



ORIGINAL RESEARCH PAPER

Dental Science

A COMPARATIVE STUDY IN TREATMENT OF DRY SOCKET "ZINC OXIDE AND EUGENOL VS ALVOGYL"

KEY WORDS: Extraction, Dry Socket, Zinc oxide Eugenol , Alvogyl

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ABSTRACT

"Dry Socket" is the term most frequently used for rather a very common, very unpleasant and dreaded local and post operative complication of routine exodontias. Hundred patients with dry socket were randomly divided in two groups, Group A and group B. Group A patients were treated with freshly prepared Zinc oxide eugenol in sterile cotton fibres, whereas group B patients were given Alvogyl dressing in the socket. This study shows that use of Alvogyl paste in dry socket provides prompt Relief from pain in comparison to Zinc oxide and Eugenol dressing and minimizes Patients visit to dental clinic for dressing.

Introduction

"Dry Socket" is the term most frequently used for rather a very common, very unpleasant and dreaded local and post operative complication of routine exodontias. This term has been used in literature since 1896, when it was first discovered by CRAWFORD¹. Since then several other terms have been used such as Alveolar Osteitis [A0], Localized Osteitis, Post operative Alveolitis, Alveolalgia, Alveolitis Sicca Dolorosa, Septic Socket, Necrotic Socket, Localized Osteomyelitis, and Fibrinolytic Alveolitis.²

It was Birn's Classical series of articles [1963-77] that provided better understanding of the pathophysiology³. According to Birn (1973), trauma and infection cause inflammation of the bone marrow with the resultant release of tissue activators that convert the plasminogen in the clot to plasmin. This fibrinolytic agent then dissolves the blood clot and at the same time, releases kinins from the kininogen, which is also in clot, leading in severe pain^{4,5}

Early and recent studies both have reported that dry socket onsets 1-3 days after extraction and within week between 95-100% of all reported dry socket cases.² Higher incidence of dry socket is reported in females and it seems to be age dependent with the mean age group between 20-40 years and more prevalent in posterior and mandibular teeth than in maxillary teeth⁶. Incidence of dry socket has been reported to be 2-4 % following routine extraction procedures and characterized by classic triad of Premature extraction socket clot loss / Necrosis ,pain and fetor Oris [Halitosis]^{2,3,6}

Pain in Dry socket is intense, continuous, severe and radiating . From an alveolus of maxilla it can radiate towards eye and frontal region and from an alveolus of mandible it can radiate towards ear and temporal region^{7,8}. Halitosis is pronounced and often accompanied by a complaint of a bad taste. Regional lymphadenopathy is occasional and trismus is a rare occurrence². The etiology of the dry socket has not been established. Its origin believed to be multifactorial .The most common etiological, aggravating and participating factors are trauma during extraction procedure. root / Bone fragment / foreign body in wound, dislodgement of the clot, Increased Fibrinolytic activity in blood clot, excessive irrigation / curettage after extraction, oral contraceptives, smoking, excessive amount of vasoconstrictor used.²

This condition cannot be completely treated until exact etiology is not firmly established. Treatment is directed primarily towards relief of pain as well as to aid in the healing of post extraction wound. There are various methods of management of dry socket available now a days. These includes bland obtundant dressings, pain reducing dressings like zinc oxide and eugenol packs to newer agents like Alvogyl active against the pain inducing kinins, anti infective agents, antifibrinolytic agents (PHBA) or dextranomer granules to simple irrigation of socket².

ALVOGYL – has been widely used in recent times for treatment of dry socket. The advantage of Alvogyl primarily lies in its soothing ability on pain, especially for long duration as well as its antiseptic properties, its haemostatic action and its limited visit application.

Introduced into a diseased alveolus Alvogyl rapidly relieves post extraction pain and allows healing of the socket in a minimum period of time⁹.

Patients and Methods:

Hundred patients with dry socket were randomly divided in two groups, Group A and group B. Group A patients were treated with freshly prepared Zinc oxide eugenol in sterile cotton fibres, whereas group B patients were given Alvogyl dressing in the socket. Oral analgesics were prescribed to all patients. Follow-up was done on day 1, day 3, day 5, and day 7 and patients were examined for relief from pain, extent of exposed socket bone and number of visits noted. Cure was judged by complete resolution of symptoms and by absence of pain, a secondary consideration was the appearance of the socket itself.



