ORIGINAL ARTICLE

Microbiological & Clinical Assessment of the Effect of Alveogyl and 0.2% Chlorhexidine Gel in Patients with Alveolar Osteitis

Sabreen Hassan[1]	**BDS, M.Phil**
Sundus Mumtaz[2]	**BDS, FCPS**
Abdul Wali Khan[3]	**BDS, FCPS**
Fouzia Aslam[4]	**BDS, FCPS**
Muhammad Azeem Khan[5]	**BDS**
Amna Muzaffar[6]	**BDS, FCPS**
Muhammad Ilyas[7]	**BDS, MFD RCSI, MFD RCSEd**
Manzoor Khan[8]	**BDS**

OBJECTIVES: The objective of this study was to determine the efficacy of Alvogyl and Chlorhexidine 0.2% gel in alveolar osteitis.

METHODOLOGY: This was randomized controlled trial. This study was carried out from January 2022 to December 2023 in Rural Health Centre,Hospital Charsadda. A total of 162 patients were included using WHO formula. The patients were divided into three groups, Alvogyl receiving group, Chlorhexidine 0.2% receiving group and control group. Age selected was 18-65 years. VAS was used to assess pain and Blood agar and Mckoney agar culture was used to assess microbial load (Colony-forming units, CFU/ml). Patients with VAS≥4 and diagnosed case of alveolar osteitis were selected. Patients were evaluated at day 03, 05 and 07. ANOVA was used to determine the VAS comparison in groups and GLMM was applied for microbial load. The level of significance was kept at p≤ 0.05.

RESULTS: The mean age presentation was 41.5 ± 5.67years. Males were predominant than females with a ratio of 2.19:1. Statistically significant difference (p< 0.000) was seen both groups when pain was compared between groups on different days. A significant microbial reduction was also seen between groups with more reduction in percentage in Chlorhexidine group, Group B.

CONCLUSION: This study concluded that microbial reduction was seen in Chlorhexidine gel group and pain reduction in Alvogyl group.

KEYWORDS: Alveolar osteitis, Chlorhexidine, Bacteria, Pain, Management.

HOW TO CITE: Hassan S, Mumtaz S, Khan AW, Aslam F, Khan MA, Muzaffar A, Ilyas M, Khan M. Microbiological & clinical assessment of the effect of alveogyl and 0.2% chlorhexidine gel in patients with alveolar osteitis. J Pak Dent Assoc 2025;34(3):99-103.

DOI: https://doi.org/10.25301/JPDA.343.99

Received: 04 December 2024, Accepted: 28 June 2025

INTRODUCTION

Alveolar osteitis is the postoperative pain increases in severity inside and outside of the socket occurred between first and third postoperative extraction with partial or complete loss of blood clot from alveolar socket accompanied with or without halitosis.[1] Some researchers suggest that alveolar osteitis empty socket with pain.[2] The pain cane trigger ear, maxillary region, ocular and frontal region accompanied with halitosis.[3,4] Ipsilateral regional lymphadenopathy is also found in alveolar osteitis with low grade fever.[5] The most accurate term used was by Birn, the fibrinolytic alveolitis and is the least term used.[6]

Smoking, mandibular teeth extractions, inadequate intraoperative irrigation, difficult or traumatic extractions, female gender, use of oral contraceptives and pre-existing infections are the predisposing factors in alveolar osteitis.[8] Most of the study demonstrate that patient with poor oral hygiene are the main cause of alveolar osteitis and suggest that bacterial infections are the main risk of alveolar osteitis.[7] Others suggest that the pre-existing advanced periodontal diseases and pericoronitis are the main cause of alveolar osteitis.[9] Amongst bacteria those who are fibrinolytic may

1. Lecturer, Department of Oral Pathology, Khyber College of Dentistry, Peshawar.
2. Consultant, Department of Oral & Maxillofacial Surgery, DHQ, Havelia.
3. Dental Surgeon, Department of OMFS, Saidu College of Dentistry, Saidu Sharif Swat.
4. Assistant Professor, Department of OMFS, HBS Medical & Dental College, Lehtrar road, Tarlai, Islamabad.
5. Department of Oral Medicine.
6. Assistant Professor, Department of Dental Section, Rawal Institute of Health Sciences.
7. Oral & Dental Surgeon, Health Department, KPK.
8. Oral & Dental Surgeon, Health Department, KPK.

