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Aqueous extracts of Propolis and Miswak as topical medicament to improve post–operative outcome after surgical removal of impacted lower third molar

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ABSTRACT

Aim: To asses the effects of topical application of aqueous extract of either Propolis or Miswak on the post–operative outcomes in relation to the duration of operation after surgical removal of lower third molar was performed. **Material and Methods:** A total of 97 patients participated and distributed randomly into 3 groups according to the medicament applied into the extraction socket: Group I, in which 5% aqueous solution of propolis extract used; group II, in which 10% aqueous solution of Miswak extract used; and group III, in which distilled water used (control group). **Results:** A significant improvement in post–operative outcome at 3rd day in both group I and II comparing to group III was observed. No significant difference noticed at 1st day and 6th day. Assessment of dry socket showed no significant difference in between the three study groups. However, when assessment performed in relation with operation time, a significant difference noticed in between the three study groups with high incidence of dry socket reported in operation take longer than 30 minutes in the three study groups. **Conclusion:** Aqueous extract of Miswak and Propolis as a topical medicament following lower third molar extraction had a slight reducing effect on the severity of post–operative complications.

Key Words: Miswak, Propolis, impacted tooth.

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INTRODUCTION

Following lower third molar surgical extraction, pain, swelling and dry socket are the most common complications developed. Different methods advocated aiming to reduce the incidence and severity of these complications.(1) Of these methods, medicating post–extraction socket had proposed in different literature. With this modality, the goal is to cause maximum regeneration of bone with minimum post–operative pain and avoidance of delay healing that may be the cause of dry socket and pain.(2) Different local agents used for that purposes includes: Antibiotic,(3) antiseptic,(4) occlusive dressing(5) and antifibrinolytics.(1)

Variable factors contribute to the development of dry socket making its etiology unclear. Therefore, study of its incidence following third molar surgery alone are inadequate and assessment of health related quality of life (HRQOL) measures are recently introduced measure to determine the clinical post–operative outcomes measure in minor oral surgery based on different outcomes measurement and not only dry socket.(6–9)

Propolis and Miswak as a part of folk medicine proposed to use as topical medicaments to reduce post–operative complications in several studies.(10–13) Propolis is a natural resinous product collected by bee from tree such as poplar and willow, bring them to their hives to seal all of it and protect against introducers. Several studies

showed that Propolis possessing antibacterial,[10] antiviral,[11] anti–inflammatory and anticancer[12] effects basing on difference in chemical composition of Propolis. Miswak is a steam or root of selected plant that crushed at one end between the teeth to produce fibers resembling toothbrush. It has been shown that the extract of Miswak possess various biological properties including antibacterial,[13] antifungal, anticaries and antiplaque effects.[14–15]

This clinical study performed to determine the effects of topical 5% aqueous extract of Propolis and topical 10% aqueous extract of Miswak and determination of the effects of operation time on the HRQOL measures and incidence of dry socket following lower third molar extraction.

MATERIALS AND METHODS

Sample selected in this study included patients presented for surgical removal of lower third molar in the Department of Oral and Maxillofacial surgery, College of Dentistry, University of Mosul from September 2001 to March 2003. Patient selected should be free of systemic disease and not with acute infection at surgical site and not take antibiotic at least 2 week before surgery. All patients informed on the purpose of the study and accepted to participate in it.

All operation performed in the same out–patient operating room and using the same materials and surgical instruments by the same operator (F.A.A.).

In all cases, inferior alveolar, lingual and buccal nerve were anesthetized with 2 anesthetic cartridge of 2% lidocaine with 1:80000 adrenaline (Septodent/France). A double trajectory incision was made; first one distal along retromolar area to the second molar and other incision made as vertical releasing incision at the mesial side of lower second molar. Bone removal performed using surgical bur as needed. After extraction of the tooth, the socket cleaned and any fragment removed. Before suturing, a syringe containing 5 ml of any studying medicament coded by other person (A.I.A.) expelled gently into the center of the socket (blind study). Care was taken not to aspirate or compress the socket for following 2 minute. Then sockets were closed with little disturbance. Post–operative cares were given and antibiotic prescribed for all patients including amoxicillin 250 mg /tid (for allergic patients, erythromycin 250 mg/qid was prescribed). Paracetamol prescribed as analgesic and patient instructed to take it on need up to 5 tablets/ day.

