

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

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Abstract: Background: Wound healing is accelerated and improved by using honey dressing due to its antioxidant, anti-bacterial and anti-inflammatory properties .

Purpose: to determine the effect of honey dressing on open wound healing and patient's satisfaction among surgical patients. **Research Design:** A quasi-experimental designs utilized for this study. **Setting:** General surgical department of menoufia university hospital. **Subjects:** A purposive sample of 90 adult patients with open wound, were selected and divided alternatively and randomly into two equal groups (45 study group -45 control group). **Instruments:** Three instruments were used for data collection: Structural interviewing questionnaire, Bates-Jensen wound assessment Tool, Patient's satisfaction assessment sheet. **Results:** There was significant improvement in wound healing and patient's satisfaction among study group than control group. Majority of the study group of the current study were satisfied with honey dressing, about 37 (82.2%) patients were satisfied while only 8 (17.8%) patients were partially satisfied. **Conclusions:** The honey dressing was safe and effective on wound healing and didn't cause any side effects, accelerate wound healing, and increase patient's satisfaction. **Recommendations:** Honey dressing should be used as an alternative therapy for wound healing as it safe, cost effective, accelerate wound healing, and promote patient comfort.

Key words: honey dressing, wound healing, and patient's satisfaction.

Introduction

A wound is damage or disruption to the normal anatomical structure and function. It can range from a simple break in the epithelial integrity of the skin or it can be deeper, extending into subcutaneous tissue with damage to other structures such as tendons, muscles, blood vessels nerves, parenchymal organs and even bone (Amer et al., 2018).

Wound healing is a complex and integrated physiological process involving interaction of many cell types, cytokines, growth factors, their inhibitors, and several enzymes. It is a complex cascade of cell interactions that leads to restoration of tissue integrity, it comprises of four distinct

but overlapping phases: haemostasis, inflammatory, proliferation and remodelling phases. Failure to progress in the stages of wound healing can lead to chronic wounds. Factors that lead up to chronic wounds are venous disease, infection, diabetes and metabolic deficiencies of the elderly. Careful wound care can speed up the stages of wound healing by keeping wounds moist, clean, and protected from reinjury and infection (Sorg et al., 2017).

Honey is a viscous, supersaturated sugar solution derived from nectar gathered and modified by the honeybee, *Apis mellifera*. Honey contains approximately 30% glucose,

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

40% fructose, 5% sucrose, and 20% water, as well as many other substances, such as amino acids, vitamins, minerals, and enzymes (Gill et al., 2019).

It is a biologic wound dressing with multiple bioactivities. Each of the healing-promoting activities can be found separately in pharmaceutical products, but in honey they are all present and work together synergistically to enhance the healing process. (White & Cutting, 2018). Honey has been used to treat infected wounds in humans as long as 2000 years before bacteria was discovered and it is effective in many variations of wounds from diabetic foot ulcers, burns, chronic pressure ulcers, surgical wounds, and even Methicillin-Resistant Staphylococcus Aureus (MRSA). It has been found to be particularly effective where standard wound care is limited or unsuccessful (Anyanechi & Saheeb, 2015). It offers broad spectrum antimicrobial properties and promotes rapid wound healing. In addition to allow adequate improved wound healing, the honey dressing has been reported easier to apply and remove with normal saline without adhesions, damage to the granulation tissue, or bleeding (Surahio et al., 2015).

Honey has antioxidant, anti-bacterial and anti-inflammatory properties. It can be used as a wound dressing to promote rapid and improved healing (Sarheed & Debe 2020). For example, honey properties contribute simultaneously to limit inflammation and promote wound healing. In the early inflammatory stage, honey seems to have the most positive effect in helping to remove necrotic tissue (Graham & Bonner, 2014). Honey application is accompanied with scarless healing in wounds cavity. It was reported that wounds treated with a topical application of honey

experienced less edema, fewer polymorph nuclear and mononuclear cell infiltrations, less necrosis, better wound contraction and improved epithelialization. Furthermore, honey causes significantly greater wound contraction, and it promotes the formation of granulation tissue and epithelialization of wounds & ulcers. It stimulates tissue growth, synthesis of collagen, and development of new blood vessels in the bed of the wound (Alam et al., 2014). Furthermore, it doesn't create an adherent interface between the wound and the dressing so that dressings can be easily removed without pain or damage to the newly regrown tissue (Upadhyay et al., 2016).