Case 1



Fig. 1 : Socket of 46, 45 with Dry Socket

Fig. 2 : Socket packed with Alvogyl Dressing



Fig. 3 : After Healing 7th Post-op Day

Fig. 4 : After Complete Healing

Case 2



Fig. 1 : Socket of 36 with Dry Socket

Fig. 2 : Socket packed with Alvogyl Dressing



Fig. 3 : After Healing 7th Post-op Day

Fig. 4 : After Complete Healing

CASE 3



Fig. 1 : Socket of 36 with Dry Socket

Fig. 2 : Socket packed with Zinc oxide Eugenol Dressing



Fig. 3 : After Healing 7th Post-op Day

Fig. 4 : After Complete Healing

RESULT

STATISTICAL TOOLS EMPLOYED

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software. The values were represented in Number (%) and Mean±SD. The following Statistical formulas were used:

1. Mean: To obtain the mean, the individual observations were first added together and then divided by the number of observation. The operation of adding together or summation is denoted by the sign Σ .

The individual observation is denoted by the sign X, number of observation denoted by n, and the mean by \bar{X}

$$\bar{X} = \frac{\Sigma X}{\text{No. of observations (n)}}$$

2. Standard Deviation: It is denoted by the Greek letter σ . If a sample is more than 30 then.

$$\sigma = \sqrt{\frac{\Sigma(X - \bar{X})^2}{n}}$$

When sample is less than 30 then.

$$\sigma = \sqrt{\frac{\Sigma(X - \bar{X})^2}{n - 1}}$$

3. Chi square test:

$$\chi^2 = \frac{\Sigma(O - E)^2}{E}$$

Where O = Observed frequency
E = Expected frequency

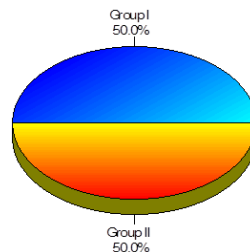
4. The Wilcoxon signed rank statistic for Mann-Whitney test: $W+$ is computed by ordering the absolute values $|Z_1|, \dots, |Z_n|$, the rank of each ordered $|Z_i|$ is given a rank of R_i . Denote where $I(\cdot)$ is an indicator function.

5. Level of significance: "p" is level of significance

- $p > 0.05$ Not significant
- $p < 0.05$ Significant
- $p < 0.01$ Highly significant
- $p < 0.001$ Very highly significant

Table 1: Distribution of Subjects

S.No	Group	Description	No. of patients	% of patients
1.	A	Patients in whom dry socket was treated with the use of Zinc oxide (powder) and Eugenol (liquid)	50	50
2.	B	Patients in whom dry socket was treated with the use of Alvogyl	50	50

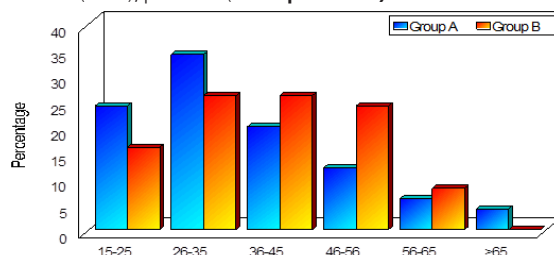


Age wise distribution of patients in two groups has been shown in Table 2 below:

Table 2: Age wise Distribution of Patients in two groups

S.No	Age group (in years)	Group A (n=50)		Group B (n=50)	
		No.	%	No.	%
1.	15-25	12	24	8	16
2.	26-35	17	34	13	26
3.	36-45	10	20	13	26
4.	46-56	6	12	12	24
5.	56-65	3	6	4	8
6.	>65	2	4	0	0

$\chi^2 = 5.867$ (df=5); $p = 0.319$ (Chi-square test)



Gender wise distribution of subjects has been shown in Table 3 below:

Table 3: Gender wise Distribution

S.No.	Gender	Group A (n=50)		Group B (n=50)	
		No.	%	No.	%
1.	Male	21	42	23	46
2.	Female	29	58	27	54

$\chi^2 = 2.560$ (df=1); $p = 0.110$ (Chi-square test)

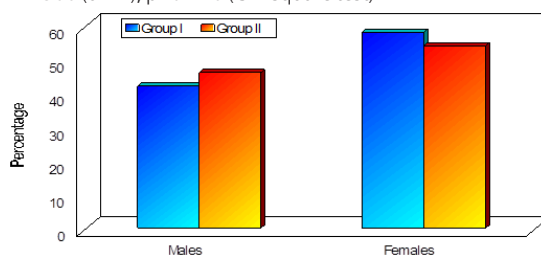


Table 4: Prevalence of dry socket in maxilla and mandible

S.No.	Location	Group A (n=50)		Group B (n=50)	
		No.	%	No.	%
1.	Maxilla	11	22	7	14
2.	Mandible	39	78	43	86

