

**EFFECTIVENESS OF NON-PROCESSED HONEY IN WOUND MANAGEMENT  
AMONG PATIENTS IN SURGICAL WARD IN KAPKATET SUB COUNTY  
HOSPITAL, KERicho COUNTY**

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**A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF  
REQUIREMENT FOR THE CONFERMENT OF THE DEGREE OF BACHELOR OF  
SCIENCE IN NURSING AT UNIVERSITY OF KABIANGA**

**JULY 2023**

## DECLARATION


We declare this research report our own work and to the best of our knowledge it has not been submitted by in any other university, the sources of reference that we have used have been indicated and acknowledged.

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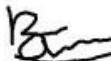
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## ABSTRACT

Dating back to ancient times, honey has been used religiously, nutritionally and therapeutically. It has been used in management of conditions and one would include the wounds. To assess the effectiveness of non-processed honey in wound management among patients with wounds in surgical ward in Kapkatet sub county hospital. Experimental study design was applied. The study was carried out at Kapkatet sub-County hospital within the surgical wards. The target population were 10 patients who have been admitted to Kapkatet hospital surgical ward with different kinds of acute wounds. The study used purposive sampling method. Questionnaires and observation methods were also used to collect the data. Statistical Package for Social Sciences (SPSS) version 20.0 software was used to analyze quantitative data. They were summarized in frequencies and means, presented in graph and tables. The University of Kabianga research ethics committee approved the study, approval number was ISERC/2023/0010, and Kapkatet district hospital administration. The research observed all ethical guidelines as required. All participants in the study (100%) reported awareness of honey in wound management. Three out of the five wounds (60%) in the treatment group were healed after 12 days, while only one out of five (20%) for control group. In the treatment group, where honey was used as an adjunct therapy, three out of five wounds were healed, resulting in a healing effectiveness of 60%. In contrast, in the control group receiving conventional management, only one out of five wounds healed, indicating a healing effectiveness of 20%. The most common complication reported was pain or discomfort, affecting 60% of the participants. Allergic reactions were experienced by 40% of the participants. Delayed wound healing and hyperglycemia were reported by 20% each. The treatment group demonstrated significant improvement in wound healing with a higher proportion of healed wounds. This suggests the potential effectiveness of honey in promoting wound healing. However, complications associated with honey use, such as pain or

discomfort, allergic reactions, delayed wound healing and hyperglycemia, were observed in some cases.

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## ABBREVIATIONS

ECM extracellular matrix

GE- gastroenteritis

H<sub>2</sub>O<sub>2</sub> - hydrogen peroxide

iNOS -inducible nitric oxide synthase

MS- Microsoft

MRSA -methicillin resistant staphylococcus aureus

ORS- oral Rehydration Solution

ROS- reactive oxygen species

WHO- world health organization

## DEFINITION OF TERMS

Der matitis- inflammation of the skin

Gangrene- dead tissue caused by an infection or lack of blood supply

Healing time: The amount of time it takes for a wound to fully heal, where the damaged tissue has been fully replaced

He mostasis- it is the mechanism by which bleeding stops on the wound surface.

Non-Processed honey: this is the honey directly sourced from the bee farm without undergoing the refining process.

Re-epithelialization- This is the process by which new cells form on the wound surface during healing

Surgical Ward Patients: Adult patients admitted to a surgical ward with wounds that require management.

Wound healing- it is a process involving replacement of destroyed or damaged tissue.

## **ACKNOWLEDGEMENT**

We are grateful to God for the gift of life and good health. We thank our facilitator/lecturer Sanga for his supervision and guidance from where we began the project. We also wish to thank our class mates and lecturers more so madam Rose Rotich for criticizing our work and being a valuable source of knowledge. We also thank all other people whose contribution led to the success of this research project.

## **DEDICATION**

We dedicate this research to our lecturers, Kapkatet hospital staff and patients for their input to this project. We also dedicate it to caretakers for sharing knowledge and making this study success.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the study

The world today aims at safety in the workplace and other environments. However, the technological advancements are still proving to be inadequate in completely preventing harm and injury to individuals. As such, medical facilities still receive individuals affected by injurious events and would sustain breakages in the skin. Wounds are thus being managed by saline gauzes and dressings and several surgical procedures like suturing and debridement are in the guidelines for wound management by WHO (Maki, 2020). The world today records a rising antimicrobial resistance by pathogens especially where antibiotics are the key players in treating infections. Therefore, some guidelines will advise individuals to rarely use antibiotic medications unless it is necessary.

The use of other methods is now being encouraged to substitute the antiseptics including iodine, chlorhexidine, and silver for local infections and systemic antibiotics for systemic infections. Honey has been proposed and its effectiveness is under way in ascertaining. Honey has been used in dressing of wounds and its use dates back to 2600- 2200bce, where it is mentioned in ancient Egyptian trauma manual currently referred to as the Edwin Smith Papyrus (Zubair R, 2015).

Types of wounds include: acute wounds (including cuts, scrapes, burns, trauma, needle punctures, and surgical incisions acquired in healthcare settings) and chronic wounds (diabetic foot ulcers or pressure ulcers). Wound healing is a dynamic process consisting of four continuous, overlapping and precisely programmed phases. The events of each phase must happen in a precise and regulated manner. Interruptions, aberrancies, or prolongation in the process can lead to delayed wound healing or a non-healing chronic wound.

In Kenya, several clinicians and medical personnel have opted to add honey in the protocol of wound management. However, it is yet a formal thing owing to the possibility that many medics are skeptic of the therapeutic effects of honey. As such, the study is based in Kapkatet Sub-Country Hospital and the outcome will aid in modification of wound management protocols.

## **1.2 Problem Statement**

Despite the different approaches such as anti microbial therapy that have been employed in the management of acute and chronic wounds, many anti microbial agents have become ineffective in wound treatment due to;

- a) The emergence of multiple drug resistance bacteria.
- b) Failures in current wound treatment methods have been widely reported.
- c) The escalated costs in the treatment of wounds.

Therefore, alternative therapy which is the use of honey in wound treatment has been sought. Honey has properties that make it suitable for wound care, these properties are high osmolarity that draws water out of the wounds in a process similar to negative pressure wound therapy. Its high acidity increases the amount of oxygen released from haemoglobin making the wound environment less favourable to microorganisms. Honey is recognized as a biological wound dressing agent with multiple bioactivities that work in concert to expedite the healing process.

## **1.3 Purpose of the study**

To assess the effectiveness of non-processed honey in wound management among patients with wounds in surgical ward in Kapkatet sub county hospital.

## **1.4 Specific Objectives**

1. To assess the level of awareness of use of honey in wound- management among patients in surgical ward in Kapkatet sub county hospital.
2. To compare wound healing within 12 days (effectiveness) for patients using non-processed honey as an adjunct therapy and those using conventional management in surgical ward in Kapkatet sub county hospital.
3. To assess complications related to use of honey in wound management in Kapkatet sub county hospital.

## **1.5 Research Questions**

1. What is the level of awareness of use of honey in wound management in surgical ward in Kapkatet sub county hospital?
2. How is wound healing for patients using honey in surgical ward in Kapkatet sub county hospital?

3. What are the complications related to the use of honey in management of wounds among patients in surgical ward in Kapkatet sub county hospital?

### **1.6 Justification of the study**

Wound care is still coupled with a lot of challenges and barriers to its effectiveness. The world is changing and new interventions on safety are being instituted. Nonetheless, surgical wounds are still being recorded. As such, a study on the use of honey as an adjunctive therapy for wound care is imperative. The outcome of the study will aid in modifying and improving care in wound management.