Significance of the Study

Open wounds are a nightmare, not only they are painful and messy, but also, it takes time to heal completely. It needs to manage very carefully and rapidly to promote safe and effective healing without causing complications and leaving scars. Open wound healing require long time to heal, as a result it increases hospital stay and cost which negatively affect to patients and their families whether effect physically, psychologically and/or financially. So, this must take researcher's attention to manage it and prevent complications that result from it as infection which may spread to other parts of the body. There are various methods used to treat it. In this study honey dressing will be used to promote healing of open wound, which is available to all people, low cost and not have any side effect that may result from other methods as chemical antiseptics.

In addition, honey doesn't produce allergy or resistance that result from using antibiotics. It may promote wound healing rapidly So, decrease the time needed for complete wound healing and enhance patient's satisfaction.

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

Research Hypothesis:

Patients who dressed with honey have rapid wound healing than patients who don't dressed with honey.

Patients who dressed with honey have better patient's satisfaction than patients who don't dressed with honey.

Methods:

Research design:

A quasi-experimental research design (study and control) was utilized to achieve the purpose of this study.

Research Setting:

The study was carried out at general surgery department of Menoufia University Hospital.

Subjects:

A convenience sample of ninety patients with open wound were selected and divided alternatively and randomly into two equal groups, 45 patients for each group (study-control).

Study group (I): Those patients were dressed by honey.

Control group (II): Those patients who received the routine hospital care only.

Inclusion criteria:

- Adult patients (65- 18).
- Willing to participate in the study.

Exclusion criteria:

- Patients who have malnutrition disease as anaemia, hypoalbuminemia.
- Patients who have autoimmune disease&receive immunosuppressant therapy.
- Patients who have skin problem as purities, skin oedema, inflammation and rapy.
- Patients who receive chemotherapy or radio therapy.

Instruments:

Three instruments were used by the researcher for collecting the necessary data, these instruments were:

Instrument I: Structural interviewed questionnaire:

It was developed by the researcher to assess bio-sociodemographic data. It was comprised of two parts:

- Part one: Sociodemographic data:

It was comprised of questions includes data related to patient's age, gender, level of education, occupation, marital status, economic status, and residence.

- Part two: Medical data:

It was comprised of questions about past and present medical history, type of wound, site of wound, lab investigation as hematocrit, albumin, hemoglobin, white blood cells& fibrinogen.

Instrument II: Bates-Jensen Wound Assessment Tool

It was developed by Barbara Bates-Jensen (2001). And it is now known as the Bates-Jensen Wound Assessment Tool. The Bates-Jensen Wound Assessment Tool (BWAT) is a valid and reliable tool used to assess healing of all types of wounds. This tool modified by the researcher to accommodate the criteria of the wound and to be suitable. The researcher used 10parameter of it, which include size(6 items), Depth(6 items), Edges(6 items), Necrotic tissue type(5 items), Necrotic tissue amount(5 items), Exudates amount(5 items), Exudates type(5 items), Skin color surrounding wound(5 items), Granulation tissue(5 items) and Epithelization(5 items). Each item had five alternatives, responses as follows: -.

Scoring system

Each item scored from 1 to 5, with 1 being the best for that attribute. After each item is assessed and scored, the 10 sub scores are summed to get a total score. An additional asset of BWAT is using the score to measure wound severity. This is important, since the goal of wound care is to reduce wound

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

severity. The total BWAT scores are divided into four severity categories:

- Range from 10–18 indicated minimal severity.
- Range from 19–28 indicated mild severity.
- Range from 29–39 indicated moderate severity.
- Range from 40–50 indicated extreme severity.

Instrument III: Patient's Satisfaction Assessment Sheet

It was developed by the researcher to assess level of patient's satisfaction. It contains 10 of close ended questions that reflect degree of satisfaction

Scoring system

Each question was given one if the subject reported Yes answer and zero if the answer was No. All questions were summed to give a score 10. The score was categorized as:

- A score from 1-3 indicate Unsatisfied.
- A score from 4-7 indicate partially satisfactory.
- A score from 8 - 10 indicate satisfactory.

Validity of the tools

All the tools were tested for face and content validity by a jury panel of 11 experts in the field of medical surgical nursing and in general surgical department to ascertain accuracy and completeness then Suggestions were incorporated and taken into consideration.