$\chi^2=1.084$; $p=0.298$ (Chi-square test)

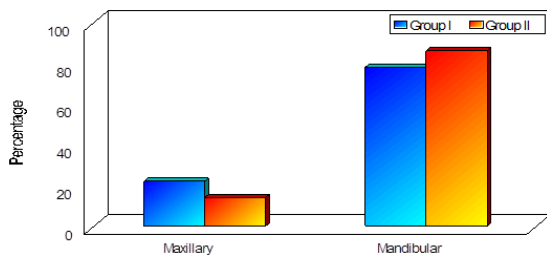


Table 5: Tooth Involved

S.No.	Tooth involved	Group A (n=50)		Group B (n=50)	
		No.	%	No.	%
1.	Mx CI	0	0	0	0
2.	Mx LI	0	0	0	0
3.	Mx Canine	0	0	0	0
4.	Mx PM1	2	4	0	0
5.	Mx PM2	2	4	2	4
6.	Mx M1	3	6	2	4
7.	Mx M2	0	0	3	6
8.	Mx M3	0	0	0	0
9.	Md CI	0	0	0	0
10.	Md LI	0	0	0	0
11.	Md Canine	0	0	0	0
12.	Md PM1	1	2	0	0
13.	Md PM2*	7	14	2	4
14.	Md M1	10	20	11	22
15.	Md M2	12	24	17	34
16.	Md M3	13	26	14	28

*1 case in Group II had two sockets involved (1 at Md PM2 and other at MdM1)

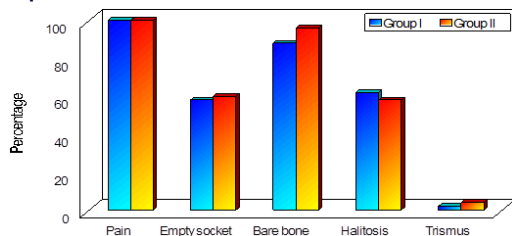
Mandibular molars and premolars were the most commonly involved teeth followed by maxillary molars and premolars. No case with involvement of incisors and canine was observed in both groups of present study.

Pre-Treatment Signs and Symptoms

Table 6: Pre-treatment signs and symptoms

S.No.	Signs and Symptoms	Group A (n=50)		Group B (n=50)		Significance of difference	
		No.	%	No.	%	χ^2	P
1.	Pain	50	100	50	100	0	1
2.	Empty socket	29	58	30	60	0.041	0.839
3.	Bare bone	44	88	48	96	2.174	0.140
4.	Halitosiis	31	62	29	58	0.167	0.683
5.	Others (Trismus)	1	2	2	4	0.344	0.558

Chi-square test



Other Findings

Table 7: Other Findings

S. No.	Finding	Group A (n=50)		Group B (n=50)		Significance of difference	
		No.	%	No.	%	Z	P

1.	No compliance to Postoperative instructions	45	90	42	84	0.796	0.372
2.	Smoking habit	7	14	4	8	0.919	0.338
3.	Oral contraceptive use	5	10	4	8	0.122	0.727

Chi-square test

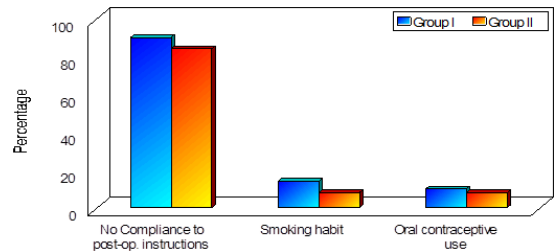
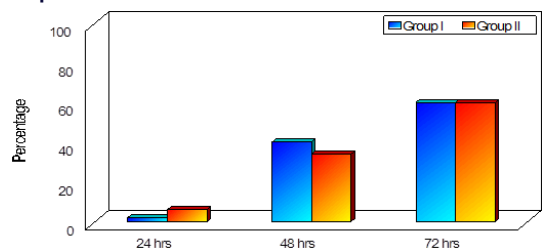