Corresponding author: "Dr. Muhammad Ilyas " < ilyas_khan526@yahoo.com >

result in blood clot lysis and are the main cause of alveolar osteitis. These bacteria include; Treponema Denticola, Streptococcus, Staphylococcus, Peptostreptococcus, Provetella and Bacteroids.[10]

The objective of treating alveolar osteitis is to optimize the lesion to capable of forming an enduring layer of epithelium that covers the exposed bone inside the socket.[11] Several clinical trials showed that both topical and systemic antibiotics as well as antiseptic reduce the occurrence of alveolar osteitis.[8,12] Many authors advocated different types of topical dressing for alveolar osteitis from eugenol as preventive measures as well as treatment options. Some suggest Alvogyl to be promising in controlling alveolar osteitis symptoms.[13,14] Despite many studies there is a little progress made in terms of both microbiological and clinical symptoms relief. Therefore, a study is warranted with enough sample including clinics as well hospital to ensure possible effect on both microbiological and clinical assessment.

The aim of this study was to compare the effect of 0.2% Chlorhexidine, Alvogyl and control group on the postoperative incidence of alveolar osteitis.

METHODOLOGY

This was a randomized double blind (patients and assessor) controlled trial study carried out at Rural Health Centre, Sherpao, Charsadda from January 2022 to December 2023. Ethical review approval was obtained (RHC-DHO/03/01-2022). A total of 162 patients were included in this study using WHO formula, standard deviation 1.5, power of study 80%, effect size 0.5, confidence interval 95% and 15% for potential dropouts. Before applying the socket was irrigated to wash out any debris in the socket.

The patients were divided equally into three groups using allocation concealment envelope containing sequential assignment regarding treatment options;

Group A: Treatment group using Alvogyl (combination of butamben, iodoform and eugenal), pea size was placed in the socket. The Alvogyl contain

Group B: Treament group using 0.2% Chlorhexidine gel (contains chlorhexidine gluconate), was placed with index finger using surgical gloves.

Group C: Controlled group using normal saline.

This study includes patients of both genders, age range from 18-65 years. The patient diagnosed with alveolar osteitis and having pain score ≥ 4 on VAS were selected. Those with systemic diseases, history of epilepsy, women using contraceptives, patients with infections, those taking analgesics for 1 week and those who are allergic to these dressings were excluded from this study. The purpose of the study was explained to the patients and an informed consent was taken from the patients. The diagnosis of the alveolar osteitis was made by the clinician not involved in the extraction of the tooth and was based on the clinical critera[1-6];

1. Severe pain in and around the extraction site 1-3 days after extrcaion.
2. Partial or total blood loss of the blood clot from the socket.
3. Exposed bone with in the socket.
4. With or without halitosis.

The pain was assessed using Visual Analogue Scale (VAS) as follows;

1. No pain: score 0
2. Mild pain: score 1-3
3. Moderate pain: score 4-6
4. Severe pain: score 7-10

MICROBIOLOGICAL ASSESSMENT

Microbiological assessment was carried out using sterile curette and moving to the bottom of the socket and put into the vial containing appropriate culture media; blood agar for general bacterial growth and Mckoney agar for gram negative bacterial growth. The plates were incubated at 37^0C 24-48 hours in aerobic conditions. After incubation the numbers of colony-forming units (CFU) were counted and results were expressed in CFU/mL to standardized measurements across the samples. Duplicate cultures were conducted to ensure consistency and reliability in results and relative percentage was recorded for this microbes. Patients were evaluated on day 03, 05 and 07 after diagnosis of alveolar osteitis. Healed socket was considered if the socket has the following parameters i.e., presence of granulation tissues, epithlization of the socket and absence of exposed bone.

