
Honey Dressing Intervention with Diabetic Foot Ulcer: Systematic Review

**Agus Purnama^{1*}, Ganjar Kundi Prasetya², Amelia Andini², Rohani²,
Noviana Haryanti², Ria Mariatul Isnaani², Fitriyan Rayasari²**

¹*STIKes Indonesia Maju, Indonesia*

²*Universitas Muhammadiyah Jakarta, Indonesia*

* *Correspondent Author: purnama.aguz@gmail.com*

ABSTRACT

Diabetic foot ulcers are one of the complications of diabetes mellitus that are often suffered by patients with a history of diabetes mellitus in addition to complications in the form of retinopathy. The purpose of this study was to collect appropriate types of therapy for wound care in diabetic foot ulcer patients. Methods The design of this study uses a systematic review approach by collecting several articles from a selected database consisting of ScienceDirect and ProQuest and Pubmed with articles published in 2016-2021. Article searches were conducted by entering the keywords "Honey dressing OR Honey treatment AND diabetes OR diabetes AND healing time OR wound healing AND wound size". Article search was limited to inclusion criteria and exclusion criteria. The inclusion criteria in this study were diabetic patients with diabetic foot ulcers. The study design was a randomized controlled trial and a quasi-experimental study, while the exclusion criteria were diabetic patients without diabetic foot ulcers, cross sectional and literature study. The results of this study were the publication of pubmed 1775 articles, 3354 sciencedirect articles and 1118 proQuest articles with a total of 6247 articles. 113 articles removed for duplicates 470 were reviewed in full and found 7 articles that matched the inclusion and exclusion criteria. The conclusion in this study is that honey is very effective for wound healing in diabetic foot ulcer patients, although there are several methods that are quite effective besides honey, namely the Vacuum Closing package (negative pressure wound care). Honey has been shown to reduce wound size and heal wounds.

Keywords: Honey Dressing, Diabetic Foot Ulcer, Wound Healing

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BACKGROUND

Foot ulcers in diabetes, are the most common complication of limb amputations, accounting for 50-70% of non-traumatic lower limb amputations ((McCallon et al., 2000). Foot ulcers that occur in diabetic patients are a frightening complication and one of the methods used to heal them is by dressing the wound, there are several wound dressings that have been carried out such as conventional dressings, in addition to controlling blood glucose levels in patients with foot ulcers. Diabetic is very important in addition to a good wound dressing in the wound healing process (Maharaul et al., 2015). Diabetic foot ulcers are a major cause of disability in diabetic patients. They are often a common cause for amputations when they are associated with ischemia or neuropathy causing peripheral nerve disorders(Pecoraro et al., 1990). diabetics is 6.9% of them during his lifetime. Stomach ulcers are the main cause of amputation which causes a decrease in the quality of life in these patients. Some strains of bacteria can inhibit the healing process, especially if there are side effects from the drug (Khanolkar et al., 2008). Peripheral neuropathy is one of the causes of foot ulcers in diabetic patients. impaired sensation allows trauma that is not felt (Astuti & Purnama, 2019) Boils that develop in this area usually increase pressure on the heel or toe.(Lavery et al., 2006) Sensory disturbances, motor deficits and muscle weakness may result from injury or nerve damage. Neuropathy causes decreased sensation of pain and temperature in the feet (Armstrong & Lipsky, 2004) Honey has been used for wound treatment since ancient times due to its anti-bacterial properties. Factors that contribute to the antimicrobial properties of honey are high viscosity, hydrogen peroxide, methylglyoxal (MGO), antimicrobial peptide bee defensin-1 and an average pH of 4.15. A decrease in pH increases the release of oxygen from hemoglobin (Mandal & Mandal, 2011).

with all the properties of honey, one of the most useful is that it can be used as an effective dressing with antibiotic and antiviral properties found in honey, so it is expected to provide a faster healing rate, especially in diabetic ulcer patients (Maqsood et al., 2018). The purpose of this study was to see the level of effectiveness of honey on wound healing in diabetic ulcer patients seen from a systematic review of several studies that have been conducted by researchers.