Table 8: Onset of symptoms

S.No.	Time interval	Group A (n=50)		Group B (n=50)		Significance of difference	
		No.	%	No.	%	χ^2	P
1.	24 hrs	1	2	3	6	1.042	0.307
2.	48 hrs	20	40	17	34	0.386	0.534
3.	72 hrs	30	60	30	60	0	1

Chi-square test



Onset of symptoms of dry socket was observed in 1 (2%) case in Group A and 3 (6%) cases in Group B after 24 hours. By 48 hrs, another 20 (40%) patients of Group A and 17 (50%) patients of Group B had onset of symptoms of dry socket. whereas dry socket symptoms had established by 72 hrs in another 30 (60%) of Group A and 30 (60%) of Group B patients. Statistically there was no significant difference between two groups at any time interval ($p>0.05$).

.POST-TREATMENT EVALUATION

Table 9: Analgesic Requirement

S.No.	Time interval	Group A (n=50)		Group B (n=50)		Significance of difference	
		No.	%	No.	%	Z	p
1.	Visit 1	50	100	50	100	0	1
2.	Visit 2	15	30	0	0	17.647	<0.001
3.	Visit 3	0	0	0	0	0	1
4.	Visit 4	0	0	0	0	0	1

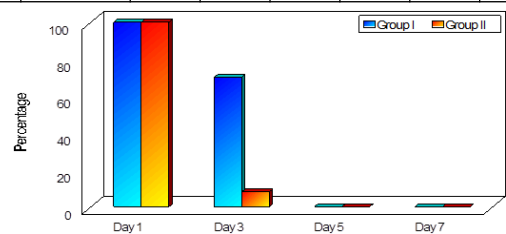


Table 10: Post-treatment evaluation of pain at different time intervals

S.No.	Time interval	Group A (n=50)		Group B (n=50)		Significance of difference	
		Mean	SD	Mean	SD	"t"	p

1.	Day 1	7.82	0.92	7.98	0.94	0.862	0.391
2.	Day 3	4.92	1.01	3.52	0.76	7.838	<0.001
3.	Day 5	1.68	1.29	0.62	0.88	4.817	<0.001
4.	Day 7	0	0	0	0	-	-

Student "t"-test

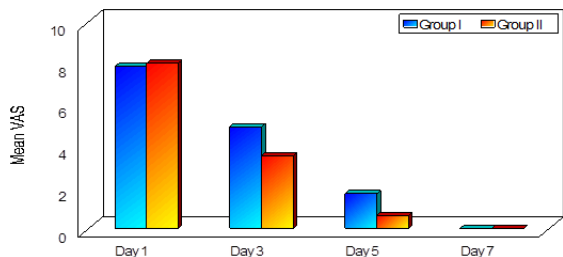
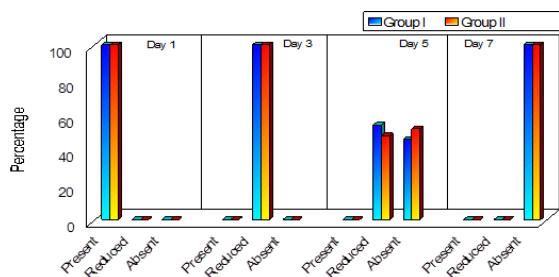


Table 11: Extent of Exposure of Socket Bone at different time intervals

S.No.	Time interval	Group A (n=50)			Group B (n=50)			Significance of difference	
		Present	Reduced	Absent	Present	Reduced	Absent	"z"	p
1.	Day 1	50 (100%)	0	0	50 (100%)	0	0	0	1
2.	Day 3	0	50 (100%)	0	0	50 (100%)	0	0	1
3.	Day 5	0	27 (54%)	23 (46%)	0	24 (48%)	26 (52%)	0.199	0.842
4.	Day 7	0	0	50 (100%)	0	0	50 (100%)	0	1

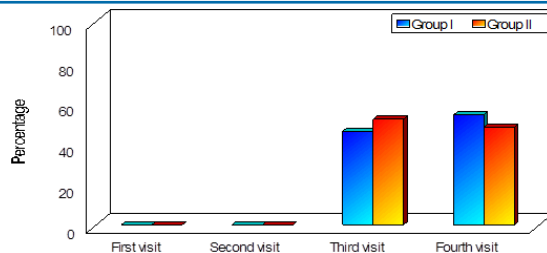
Mann-Whitney U test.



