



MOLAR EXTRACTION; EFFECT OF CHLORHEXIDINE GEL APPLICATION TO PREVENT DRY SOCKET AFTER MANDIBULAR 3RD MOLAR EXTRACTION

1. BSc, BDS, FCPS
Associate Professor,
Department of Oral & Maxillofacial
Surgery,
University College of Dentistry,
The University of Lahore, Pakistan.
2. BDS
Dental Surgeon,
University College of Dentistry,
The University of Lahore, Pakistan.
3. BDS, M.Phil
Assistant Professor
Department of Biochemistry,
The University of Lahore, Pakistan.
4. BDS
Dental Surgeon,
University College of Dentistry,
The University of Lahore, Pakistan.
5. BDS
Dental Surgeon,
University College of Dentistry,
The University of Lahore, Pakistan.

Correspondence Address:
Dr. Shahzad Waheed Qureshi
112 Garden Villas, Sultan Town,
1-km Raiwind Road,
Thokar Niaz Baig, Lahore, Pakistan.
ravian1998@gmail.com

Article received on:
29/03/2018
Accepted for publication:
15/06/2018
Received after proof reading:
00/00/2018

Shahzad Waheed Qureshi¹, Maha Siddiqui², Gulrez Amin³, Aliha Liaquat⁴, Sundas Chaudhary⁵

ABSTRACT... Introduction: Dry socket (DS) or Alveolar osteitis (AO) is a common post extraction complication in third molar removal. Various techniques have been used to reduce the risk of DS. **Objectives:** To evaluate the effect of Chlorhexidine (CHX) gel in preventing the development of DS. **Study Design:** Randomized double blind case-control study. **Setting:** Oral and Maxillofacial Surgery Department of University College of Dentistry (UCD), The University of Lahore, Pakistan. **Period:** July 2017 to December 2017. **Methodology:** Patients having impacted mandibular 3rd molars selected for surgical extraction. Randomly selected one group consisted of 30 patients received CHX gel and the other group again of 30 patients considered as the control. The outcome variable was formation of DS and the predictor variable was CHX gel application. Data were processed using chi-square test with the confidence interval of 95%. **Results:** 60 cases (39 females and 21 males) with average age of 22 years \pm 5 years underwent 3rd molar extractions. Total 09 sockets (15%) developed DS. The frequency of DS in CHX gel (2 cases, 6.7%) was significantly lower than control (7 cases, 23.3%) (P-value < 0.05). **Conclusion:** CHX gel can reduce the risk of development of DS after mandibular 3rd molar surgical extraction.

Key words: Alveolar Osteitis, Chlorhexidine Gel, Dry Socket, Impacted Mandibular 3rd Molar.

Article Citation: Qureshi SW, Siddiqui M, Amin G, Liaquat A, Chaudhary S. Molar extraction; effect of chlorhexidine gel application to prevent dry socket after mandibular 3rd molar extraction. Professional Med J 2018; 25(9):1350-1355.
DOI:10.29309/TPMJ/18.4821

INTRODUCTION

Dry socket (DS) is a poorly understood form of post-operative pain in the area of extracted tooth, which happens due to loss of a blood clot.⁴ Dry socket is featured with severe pain, initiating in initial three days of post-surgery associated with smell, bad taste, or respective side lymphadenopathy. However, DS is resolved within ten days with no intervention, but patient requires several follow up visits.^{1,3}

Even if the etiology of AO is debated, it may be multifactorial.¹⁷ Some precipitating factors were recognized; hypovascularity due to the density of the bone, anesthetic agents (vasoconstriction), systemic conditions/disease, smoking, age, oral contraceptive (OCP) and traumatic extraction.^{19,20,21}

Mandibular impacted tooth extraction is a routine

procedure carried out by dental surgeons. Dry socket (DS) is a common complication occurring after mandibular 3rd molar surgery.¹ Different studies reported incidence of dry socket in simple extractions as 1% to 4% while in surgical extractions as 5% to 30%.²

Different methods have been adopted to reduce the DS development, e.g. application of antifibrinolytics, clot stabilizing agents, steroids, systemic and local antibiotics, chlorhexidine (CHX) mouthwashes, and gels.^{4,5}

Chlorhexidine is having antiseptic properties, and therefore effective against aerobic and anaerobic bacteria.^{6,7} CHX is available in different forms but the CHX mouthwash is the most commonly used form.⁸ While the bio adhesive CHX gel extends its availability to the tissues, when applied in 3rd molar surgery.⁹

The purpose of this research was to assess the effectiveness of CHX gel in preventing dry socket formation after 3rd molar surgery.