Reliability of tool

The BWAT has excellent intra-reliability and good interrater reliability, provided assessors had completed one to two hours of training and followed instruction consistently. Excellent agreement also has been shown between BWAT scores derived using digital wound images and those from bedside assessments. Total BWAT scores have been shown to

progressively decrease as the wound heals and have been used in clinical trials to detect changes in wound appearance over time and significant differences between control and active treatment groups (Thompson et al., 2013).

Pilot study:

It was conducted prior to the actual study on 10% of the study sample (9 patients) to test the clarity and applicability of the tools and estimate the time needed to collect data. Necessary modifications were done. Data obtained from the pilot study was excluded from the current study.

Ethical Consideration:

An oral consent was obtained from all patients' to participate in this study after explanation of the purpose of the study. Each patient was reassured that any information obtained would be confidential and would only be used for the study purpose. The researcher emphasized that participation in the study was entirely voluntary, and anonymity of the patients were assured through coding of data. Patients were also informed that refusal to participate in the study wouldn't affect their care.

Procedure:

- Data were collected over a period of 10 months from December 2019 to September 2020, duration of April & May period of lock down due to Corona Virus limited number of patients in hospital.
- Permission to get acceptance for gathering the data was obtained from the directors of the selected setting after submitting an official letter from the Dean of the faculty of nursing at Menoufia University explaining the purpose of the study and methods of data collection to obtain the acceptance for data collection. Then, this letter was provided to the head of department.

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

- Patients who agreed to participate in the study and fulfilled the inclusion criteria were divided randomly and alternatively into study and control group 45 patients each.

Study group: Those patients who dressed by honey. Dressing was changed daily, and the wound was assessed at 7th, 14th, 21st day of using honey dressing to monitor wound healing.

Control group: Those patients who treated by traditional dressing according to hospital policy and the wound was assessed at 7th, 14th, 21st day to monitor wound healing.

The researcher dealt with the control group (II) firstly then the study group (I) to avoid the contamination of data collection. Purpose of the study was explained to each subject in both groups.

- Patients in the study group were interviewed every day from 8A.m to 12P.m to perform dressing using honey. The technique of dressing was:
 - Hand washing & preparing the equipment used in dressing procedure.
 - Prepare the patient and place him in the suitable position that facilitates dressing.
 - Wear gloves & removing the old dressing then discard it after assessing it for colour, amount, and odour of discharge.
 - Change gloves and wear sterile one
 - Clean the wound through washing with normal saline for good visualisation and assessing the wound.
 - Squeeze the wound to clean from pus cells and then removing any loosed dead tissue using sterile artery and scissor.
 - Washing the wound with normal saline.
 - Dry the wound using sterile cotton sponge or dressing

- Apply layer of honey on sterile gauze and put it on the wound and then apply sterile dressing to cover the wound. Finally secure the dressing with adhesive tape.

- The researcher was assessed the wound healing for the two groups included in the study at day 7, 14, 21 using tool II Bates-Jensen Wound Assessment Tool.

- Evaluation of the study group was done using tool II (Bates-Jensen Wound Assessment Tool) at day 7th, 14th, 21st of the intervention to determine the degree of wound healing and using the third tool (Patient's Satisfaction Assessment Sheet) at the end of the intervention.

Some patients were discharged before the 21st day, those patients were met at the outpatient clinic in the menoufia University Hospital for assessing wound healing.

Statistical Analysis

The collected data were tabulated and analyzed by SPSS (statistical package for the social science software) statistical package version 20 on IBM compatible computer. Two types of statistics were done:

1) Descriptive statistics: were expressed as mean and standard deviation ($X+SD$) for quantitative data or number and percentage (No & %) for qualitative data.

2) Analytic statistics:

Pearson Chi-square test (χ^2): It is the test of significance used to study association between two qualitative variables.

P-value at 0.05 was used to determine significance regarding:

- P-value > 0.05 to be statistically insignificant.
- P-value ≤ 0.05 to be statistically significant.
- P-value ≤ 0.001 to be highly statistically significant.

