

Effect of Honey Dressing on Open Wound Healing and Length of Stay among Surgical Patients

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Abstract: 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 the length of stay among surgical patients. **Design:** A quasi-experimental design was utilized for this study. **Setting:** General surgical department of menoufia university hospital. **Sampling:** A purposive sample of 90 adult patients with open wound, were selected and divided alternatively and randomly into two equal groups (45 study group and 45 control group). **Instruments:** Bates-Jensen wound assessment Likert Scale was used. **Results:** There was significant improvement in wound healing among study group than control group. Moreover there were statistical significant differences between both groups regarding length of stay at hospital. The mean length of stay (days) of the study group was 9.31 ± 2.77 ranging from 4 days to 16 days of the control group was 16.84 ± 6.45 ranging from 7 days to 30 days. **Conclusions:** The honey dressing was safe and effective on wound healing and didn't cause any side effects, accelerate wound healing and decrease length of hospital stay. **Recommendations:** Honey dressing should be used as an alternative therapy for wound healing as it is safe, cost effective, accelerate wound healing, and promote patient comfort.

Key words: honey dressing, wound healing, hospital stay.

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

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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, 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, So it decrease the time needed for complete wound healing as well as length of hospitalization (Upadhyay et al., 2016).

Significance of the Study:

Open wounds are a nightmare, not only they are painful and messy, but also, they take time to heal completely. It needs to manage very carefully and rapidly to promote safe and effective healing without causing complications and leaving scares. Open wound

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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 don'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 as well as length of hospitalization and enhance patient's satisfaction. It was proven in a study that was done in India in February 2018, which study the effect of honey on Fournier's gangrene and was very useful for treatment of Fournier's gangrene and it was concluded that honey reduces days for clearance of slough and hospital stay (Shrikant, 2018).

Research Hypothesis:

Patients who dressed with honey have rapid wound healing than patients who dressed with honey. Patients who apply honey dressing will have more rapid wound healing than patients who apply routine hospital dressing.

Patients who apply honey dressing will have fewer duration of hospitalization than patients who apply routine hospital dressing.

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 in Menoufia University Hospital.

Sampling

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

- Study group (I): Those patients applied honey dressing.
- Control group (II): Those patients applied routine hospital dressing.

Inclusion criteria:

Adult patients (18-65yrs).

Exclusion criteria:

- Patients who have malnutrition disease such 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:

Two instruments were used:

Instrument One: Structured interviewed questionnaire:

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

- **Part one:** Social characteristics:

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It contained questions related to patient's age, gender and sex, level of education, occupation, marital status, economic status, and residence.

▪ **Part two:** Medical data:

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

Instrument Two: Bates-Jensen Wound Assessment

It was developed by Barbara Bates-Jensen (2001). The Bates-Jensen Wound Assessment Tool (BWAT) is a used to assess and monitor healing of all types of wounds. This instrument was modified by the researcher. The researcher used 10 parameters 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 was 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. The total BWAT scores are divided into four severity categories: Scores which indicated minimal severity ranged from 10–18. Mild severity ranged between 19–28. If the scores ranged from 29-39, they indicated moderate severity. Scores which ranged from 40-50 indicated extreme severity.

Reliability of the instrument:

The BWAT has excellent intra-reliability and good interrater reliability, the reliability coefficient for BWAT score was high ($r = 0.90$; $p < 0.0001$). (Thompson et al., 2013).

Validity of the tools

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

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 instruments 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:

A written 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 obtained information 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.
- Permission to carry out the study was obtained from the directors of the

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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.

- 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: They were patients who applied honey. Dressing was changed daily, and the wound was assessed at 7th, 14th, 21st day after using honey dressing to monitor wound healing.

Control group: Those patients who had traditional dressing according to hospital policy (normal saline) the wound was assessed at 7th, 14th, 21st day to monitor wound healing.

The researcher deals 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 procedure of dressing was:
 - Hand washing & Preparing the equipment used in dressing.
 - Prepare the patient and place him in the suitable position that facilitates dressing.
 - Wear gloves & removing the old dressing and 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.
- 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.

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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.

Results

Table (1): 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

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. In this study, there were no statistically significant difference (P value> 0.05) was found between both groups regarding sociodemographic characteristics.

Table (2): Medical Data of the Studied 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
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		NS
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		NS
Neck	0	0.0	1	2.2		
Upper limb	6	13.3	5	11.1		

Fisher`s Exact test

NA: not applicable

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. 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.

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Table (3): Wound Healing Rates among Patients in the Study and Control Groups.