Rationale of this study is that the CHX gel application in sockets after 3rd molar surgery has significant effect in decreasing frequency of dry socket (DS) in comparison to control sockets.

MATERIALS AND METHODS

Study Design

Randomized double blind case-control study.

Setting

This research was conducted at the Oral and Maxillofacial Surgery Department of University College of Dentistry (UCD), The University of Lahore, Pakistan. The ethical committee of UCD approved the study protocol and a signed informed consent was taken from all patients.

Sample Technique

Technique was "simple random sampling (SRS)". Patients who were routinely reporting to surgeon for 3rd molar surgery, first patient was included in CHX group and second reported patient was included in control group, then third patient in CHX group and fourth in control group and so on, according to inclusion/ exclusion criteria randomly.

Sample Size

Sample of our study comprised of total 60 patients who presented in Oral and Maxillofacial surgery department with impacted third molars. 30 patients selected randomly for application of chlorhexidine gel and 30 patients as a control group.

Sample size calculated by the formula Daniel, 1999.²²

Study Duration

The study was carried out from July 2017 to December 2017.

Inclusion Criteria

Eighteen to thirty five years old age group, having ASA physical status I or II, and impacted

mandibular 3rd molars with moderate difficulty level of surgery.¹⁰

Exclusion Criteria

Following categories of patients were excluded from study as these conditions have known effect in developing dry sockets;

- Smokers
- Patients on oral contraceptives,
- Patients had received antibiotics during the last 2 weeks
- Allergic to CHX,
- Patients who has been injected more than 2 anesthesia cartridges during surgery.

Data related to age and gender were also analyzed, along with data about DS formation and CHX gel application.

Single surgeon performed all surgeries using same standard protocol for 3rd molar extraction. Amoxicillin (500 mg three times daily) and in case of pain acetaminophen (500 mg three times daily) were prescribed to almost all patients.

After surgery, CHX gel inserted into sockets of randomly selected half of total patients and remaining half acted as control. Every patient was called on follow-up after 7 days of surgery to assess the status of socket regarding proper healing or dry socket formation. Also they were advised to come anytime for check-up in case of persistent pain. Such patients were assessed clinically for signs of DS.

For treatment of DS Alvogyl was placed after irrigation of socket. Moreover, systemic analgesics were prescribed in some cases.

Recorded data were analyzed, and chi-square test performed using SPSS (ver. 23).

RESULTS

Initially 70 patients were included; but, ten patients were excluded as we had to inject more than two anesthetic cartridges during surgery to control pain. Finally 60 cases (39 females and 21 males) with mean age of 22 years \pm 5 years underwent 3rd molar surgeries.

Out of 60 surgical extraction cases, 09 (15%) shown DS formation in 1st week of surgery. Only 2 (6.7%) cases developed DS in CHX group, while 7 (23.3%) cases developed DS in the control group who has not received CHX gel (Table-III).

Chi-square test analysis showed no significant association between frequency of DS with gender, slight association with age groups (Table-I and Table-II), and strong relation between the frequency of DS and application of CHX gel (Table-III).

Variable Gender	DS n %		P-Value
	Yes	No	
Male	3 (33%)	18 (35%)	0.27
Female	6 (67%)	33 (65%)	

Table-I. Distribution of dry socket on the bases of gender.

Variable Age (years)	DS n %		Mean Age (Years)	P-Value
	Yes	No		
18-22	4 (45%)	34 (47.9%)	22	0.05
23-26	2 (22%)	25 (35.2%)		
>26	3 (33%)	12 (16.9%)		

Table-II. Distribution of dry socket based on age groups.