Patients allocated to study groups according to the table of random number to the following study groups:

Group I, in which 5% aqueous solution of Propolis extract was used.

Group II, in which 10% aqueous solution of Miswak extract was used.

Group III, in which distilled water wad used (control group).

Both Miswak and Propolis aqueous extracts prepared by chopping the hard form of the material and then extract with water at pH 7.2 for 5 days and then dried and suspended at 1 gm/100 ml of saline solution. Final extract used with different concentration according to procedure described by Ibrahim *et al*.[12] This preparation performed by other person (L.A.M.)

The following data were recorded for each patient: Name, age, sex, time of operation (from lifting of flap to the last stitch).

Each patient was given 3 copies of the post surgery diary which is a modified Arabic version of HRQOL instruments to be completed by the patient at the end of 1st, 3rd and 6th days after surgery which included:

1. Worst pain felt today. Rated 1, 2, 3, 4, 5 (from no pain to severe pain),
2. What grade of problem with mouth opening? Rated 1, 2, 3, 4, 5 (from no to severe).
3. Do you notice swelling? Rated 1, 2, 3, 4, 5 (from no to severe).
4. What number of paracetamol tablets taken? Rated 1, 2, 3, 4, 5 (grading recorded by patient using visual analogue scale)

Patients instructed to return at 7th day for suture removal or when any complication developed. At 7th day, the three copies taken and assessed statistically.

Any patient returned for any complication was recorded in his data sheet especially for dry socket. Any patient fail to complete the questionnaire was completely excluded from the study.

Data collected and analyzed using analysis of variance (ANOVA), Duncan's Multiple Range Test and Chi–square test on Minitab Statistical Program.

RESULTS

The results of the study showed that of 105 patients participated, 97 patients included in the study, whereas the remaining 8 patients either not returned at 7th day or fail to complete the data questionnaire accurately (5 from group I, 1 from group II and 2 from group III).

The mean age of patient participated was 28 $\pm$ 10.5 year with age range of 19–40 year. Female: male ratio was 1.31: 1.

Assessment of the change in HRQOL measure of the three study groups at 1st, 3rd and 6th days successively were shown on Table (1). Using ANOVA test, no significant differences noticed in assessment of 4 questioners between the three study groups at 1st day. At 3rd day, the result of HRQOL instrument showed a significant difference in between the three study groups for pain and number of paracetamol tablets only. Duncan's test showed better result obtained in group II and poor result noticed in control group; whereas at 6th day, the results of HRQOL instrument showed no significant differences in between the three study groups. Regarding the incidence of dry socket recorded in this study, chi–square test showed no significant differences in between the three study groups (Table 2).

Table (1): Health related quality of life in the three study groups at 1st, 3rd and 6th days of study

	Day 1				Day 3				Day 6			
	Groups			F	Groups			F	Groups			F
	I	II	III	value	I	II	III	value	I	II	III	value
1	4.03	3.85	3.18	0.46	2.7 ^{b}	2.5 ^{b}	3.9 ^{a}	11.3*	1.5	1.7	1.85	0.49
2	3.02	2.9	3.43	1.36	3.9	3.1	4.6	1.15	1.7	2.02	1.9	1.02
3	3.27	3.99	3.66	1.09	3.2	3.6	3.5	0.56	2.2	2.01	2.1	0.51
4	3.82	4.1	4.02	1.2	3.3 ^{b}	2.2 ^{b}	4.5 ^{a}	12.7*	1.5	1.9	1.7	0.93

*Indicated significant differences.
Different letter indicated significant difference within group.
Group I: in which 5% Propolis extract used.
Group II: in which 10% Miswak extract used.
Group III: in which distilled water used.
1: Pain; 2: Limited mouth opening; 3: Swelling; 4: Number of paracetamol/day.