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:					5.07	0.02 S
Healed resolved wound	9	20.0	2	4.4		
Not healed	36	80.0	43	95.6		
Third week:					9.25	0.002 S
Healed resolved wound	16	35.6	4	8.9		
Not healed	29	64.4	41	91.1		

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: Wound Assessment Scores among the Studied Groups according to Bates -Jensen.

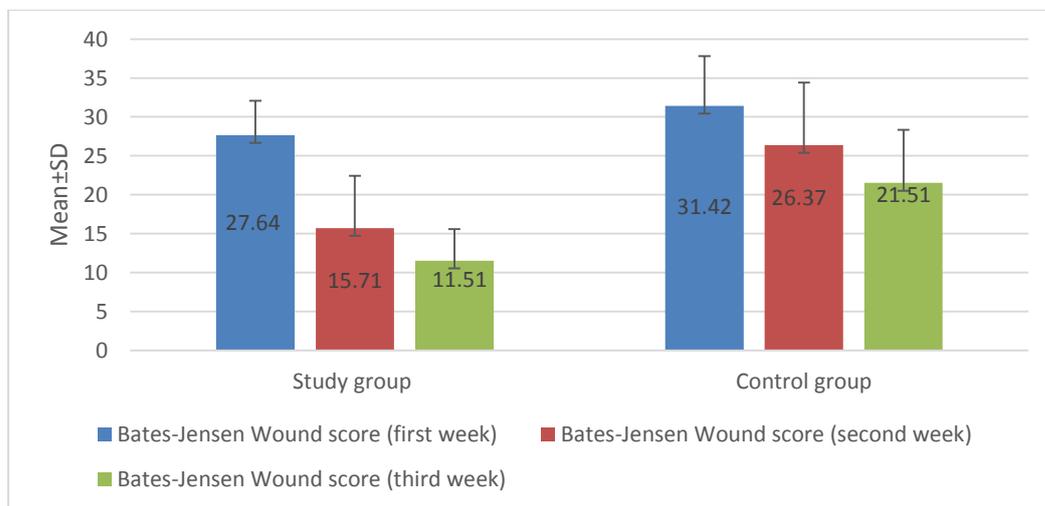


Figure 1: showed that, the mean BWAT score of study group decreased from (27.64±5.35 to 15.71±6.72 to 11.51±4.05 at first, second and third

week respectively) with highly statistically significant difference (P value <0.001)..

Figure(2): Comparison of Hospitalization Stay among the Surgical Studied Patients.

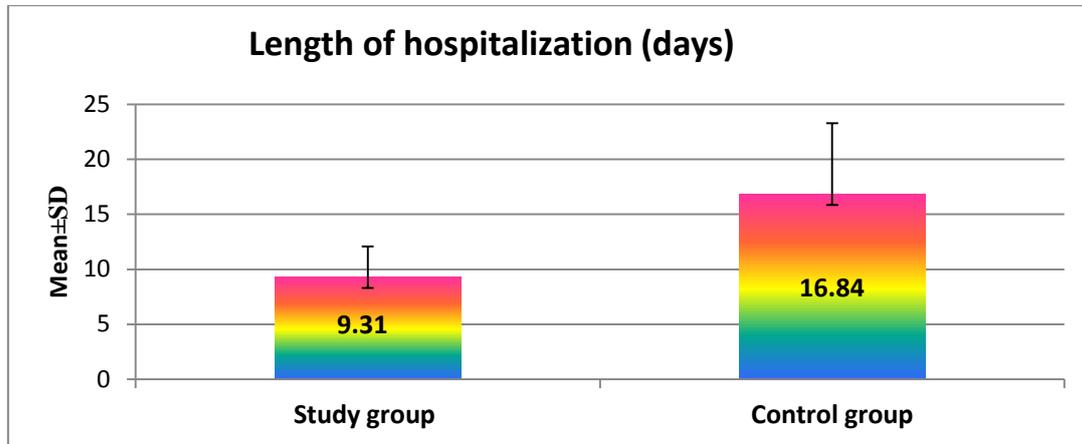


Figure2: Showed that the mean length of stay (days) of the study group was 9.31 ± 2.77 ranging from 4 days to 16 days while that of the control group was 16.84 ± 6.45 ranging from 7 days

to 30 days. In this study, length of hospitalization of the study group was significantly lower than that of control group (P value < 0.001).

Figure(3): Correlation between patients` length of hospitalization and their Bates-Jensen Wound Assessment scores.