### **1.7 Limitations**

Laboratory investigations on the standard honey challenged access in the set-up of study. The study has a small sample size of only 10 participants, which may limit the generalizability of the findings to a larger population. The small sample size reduces statistical power and increases the risk of chance variations in the results. The study only examines wound healing progression over a 12-day period. Wound healing is a complex process that cannot be fully assessed. A longer follow-up period would provide a more comprehensive understanding of the effectiveness of non-processed honey in wound healing. The study was conducted in a single surgical ward in Kapkatet Sub County Hospital, which may limit the generalizability of the findings to other settings or patient populations. Results may be influenced by unique characteristics of the specific healthcare facility or patient population. The study might be affected by potential confounding factors such as the type or severity of wounds, underlying medical conditions, or concurrent treatments, which could impact the wound healing outcomes.

### **1.8 Significance of the Study**

The study aids in adoption of honey in wound management guidelines. This is through improving confidence among health workers on the use of honey as a therapeutic option.

The study creates awareness about use of honey for wound management in general public who do not know about use of honey in wound therapy.

The study also generates more knowledge in nursing on the use of honey for wound management.

The study helps evaluate wound healing among patients using honey in wound care. It would bring comparison between use of honey and other agents for management such as normal saline.

The study helps to note the side effects associated with use of honey in wound dressing

The study helps in improving wound management procedures that are acceptable and in modifying policies that govern wound management in Kapkatet Hospital and Kenya other healthcare facilities.

### **1.9 Assumptions**

The wound being dressed would have no other associated comorbidities or associated risk factors e.g, pressure points

The general principles of management would be followed as principles used in other wound management products e.g, antiseptics, antibiotics and normal saline.



## CHAPTER 2

### 2.0 REVIEW OF LITERATURE

#### 2.1 Introduction

The use of honey as a therapeutic regimen date back to ancient times when honey was introduced to mankind (Nweze, Ogo, Nweze, John, & Paul, 2019). Honey is a natural product produced by honey bees from a blend of myriad of substances. As we aim to comprehend the effectiveness in wound-management, this chapter will describe the honey and its relation to wound healing while basing on the literature of previous researches and other theoretical perspectives. Furthermore, the chapter will describe conceptual frameworks for this research and note on the existing knowledge gap experienced in the nursing and medical set-up today. As such, this chapter's literature review will have descriptions of honey as a therapeutic agent, clinical conditions managed by honey, honey and wound management, and complications with honey use.

#### 2.2 Review of Related Literature

Honey has outstanding properties that give it features of nutritional and therapeutic/medical values. Despite the different approaches such as antimicrobial therapy that have been employed in the management of acute and chronic wounds, many antimicrobial agents have become ineffective in wound treatment. Therefore, many researchers and healthcare personnel labor to find new solutions to the foreseen crisis. Honey poses strongly as one of the alternatives. However, there are still gaps to the effectiveness of the use of honey in wound management. Several researches show its effectiveness and it is echoed by the biochemical components

Several researches, articles, journals and books have described honey, its components, features, and uses. Also, others have described wound healing and its perspectives with the management guidelines for nursing care. Predominantly, this review will cover the done researches and other literature to advance the knowledge of the known and the unknown with regard to the use of honey in wound healing

##### 2.2.1 Honey as a therapeutic agent

Being one of the most cherished natural products, honey has anti-oxidant anti-bacterial and anti-inflammatory properties. Honey is formed from nectar of flowers. It is a highly nutritious substance that is reviewed as valanced and never gets spoiled. Among its biochemical

features are a pH of approximately 3.9 and water activity (WA) of 0.56-0.62 (Samar ghadi an, Farkhondeh, & Sa mini, 2017). It has a high level of fructose that makes it 25 % sweeter than table sugar. This is because of its carbohydrate composition of 95-97%. Honey is also composed of proteins, vitamins (all water-soluble vitamins), amino acids (both essential and non-essential safe asparagine and glutamine), organic acids (primarily gluconic acid) and minerals and so is considered a balanced nutrient to an extent. Additionally, it has flavonoids, polyphenols, alkaloids, cardiac glycosides, volatile compounds, and anthraquinone. Trace compounds including silicon, lithium, vanadium, zirconium, strontium and others. Volatile compounds like alcohol, aldehydes, hydrocarbons, ketones, benzene, and pyran are present contributing to honey's biomedical effect.

Flavonoids and polyphenols are the major bioactive molecules that act as antioxidants. The compounds in these are gallic acid, syringic acid, ellagic acid, benzoic acid, cinnamic acid, caffeic acids, myricetin, chrysin, coumaric acid, naringenin, galangin, and luteolin (Samar ghadi an, Farkhondeh, & Sa mini, 2017). These ingredients are the ones that assert antioxidant, antimicrobial, anti-inflammatory, antiproliferative, anticancer, and anti metastatic effects.

Honey has several therapeutic effects that owe to the complex composition of honey. Honey is a complex substance and with the rising antimicrobial resistance and risk of more resistance, it is considered as a possible alternative. It is natural, non-toxic, and with a broad spectrum. Dating back to ancient times as old as 8000 years ago, the use of honey can be noted as for medicinal purposes to treat asthma, tuberculosis, eye problems, hepatitis, piles, wounds, skin inflammation, worm invasion, and ulcers (Nweze, Qovo, Nweze, John, & Paul, 2019). As such, honey has different therapeutic activities that have been reviewed in different studies and researches.

The antimicrobial activity of honey stems to its ability to act against reactive oxygen species, and infectious agents. In 1982, a report was made that honey has antimicrobial effects that would then be studied to have antimicrobial effects against 60 bacterial species both aerobic and anaerobic (Khan, et al., 2018). Depending on the concentration used, honey can be bacteriostatic or bactericidal. The antimicrobial activity is credited to its high osmolarity, low pH, presence of hydrogen peroxide and non-peroxide components like glyoxal and 3-deoxyglucosulose. The supersaturated sugars in honey have high affinity to water molecules thus depriving microorganisms' water that is essential for their growth. The antimicrobial

activity is much owed to the reactive free radicals produced by hydrogen peroxide ( $H_2O_2$ ). Several honeys have non-peroxide activity e.g., Jelly bush and Manuka honey. Another property that is owed to the antimicrobial activity is the oligosaccharides which have prebiotic properties. The Manuka honey (*L. scoparium*) has been proven effective against *S. aureus*, *Enterobacter aerogenes*, *E. coli*, *Salmonellatyphi*, and others like MRSA (methicillin resistant *S. aureus*) (Almasaudi, Al-Nahari, El-Chany, Barbour, S, & Al-Jaouni, 2017). This proves how honey is good as an anti-infective.

Honey is also mentioned to have anti-inflammatory and immune-modulatory features (Nweze, Okafor, Nweze, & Nweze, 2016). The anti-inflammatory effect is owed to the phenolic and flavonoid acids present. These components repress pro-inflammatory substances like inducible nitric oxide synthase (iNOS). Ingestion of diluted honey also decreases prostaglandins' concentration and can play a role of as that of prednisolone. This is advantageous as it has no major side effect. Furthermore, topical application of honey has been reported to lessen the exudate and edema in wounds thus local anti-inflammatory effect (Nweze, Oovo, Nweze, John, & Paul, 2019). Thus, honey has a great aspect of immunomodulation and anti-inflammation.

The antioxidant activity of honey stems from its ability to decrease oxidative reactions by scavenging free radicals. The flavonoids and phenolic acids play this great role. Honey represses free radical formation thus keeping the free radical level at minimum. It is noted that antioxidant effect is greater in darker honey's than lighter ones (Nweze, Oovo, Nweze, John, & Paul, 2019). The effects vary depending on the floral source, processing, handling and storage of honey. Additionally, honey can boost the immune system by stimulating T lymphocytes and other immune cells and mediators.