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

Results

Table 1: This table shows that, the mean ages of study and control groups were 42.04 ± 10.75 & 41.86 ± 10.32 years old, respectively. About 46.7% of the study group & 55.6% of the control group were males. Concerning marital status, more than three quarter of subjects of both the study and control groups (75.6% & 86.7% respectively) were married. About 57.8% of the studied group came from urban areas compared to 40% of the control group. Regarding occupation, about (35.6% and 55.6% of the study group) and control group (37.8% and 48.9%) were housewives & working administrative work respectively. As regarding level of educational, about half of both study and control groups had secondary education (48.9% & 51.2% respectively). The monthly income was enough for almost three quarter of subjects of both group (73.4% for study group & 75.6% for control group respectively). In this study, there were no statistically significant difference (P value > 0.05) was found between both groups regarding sociodemographic characteristics.

Table 2: This table shows that, more than half of both groups (57.8% and 51.1% respectively) for the study and control group had chronic diseases. Diabetes mellitus was found in nearly two thirds of patients having chronic diseases in both groups. In relation to the previous surgery about 24.4% of the study group had previous surgery compared to control group (31.1%). Regarding current surgery, 51.1% & 60% of the study and control groups respectively had post-surgery wounds while 20% of the study group had diabetic foot wound compared to 8.9% in the control group, about 17.8% of either the study or control group patients had leg ulcer wound. All patients of both the study and control

groups had deep wound. The wound was infected in 97.8% and 95.6% of the study and control group, respectively. Regarding wound site, about 46.7% and 55.6% of the study and control group patients respectively had their wound in the abdomen. Patients' wound was present in their lower limb in about 40% of the study group and 31.1% of the control group. There was no statistically significant difference (P value > 0.05) between both groups regarding all medical characteristics.

Table 3: Illustrates comparison of healing rate among the studied groups. This table shows that, at first week, none of patients in either the study or control groups had healed resolved wound. At second week, (20.0%) patients of the study group had healed resolved wound compared to only (4.4%) patients in the control group with statistically significant difference (P value 0.02). At third week, (35.6%) patients of the study group had healed resolved wound compared to (8.9%) patients in the control group with statistically significant difference (P value 0.002).

Figure 1: showed that, the mean BWAT score of study group decreased from (27.64 ± 5.35 to 15.71 ± 6.72 to 11.51 ± 4.05 at first, second and third week respectively) with highly statistically significant difference (P value < 0.001). Also, the mean BWAT score of control group decreased from (31.46 ± 6.40 to 26.37 ± 8.02 to 21.51 ± 6.82) at first, second and third week respectively) with highly statistically significant difference (P value < 0.001).

Figure 2: showed that, the mean total satisfaction score of the study group was 8.55 ± 1.13 ranging from 6.0 to 10.0 and about 37 (82.2%) patients were satisfied while only 8 (17.8%) patients were partially satisfied. None of the patients of the study group were unsatisfied with honey dressing.

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

Table (1): Distribution of Socio-Demographic Characteristics of the Studied Groups

Sociodemographic characteristics	Studied groups				χ^2	P value
	Study group (n=45)		Control group (n=45)			
	No.	%	No.	%		
Age (years): Mean±SD Range	42.04 ±10.75 20.0 – 58.0		41.86 ± 10.32 19.0– 58.0		t- test = 0.08	0.93 NS
Age categories: 18 – 30 31 – 45 46 – 60	10 15 20	22.2 33.4 44.4	8 16 21	17.7 35.6 46.7	0.27	0.87 NS
Gender: Male Female	21 24	46.7 53.3	25 20	55.6 44.4	0.71	0.39 NS
Marital status: Single Married Widowed	4 34 7	8.9 75.6 15.5	5 39 1	11.1 86.7 2.2	4.95	0.08 NS
Residence: Urban Rural	26 19	57.8 42.2	18 27	40.0 60.0	2.84	0.09 NS
Occupation: Hand worker Administrative work Not working Housewife	2 25 2 16	4.4 55.6 4.4 35.6	4 22 2 17	8.9 48.9 4.4 37.8	0.88	0.82 NS
Education level: Read and write Primary Secondary University	2 3 22 18	4.4 6.7 48.9 40.0	1 1 23 20	2.2 2.2 51.2 44.4	1.46	0.69 NS
Monthly income: Not Enough Enough Enough & more	1 33 11	2.2 73.4 24.4	0 34 11	0.0 75.6 24.4	1.01	0.60 NS