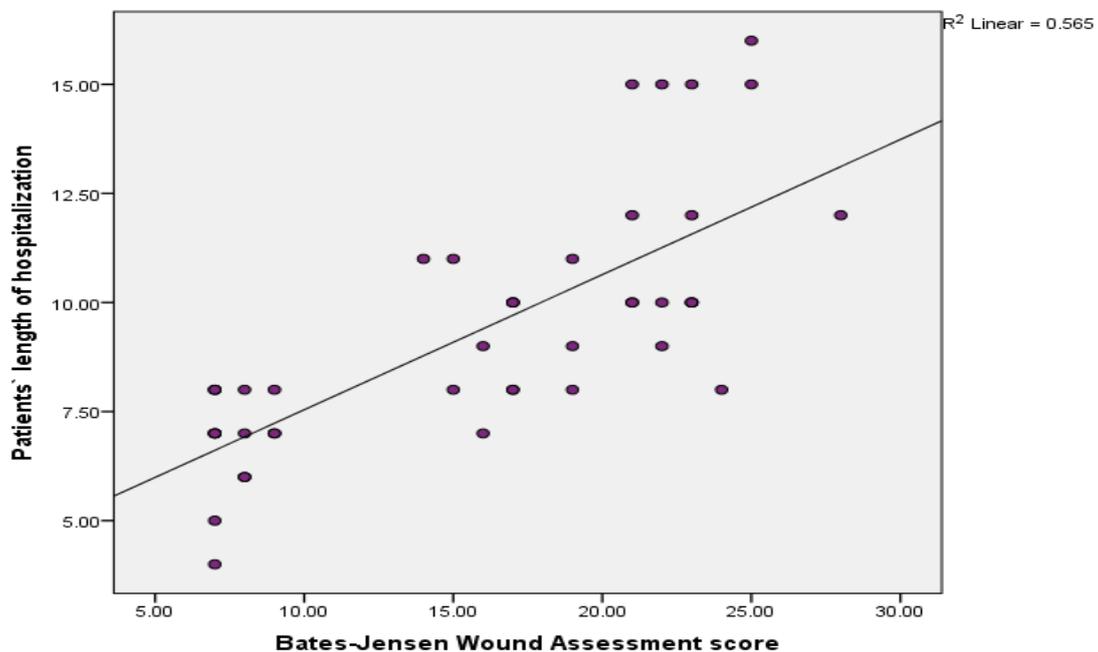


Figure 3: showed that, Patients` length of hospitalization was positively correlated with BWAT scores of the

study group assessed at first week, second week and third week (P value < 0.001).

Discussion:

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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 promote 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 length of Stay among surgical patients.

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

The effect of honey dressing on the wound healing was obvious from the first week of using honey dressing for wound care in the study group compared to the control group. The results revealed that the honey dressing contributed and accelerated healing process, this may be related to its anti-inflammatory, antibacterial, debriding and deodorizing effect of it. The result of this study was in the same line with Mehmood, (2015) who found that there was a significant difference in time taken for wound healing between

in the two groups. This result of the study support the hypothesis that the honey accelerate wound healing

Also, this finding agreed with the results of Kurane et al., (2018) who found that honey was very useful for treatment of Fournier’s gangrene and reduced days for clearance of slough and hospital stay. Also, this finding was in line with Upadhyay et al., (2016) who indicated that honey was an effective wound treatment agent, but no additional benefit was gained over standard therapy. Furthermore, Anyanechi & Saheeb, (2015) identified that honey speeds up the healing of dehiscence wounds of resected mandible when used as dressing for the study group rather than control group.

The current study shows that there were highly significant differences between the study and control group regarding the duration of hospitalization. Study group patients spent fewer days in the hospital (4-16 days) compared to control group (7 to 30 days). From the researcher point of view this may be related to honey 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 (Nazeri, 2015). This finding was in the line with Kurane et al., (2018) who stated that, honey was very useful for the treatment of Fournier’s gangrene. It reduces days for clearance of slough and hospital stay. Regarding healing rate, the present study revealed that there was significant difference between both the studied groups in relation to the healing rate. On the

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third week 35.6% patients in the study group had complete healing compared to only 8.9% patients in the control group. This finding was 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.

Conclusions

Honey dressing accelerated wound healing and decreased the length of hospital stay.

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, promote patient satisfaction and decrease length of hospital stay.
- B. Recommendations for further research:
Replication of the study using longer probability sample from different geographical areas to help for generalization of the results.