### **2.2.2 Clinical conditions manageable with honey**

Several conditions have been managed with honey. Diarrhea is one of the conditions that have been ameliorated with use of honey. Several researches have been done on this. For instance, Abdulrhman et.al found out in their research that giving a child with GE both ORS (oral Rehydration Solution) and honey, a significant reduction of the frequency of bacterial and non-bacterial diarrhea was observed (Abdulrhman, Mekawy, Awadalla, & Mbhamed, 2010). Honey has also been used to manage gastritis and gastro-duodenal ulcers. Eczema has also been managed with topical application of honey that ensured decreased inflammatory events and even recovery within 7 days. However, the effects on other forms of dermatitis showed a

difference in response to dose and type of the honey. As an anti-diabetic agent in Diabetes Mellitus, honey has been used. However, much still need to be done to discern honey's effectiveness in managing diabetes. Honey has strong anti-mutagenic property thus can be anti-carcinogenic. As such, it can be used to manage cancer.

### **2.2.3 Awareness of Honey as Employed in Wound Management**

Nonetheless, our focus is on wound management. Nweze et.al. reported on the use of honey in management of wounds (Nweze, Oovo, Nweze, John, & Paul, 2019). The wounds heal in a structured and programmed four phases i.e., rapid hemostasis, inflammation, proliferation and remodeling. During the first phase of hemostasis, events like vascular constriction, platelet aggregation, degranulation, and fibrin formation take place. Inflammation phase involve neutrophil infiltration, monocyte infiltration, differentiation of monocyte to macrophage and lymphocyte infiltration. In this stage, neutrophils cause clearance of debris but may also produce ROS that can cause further damage. Proliferation phase involves re-epithelialization, angiogenesis, collagen synthesis, and extracellular matrix ECM formation. Lastly, remodeling involves collagen remodeling, and vascular maturation and regression. This last stage can take several years to complete.

Wound healing can be impaired by poor oxygenation, infection, foreign body, venous insufficiency, old age, stress, ischemia, chronic diseases, immunosuppressive medications, alcoholism and smoking, poor nutrition, and immune compromise (Guo & Di Pietro, 2010). Through these stages, wounds get to be assessed of recovery. Chronic and extensive/deep wounds will take more time in each of the stages since the demands for healing will be higher.

Honey has both endogenous and exogenous properties of wound healing. Honey has been observed to enable wound recovery by preventing or managing infection. Honey has several properties for antibacterial effects and others like anti-inflammatory. As previously discussed, several components like hydrogen peroxide play a role in antiseptic effect and also in immune stimulation. Honey is jelly-like and is a viscous fluid that when applied topically on wounds create a surface layer that inhibits entrance of bacteria and protects wound from dehydration (Tashkandi, 2021). High osmolarity and antioxidants also play a greater role in wound healing.

Jull et al. employed honey as a therapeutic agent and research of 470 individuals had 465 healing successfully (Jull, Rodgers, & Walker, 2008). In this research, honey applied a

deodorizing and anti-inflammatory effects to the wounds thus reduction of pain. Burn injuries have also been used to do a study on the use of honey for management. A significant fast healing in first and second degree is noted (Zbucnea, 2014). Through these studies, honey proves to be effective in the management of wounds in patients for both chronic and acute wounds and those poorly responding to conventional management.

In his research done in 1998, Mblan was able to bring out the strong evidence supporting the effective use of honey in the management of surgical wounds by comparing honey to other wound treatment therapies. These comparisons included;

- Honey and silver sulfadiazine; the group treated with honey 87% healed in 15 days while those treated with silver sulfadiazine only 10% healed in 15 days.
- Honey and saline; the group treated with honey healed in 8.2 days while the group treated with saline healed in 9.9 days.
- Honey and polyurethane film; the group that were treated with honey healed in 10.8 days while the group treated with polyurethane film healed in 15.3 days.

In his research the result showed a considerably shorter healing time when dressing the wound with honey as compared to when dressing the wound with other antimicrobial treatments. The use of honey for dressing infected wounds also gives it a clean base that allows early grafting and also an increased chance of acceptance hence making surgery to be more successful in cases of wounds in diabetic patients (Mblan, 1998). However, honey's effectiveness is affected by exposure to light and heat.

A similar review on Honey for Wound Management was done by (Clark & Adcock, 2018). The review aimed to summarize the guidelines for use and evidence regarding the effectiveness and safety of honey for the treatment of acute and chronic wounds.

Population included patients with both acute (burns, lacerations, surgical wounds, other skin injuries from minor trauma) and chronic wounds (skin ulcers [including pressure ulcers or diabetic foot ulcers] and infected wounds healing by secondary intention.

Findings were as follows: Evidence of limited quality from systematic reviews suggested that honey may be of some benefit for the healing of partial thickness burns. The results were inconclusive regarding the use of honey for other indications. One guideline, with no mention of quality of evidence or strength of the recommendation, recommends against the use of honey for the management of chronic wounds, including venous leg ulcers; however, topical

honey and honey impregnated dressings may be considered for the management of pressure injuries.

Limitations: Many of the studies did not report on the type of honey that was used. The guideline recommended against the use of honey for chronic wounds but the quality of the studies could not be assessed in the context of the guideline development.

Individuals being managed of wounds have had a little but present understanding of honey's effectiveness. Honey has been in existence in the world and is widely used for its high nutritional values. Several applications show that healthcare workers have a small experience on the use of honey on wound management. This is seen where honey is used in burns, dry eye, cold sores, ulcers, swelling skin conditions and little on wound healing.

In Kenya wound management has solely been based on the conventional regimen and little is applied to the use of honey. However, there are healthcare professionals who have applied honey to foul smelling wounds and chronic wounds with an attempt to reduce the effects of the wounds. In Kapkatet Sub-County Hospital, there have not been scenarios in which honey is used to manage wounds. Furthermore, there have been no documentations on the use of honey in management of the wounds.

### **2.2.3 Wound Healing Time: Conventional Therapy and Honey therapy**

In hospital settings and general health care, conventional methods are used for wound management. These include the use of antiseptics, normal saline, sterile water and antibiotics.

In a study done by Samatar Osman et al. on the efficacy of honey compared to silver sulfadiazine for burn wound dressing superficial and partial thickness, a total from all seven studies where there were 582 patients was included in the review (Osman, Umar, Hashmi, Jawaid, & Ahmed, 2022). The results of primary outcome analysis indicated that honey is more effective than silver sulfadiazine in rendering infected burn wound(s) sterile.

However, from the primary outcome analysis, it could not be concluded that honey is more effective than silver sulfadiazine in reducing the time taken for complete burn wound healing. A major barrier reported in the study is high heterogeneity amongst included studies due to substantial variation between studies such as participant characteristics and duration of follow (Osman, Umar, Hashmi, Jawaid, & Ahmed, 2022). Evidence of efficiency of wound healing in the use of honey as compared to other conventional therapies in Africa and locally (Kenya) have not been documented.

A study was done to assess the effect of honey dressing on open wound healing and length of stay among surgical patients. This was done in the general surgical department of Menoufia university hospital. In the study, 90 participants were used and the results on wound healing showed a significant improvement in wound healing among study group than the control who used conventional regimen. In the study there was a significant wound healing among those managed with honey and the hospital stay is decreased. The mean length of stay in the control group was 7-30 days and the study group was 4-16 days (Rashad, Abdullah, Soliman, & Mishaal, 2021). As such, the researchers concluded that honey dressing was safe and effective on wound healing and didn't cause any side effects, accelerate wound healing and decrease hospital stay length and so should be employed to be used as an alternative therapy in wound healing.