METHODS

The design in this study is a literature study using the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guide as a guide to get articles to be reviewed in depth. This study uses the PIO format (Population, Intervention/Exposure, Outcome). P : The patient is diagnosed with diabetic foot ulcers, I : wrapped with honey, O : the rate of wound healing. The databases used in this research are ScienceDirect, pubmed and ProQuest. The keywords in this study were "Honey dressing OR Honey treatment AND diabetes OR diabetes AND healing time OR wound healing AND wound size". Search articles were limited to inclusion criteria and exclusion criteria. The inclusion criteria in this study were diabetic patients with diabetic foot ulcers. The study design was a randomized controlled trial and a quasi-experimental study, while the exclusion criteria were diabetic patients without diabetic foot ulcers, cross sectional and literature review. The results of this study are the publication of 1775 articles, science direct 3354 articles and proQuest 1118 with 6247 articles 113 the article was deleted because it was duplicate 6134 it was specifically reviewed and found 7 articles that matched the inclusion and exclusion criteria. Research that met the criteria was shown in a systematic table. The contents of the table consist of the author's name, year, country of sample, type of dressing used, and the results obtained from the treatment.

RESULTS

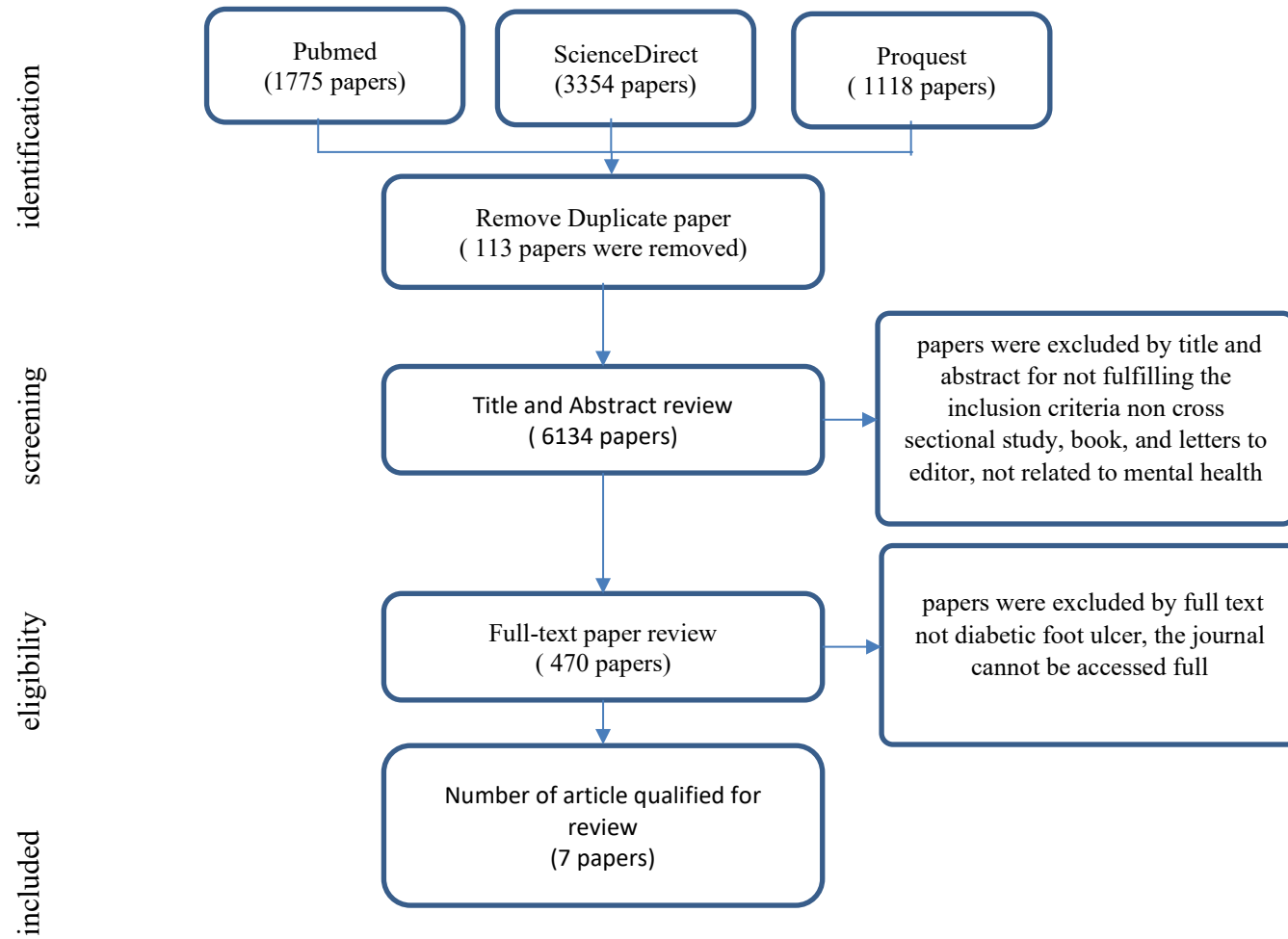


Figure 1. Article search process

Table 1. Honey Dressing intervention with diabetic foot ulcer

Author/ year	Country	Study Design	Population/ Sample Charasteristic	Outcome	Length of treatment	Treatment		
						Honey Dressing	Conventional Dressing	Others treatment
(Maqsood et al., 2018)	Pakistan	Randomize d controlled trial study	95 patient with ages between 30-60 years of both sexes, Female 35 (36,8%) and Male 60(62,2%), patient with Diabetes mellitus type 2 diagnose,	Wound Healing, Wound Size	6 month (august 2016- february 2017)	The maximum size of the wound in Honey is 23cm ² Number of days for the development of healthy granulation tissue in group Honey was mean 28.8 days	N/A	Vacuum Pack closure (negative pressure wound treatment), The maximum size of the wound in groupv was 19 cm ² Number of days for the development of healthy granulation tissue in group V was mean 18.2 days