On day 1, in all the patients in both the groups, the socket bone was exposed. On day 3, a reduction in exposure of socket bone was observed in all the patients in both the groups. On day 5, 23 (46%) patients in Group A and 26 (52%) patients in Group B had no exposed bone. However, comparison of two groups did not reveal a statistically significant difference between two groups (p=0.842). On day 7, none of the patients had exposed socket bone.

Table 12: Number of visits required for complete resolution

S.No.	Visit No.	Group A (n=50)		Group B (n=50)		Significance of difference	
		No.	%	No.	%	"X ₂ "	p
1.	1	0	0	0	0	0	1
2.	2	0	0	0	0	0	1
3.	3	23	46	26	52	0.360	0.548
4.	4	27	54	24	48	0.360	0.548
Mean No. of visits		3.68±0.47		3.34±0.48		t=3.580; p=0.001	



As compared to Group A, the mean number of visits required for complete resolution was significantly lower in Group II (p=0.001).

Discussion

Alveolitis sicca Dolorosa more commonly known by the term "Dry Socket" or "Fibrinolytic Alveolitis" is characterized by a disintegration of the blood clot exposing an infected necrotic socket wall with a resultant fetid odour. It is defined as "Postoperative pain in and around the extraction site, which increases in severity at any time between 1 and 3 days after the extraction accompanied by a partially or totally disintegrated blood clot within the alveolar socket with or without halitosis". **Blum (2002)²**

Since it has multifactorial origin, thus this condition cannot be completely treated as long as the exact etiology is not firmly established. Its management appears to be simple and effective. It usually involve reassurance of the patient, cleaning and irrigation of the infected socket, and insertion of a medicated pack.¹¹

In this study the difference in the prevalence of dry socket between males and females in group A was male (42%) and Females (58%) and in group B was male (46%) and female (54%). This finding is in conjunction with the findings of **Krogh (1937)¹⁰** who did a study, on 6,403 extraction sockets out of which 138 sockets developed dry socket and out of these 41.3% were in males and 58.7% were in females. He concluded that male and female are equally susceptible to development of dry socket. It is also similar to the findings of **AL Khateeb et al¹¹** but **MacGregor (1966)⁶** refuted this finding by conducting a study on 6182 patients. His incidence was male 4.2% and female 6.5%. He concluded that incidence of dry socket was significantly higher in females. Here, in both of groups though female predilection is slightly more than male. Statistically there was no significant difference between two groups.

According to our study (Table 2) majority of subjects in both groups were in the age group of (26-35) and (36-45). This is in conjugation with **MacGregor's⁶** follow up study showing highest incidence in third or fourth decade of life. This is also more or less similar to study concluded by **Oginni et al (2003)¹²**. Over all the mean age of patients was 37.39±13.36 years. The mean age of patients was 36.62±14.23 in Group A and 38.16±12.52 years. On comparing the data statistically, no significant difference was observed between two groups (p=0.319).

Many authors reported site specificity in the occurrence of dry socket with the mandibular molar area being the most commonly affected site. (**Oginni et al¹², Rood JP & Murgatroid J¹³, MacGregor⁶**). **Kruger(1973)⁴** associated higher incidence of Dry socket in mandibular molar regions due to thick cortical bone resulting in poor local blood supply. But **Birn (1973)³** disputed this by showing that mandibular molar region is one of the most richly vascularised region of mandible. In our study (Table-4) in both groups mandibular teeth (group A-78% & group B-86%) were more commonly involved. It was also suggested this site specificity could be explained in term of difficulty of extraction (**MacGregor⁶**).

In this study all patients presented with classical sign of pain , followed by bare bone and empty socket which is more or less similar with the findings of **Blum et al. (2002)² and MacGregor (1968)⁶**. Halitosis was also found in 62% cases in group A and

58% cases in group B. Trismus was the least common sign/symptom observed in both groups, this finding correlates with finding of **Blum *et al.***

Other findings were negligence of post extraction instructions. Smoking habits was another finding, in group A 14% were smokers and in group B 8% were smokers. This finding is similar to the findings of **Sweet and Buttler (1979)**¹⁴ who showed 20% incidence of dry socket among patients who smoked more than a pack per day and 40% incidence among those who smoked on the day of surgery or on the 1st post-operative day. This may be due to introduction of foreign substance that could act as a contaminant in the surgical site and / or dislodgement of clot from the socket due to suction.