#### **2.2.4 Possible Complications with the use of Honey in Wound Management**

Honey is a natural product that has insignificant side effects on human body. The common complications of wounds are infections, osteomyelitis, tissue necrosis, gangrene; peri wound dermatitis and oedema, hematomas, and dehiscence (Editors, 2018). Of these common complications, none is noted to be associated with the use of honey. Better still, honey is noted to prevent some of these complications including oedema, infection and dermatitis. However, it is noted that honey use can be associated with allergic reactions and that medicals should be courteous to use raw honey for it may inflict more damage and infections than cure.

Allergic reactions have been found to occur due to presence of pollen which is naturally found in the honey. This carries a risk to people who are allergic to pollen or bee proteins in honey. However, it is rare. It is evidenced by stinging pain on topical application, swelling, dizziness and nausea. No adverse effects have been reported on animal studies with honey in wound dressing (Dane, Hanson, Anderson, Thompson, & Hunter, 2009). There has not been found any case of honey resistant bacteria, and honey has been found to have no toxicity on the wound.

Further, there is little mentioned interaction of honey with other therapeutic agents like antiseptics or essential oils. Under a study done to check the interaction of honey with other antiseptic substances, the results showed that, safe chlorhexidine, honey showed no antagonistic effect to the action of other antiseptic substances (Gray, Green, & Haines, 2022). Interesting still, it showed that honey can be used as a combination therapy with other

antibacterial agents for topical applications in treating superficial infections. The synergistic effect was also experienced with antiseptics and essential oils. Systemic use notes that a combination with blood clotting and antiplatelet agents can cause increase in bruising and bleeding.

### **2.3 Theoretical Framework**

Several theories have been stipulated to explain management of wounds and fast healing. Honey is a natural product that is cheap to access, is renewable, easy to administer and has little to no adverse effects to the patients. As such, this research employs Myra Estri Levine's theory of conservation theory that focuses on promoting adaptation and maintaining the wholeness of a patient's wellbeing using conservational methods. The goal is achieved by activities that promote conservation of energy, social constructs, personal drives, and structure conservation.

Being built on the four metaparadigms (environment, health, person, and nursing), Levine's conservation theory employs four principles that are core in achieving wholeness in patient care. The principles are conservation of energy, structural integrity, personal integrity, and social integrity (Levine's Conservation Theory in Healthcare Research, 2022). Conservation of energy means that the input and output of energy is balanced in the patient and is achieved through rest, healing procedures, physical and mental activities. Structural integrity conservation is achieved through activities that promote healing and maintaining patient's soul and body at a healthy state. This involves the promotion of healing in case of illness and prophylactic measures for future prospects.

Personal integrity is met where the patient is recognized and cared for as a person whose rights, thoughts, values, dreams and desires must be respected always. Thus, patient's rights are achieved. Social integrity recognizes a patient as a social being who is able to participate in social activities to facilitate mental and social wellbeing and prevent deterioration. Conservation is mainly a focus to maintain an individual's wholeness through sustenance, maintenance, and defending the integrity of the concerned system.

This research employs Levine's theoretical approach to address wound healing with use of honey. This is because of the simplicity in the applicability of the principles and the simplicity in the testing of the principles. The universality of the principles in most interventions give it an additional mark on its suitability. The principles are also applicable in all aspects of nursing from clinical care provision to administration and management.

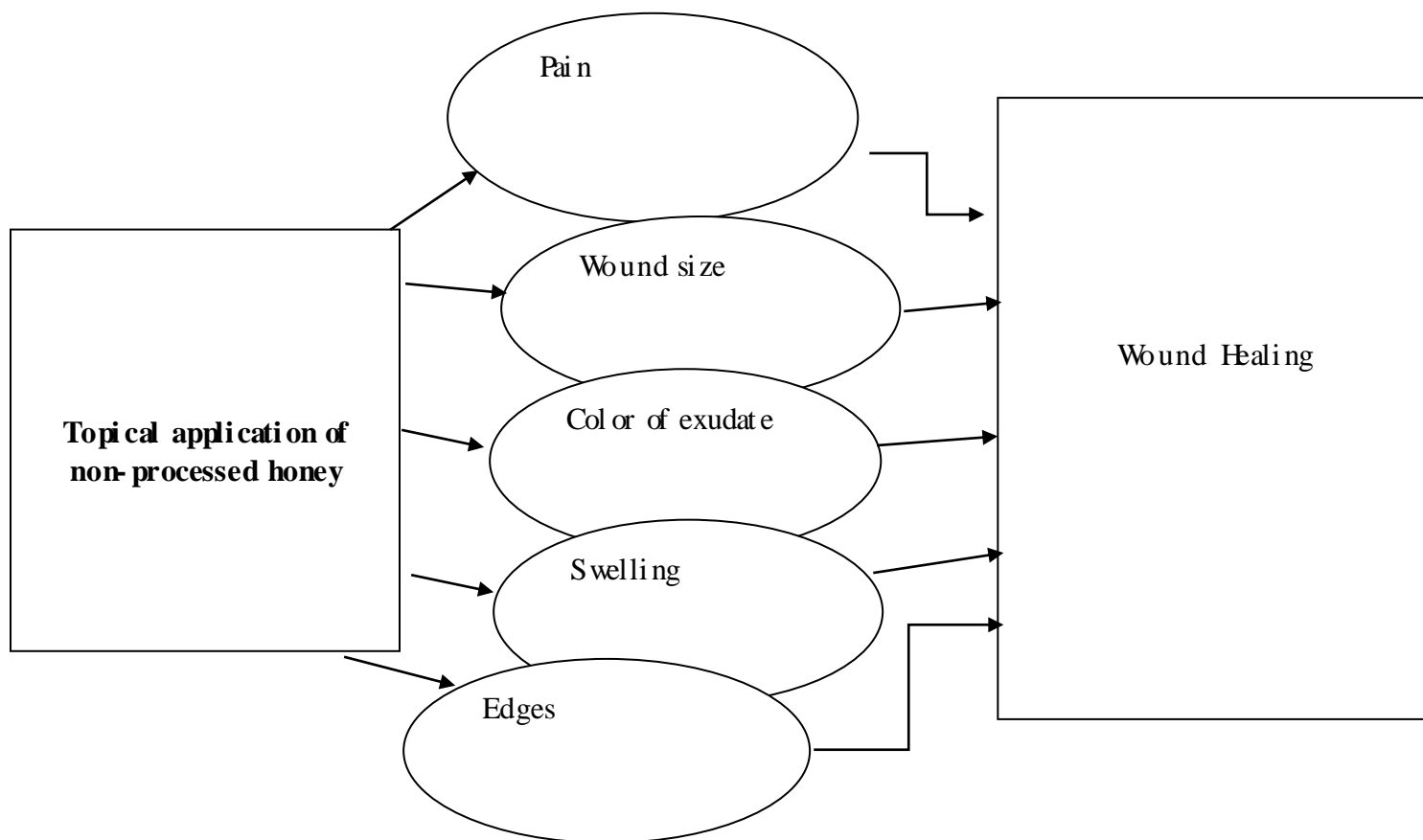


However, the theory has some limitations in making. It is mainly focused on illness rather than health and thus nursing intervention will only focus on the presenting condition of the patient. Therefore, the theory supports not health promotion principles.

#### **2.4 Conceptual Framework**

As we employ our theoretical approach to form the conceptual framework, we are aiming at meeting wellbeing in terms of wound healing. Honey having the many features stemming from biological to social will meet the criteria of this theory to conceptualize.

In this conceptual framework, the independent variable is the topical application of non-processed honey. The dependent variables are pain, wound size, exudate, swelling and edges of the wound. Interaction between the non-processed honey and the dependent variables is expected to lead to decreased pain, decreased wound size, reduced exudate, reduced swelling and dry edges of the wound. These events are summarized as wound healing.