(Imran et al., 2015)	Pakistan	Randomize d controlled trial study	348 patient with ages between 47-64 years of both sexes, Female 160 (54,03%) and Male 188(45,97%), patient with Diabetes mellitus type 2 diagnose,	Wound Healing time,	4 years (15- 2-2006 – 15-2-2010)	One hundred and thirty six (75.97%) wounds were completely healed with honey dressing, Mean wound healing time was 18.00 (6 - 120) days in honey	N/A	One hundred and thirty six (75.97%) wounds were completely healed with 97 (57.39%) with saline dressing, Mean wound healing time was 29.00 (7 - 120) days in saline dressing
(Aryani et al., 2020)	Indonesia	Quasy experiment al study	27 patient with ages between 37-69 median 49 (Control Group) median 54,5 (Intervention group), Female 13 (36,8%) and	Wound Healing,	14 days	distribution of wound conditions in each group on days 1, 7, and 14 which shows adecrease in	N/A	Honey with tea tree oil. Result distribution of wound conditions in each group on days 1, 7, and 14 which shows adecrease in LUTS score

			Male 14 (62,2%), patient with Diabetic foot ulcer ≥ 4 month			LUTS score from baseline mean 31,32 and 14 days mean 16,38		from baseline mean 32,86 and 14 days mean 18,64
(Koujalagi et al., 2020)	India	Randomize d controlled trial study	Total of 64 patients with diabetic foot ulcer in honey dressing group were 26 (81.3%) participants male, remaining 6 (18.8%) participants were female. povidone iodine dressing group, 24 (75%) participants were male remaining 8 (25%) participants were female. Among the honey dressing group, 18 (56.3%) participants were farmer, 10 (31.3%) participants were worker and 4 (12.5%) participants were bus driver. povidone iodine dressing group, 15 (46.9%) participants were farmer, 14 (43.8%) participants were worker and 3 (9.4%) participants were bus driver	Wound Size	15 (Fifteen Days)	Among the honey dressing group, 20 (59.4%) participants had left foot and 12 (37.5%) participants had right foot, The mean wound size in honey dressing was 23.16 cm ² at baseline, 23.16 cm ² at 1 st day follow up, 23.16 cm ² at 3 rd day follow up, 19.38 cm ² at 5 th day follow up, 16.13 cm ² at 7 th day follow up, 12.44 cm ² at 10 th day follow up and the end of 15 th day, it was 10.69 cm ² .	Among the povidone iodine dressing group, 19 (53.1%) participants had left foot and 13 (40.6%) participants had right foot. The mean wound size in povidone dressing was 23.03 cm ² at base line, 22.94 cm ² at 1 st day follow up, 22.94 cm ² at 3 rd day follow up, 20.28 cm ² at 5 th day follow up, 17.06 cm ² at 7 th day follow up, 16.13 cm ² at 10 th day follow up and the end of 15 th day, it was 15.06 cm ² .	N/A