t test: student t test

χ^2 : chi square test

NS: not significant

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

Table (2): Characteristics of Medical Data for the Study & control Groups

Medical data	Studied groups				χ^2	P value
	Study group (n=45)		Control group (n=45)			
	No.	%	No.	%		
Presence of chronic disease:						
No	19	42.2	22	48.9	0.40	0.52
Yes	26	57.8	23	51.1		NS
	Total =26		Total=23			
Chronic diseases:						
Diabetes	18	69.2	14	60.9	1.39	0.49
Hypertension	7	26.9	6	26.1		NS
Bronchial asthma	1	3.9	3	13.0		
Past Surgical history:						
Yes	11	24.4	14	31.1	0.49	0.48
No	34	75.6	31	68.9		NS
Current surgery:						
Post-surgery wound	23	51.1	27	60.0	2.33	0.50
Diabetic foot	9	20.0	4	8.9		
Leg ulcer	8	17.8	8	17.8		
Abscess	5	11.1	6	13.3		
Wound depth						
Deep	45	100.0	45	100.0	NA	NA
Wound type:						
Clean	1	2.2	2	4.4	0.34	1.0*
Infected	44	97.8	43	95.6		NS
Wound site:						
Abdomen	21	46.7	25	55.6	1.93	0.58
Lower limb	18	40.0	14	31.1		
Neck	0	0.0	1	2.2		
Upper limb	6	13.3	5	11.1		

*Fisher's Exact test

NA: not applicable

Table (3): Comparison of Healing Rate among the Study & control Group

Healing Rate	Studied groups				χ^2	P value
	Study group (n=45)		Control group (n=45)			
	No.	%	No.	%		
First week:						
Healed/resolved wound	0	0.0	0	0.0	NA	NA
Not healed	45	100.0	45	100.0		
Second week:						
Healed/resolved wound	9	20.0	2	4.4	5.07	0.02
Not healed	36	80.0	43	95.6		
Third week:						
Healed/resolved wound	16	35.6	4	8.9	9.25	0.002
Not healed	29	64.4	41	91.1		