Statistical analysis was carried out using SPSS 23.0 version. Frequency and percentage were used for demographic data, mean and standard deviation were used for pain score. ANOVA was used to compare pain score between groups and Generalized linear mixed model (GLMM) was applied to determine the microbiological load percentage between groups. The level of significance was kept at ≤ 0.05.

RESULTS

The mean age presentation in this study was 41.5 ± 5.67 years. Amongst 162 subjects, 108(66.67%) were males and females were 54(33.33%). Table 1 showed the mean score of VAS of these three different groups. The mean pain score showed there was significant difference (P<0.000) on day 3, day 5 (P<0.001) and day 7(P<0.001) as shown in table 1.

Table 1: Pain score (VAS) in three different groups.

Pain	Variables	Group A	Group B	Group C	*P* value
Day 03	Mean ±SD	7.53± 0.64	7.80±0.73	7.75±0.69	0.000
	SE	0.067	0.076	0.071	
	Confidence interval 95% mean	7.4 to 7.80	7.61 to 7.95	7.53 to 7.89	
Day 05	Mean ±SD	4.40±0.51	5.1±0.53	6.1±0.57	0.001
	SE	0.053	0.056	0.059	
	Confidence interval 95% mean	4.20 to 4.65	4.90 to 5.32	6.0 to 6.37	
Day 07	Mean ±SD	0.39±0.58	1.73±0.93	3.6± 1.56	0.001
	SE	0.061	0.098	0.132	
	Confidence interval 95% of mean	0.27 to 0.51	1.54 to 1.93	3.42 to 3.85	

Table 2: Microbial load percentage in three different groups.

Microbial Load	Variables	Group A	Group B	Group C	*P* value
Day 03	Mean ±SD	73.40± 5.73	83.01± 6.64	75.81± 5.69	0.000
Day 05	Mean ±SD	45.36± 4.23	51.15± 4.51	54.15± 4.51	0.000
Day 07	Mean ±SD	29.72± 2.93	21.45± 2.58	43.6± 4.05	0.000

The microbial load was shown in table 2. There was significant difference (P<0.001) seen in the microbial load on day 3, day 5 and day 7. There was reduction in the percentage of the microbial load in group A ,B and C. The reduction in Group B was more than Group A and Group C.

DISCUSSION

Alveolar osteitis is a complication of tooth extraction accounts 24-35% followed by tooth extraction[15-16] Duration of alveolar osteitis varies from 5 to 10 days usually depends on the severity of alveolar osteitis.[17] This randomized controlled trial assess the comparative efficacy of Alvogyl and 0.2% chlorhexidine gel evaluating the clinical as well as microbiological parameters.

This study revealed that the most dominant age were middle age patients. The mean age was 41.5 years. The male were most predominant that female. Decreased in vascularity as the age increases results in slower healing process may cause alveolar osteitis more than the youngers. Male to female ratio were 2.19:1. The reason could be that females are more cautious about their health than male. This study contradicts the study done by Hakobyan et al[11] and Jesudasan et al.[13] in which they showed that males and females were uniformly distributed in their study. In another study[18] it was shown that females were more than males which also opposes this study.

This study demonstrates that there was significant difference in pain score on visual analogue scale. The mean pain was 0.39 in group A which is far more less than the control group which is 3.6 after 07 days. Group A showed better pain relief than other groups in this study. This could be due to the presence of eugenol content which shows analgesic as well as anti-inflammatory effect. This study is in consistent with study done by Fazakerley et al.[19] in which they proposed that pain was relieved using Alvogyl. Keshini et al[20] demonstrate that Alvogyl significantly reduced pain associated with alveolar osteitis which support our study. Antonia et al.[21] in their study revealed that Alvogyl showed a promising result in terms of pain relief but healing was delayed in those patients who received Alvogyl. In one of the study it was demonstrated that there was no significantly association seen in groups which opposes this study. They used Alvogyl, Chlorhexidine and hyaluronic acid in their study for alveolar osteitis and further elaborate a significant reduction in inflammation was seen in chlorhexidine group[22] Our study also revealed a difference that was found in microbial load after 7 days of the treatment in three groups. There was reduction in microbial load in three groups however the reduction in percentage was far more in patients using 0.2% Chlorhexidine groups than other groups. Chlorhexidine showed a promising result in terms of microbial load reduction than other groups in this study and this could be due to its primary function as a broad spectrum antibactertial efficacy. Fahimuddin et al.[23] in their study compared alveogyl and chlorhexadine in the management of alveolar osteitis and revealed that Alvogyl remained superior to Chlorhexidine i.e. on second, third and fourth day of treatment there was a tremendous improvement in pain relief of group B patients (Alvogyl group) with P=0.000, P=0.000 and P=0.02 respectively. The reason could be that aveogyl contains obtundent ingredients which results in more pain relief as compared to chlorhexidine group. This study support our study.