*Figure 1: Conceptual framework*

## 2.5 Knowledge Gap

Honey is a potential therapeutic agent that can replace many therapies like the antimicrobial agents. However, less knowledge is in place to understand its effectiveness. As such, it calls for more research on the component to understand its applicability in management of various diseases. Additionally, knowledge inefficiency is experienced due to honey's complexity and inability to draw specific reference on its action and the factors for its use.

## CHAPTER THREE

### METHODOLOGY

#### 3.0 Introduction

To systematically and theoretically analyze the methods applied in our study, it is imperative to discuss the research methodology for this study. The research methodology incorporated theoretical analysis of methods associated with the branch of knowledge and also the concepts of theoretical model, and quantitative and qualitative techniques.

#### 3.1 Research design

Experimental study design was applied as it is the best in terms of accuracy and reliability. This study design is concerned with testing hypotheses and establishing causality. It tests the hypothesis of relationships, that is, attempts to make predictions of future outcomes based on a causal model implementing strategies to control the predicted outcome.

It tries to establish causal links between several factors, for instance, the effectiveness of non-processed honey in wound management. This means that patients being managed of wounds have an additional therapy of honey. Patient continued with normal management based on hospital guidelines. The study employed control method where action of the independent or causal variable(s) is controlled or manipulated and the action or outcome on the dependent variable is observed and measured. Randomization manipulation and control which are aspects of experimental study design was used.

#### 3.2 Study Location

The study was carried out at Kapkatet sub-County hospital within the surgical wards ([Appendix 1](#)). The hospital is located in Chemiben sub-location, Kapkatet location, Bureti constituency, Kericho County, Rift valley region in Kenya. It is situated within Kapkatet shopping-Centre along Kericho-Bo met highway about 42km from Kericho town.

#### 3.3 Study Population

The target population were patients who have been admitted to Kapkatet hospital surgical ward with different kinds of acute wounds. Kapkatet hospital has a constant admission of patients with wounds.

##### 3.3.1 Inclusion Criteria

The study involved only those patients diagnosed with acute wounds.

The study involved those willing to participate in the research and signed the informed consent.

Those aged above 18 years.

### **3.3.2 Exclusion criteria**

Patients who were not willing to participate in the study and do not sign the informed consent will not be included in the study.

Patients having prolonged healing/ wound infection e.g., those coming for readmission were excluded.

## **3.4 Sampling**

### **3.4.1 Sampling technique**

The study used purposive sampling method.

The sample was chosen from all patients admitted in surgical ward who qualify to the sampling criteria.

### **3.4.2 Sample Size**

A total of 10 patients were chosen. Five were under routine wound dressing products (control group) while five were under honey dressed wounds (treatment group) in addition to their prescribed standard therapy. Medications as well as other treatment approaches were not discontinued for the selected patients but rather, honey therapy was added in their management.

## **3.5 Data Collection Instruments.**

The study utilized the use of a summarized version of Bates and Jenson Wound Assessment Tool containing measurements methods such as wound size, colour, exudate type, edema and level of pain among other criteria of measurement.

Questionnaires and observation methods were also used to collect the data and to assess wound healing. These methods of data collection helped us gain an in-depth understanding and also to obtain a rich description from participants' perspectives of the study. Questionnaires is chosen because it is cost effective, quick and helps us collect data from a fairly large sample of people within a short period of time.

### **3.5.1 Validity**

We adhered to the principle of trustworthiness, to ensure only participants who met the inclusion criteria were recruited in the study. The participants' confidentiality was also preserved during the data collection. The university's experienced researchers also checked the accuracy and credibility of the questionnaires.

### **3.5.2 Reliability**

Pilot or feasibility study employed. Pilot was done using 2 adult patients with wounds in surgical wards in Kericho County Referral Hospital. Questionnaires were administered to them to assess feasibility of the study.

### **3.6 Data Collection Procedures**

The questionnaires were administered by the researchers who the interviewers are asking the questions. The results were recorded by the researchers and data written up for analysis.

Observation was also employed and the relevant evidence taken like pictures on the progress of the wound healing, then recorded for analysis later.

Wound assessment tool- the tool is a summarized version of Bates and Jenson Wound Assessment Tool containing measurements such as diameter of the wound, type of exudate and edema among others, which were used to monitor and assess progress of wound healing. This tool is available in the [Appendix 6](#)

### **3.7 Data Analysis and Presentation**

Data were collected from respondents by interviewing, observations and questionnaires to gather the information. These respondents included patients with surgical wounds being managed with conventional care protocols and those managed by use of non-processed honey as adjunct therapy. Data collected were organized into qualitative and quantitative data for analysis. Statistical Package for Social Sciences (SPSS) version 20.0 software was used to analyze quantitative data. They were summarized in frequencies and means, presented in graph and tables.

### **3.8 Ethical considerations**

The research was conducted after getting an approval from the University of Kabianga research ethics committee, approval number was ISERC/2023/0010, and from Kapkatet district hospital administration. The research observed all ethical guidelines as required. The respondents were explained to the purpose of the research, possible risks and benefits.

Participants were informed about voluntary consent before they are presented with questionnaires and subjected to interviews, those who were unwilling to participate were not forced to participate. Assurance on confidentiality of the information was done and only authorized persons were allowed to access the information. Autonomy of the respondents and that of the hospital were highly considered and respected. Findings were only used for studies purposes.

## CHAPTER FOUR: FINDINGS

*Table 1: Socio-demographic characteristics of the study participants*

Variable	Frequency ( %)
<b>Age</b>	
18-24	2 (20 %)
25-34	4 (40 %)
35-44	3 (30 %)
>44	1 (10 %)
<b>Gender</b>	
Female	4 (40 %)
Male	6 (60 %)
<b>Educational attainment</b>	
No formal education	2 (20 %)
Primary education	4 (40 %)
Secondary education	3 (30 %)
Tertiary education	1 (10 %)
<b>Employment status</b>	
Employed (Private & government)	2 (20 %)
Unemployed	4 (40 %)
Self employed	2 (20 %)
Student	1 (10 %)
Retired	1 (10 %)
<b>Wealth class/ quintiles</b>	
Low wealth quintile	3 (30 %)
Middle wealth quintile	5 (50 %)
High wealth quintile	2 (20 %)

In terms of age, the majority fell within the 25-34 age range (40%), followed by 35-44 (30%). Participants over 44 years old represented the smallest group (10%). Regarding gender, the sample was predominantly male (60%) compared to female participants (40%). Educational

attainment varied among participants, with the highest proportion having primary education (40%), followed by secondary education (30%). A smaller percentage had no formal education (20%), while tertiary education was obtained by a minority (10%). Employment status showed diversity, with 40% being unemployed, 20% employed (private & government) or self-employed, and 10% each being students or retired. In terms of wealth class, the middle wealth quintile had the largest representation (50%), followed by the low wealth quintile (30%), and the high wealth quintile (20%).