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

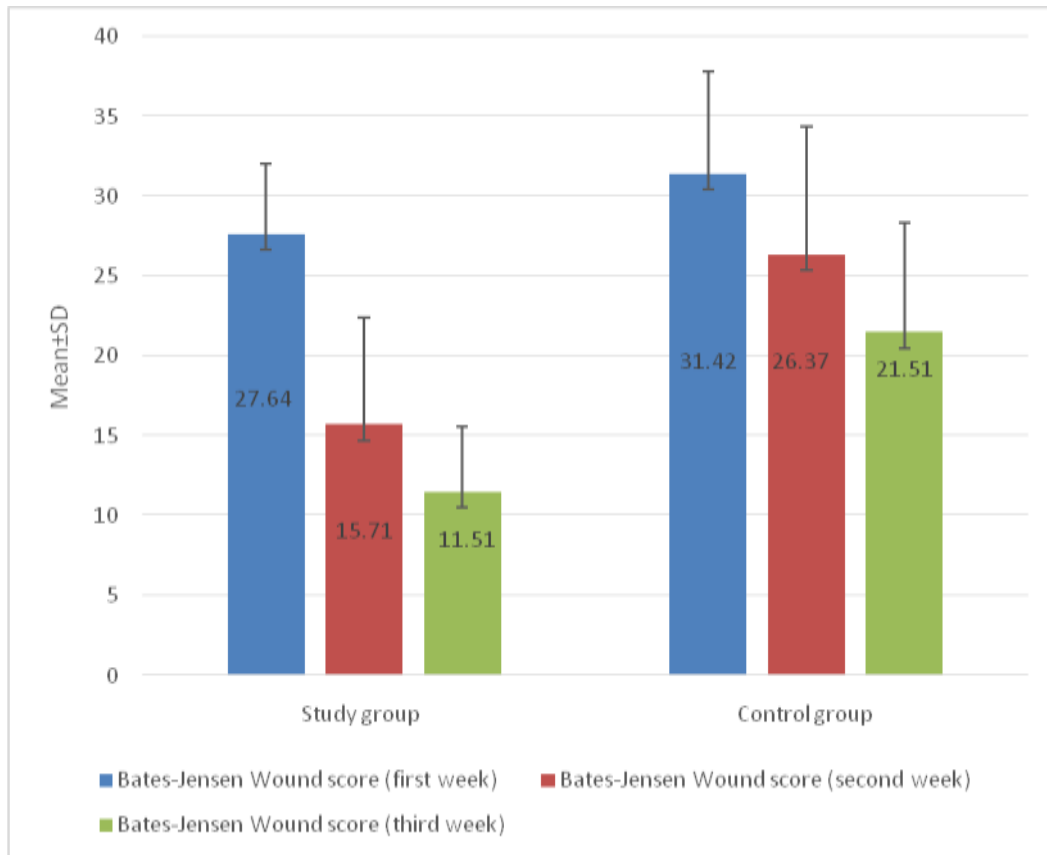


Figure 1: Comparison of Bates-Jensen Wound Assessment Tool Scores among the Studied Groups

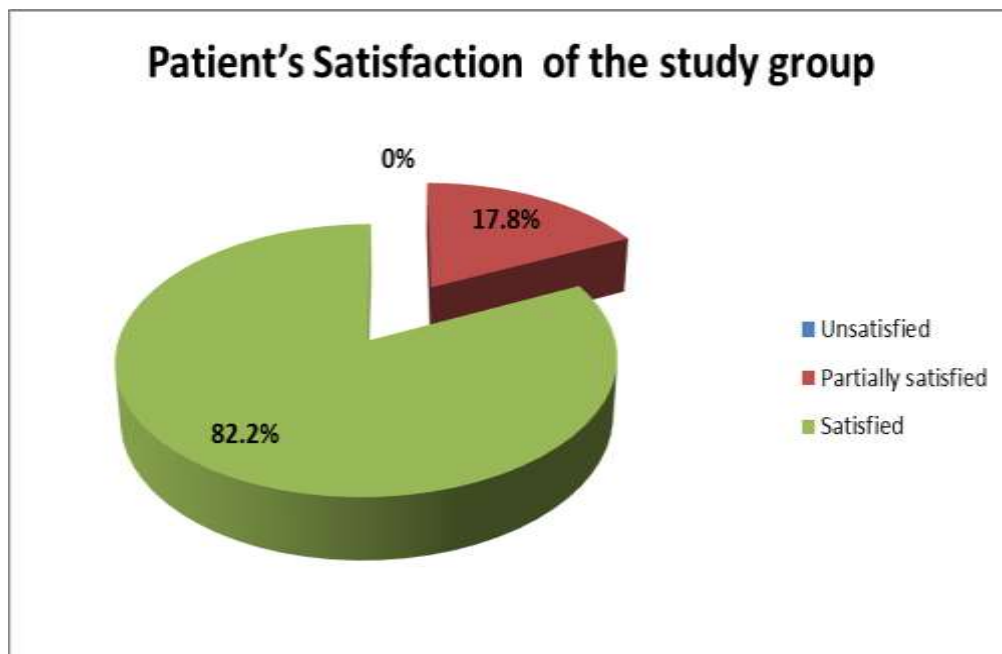


Figure (2): Patient's Satisfaction Assessment of the Study Group of Surgical Patients

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

Discussion:

Wounds are injuries that break the skin or other body tissues. It includes cuts arise from surgical intervention, some are the result of injury, and others are a consequence of extrinsic factors, such as pressure or shear, or underlying conditions such as diabetes or vascular disease. There are often classified because of their underlying cause into acute wounds, such as surgical wounds and burns, and chronic wounds, such as leg ulcers, diabetic foot ulcers (DFUs) and pressure ulcers (Lindholm & Searle, 2016).

Quality of life is impaired by wound persistence and the care cost manifests from both a psychological point of view and in the prolonged hospitalization time, as well as morbidity and even mortality. For these reasons, wounds have been called a "Silent Epidemic" (Ward et al., 2019). Most of the financial costs relate to health care personnel employment, the time and cost of hospitalization and the choice of materials and treatments. For all these reasons, the development of new technologies, intended to improve the healing process, is challenging (Frykberg & Banks, 2015). Many wound dressings have been developed to protect the healing wound from infection and help in promoting the wound healing process itself. Hence, the aim of the present study was to determine the effect of honey dressing on open wound healing and patient's satisfaction among surgical patients.

Regarding to Socio-demographic characteristics studied sample: The result of the present study revealed that, there was no statistical significant difference between the study and control groups regarding their socio-demographic characteristics baseline and this was consistent with (Guest et al., 2016) and

(Anyanechi & Saheeb, 2015) who reported that the studied groups didn't differ significantly regarding age and gender at the beginning of the study.