Variable	DS n %		Total	P-Value
	Yes	No		
Chlorhexidine gel*	2 (6.7%)	28 (93.3%)	30	0.04
Control	7 (23.3%)	23 (7.7%)	30	
Total	9 (15%)	51 (85%)	60	

Table-III. Frequency of dry Socket on the bases of chlorhexidine gel.

*The frequency of DS was less in sockets in which CHX gel applied, in comparison to control sockets (95% confidence interval; P-value = 0.04).

DISCUSSION

The purpose of this study was to see the correlation between application of CHX gel and formation of dry socket after mandibular 3rd molars impaction surgery.

Our hypothesis was confirmed by the results as the frequency of DS in CHX gel group was prominently reduced from that of the control

group.

There was no marked difference between males and females regarding the frequency of DS. But there is less association of age groups to dry socket development in our study (p-value=0.05). The frequency of DS was significantly less in CHX gel group in comparison to the control group (p-value = <0.04).

Very less work has been done locally on this topic. However according to Khitab U, Khan A, Sh ah SM²³ 53% males and 47% females developed DS while in our study 33% males and 67% females developed DS.

One of the common complications occurred after mandibular 3rd molar surgery is Dry Socket.¹ Different studies reported DS frequency from 5% to 30%.² The frequency of DS in our study (15%) was in line with the previous studies.

Based on the results of our study, the frequency of dry socket formation was markedly less in CHX gel group (6.7%). Supporting our study, Hita-Iglesias et al⁹, Torres-Lagares et al¹¹, Babar et al¹², found obvious decrease in formation of DS after 0.2% chlorhexidine gel application.

Use of CHX mouthwash has been observed to reduce risk of DS formation. However, Hita-Iglesias et al⁹ reported the gel form of CHX is more effective than the mouth rinses. This might be due to more exposure time period and sustain release of CHX during the first post-extraction day.¹¹ Also there is no mucosal irritation, tooth discoloration, taste change, which are side effects in rinsing with mouthwash.⁹

Younus S, Ghumman NU, Latif K, Chishty MS compared efficacy of CHX gel and mouthwash in reducing dry socket formation after 3rd molar surgery. However, according to their study dry socket developed in only 6% cases in CHX group which is in line with the results of our study 6.7%.²⁴

According to Channar K, Dall A, Memon A, Lal R 8.7% cases developed DS who were prescribed antibiotic and CHX rinses after 3rd molar surgery.

Their results were almost in range to our results which are 6.7%.²⁵

Haraji A, Rakhshan V, Khamverdi N, Alishahi HK and Silvana Requena-Calla, Italo Funes-Rumiche also proved significant reduction in development of DS when CHX gel placed, hence strengthen results of our study.^{26,27}

Joseph Rubio-Palau, Jordi Garcia-Linares, Juan-Antonio Hueto-Madrid, Javier González-Lagunas, Guillermo Raspall-Martin, and Javier Mareque-Bueno conducted a study in 2014 to assess CHX gel role in preventing dry socket, published in 2015. They found 22% reduction in dry socket formation in CHX group in comparison to placebo group. This study also reinforces results of our study.²⁸

The less occurrence of DS in CHX gel group in comparison to control group may be due to the antiseptic qualities of this drug. Clot dissolution and dislodgment occurs due to fibrinolytic activity of bacteria that leads to dry socket formation.^{13,14} CHX prevents fibrinolytic activity of bacteria by reducing their number. This results in decreased DS development as demonstrated in the present study too.

Amount of surgical trauma is a major risk factor in formation of DS as difficult surgeries require more amount of bone grinding and tooth sectioning. Experience of the operator affects the amount of trauma too.^{15,16} To prevent biasness in results due to above said factors, single surgeon did all surgeries in patients of impacted mandibular 3rd molars with almost same difficulty level, using same protocol.

Most of the studies says that DS formation has relation with age groups, indicating the peak age of 20 to 40 years old.^{17,18} However, in our study slight association between age groups and frequency of DS was found, as there are more number of patients in age group 18-22 years (p-value= 0.05).