Table (2): Incidence of dry socket in three study groups

Dry Socket	Group I	Group II	Group III	Total
Yes	5	4	9	18
No	25	30	24	79
Total	30	34	33	97

χ^2= 2.76 df=2 p= 0.251
Group I: in which 5% Propolis extract used.
Group II: in which 10% Miswak extract used.
Group III: in which distilled water used.

When assessment performed regarding duration of operation using ANOVA test, no significant differences noticed in all data recorded in 1st day (Table 3). At 3rd day, a significant difference noticed in the result of pain recorded as well as the number of paracetamol tablets taken by patients. For pain record, least pain recorded in Miswak group in which operation last less than 30 minutes followed by Propolis group with less than 30 minute duration then Miswak and Propolis groups with longer duration (Table 4). No significant differences noticed in all data recorded at 6th day regarding duration of operation (Table 5).

Table (3): Health related quality of life instrument at the 1st day in regard to duration

	Group I		Group II		Group III		F Value
	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes	
1	3.8	4.1	3.8	4.01	4.02	4.54	0.75
2	3.0	3.3	2.95	2.82	3.43	4.9	0.27
3	2.9	4.1	3.8	4.6	3.55	3.91	0.52
4	3.8	3.86	3.9	4.75	3.8	4.5	0.91

Group I: in which 5% Propolis extract used.
Group II: in which 10% Miswak extract used.
Group III: in which distilled water used.
1: Pain; 2: Limited mouth opening; 3: Swelling; 4: Number of paracetamol/day.

Table (4): Health related quality of life instrument at the 3rd day in regard to duration

	Group I		Group II		Group III		F Value
	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes	
1	2.6	2.9	2.45	2.6	3.7	4.3	10.27*
2	3.9	3.9	3.06	3.2	4.55	4.71	1.02
3	3.07	3.5	3.47	3.9	3.2	4.19	1.14
4	2.3	2.3	3.18	3.25	4.5	4.5	11.9*

*Indicated significant differences
Group I: in which 5% Propolis extract used.
Group II: in which 10% Miswak extract used.
Group III: in which distilled water used.
1: Pain; 2: Limited mouth opening; 3: Swelling; 4: Number of paracetamol/day.

Table (5): Health related quality of life instrument at the 6th day in regard to duration

	Group I		Group II		Group III		F Value
	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes	
1	1.5	1.5	1.7	1.7	1.83	1.89	0.85
2	1.7	1.7	2.1	1.8	1.86	2.0	0.65
3	2.17	2.3	2.0	2.0	2.1	2.1	0.78
4	1.5	1.5	1.85	1.99	1.7	1.7	0.45

Group I: in which 5% Propolis extract used.
Group II: in which 10% Miswak extract used.
Group III: in which distilled water used.
1: Pain; 2: Limited mouth opening; 3: Swelling; 4: Number of paracetamol/day.

Regarding incidence of dry socket and duration of operation, a significant difference noticed in between the three study groups (Table 6) with high incidence reported in prolonged operation in the three study groups.

Assessment of the change in HRQOL measure of the three study groups at 1st, 3rd and 6th days successively showed a reduction in pain in groups I and II progressively throughout the study, whereas in group III pain although reduced at 6th day, it recorded to increase in day 3 (Figure 1). Similar results noticed for assessments of number of paracetamol tablets used by the patients (Figure 2). Other records (swelling and limitation of mouth opening) clearly find a maximum symptom to appear in the 3rd post–operative day whereas at 6th day the symptom being mild or disappeared (Figures 3 and 4).

Table (6): Incidence of dry socket in three study groups in relation to operation time

Dry Socket	Group I		Group II		Group III		Total	
	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes	< 30 Minutes	> 30 Minutes
Yes	2	3	1	3	3	6	6	12
No	19	6	25	5	20	4	64	15
Total	21	9	26	8	23	10	70	27

χ^2= 19.884 df= 5 *p*= 0.001

Group I: in which 5% Propolis extract used.
Group II: in which 10% Miswak extract used.
Group III: in which distilled water used.