(Tsang et al., 2017)	Hong kong	Randomized controlled trial study	31 patient with ages about 64 years of both sexes, Male 18(58,1%) and Female 13(41,9%), patient with Diabetic foot ulcer	Ulcer healing, ulcer size reduction, bacteriology, clinical sign of wound infection, cytokines concentration	12 Weeks	The reduction rate The Manuka honey MHgroup (86.24%)	The reduction rate the conventional group conventional dressing (paraffin tulle) (76.91%).	The reduction rate The nanocrystalline silver nAg group (97.45%). In other words, the subjects with DFU in the nAg group were estimated on the average 118% better healing potential at any particular time than those in the convention group
(Karimi et al., 2019)	Iran	Randomized controlled trial study	45 patient with ages between 30-79 years of both sexes, Female 14 (31,1%) and Male 31(68,9%), patient with Diabetes foot ulcer	Wound healing	1 Month	The mean wound grade in these patients before and after the honey intervention was 65.5 and 89.5, respectively (p<0.0001); the mean score of tissue around the wound was 61.5 and 90.5, respectively (p<0.0001); the mean score of wound drainage was 97.0 and 75.0, respectively	The mean wound grade in these patients before and after the conventional intervention was 67.0 and 64.5, respectively (p=0.36); the mean score of tissue around the wound was 67.0 and 64.5, respectively (p=0.74); the mean score of wound drainage was 77.0	The mean wound grade in these patients before and after the Olive oil intervention was 63.5 and 82.5, respectively (p<0.0001); the mean score of tissue around the wound was 57.0 and 83.0, respectively (p<0.0001); the mean score of wound drainage was 69.0 and 89.0, respectively (p<0.0001); and the mean score of wound healing was 253.0 and 330.5, respectively

						(p<0.0001); and the mean score of wound healing was 267.5 and 371.5, respectively (p<0.0001). Increases in mean scores in patients after intervention indicate better wound healing	and 74.0, respectively (p=0.43); and the mean score of wound healing was 277.5 and 268.0, respectively (p=0.57) (Figure 6). Decreases in mean scores in patients after the intervention indicate no wound healing	(p<0.0001). Increases in mean scores in patients after the intervention indicate better wound healing.
(Ritonga & Daulay, 2019)	Indonesia	quasy experiment	N/A sample characteristic, 8 Patient with diabetic foot ulcer	Wound healing	14 days	The effectiveness sialang honey toward <i>wound bed preparation</i> based on <i>wound bed score</i> . mean score before intervention is 2,75 and mean score after intervention is 9,25, significant 0,11.	N/A	N/A

From the results of the search for articles conducted, it was found that according to research conducted by Bashir U, 2018 with the randomized controlled trial method, the results of patient characteristics were 90 patients with a time span of 30-60 years with a diagnosis of type II diabetes mellitus with complications of diabetic ulcers. The results of the research carried out with honey dressing therapy obtained that the maximum wound size given honey dressing was 23cm² with a healing rate of 28.8 days, while the treatment carried out using vacuum pack closure the maximum wound size was 19cm² with a faster healing time than honey for 18, days (Maqsood et al., 2018), from the results of a study conducted by Muhamd Imran with the same method, a characteristic sample of 348 patients between 47-64 years old with a diagnosis of diabetes mellitus was obtained, the results of the average wound healing rate in patients with ulcers diabetic is 18 days while the other treatment with saline dressing or conventional dressing is 29 days (Imran et al., 2015). The results of the study from Koujalagi RS et al (2020) showed a decrease in the size of diabetic ulcers during therapy starting from the first day to the 15th day (10.69cm²) there was a very significant decrease in wound size from the baseline (23.16cm²). the same as giving conventional dressing with iodine although the results on day 15 (15.06cm²) were not as effective as giving with honey where the baseline for conventional dressing was (23.03cm²) (Koujalagi et al., 2020). Another study that compared Manuka Honey, Conventional dressing and nanocrystalline silver nAg group showed that the nanocrystalline silver nAg group (97.45%) was very effective, seen from the reduction rate where nAg was higher, followed by honey (86.24%) and conventional dressing (76). ,91% (Tsang et al., 2017).

