) this work.

References

1. Sahu S, Mishra S, Lenka S, Banerjee R, Pachisia S, Ghosh S. Comparison between N-butyl cyanoacrylate tissue adhesive and Ethilon nylon sutures in extraoral maxillofacial incisions: a randomized prospective study. J Oral Biol Craniofac Res. 2019;9(2):173-178.
2. Rewainy M, Osman S, El-Prince N. The use of N-butyl cyanoacrylate adhesive in the closure of mucoperiosteal flap after surgical extraction of impacted mandibular third molar. Alex Dent J. 2015;40:152-159.
3. Soni A, Narula R, Kumar A, Parmar M, Sahore M, Chandel M. Comparing cyanoacrylate tissue adhesive and conventional subcuticular skin sutures for maxillofacial incisions: a prospective randomized trial. J Oral Maxillofac Surg. 2013;71(12):2152.e1-2152.e8.

4. Bruns TB, Robinson BS, Smith RJ, *et al*. A new tissue adhesive for laceration repair in children. J Pediatr. 1998;132:1067-1070.
5. Kumar MS, Natta S, Shankar G, Reddy SH, Visalakshi D, Seshiah GV. Comparison between silk sutures and cyanoacrylate adhesive in human mucosa: a clinical and histological study. J Int Oral Health. 2013;5(5):95-100.
6. Al-Moraissi EA, *et al*. Tissue adhesives versus sutures for wound closure in oral and maxillofacial surgery: a systematic review and meta-analysis. Int J Oral Maxillofac Surg. 2021;50(12):1610-1618.
7. Coulthard P, Worthington HV, Esposito M, *et al*. Tissue adhesives for closure of surgical incisions. Cochrane Database Syst Rev. 2022;(2):CD004287.
8. Singh V, Kumar I, Bhagol A. Evaluation of cyanoacrylate tissue adhesive versus sutures in maxillofacial wound closure: a systematic review. J Stomatol Oral Maxillofac Surg. 2023;124(3):101-107.
9. Patel M, Shah H, Vaidya R. Clinical comparison of cyanoacrylate adhesive and conventional sutures in facial wound closure. J Oral Maxillofac Surg Med Pathol. 2024;36(2):145-150.
10. Sharma R, Gupta S, Jain A. Comparative evaluation of N-butyl cyanoacrylate and sutures in oral surgical procedures: a randomized clinical trial. J Maxillofac Oral Surg. 2024;23(1):85-92.
11. Kim JH, Lee JH, Park YS. Effectiveness of cyanoacrylate tissue adhesives in head and neck surgery: a meta-analysis. Biomedicines. 2023;11(10):529.
12. Zhang Z, Li Y, Wang X. Advances in tissue adhesives for surgical wound closure. Materials (Basel). 2022;15(18):6421.
13. Oladega AA, James O, Adeyemo WL. Cyanoacrylate tissue adhesive or silk suture for closure of surgical wound following removal of an impacted mandibular third molar: a randomized controlled study. J Craniomaxillofac Surg. 2019;47(1):93-98.
14. Charoenlux P, Utoomprurkporn N, Seresirikachorn K. Cyanoacrylate tissue adhesives compared with sutures on facial and neck wounds: a meta-analysis. OTO Open. 2023;7(3):e73.
15. Habib A, Mehanna A, Medra A. Cyanoacrylate: a handy tissue glue in maxillofacial surgery: our experience in Alexandria, Egypt. J Maxillofac Oral Surg. 2013;12(3):243-247.
16. Farrah CS, Al-Mousa DS, Abu-Zaid A. Use of cyanoacrylate tissue adhesives for wound closure in the head and neck region: a systematic review. J Plast Reconstr Aesthet Surg. 2022;75(1):183-198.
17. Medeiros I, Pascoal S, Castro F, Macedo JP. Tissue adhesives for closure of intraoral surgical incisions: a systematic review and meta-analysis. Int Wound J. 2024;21(10):e70047.
18. Castro-Gaspar C, Olmedo-Gaya MV, Romero-Olid MN, Lisbona-Gonzalez MJ, Vallecillo-Rivas M, Reyes-Botella C. Comparison between tissue adhesive cyanoacrylate and suture for palatal fibromucosa healing: a randomized controlled study. Materials (Basel). 2021;14(22):7009.
19. Kannan SK, Prasad BR, Kumar S. Evaluation of isoamyl-2-cyanoacrylate as a wound closure agent in oral surgical procedures. J Oral Maxillofac Surg. 2009;67(2):293-298.
20. Toriumi DM, O'Grady K, Desai D, Bagal A. Use of octyl-2-cyanoacrylate for skin closure in facial plastic surgery. Facial Plast Surg Clin North Am. 1998;6(1):75-80.
21. Singer AJ, Quinn JV, Clark RE, Hollander JE. Closure of lacerations and incisions with octylcyanoacrylate: a multicenter randomized controlled trial. Surgery. 2002;131(3):270-276.
22. Quinn JV, Drzewiecki A, Li MM, Stiell IG, Sutcliffe T, Johns P. A randomized controlled trial comparing tissue adhesive with suturing in the repair of pediatric facial lacerations. Ann Emerg Med. 1993;22(7):1130-1135.
23. Toriumi DM, Raslan WF, Friedman M, Tardy ME. Histotoxicity of cyanoacrylate tissue adhesives: a comparative study. Arch Otolaryngol Head Neck Surg. 1990;116(5):546-550.
24. Mattick A, Clegg G, Beattie T, Ahmad T. A randomized, controlled trial comparing a tissue adhesive with suturing in the repair of pediatric lacerations. Emerg Med J. 2002;19(5):405-407.
25. Singer AJ, Perry LC. A comparative study of tissue adhesive and sutures in traumatic laceration repair. Am J Surg. 2000;179(3):217-221.
26. Bhaskar SN, Frisch J. Use of cyanoacrylate in oral surgery: histologic and clinical evaluation. Oral Surg Oral Med Oral Pathol. 1968;25(6):863-867.
27. Kulkarni S, Dodwad V, Chava VK. Healing of oral wounds using cyanoacrylate tissue adhesive: a clinical evaluation. J Indian Soc Periodontol. 2007;11(4):219-223.

How to Cite This Article
Bamane N, Bezalwar A, Sudhakar GVS, Jain S, Raghuwanshi S, Aher S, Lunawat P. Efficacy of N-butyl cyanoacrylate in extraoral maxillofacial incisions. International Journal of Medical and All Body Health Research. 2026;7(3):28-32.
doi:10.54660/IJMBHR.2026.7.3.28-32.