**Table 2: Awareness of honey in wound management**

<b>Variable</b>	<b>Frequency ( %)</b>
<b>Awareness of honey</b>	
Yes	10 (100 %)
No	0 (0 %)
<b>Source of information</b>	
Healthcare professionals	3 (30 %)
Family or friends	6 (60 %)
Media (TV, Radio, internet etc.)	1 (10 %)
<b>Knowledge rating</b>	
Very Knowledgeable	2 (20 %)
Average knowledgeable	5 (50 %)
Low knowledge	3 (30 %)
<b>Believe honey is effective</b>	
Yes	5 (50 %)
No	1 (10 %)
Not Sure	4 (40 %)
<b>Potential benefits of honey</b>	
Anti-bacterial properties	1 (10 %)
Anti-inflammatory properties	1 (10 %)
Promotes faster healing	7 (70 %)
Reduces scarring	1 (10 %)
<b>Aware of potential risks or side effects of honey</b>	



Yes	
No	5 (50 %)
	5 (50 %)
<b>Ever used honey in wound management.</b>	
Yes	1 (10 %)
No	9 (90 %)
<b>Consider using in future</b>	
Yes	2 (20 %)
No	1 (10 %)
Not sure	7 (70 %)

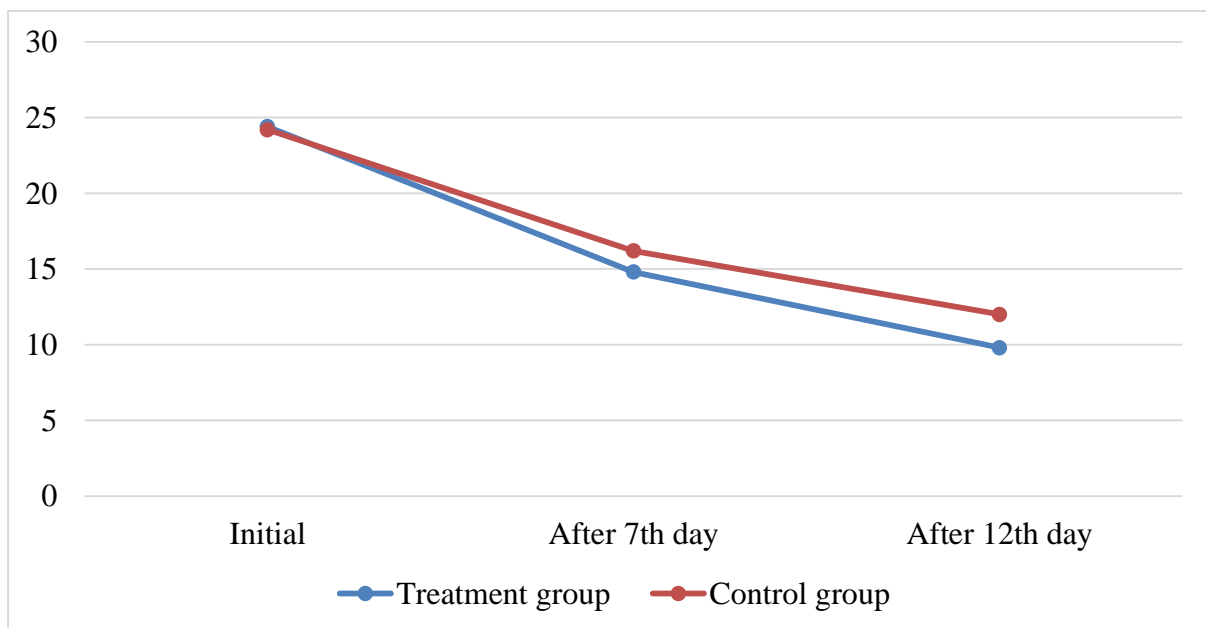
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All participants in the study (100 %) reported awareness of honey in wound management. The majority of participants became aware of honey through family or friends (60 %), followed by healthcare professionals (30 %), and a smaller percentage through media sources (10 %). In terms of knowledge rating, half of the participants considered themselves to have average knowledge (50 %), while 30 % reported low knowledge and 20 % considered themselves very knowledgeable. Regarding belief in honey's effectiveness, 50 % believed honey to be effective, while 10 % did not believe so, and 40 % were unsure. The potential benefits of honey in wound management were most commonly associated with promoting faster healing (70 %), followed by anti-bacterial properties (10 %), anti-inflammatory properties (10 %), and reducing scarring (10 %). Half of the participants (50 %) reported being aware of potential risks or side effects of honey, while the other half (50 %) were not. Only 10 % of participants reported having used honey in wound management, while the majority (90 %) had not. Regarding future use, 20 % of participants expressed willingness to consider using honey, while 10 % said no, and 70 % were unsure.

**Table 3: Healing Progression after 12 days**

Wound Assessment Total Scores						
Treatment Group (n = 5)				Control Group (n = 5)		
	Initial	After 7 days	After 12 days	Initial	After 7 days	After 12 days
	19	15	8 (H)	20	15	12
	26	17	12	25	17	14
	23	13	7 (H)	25	12	7 (H)
	25	18	15	24	18	16
	29	11	7 (H)	27	19	11
<b>Mean score</b>	<b>24.4</b>	<b>14.8</b>	<b>9.8</b>	<b>24.2</b>	<b>16.2</b>	<b>12.0</b>

*H: Healed wound*



**Figure 2: Line graph of mean score of healing rate of treatment and control groups**

The findings indicate the progression of wound healing over a period of 12 days in both the treatment group (n=5) and the control group (n=5). The total scores, derived from the wound assessments, provide insight into the severity and progress of the wounds. In the treatment

group, the mean total score decreased from the initial assessment (24.4) to 14.8 after 7 days and further decreased to 9.8 after 12 days. It is worth noting that three out of the five wounds (60%) in the treatment group were marked as "healed" (H) after 12 days. This suggests a significant improvement in wound healing as indicated by the lower total scores and the healing designation. In the control group, the mean total score decreased from the initial assessment (24.2) to 16.2 after 7 days and further decreased to 12.0 after 12 days. Although the total scores decreased, indicating some level of improvement, none of the wounds in the control group were marked as "healed" after 12 days. These findings suggest that the treatment group, using non-processed honey as an adjunct therapy, demonstrated more favorable wound healing progression compared to the control group receiving conventional management. The lower mean total scores and the higher number of healed wounds in the treatment group indicate the potential effectiveness of honey in promoting wound healing.

**Table 4: Effectiveness of non-processed honey in wound healing process**

Category	Healed	Not Healed	Total	Wound Healing Effectiveness
<b>Treatment Group</b> (Honey as adjunct therapy)	3	2	5	60 %
<b>Control group</b> (Conventional management)	1	4	5	20 %
<b>Total</b>	<b>4</b>	<b>6</b>	<b>10</b>	

The findings suggest that the use of non-processed honey as an adjunct therapy in wound management demonstrated higher effectiveness in promoting wound healing compared to conventional management alone. In the treatment group, where honey was used as an adjunct therapy, three out of five wounds were healed, resulting in a healing effectiveness of 60%. In contrast, in the control group receiving conventional management, only one out of five wounds healed, indicating a healing effectiveness of 20%.

These findings indicate that the use of non-processed honey in wound management was associated with a higher proportion of healed wounds compared to conventional management alone. The 60% healing effectiveness in the treatment group suggests a substantial positive impact of honey on wound healing.

**Table 5: Complications associated with use of honey in wound management**

<b>Complications</b>	<b>Frequency ( % (n =5)</b>
Allergic reactions	2 (40 %)
Delayed wound healing	1 (20 %)
Hyperglycemia	1 (20 %)
Pain or discomfort	3 (60 %)

Among the treatment group complications associated with the use of honey in wound management were observed in some cases. The most common complication reported was pain or discomfort, affecting 60% of the participants. Allergic reactions were experienced by 40% of the participants. Delayed wound healing and hyperglycemia were reported by 20% each.

## CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATION

### 5.1 Discussion

The findings of the study indicate a high level of awareness (100%) among participants regarding the use of honey in wound management. This aligns with existing literature highlighting the increasing popularity and recognition of honey as a potential therapeutic agent for wound healing (Khan et al., 2019; Mandal et al., 2021). It is noteworthy that participants primarily gained knowledge about honey through family and friends (60%), suggesting the influence of personal networks in disseminating information. In terms of knowledge rating, a substantial proportion of participants considered themselves to have average knowledge (50%). This indicates a moderate level of understanding regarding the use of honey in wound management. However, a significant number of participants reported low knowledge (30%), which may reflect the need for improved education and awareness campaigns targeting patients in healthcare settings (Gethin & Cowman, 2011).