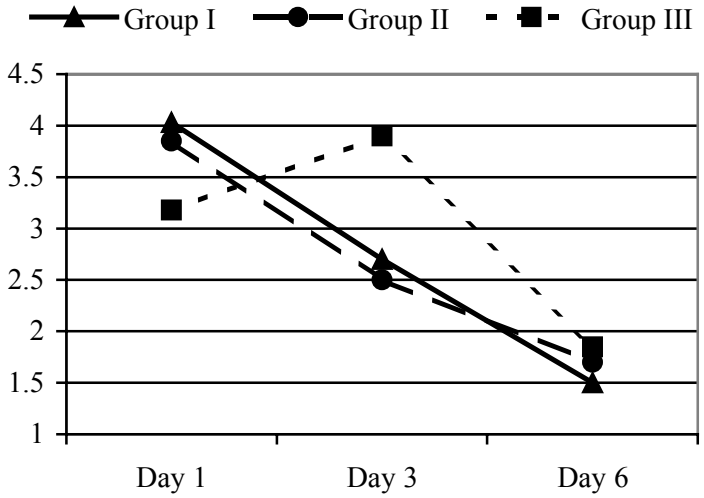

Figure (1): Pain in the three study groups at the 1st, 3rd and 6th days of study

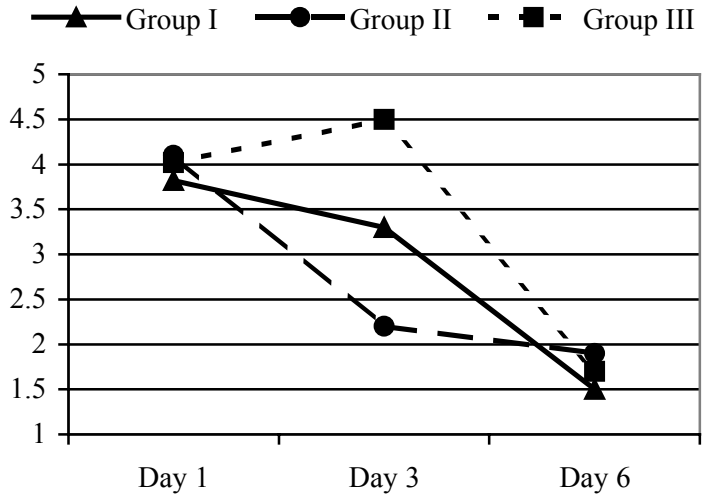

Figure (2): Number of paracetamol tablets in the three study groups at the 1st, 3rd and 6th days of study

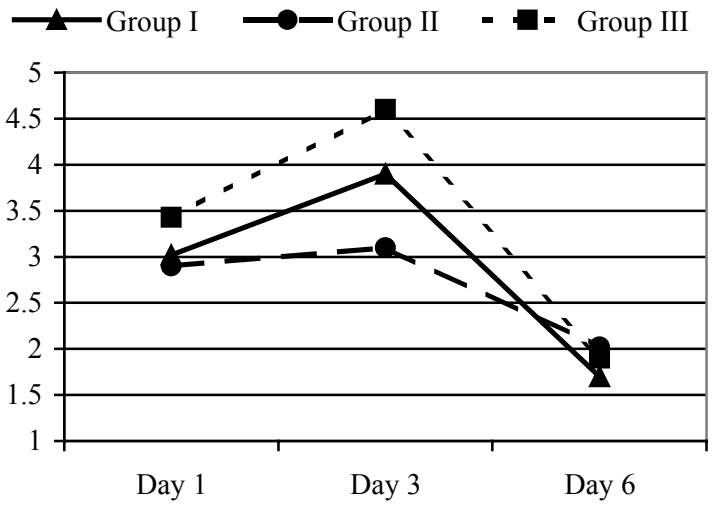

Figure (3): Limitation of mouth opening in the three study groups at the 1st, 3rd and 6th days of study