DISCUSSION

The results of the search for articles obtained in this study showed that most of the honey was very effective for wound healing in patients with diabetic foot ulcers (Aryani et al., 2020). Honey is indeed very effective for wound healing due to its antibacterial and antiviral properties. A previous study conducted where Amdu was very effective in reducing the degree of wound in patients with diabetic foot ulcers (Shukrimi et al., 2008). The results obtained from several articles that we searched showed that the treatment was also quite effective compared to honey, namely with vacuum pack closure (Maqsood et al., 2018). The results of this study are an alternative and require further research to further prove the results of the study using the vacuum method. pack closures. Even so, honey is an intervention that cannot be considered small because most honey dressings are very effective in accelerating or reducing the size of the wound (Abdelatif et al., 2008). Research conducted by Muhamd Imran with the same method obtained a characteristic sample of 348 patients between 47-64 years with a diagnosis of diabetes mellitus, the results of the average wound healing rate in patients with diabetic ulcers was 18 days while the other treatments were with saline dressing or conventional dressings. is 29 days (Imran et al., 2015) from the results of previous studies it was found that honey dressing significantly reduced the duration of wound healing in diabetic foot ulcer patients. The reason for this result could be the strong anti-inflammatory, antibacterial activity and increased release of growth factors and debride effect of honey (Lee et al., 2011). The increase in the incidence of diabetes has resulted in many comorbidities. The critical effects of hyperglycemic conditions are microvascular complications such as nephropathy, neuropathy and retinopathy and macrovascular complications such as coronary artery disease, stroke and peripheral arterial disease. Diabetes is the leading cause of non-traumatic lower extremity amputations, which are often preceded by nonhealing ulcers. The lifetime risk of foot ulceration in diabetics is 15-20%. More than 15% of foot ulcers result in leg amputation. Several other studies have shown a collective annual incidence of 0.5-3% of diabetic foot ulcers. The reported prevalence of

foot ulcers varies from 2-10%. Approximately 45-60% of all diabetic foot ulcerations are purely neuropathic, whereas 45% have a neuropathic and ischemic component. It is estimated that about 15-27% of diabetic patients require lower extremity amputation mainly (50%) due to infection (Molan, 2006). Overall, the study conducted by Koujalagi found that dressings with honey affected granulation and thus increased early healing compared to dressings with povidone iodine. Koujalagi hypothesized that, honey dressing has several beneficial effects on the preparation and healing of the wound bed, through the removal of necrotic plugs by enzymatic action (Koujalagi et al., 2020). Honey has indeed been used as a wound healing agent in several countries for centuries, but it wasn't until the late 19th century that experts began researching the clinical effects of honey. High osmotic pressure and low pH effectively inhibit bacterial growth (Lee et al., 2011). In addition, a study conducted by Karimi in Iran comparing honey dressing, conventional dressing and olive oil dressing showed that the mean score of wound healing in honey was higher than that of conventional dressing and olive oil dressing (267.5 and 371.5, 277.5 and 268.0, 253.0 and 330.5) (Karimi et al., 2019) Another study conducted in Indonesia using honey dressing as a wound dressing treatment in patients with diabetic foot ulcers showed that the mean score before intervention was 2.75 and the mean score after intervention was 9.25, significant 0.11 (Aryani et al., 2020). From the results of investigations from several studies conducted, the author's hypothesis is that honey is still one of the most effective wound dressings compared to conventional dressings because of the nature of honey which has several ingredients that can accelerate the wound healing process.

CONCLUSION

The conclusion obtained from the results of our article search, it was found that the wound dressings given to patients other than honey were iodine dressing, paraffin tulle, olive oil dressing, nanocrystalline silver dressing, Honey with tea tree oil dressing, and Vacuum Pack closure (negative pressure wound treatment). Among the comparisons of wound dressings, it was found that Vacuum Pack closure (negative pressure wound treatment) are more effective than honey dressings, but this related research is still limited, and most of the time it can be concluded that honey is still an effective therapy as wound dressing in patients with diabetic foot ulcers from studies that have been obtained from the results of this systematic review.

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CONFLICTS OF INTEREST

There is no conflict of interest in this research

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