However, direct comparison of Alvogyl and chlorhexidine gel in the management of alveolar osteitis is limited in the literature. This study fill the gap by providing evidence of superior antimicrobial activity of chlorhexidine and effective relief of pain using Alvogyl in the patients having alveolar osteitis.

CLINICAL IMPLICATIONS

The clinical implication of chlorhexidine gel and Alvogyl depend on the patients presenting with alveolar osteitis. Those patients who have severe pain and require immediate relief, Alvogyl should be the preferred choice. On the other hand those patients where infection control is the paramount, chlorhexidine gel give significant advantage due to its

antimicrobial properties. Furthermore, the ease of application and patient compliance chlorhexidine gel potentially reducing multiple visits and can be considered in those areas with a limited acess to dental care.

LIMITATIONS

The limitation of this study is the limited area included and all teeth were included. Males were more than females. The relative percentage was used for microbial load and doesn't specify the type of microbial reduction and further study may be required. In future the study may be required to compare the specific microbial reduction, as well as to compare chlorhexidine with other material used for alveolar osteitis which not only cause specific microbial reduction but relieve pain and inflammation at the extraction socket site.

CONCLUSION

Within the limitations of this study it was concluded that a difference was present between Alvogyl, Chlorhexidine and control group in terms of pain and microbial reduction. Alvogyl relieve pain better than Chlorhexidine and control group while microbial reduction was seen more in Chlorhexidine than Alvogyl and control group.

CONFLICT OF INTEREST

None to declare

REFERENCES

1. Blum IR. Contemporary views on dry socket (alveolar osteitis): a clinical appraisal of standardization, aetiopathogenesis and management: a critical review. Int J Oral and Maxillofac Surgery. 2002;31:309-17. *https://doi.org/10.1054/ijom.2002.0263*

2. Daly BJ, Sharif MO, Jones K, Worthington HV, Beattie A. Local interventions for the management of alveolar osteitis (dry socket). Cochrane Database of Systematic Reviews. 2022(9). *https://doi.org/10.1002/14651858.CD006968.pub3*

3. Lodi G, Azzi L, Varoni EM, Pentenero M, Del Fabbro M, Carrassi A, Sardella A, Manfredi M. Antibiotics to prevent complications following tooth extractions. Cochrane Database of Systematic Reviews. 2021(2). *https://doi.org/10.1002/14651858.CD003811.pub3*

4. Pleeging CC, Wagener FA, De Rooster H, Cremers NA. Revolutionizing non-conventional wound healing using honey by simultaneously targeting multiple molecular mechanisms. Drug Resistance Updates. 2022;62:100834. *https://doi.org/10.1016/j.drup.2022.100834*

5. Mamoun J. Dry socket etiology, diagnosis, and clinical treatment techniques. Journal of the korean association of oral and maxillofacial surgeons. 2018 Apr 1;44:52-8. *https://doi.org/10.5125/jkaoms.2018.44.2.52*

6. Birn H. Etiology and pathogenesis of fibrinolytic alveolitis (dry socket).Int J Oral Surgery 1973;2:211-63. *https://doi.org/10.1016/S0300-9785(73)80045-6*

7. Peñarrocha-Diago M, Sanchis JM, Sáez U, Gay C, Bagán JV. Oral hygiene and postoperative pain after mandibular third molar surgery. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics. 2001;92:260-64. *https://doi.org/10.1067/moe.2001.115722*