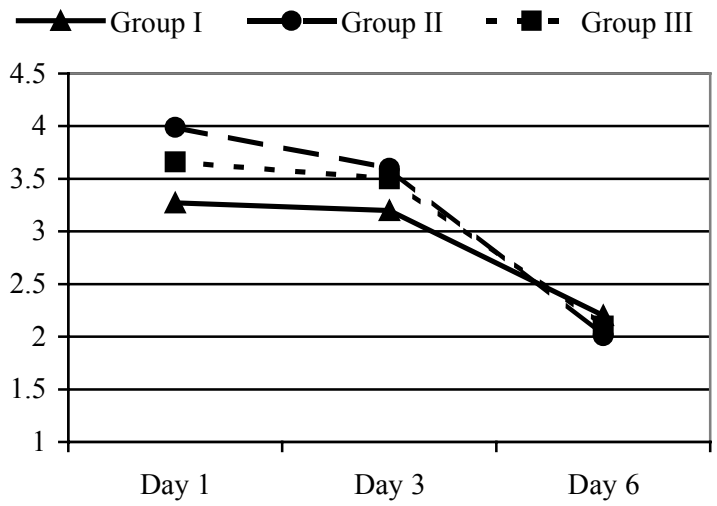

Figure (4): Swelling in the three study groups at the 1st, 3rd and 6th days of study

DISCUSSION

No single factor could be regarded as a cause for development of dry socket as a complication of extraction since its etiology regarded as multifactorial.[1] Therefore, assessment of other sign and symptom of complications for determination of effectiveness of any new technique or medicaments used being necessary.[6] In this study, although no significant difference noticed in the incidence of dry socket between three study groups, HRQOL assessment showed a significant difference in pain and number of paracetamol tablet taken by the patient at the 3rd day. This finding was of a significant importance since the 3rd day represent a day at which dry socket symptom appeared.[1, 2] Also, this finding was in agreement with that of other studies[6, 8, 9] in which uses of HRQOL showed amore accurate records than analysis of dry socket incidence alone. Although no significant difference noticed in swelling and limitation of mouth opening, this finding could occurred due to a small sample size as well as the use of medication (antibiotic and analgesic).

Original version of HRQOL instruments includes different measures[6–9] but in this study it modified to be simple question that could be assessed by the patient simply and not need complex description for each patient by operator.

Other findings in this study that uses

of both medicaments provideed no benefits at the 1st day. This may give clue that both medicaments had no any analgesic effects and only anti–inflammatory and antibacterial effects could be the cause of fewer symptoms appeared at the 3rd day. These agreed with several studies that showed similar effects for Propolis and Miswak when used topically.[11, 12, 14, 16] It is clear that the maximum symptom appear to be evident at the 3rd day. This mainly related to the effect of inflammatory response that occurs following surgical procedure that may cause pain, swelling and trismus.[1, 2, 5]

The determination of the effects of operation duration on clinical outcomes was performed in this study since prolonged operation associated with difficult operation, more surgical trauma, excessive inflammatory response, prolonged mouth opening and more incidence of complications (since operation performed by the same operator).[1] The difference noticed in some variables of HRQOL at the 3rd day and dry socket incidence in this study was in agreement with that of other studies,[1, 3–5] which stated that dry socket incidence increased with increasing operation time.

Although minimal or no anti–inflammatory activity present in Miswak in most of studies,[16] however aqueous extract of Miswak in this study produced better result at the 3rd day regarding both pain and analgesic consumption. This finding may be explained as that Miswak possess delayed analgesic activity not related to its anti–inflammatory activity.

Both medicaments used showed good effect in reducing symptom of pain especially at the 3rd day and this is important in reducing the need for analgesic and antibiotic consumption. Other studies suggested using the same medicaments without the use of antibiotic or analgesic.

CONCLUSION

Aqueous extracts of Miswak and Propolis proved to have improving effects on post–operative outcome following lower third molar extraction.

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