None of the Patients in either of the two groups had any positive medical history contraindicative of treatment protocol being employed. With regards to medications only oral contraceptives have been reported to be associated with an increased risk of dry socket. However in our study in group A out of 29 females, 5 patients were on oral contraceptive (17.24%) and in group B, out of 27 females, 4 patients (14.81%) were on oral contraceptive. This was more or less similar to the study done by **J.B. Sweet and D.P Butler (1977)**¹⁵ There was no statistically significant difference between two groups for any of these findings, probably because of the small numbers of patients who were on oral contraceptive. On exploring the data further, it was observed that out of 9 patients on oral contraceptives, 3 required only 3 visits while the remaining 6 too did not require more than 4 visits. Thus for the patients on oral contraceptive pills too, the results were similar to the other patients.

Regarding onset of symptoms, in our study onset of symptom seen in mostly after 72 hours in both of groups followed by after 2nd day. 2% patients in group A and 6% in group B developed symptoms of dry socket after 24 hours. **Charles B. Hermes** (1998)¹⁶ showed the onset of symptoms to be ranging from 2-5 days in his study of 271 patients.

In this study 100 patients were randomly divided into 2 groups of 50 patients. Group A treated with freshly prepared zinc oxide eugenol paste in cotton fibers and Group B treated with Alvogyl(Septodont,France). All patients advised same analgesic (Combiflam, S.O.S) on very first visit.

Post operative assessment was made on criteria which was undertaken in study. According to this, when we evaluated pain on VAS scale after every follow up, on day one, there was no statistically significant difference between two groups ($p=0.391$). However on day 3 and day 5, the mean pain score in group A was significantly higher as compared to that in group B, showing a statistically difference between two groups ($p<0.001$), table(10). This shows that Alvogyl has advantage over zinc oxide eugenol in pain reduction, this is due to its anesthetic action for longer time due to its slow but persistent release of Butyl Para aminobenzoate. The antiseptic effect of iodoform is also useful in reducing infection.

According to this study, on visit one, all the patients required analgesia. However, on second visit the number of patient required analgesics were (30%) in group A and none of the group B patient required analgesic use, showing statistically significant difference between two groups but by third visit none of the patients in either group required analgesic use. Since the sample size is small.

Extent of exposed Socket bone comparison showed that on day 3rd, a reduction of exposed socket bone was observed in all the patients in both groups, on day 5th, 46% patients in group A and 52% patients in group B had no exposed bone, statistically there were no significant finding observed. However on day 7th none of the patients had exposed socket bone.

When number of visit was compared in both groups, the mean number of visits required for complete resolution was significantly

lower in group B ($p=0.001$) as compared to group A. It shows a significant advantage of Alvogyl over the traditionally used dressing of Zinc oxide and eugenol.

In this study resolution of symptoms occurred mostly on 7th day followed by 5th day and 3th day after treatment. This correlates with the total treatment duration i.e. 7-14 days recommended in the literature.

Mainous (1974)¹⁷ reported a foreign body reaction 8 weeks after intra alveolar packing of an extraction site with zinc oxide eugenol dressings. **Rozer E Alexander (2000)**³ also reported that zinc oxide eugenol paste delays healing in extraction sites and markedly extended the post-operative course. **Oginni(2003)** on his study treated dry socket with thorough irrigation and zinc oxide eugenol dressing, which was changed on alternate day until socket granulated adequately and found no clinical complication.

In this study we also did not find delayed healing in any patient in which zinc oxide eugenol dressings were given.

According to study done by **Stina M. Syrjänen and Kaki J. Syrjänen (1979)**¹⁸, retarded wound healing were encountered in the sockets packed with Alvogyl. In our study we did not find any delayed healing in any of the patient treated with Alvogyl.

In our study all the sockets with dry socket showed significant improvement in all the 2 groups within 7 days. But it is difficult to assume that the improvement in the symptoms were only due to the dressings placed in the sockets or cleaning of the sockets of debris and root/bone fragments alone because in all the sockets normal saline solution was used as an irrigant to clean the sockets and gargling with normal warm saline solution was also advised to the patient which may have some contribution towards the healing of the sockets.

Conclusion

In this study complication with intra-alveolar dressing was not found in any patient of Group A and Group B. and this study also shows that use of Alvogyl paste in dry socket provides prompt Relief from pain in comparison to Zinc oxide and Eugenol dressing and minimizes Patients visit to dental clinic for dressing. However a bigger sample size and longer follow up is required to found a suitable method for treatment of Dry Socket

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