Belief in the effectiveness of honey in wound healing was varied, with 50% of participants expressing belief, 10% expressing disbelief, and 40% being unsure. These findings are consistent with the diverse perceptions and attitudes towards complementary and alternative therapies, including honey, in wound management (Arif et al., 2018; Lusby et al., 2005). The potential benefits attributed to honey in wound management were most commonly associated with promoting faster healing (70%). This aligns with the well-documented antimicrobial and wound healing properties of honey, supported by numerous *in vitro* and *in vivo* studies (Mandal et al., 2021; Mblan, 2015). The reported awareness of potential risks or side effects of honey by half of the participants (50%) highlights the importance of considering the safety aspects and potential allergenic reactions associated with honey use (Simon et al., 2019).

Despite a high level of awareness, only a small proportion of participants (10%) reported having used honey in wound management. This may reflect barriers related to availability, accessibility, or lack of healthcare professional recommendations (Gethin & Cowman, 2011; Simon et al., 2019). Furthermore, a significant percentage of participants (70%) expressed uncertainty regarding future use, underscoring the need for further research, education, and communication to address patient concerns and enhance informed decision-making (Arif et al., 2018; Gethin & Cowman, 2011).

The use of non-processed honey as an adjunct therapy in wound management resulted in more favorable wound healing progression compared to conventional management alone. The treatment group showed a significant improvement in wound healing, as evidenced by the lower mean total scores and the higher number of wounds marked as "healed" after 12 days. This suggests that the application of non-processed honey contributed to a more effective healing process. These findings align with previous research that has demonstrated the potential effectiveness of honey in wound management. Honey has been recognized for its antimicrobial, anti-inflammatory, and wound healing properties (Mijtan, 2014). The presence of bioactive compounds in honey, such as hydrogen peroxide, phenolic compounds, and enzymes, contribute to its therapeutic effects on wound healing (Mijtan, 2014; Mijtan et al., 2018). The observed improvements in wound healing in the treatment group are in line with other studies that have reported positive outcomes when honey is used as a wound dressing or adjunct therapy (Jull et al., 2015; Abdulrhman et al., 2017). These studies have highlighted the potential of honey to promote wound healing, reduce inflammation, and improve wound closure rates.

The healing effectiveness of 60% observed in the treatment group, where honey was used, highlights the significant positive impact of honey in wound management. This is in contrast to the control group, which only achieved a healing effectiveness of 20% with conventional

management alone. These findings align with previous research that has demonstrated the beneficial effects of honey in wound healing. Research by Jull et al. (2015) conducted a systematic review and meta-analysis of randomized controlled trials examining the use of honey in wound management. Their findings showed that honey was associated with improved wound healing rates compared to conventional dressings alone. The study also noted the antimicrobial and anti-inflammatory properties of honey, which contribute to its effectiveness in wound healing. Furthermore, a study by Subrahmanyam (2007) investigated the use of honey as a primary dressing for chronic wounds. The results demonstrated faster wound healing, reduction in wound size, and improved granulation tissue formation with honey treatment. The study emphasized the importance of using non-processed honey for optimal therapeutic benefits.

The findings from the treatment group in this study indicate that the use of honey in wound management can be associated with certain complications. Pain or discomfort was the most common complication reported, affecting 60% of the participants. This aligns with previous research that has highlighted the potential for honey application to cause a stinging or burning sensation at the wound site (Khoo et al., 2019). Allergic reactions were experienced by 40% of the participants, which underscores the importance of considering individual patient allergies and conducting proper allergen testing before using honey in wound management (Majtan, 2014). Furthermore, delayed wound healing and hyperglycemia were reported by 20% each, suggesting that these complications may be potential concerns in certain cases. While delayed wound healing is not commonly associated with honey use, it is important to consider individual patient factors and underlying conditions that may influence wound healing (Vandamme et al., 2013). The potential for honey to temporarily raise blood glucose levels, leading to hyperglycemia, is a known consideration, particularly in patients with diabetes or those at risk of hyperglycemia (Al-Waili, 2011). These findings highlight the

importance of careful monitoring and individualized assessment when using honey in wound management to minimize the risk of complications and optimize patient outcomes.

## **5.2 Conclusion**

The study findings highlight a high level of awareness among participants regarding the use of honey in wound management. However, there are variations in knowledge, beliefs, and future intentions related to honey use. The use of non-processed honey as an adjunct therapy in wound management showed more favorable wound healing progression compared to conventional management alone. The treatment group demonstrated significant improvement in wound healing with a higher proportion of healed wounds. This suggests the potential effectiveness of honey in promoting wound healing. However, complications associated with honey use, such as pain or discomfort, allergic reactions, delayed wound healing and hyperglycemia, were observed in some cases. These findings emphasize the importance of careful monitoring, individualized assessment, and proper consideration of patient factors when using honey in wound management.

## **5.3 Recommendations**

With regard to the findings of this study, the following recommendations were suggested:

1. **Improve Patient Education:** Develop educational materials and programs to enhance patient awareness and knowledge about the use of honey in wound management. These materials should cover the benefits, potential risks, and proper application techniques of honey. Healthcare professionals can play a crucial role in providing accurate and evidence-based information to patients, ensuring they have the necessary knowledge to make informed decisions.
2. **Conduct Further Research:** Conduct large-scale randomized controlled trials and longitudinal studies to evaluate the efficacy and safety of honey in wound management.



This research should include diverse patient populations and various types of wounds to gather comprehensive evidence on the effectiveness and potential complications associated with honey use. Long-term follow-up assessments are also necessary to monitor the outcomes and potential long-term effects of honey on wound healing.

3. **Develop Clinical Guidelines:** Establish clinical guidelines or protocols for the use of honey in wound management. These guidelines should provide healthcare professionals with standardized procedures for selecting appropriate honey products, assessing wound suitability, and monitoring for complications. By implementing consistent guidelines, healthcare providers can ensure safe and effective use of honey as an adjunct therapy in wound healing.
4. **Promote Collaboration:** Encourage interdisciplinary collaboration among healthcare professionals, including surgeons, wound care specialists, nurses, and pharmacists, to optimize the use of honey in wound management. Collaboration can facilitate knowledge exchange, share best practices, and ensure a holistic approach to wound care. This teamwork will enhance patient outcomes, improve adherence to treatment plans, and allow for comprehensive assessment and management of potential complications.