8. Shen LH, Xiao E, Wang EB, Zheng H, Zhang Y. High-Throughput Sequencing Analysis of Microbial Profiles in the Dry Socket. J Oral Maxillofac Surg. 2019;77:1548-56. *https://doi.org/10.1016/j.joms.2019.02.041*

9. Rud J. Removal of impacted lower third molars with acute pericoronitis and necrotising gingivitis. British Journal of Oral Surgery. 1970;7:153-60. *https://doi.org/10.1016/S0007-117X(69)80015-6*

10. Ren YF, Malmstrom HS. Effectiveness of Antibiotic Prophylaxis in Third Molar Surgery: A Meta-Analysis of Randomized Controlled Clinical Trials. J Oral Maxillofac Surg.2007;65:1909-21. *https://doi.org/10.1016/j.joms.2007.03.004*

11. Hakobyan G, Vanyan N, Khachatryan G, et al. Clinical and Microbiological Assessment of the Results of Combined Treatment of Patients with Alveolar Osteitis. Archives Oral Maxillofac Surg.2022; 5:159-65. *https://doi.org/10.36959/379/372*

12. Cardoso RB, Soto VC, Gonçalves RC, Pedroso AM, Jabur RD, Bortoluzzi MC. Prevalence and factors associated with dry socket following routine dental extractions. Med Oral Patol Oral Cir Bucal. 2024;29:e408-e415. *https://doi.org/10.4317/medoral.26391*

13. Jesudasan JS, Wahab PU, Sekhar MR. Effectiveness of 0.2% chlorhexidine gel and a eugenol-based paste on postoperative alveolar osteitis in patients having third molars extracted: a randomised controlled clinical trial. Br J Oral Maxillofac Surg. 2015;53:826-30. *https://doi.org/10.1016/j.bjoms.2015.06.022*

14. Alexander RE. Dental Extraction Wound Management: A Case Against Medicating Postextraction Sockets. J Oral Maxillofac Surg.2000; 58:538-51. *https://doi.org/10.1016/S0278-2391(00)90017-X*

15. Antonia K,Eliza O, Michael M. Alveolar osteitis: Comprehensive review & controversies. Int J Dent. 2010: 249073. *https://doi.org/10.1155/2010/249073*

16. Haraji A, Motamedi M H, Rezvani F.Can flap design influence the incidence of alveolar osteitis following removal of impacted mandibular third molars? Gen Dent. 2010; 58: e187-e189.

17. Blum IR. Contemporary views on dry socket (alveolar osteitis): A clinical appraisal of standardization, aetiopathogenesis and management: A critical review. Int J Oral Maxillofac Surg. 2002;31:309-17.
https://doi.org/10.1054/ijom.2002.0263

18. Øyri H, Jensen JL, Barkvoll P, Jonsdottir OH, Reseland J, Bjørnland T. Incidence of alveolar osteitis after mandibular third molar surgery. Can inflammatory cytokines be identified locally? Acta Odontol Scand. 2021;79:205-11.
https://doi.org/10.1080/00016357.2020.1817546

19. Fazakerley M, Field EA. Dry socket: A painful post-extraction complication (a review) Dent Update. 1991;18:31-5.

20. Keshini MP, Shetty SK, Sundar S, Chandan SN, Manjula S. Assessment of Healing Using Alvogyl and Platelet Rich Fibrin in Patients with Dry Socket - An Evaluative Study. Ann Maxillofac Surg. 2020;10:320-324.
https://doi.org/10.4103/ams.ams_259_19

21. Antonia K. Alveolar osteitis: A comprehensive review of concepts and controversies. Int J Dent. 2010;1:10.
https://doi.org/10.1155/2010/249073

22. Dereci Ö, Görkem T, Kosar YÇ. The comparison of the efficacy of Alvogyl, 0.8% Hyaluronic acid, and 0.2% Chlorhexidine Digluconate in alveolar osteitis. Int Dent Res 2021;11:6-11.
https://doi.org/10.5577/intdentres.2021.vol11.no1.2

23. Fahimuddin, Abbas I, Khan M, Reehman AU. Management of Dry Socket: A Comparison of Two Treatment Modalities. Pak Oral Dent J. 2013;33:31-34.