Local anesthesia with epinephrine could hamper the bleeding and hence no clot formation leading

to dry socket formation. This factor was addressed by eliminating patients who had been injected more than two anesthetic cartridges.

The small sample size was one of the limitations of our research. More research is needed in more complicated impaction cases with advanced variables to be compared for CHX gel effect in development of dry sockets.

CONCLUSION

Besides the limitations of this study, CHX gel was effective in minimizing the development of dry socket. Hence we can use CHX gel in patients whom we suspect of dry socket formation after extraction.

Copyright© 15 June, 2018.

REFERENCES

1. Osborn TP, Frederickson G, Small IA, Torgerson TS. **A prospective study of complications related to mandibular third molar surgery.** J Oral Maxillofac Surg 1985; 43: 767-72.
2. Noroozi AR, Philbert RF. **Modern concepts in understanding and management of the “dry socket” syndrome: Comprehensive review of the literature.** Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009; 107: 30-5.
3. Fazakerley M, Field EA. **Dry socket: A painful post-extraction complication (a review).** Dent Update 1991; 18: 31-4.
4. Blum IR. **Contemporary views on dry socket (alveolar osteitis): A clinical appraisal of standardization, aetio pathogenesis and management: A critical review.** Int J Oral Maxillofac Surg 2002; 31: 309-17.
5. Sridhar V, Wali GG, Shyla HN: **Evaluation of the perioperative use of 0.2% chlorhexidine gluconate for the prevention of alveolar osteitis after the extraction of impacted mandibular third molars: A clinical study.** J Maxillofac Oral Surg 2011; 10: 101-11.
6. Delilbasi C1, Saracoglu U, Keskin A. **Effects of 0.2% chlorhexidine gluconate and amoxicillin plus clavulanic acid on the prevention of alveolar osteitis following mandibular third molar extractions.** Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2002; 94: 301-4.
7. Hermes CB1, Hilton TJ, Biesbrock AR, Baker RA, Cain-Hamlin J, McClanahan SF, et al. **Perioperative use of 0.12% chlorhexidine gluconate for the prevention**