Concerning to medical history of the studied groups: The present study revealed that there were no statistical significant difference (P value > 0.05) between both groups regarding almost all medical characteristics (presence of chronic disease, past surgical history, current surgery & type of wound). This was in the same line with Gulati et al., 2014 who illustrated that there were no statistical significant difference between the studied groups regarding concomitant disease, previous medical, surgical therapy and also the type of wound.

The result of the present study supported the hypotheses & showed improvement of wound healing.

The researcher finding illustrated that there was statistically significant difference between the study and the control groups at the first week (P value < 0.003) and there were highly statistically significant difference between study & control group regarding mean total BWAT scores assessed at second and third week (P value < 0.001). The effect of honey dressing on the wound healing had been showed from the first week of using honey dressing for wound care to the study group compared to the control group. This result revealed that the honey dressing affect positively on the wound healing and accelerate the healing process. From the researcher point of view, this may be related to its anti-inflammatory, antibacterial, debriding and deodorizing effect of it. The result of this study was going in the same line with various studies which study the effect of honey on different types of wounds. The current study was consistent with (Mehmood, 2015) who found that there was a

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

significant difference in time taken for wound healing (p -value = 0.002) between the two groups. the result of the study support the hypothesis that the honey accelerate wound healing and showed that honey has advantage compared to those dressed with SSD(silver sulphadiazine Dressing)regarding early wound epithelialization, time taken in wounds to get culture negative, earlier pain relief and cost-effectiveness.

The result of the current study revealed that the honey dressing effect positively on the wound healing and accelerate the healing process, this finding are agreed with the results by (Kurane et al., 2018) who found that honey is very useful for treatment of Fournier's gangrene and reduces days for clearance of slough and hospital stay. Also, this finding is in line (Upadhyay et al., 2016) who indicated that honey is an effective wound treatment agent, but no additional benefit is gained over standard therapy. Also (Anyanechi&Saheeb, 2015) demonstrate that the honey speeds up the healing of dehiscence wounds of resected mandible when used as dressing for the study group rather than control group.

Regarding healing rate, the present study revealed that there was significant difference between both the studied groups related to the healing rate. At the third week there were 35.6% patients in the study group had healed resolved wound compared to only 8.9% patients in the control group. This finding is consistent with (Nikpour et al., 2014) who reported that the total REEDA score in honey gel and placebo groups was not significantly different on the first day while it was significantly lower in honey gel group compared with the placebo one on days 7 and 14.

. Moreover, the result of the present study revealed that the use of the

honey dressing increases patient's satisfaction. Most of the study group were satisfied with the honey dressing while only few patients were partially satisfied, none of the patients were unsatisfied with honey dressing. The satisfaction of the patients was measured by the degree of the wound healing, the availability of honey, the comfort of the honey dressing since the honey didn't cause pain or irritation while removing old dressing or applying new one.

This result is supported by Alam, (2014) who reported that honey can be suggested for use as a safe and satisfying healing agent when applied topically to diabetic wounds with no local or systemic reactions to honey. The result of this study based on several studies which report that the honey increase patient's comfort and has positive outcomes with encouraging patient acceptance. Also, Nikpour et al, 2014 who illustrated that the satisfaction rate for wound healing status was significantly different between the study groups ($p < 0.001$). From the researcher point of view, the patient satisfaction may be related to the positive effect of honey on the wound healing, honey dressing is more comfort as it doesn't cause either pain on removal or irritation on application. It also doesn't cause any side effect as a result of applying it on wound.

Honey dressing has a great effect on wound healing which has a great effect on the patient physical, psychological and financial state.

Cconclusions

Based on the finding of the study this study it can be concluded that:

- The honey dressing was safe and effective on wound healing and didn't cause any side effects.
- Honey dressing accelerates wound healing and increase patients' satisfaction.

Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

Recommendation

A-Recommendations for the patients:

Honey dressing should be used as an alternative therapy for wound healing as it safe, cost effective, accelerate wound healing, and promote patient satisfaction.

B-Recommendations for further research:

Replication of the study using longer probability sample from different geographical areas to help for generalization of the results.

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Application of Honey Dressing on Open Wounds: It's Healing Effect and Satisfaction among Surgical Patients

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