References

- Alam. F., Islam. A., HuaGan.S., & Khalil.I., (2014). Honey: A Potential Therapeutic Agent for Managing Diabetic Wounds. Evidence-Based Complementary and Alternative Medicine,(2014), 1-16.
- Amer,A., Abd El Maksoud,A.,Abdeen, M ., Hamdy,A., Mabrok,H., Amer, M., & El-Sanousi,A. (2018) . Potency Of Titanium Dioxide Nanoparticles On Skin Wound Healing In Rats. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 9(6),909-23
- Anyanechi, C., & Saheeb, B. (2015). Honey and wound dehiscence: a study of surgical wounds in the mandibular bed. Nigerian Journal Of Clinical Practice, 18(2), 251-255.
- Bates-Jensen, B., Vredevoe, D., Brecht, M. (2001). Validity and reliability of the pressure sore status tool. Decubitus; 5(6):20-8.
- Frykberg, R.G., Banks, J. (2015). Challenges in the Treatment of Chronic Wounds. Adv. Wound Care. 2015,(4), 560–82.
- Gill, R., Poojar, B., Bairy, L., Praveen K. (2019). Comparative evaluation of wound healing potential of manuka and acacia honey in diabetic and nondiabetic rats. J Pharm Bioall Sci, 11(2),116-26.
- Graham, J., & Bonner, L., (2014). The healing power of honey. Equus, (440),32-39.
- Guest, J., Ayoub, N., McIlwraith, T., Uchegbu, L., Gerrish, A., Weidlich., D., Vowden, K., & Vowden, P. (2016). Health

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- economic burden that different wound types impose on the UK's National Health Service. *J WoundCare* ,24,1–8.
- Gulati, S., Qureshi, A., Anurag Srivastava, A., Kataria, K., Kumar, P., & Balakrishna, A. (2014). A Prospective Randomized Study to Compare the Effectiveness of Honey Dressing vs. Povidone Iodine Dressing in Chronic Wound Healing; *Indian J Surg* ,76(3),193–98.
- Kurane, S., Kalbagwar, S., Shrikant, K., Ugane, S. (2018). A clinical study of Fournier's gangrene and use of honey dressing in treatment. *Int J Res Med Sci*, 6(3), 932-36
- Lindholm, C., Searle, R. (2016). Wound management for the 21st century: Combining effectiveness and efficiency. *Int. Wound J*, (13), 5–15.
- Nazeri, S. (2015). Evaluation of Effectiveness of Honey-Based Alginate Hydrogel. *Journal of Applied Biotechnology Reports*, 2(3), 29.
- Rahul, R., Manohar, V., Shankar, R., Sandeep, R., Shivaprasad, R., Poornachandra, T., Shivananda, P. (2014). Comparison of Sugar and Honey Dressings in Healing of Chronic Wounds, *IOSR Journal of Dental and Medical Sciences*,13(5),82-8..
- Mehmood,N.(2015). Honey Compared with Silver sulphadiazine as Burn Wound Dressing. *Ann. Pak. Inst. Med. Sci*, 7(1), 22-25
- Sarheed, O., Debe, M.S. (2020). Honey Products and Their Potential in Wound Healing. In: Rehman, M.U., Majid, S. (eds) *Therapeutic Applications of Honey and its Phytochemicals*. Springer, Singapore.
https://doi.org/10.1007/978-981-15-7305-7_18.
- Shrikant, K. (2018). A clinical study of Fournier's gangrene and use of honey dressing in treatment. *International Journal of Research in Medical Sciences*, 6(3),932-6.
- Sorg, H., Tilkorn, D., Hager, S., &Haue, J. (2017). Skin Wound Healing: an Update on Current Knowledge and Concepts.,*Eur Surg Res*,58(12),81-94.
- Surahio, A., Khan, A., Farooq, M., Fatima, I., (2015). Role of honey in wound dressing in diabetic foot ulcer. *Journal of Ayub Medical College, Abbottabad: JAMC*, 26(3), 304-306.
- Thompson, N., Gordey, L., Bowles, H. (2013). Reliability and validity of the revised Photographic Wound Assessment Tool (revP-WAT©) on digital images taken of various types of

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- chronic wounds. *Adv Skin Wound Care*, 26, 360–74.
- Upadhyay, M., soni, M., Patel, J. (2016). Study of an Effect of Honey Dressing in Traumatic Wounds of Orthopedics. *International Journal of Advanced Research*; 4 (4) :911-5.
- Upadhyay, M., soni. M., Patel, J., (2016). Study of an Effect of Honey Dressing in Traumatic Wounds of Orthopedics. *International Journal of*
- Advanced Research, 4 (4),911-5.
- Ward, J., Holden, J., Grob, M., Soldin, M. (2019). Management of wounds in the community: Five principles. *Br. J. Community Nurs*, (24), 20–23.
- White. R., Cutting. K. (2018). Critical colonisation of chronic wounds: microbial mechanisms. *Wounds UK*. ,4(1),70-78.