- of alveolar osteitis: Efficacy and risk factor analysis.** Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998; 85: 381-7.
8. Yengopal V, Mickenautsch S. **Chlorhexidine for the prevention of alveolar osteitis.** Int J Oral Maxillofac Surg 2012; 41: 1253-64.
 9. Hita-Iglesias P, Torres-Lagares D, Flores-Ruiz R, Magallanes-Abad N, Basallote-Gonzalez M, Gutierrez-Perez JL. **Effectiveness of chlorhexidine gel versus chlorhexidine rinse in reducing alveolar osteitis in mandibular third molar surgery.** J Oral Maxillofac Surg 2008; 66: 441-5.
 10. Eshghpour M, Moradi A, Nejat AH. **Dry socket following tooth extraction in an Iranian dental center: Incidence and risk factors.** J Dent Mater Tech 2013; 2: 86-91.
 11. Torres-Lagares D, Infante-Cossio P, Gutierrez-Perez JL, Romero-Ruiz MM, Garcia-Calderon M, Serrera-Figallo MA. **Intra-alveolar chlorhexidine gel for the prevention of dry socket in mandibular third molar surgery. A pilot study.** Med Oral Patol Oral Cir Bucal. 2006; 11: e179-84.
 12. Babar A, Ibrahim MW, Baig NJ, Shah I, Amin E. **Efficacy of intra-alveolar chlorhexidine gel in reducing frequency of alveolar osteitis in mandibular third molar surgery.** J Coll Physicians Surg Pak 2012; 22: 91-4.
 13. Birn H. **Etiology and pathogenesis of fibrinolytic alveolitis (dry socket).** Int J Oral Surg 1973; 2: 215-63.
 14. Eshghpour M, Rezaei NM, Nejat A. **Effect of menstrual cycle on frequency of alveolar osteitis in women undergoing surgical removal of mandibular third molar: A single-blind randomized clinical trial.** J Oral Maxillofac Surg 2013; 71: 1484-9.
 15. Sisk AL, Hammer WB, Shelton DW. **Complication following removal of impacted third molars: The role of the experience of the surgeon.** J Oral Maxillofac Surg 1986; 44: 855-9.
 16. Eshghpour M, Nejat AH. **Dry socket following surgical removal of impacted third molar in an Iranian population: Incidence and risk factors.** Niger J Clin Pract 2013; 16: 496-500.
 17. MacGregor AJ. **Etiology of dry socket: A clinical investigation.** Br J Oral Surg 1968; 6: 49-58.
 18. Khorasani M, Razavi F. **The prevalence and risk factors of dry socket in dental surgery clients following tooth extraction at Qazvin faculty of dentistry.** JQUMS 2006; 10: 29-35.
 19. Kolokythas A, Olech E, Miloro M. **Alveolar osteitis: A comprehensive review of concepts and controversies.** Int J Dent. 2010; 2010: 249073.
 20. Bonine FL, Larsen PE. **Effect of chlorhexidine rinse on the incidence of dry socket in impacted mandibular third molar extraction sites.** Oral Surg Oral Med Oral Pathol Oral Radiol Endodontol. 1995; 79(2): 154-158.
 21. Abu Younis MH, Abu Hantash RO. **Dry socket: Frequency, clinical picture, and risk factors in a palestinian dental teaching center.** Open Dent J. 2011; 5(1): 7-12.
 22. Daniel WW (1999). **Biostatistics: A foundation for analysis in the health sciences.** 7th edition. New York: John Wiley & Sons.
 23. Khitab U, Khan A, Shah SM. **Clinical characteristics and treatment of dry socket- A Study.** Pak Oral Dent J. 2012; 33(2): 206-209.
 24. Younus S, Ghumman NU, Latif K, Chishty MS. **Efficacy of chlorhexidine gel vs chlorhexidine rinses in reducing incidence of dry socket in mandibular third molar surgery.** Pak Oral Dent J. 2014; 34(2): 249-252.
 25. Channar K, Dall A, Memon A, Lal R. **Prevention of alveolar osteitis in surgical removal of lower third molar.** Pak Oral Dent J. 2013; 33(2): 244-248.
 26. Haraji A, Rakhshan V, Khamverdi N, Alishahi HK. **Effects of intra-alveolar placement of 0.2% chlorhexidine bioadhesive gel on dry socket incidence and postsurgical pain: A double-blind split-mouth randomized controlled clinical trial.** J Orofac Pain. 2013; 27(3): 256-62.
 27. Silvana Requena-Calla and Italo Funes-Rumiche. **Effectiveness of intra-alveolar chlorhexidine gel in reducing dry socket following surgical extraction of lower third molars- A pilot study.** J Clin Exp Dent. 2016 Apr; 8(2): e160-e163.
 28. Joseph Rubio-Palau, Jordi Garcia-Linares, Juan-Antonio Hueto-Madrid, et al. **Effect of intra-alveolar placement of 0.2% chlorhexidine bioadhesive gel on the incidence of alveolar osteitis following the extraction of mandibular third molars. A double-blind randomized clinical trial.** Med Oral Patol Oral Cir Bucal. 2015 Jan 1; 20(1): e117-22.





“

Nothing is more dangerous than ignorance & intolerance armed with power.

– Unknown –

”

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Shahzad Waheed Qureshi	Study planning & designing, Chief surgeon for study patients, Principal author, Manuscript drafting, Introduction and discussion writing, Materials & methods, Results write up and interpretation.	
2	Maha Siddiqui	Assistant surgeon for study patients, Literature search, Data collection and compilation, Statistical analysis.	
3	Gulrez Amin	Review of manuscript, Tables and conclusion, final proof reading.	
4	Aliha Liaquat	Assistant surgeon for study patients, Data collection and compilation, Referencing, Technical support to check plagiarism.	
5	Sundas Chaudhary	Assistant surgeon for study patients, Data collection, Formatting and editing of manuscript, Proof reading.	