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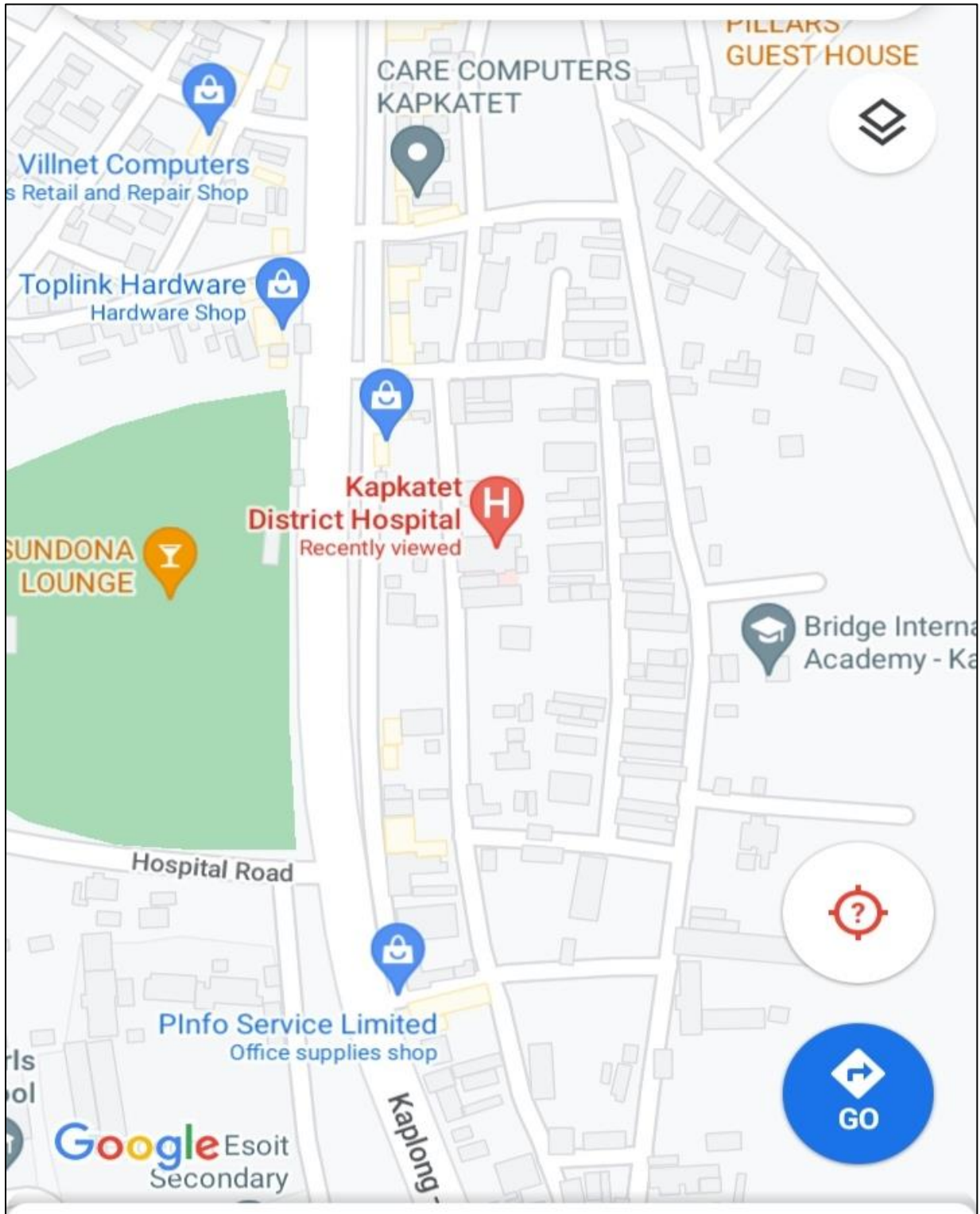
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APPENDICES

Appendix 1: Map of Kapkatet Sub-County Hospital, Kericho County



**Appendix 2: Work Plan**

TASK	JULY WK4 2022	SEPT WK2 2022	JAN WK3 2023	2023	2023	2023	2023	2023	2023
Identification of problem and concept development									
Proposal development and presentation									
Pre-testing of tools									
Data collection									
Data analysis and report writing									
Project writing presentation, correction and submission									

Table 1. O



### Appendix 3: Study Budget

Item	Unit cost	Units	Total	Total amount in Ksh
<b>Research proposal development and defense</b>				
Printing of research proposal	1 copy @30	2	2 COPY X Ksh 230	460
Photocopies of research proposal	1 copy @ 100	2	2 copies X Ksh 100	200
Spiral binding	1 copy @70	4 copies	4 copies Xsh70	280
Internet browsing			Ksh 1000	1000
Airtime cost			Ksh 200	200
Transport to Kapkatet hosp and lunch	@30	14 days	Ksh 420 X 7	2940
<b>2 Data collection and Analysis</b>				
Questionnaire printing and photocopies	@10	190 copies	Ksh5 X 190	950
Purchase of honey	@500	10 pieces	Ksh500 X 10	5000
<b>3 Report writing</b>				
Printing of research project	1 copy @ 500	2 copies	Ksh 500 X 2	1000
Photocopy of research project	1 copy @ 150	1 copy	Ksh 150	150
Binding of the project	@ 500	2 copies	Ksh 500 X2	1000
Contingencies (10%)				820
<b>TOTAL</b>				<b>14,000 =</b>

## **Appendix 4: Consent Form**

Researchers' statement Study Title: **Effectiveness of non-processed honey in wound management among the patients with wounds in surgical ward in Kapkatet sub-county hospital, Bureti constituency, Kericho County**

**Name of Principal Investigator(s):**

Cherono Mckey- NUR/ K/0016/2019

Benard Kpkorir- NUR/ K/0011/2019

Brian Koech- NUR/ K/0006/2019

Sharon Mutai- NUR/ K/0025/2018

Jepkoech Romana - NUR/ K/0005/2019

**Co Investigators:** Madam Bevaline Kavai

**Name of Organization** University of Kabiranga, Kapkatet campus.

**This Informed Consent Form has two parts:**

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the signed Informed Consent Form

### **Part I: Information Sheet**

**Introduction** You are being asked to take part in a research study. This information is provided to tell you about the study. Please read this form carefully. You will be given a chance to ask questions. If you decide to be in the study, you will be given a copy of this consent form for your records.

Taking part in this research study is voluntary. You may choose not to take part in the study. You are also free to withdraw from this study at any time. If after data collection you choose to quit, you can request that the information provided by you be destroyed under supervision and thus not used in the research study.

If you decide to be in the study, you will be given a copy of this consent form for your records. Taking part in this study is voluntary.

**Purpose of the study:**

To find out the effectiveness of non-processed honey in wound management among the patients with wounds in surgical ward in Kapkatet sub-county hospital, Bureti constituency, Kericho County.

**Type of Research Project/Intervention**

The research will involve asking you to fill the questionnaire.

**Why have I been identified to Participate in this study?**

You have been identified to participate in this study because you willingly accepted to participate and you have a wound.

**How long will the study last?**

You will be in this study for two months.

**What will happen to me during the study?**

We are asking you to assist us to know more on the effectiveness of the use of honey in wound management in surgical ward in Kapkatet sub-county hospital, Bureti constituency, Kericho County. If you accept, you will be asked questions and you will answer as we record in a paper.

**What side effects or risks I can expect from being in the study?**

There will be no risks involved in the study.

**What are the benefits of participating in the study?**

There will be no benefits in participating in the study

**Reimbursements?**

There will be no reimbursements if you participate in the study.

**Who do I call if I have questions about the study?**

Questions about the study: call 0758463145/0728842433 or email [nurk00162019@students.kabianga.ac.ke](mailto:nurk00162019@students.kabianga.ac.ke) or [psanga@kabianga.ac.ke](mailto:psanga@kabianga.ac.ke).

Questions about your rights as a research subject: You may contact Institutional Review Ethics Committee (IREC) 053 33471 Ext.3008. IREC is a group of people that reviews studies for safety and to protect the rights of study subjects.

**Will the information I provide be kept private?**

All reasonable efforts will be made to keep your protected information (private and confidential). Protected Information is information that has been collected, maintained and can be linked back to you.

**Part II: Consent of Subject:**

I have read or have had read to me the description of the research study. The investigator or his/her representative has explained the study to me and has answered all of the questions I have at this time. I have been told of the potential risks, discomforts and side effects as well as the possible benefits (if any) of the study. I freely volunteer to take part in this study.

\_\_\_\_\_  
\_\_\_\_\_

Name of Participant      Signature of subject/thumbprint      Date & Time

( Witness to print if the

Subject is unable to write

\_\_\_\_\_

Name of Representative/Witness

Relationship to Subject

\_\_\_\_\_

Name of person Obtaining Consent    Signature of person    Date

Obtaining Consent

\_\_\_\_\_

Printed name of Investigator    Signature of Investigator    Date

## **Appendix 5: Questionnaires**

### **A socio-demographic characteristics**

1. What is your age?

18-24 [ ]    25-34 [ ]    35-44 [ ]    >44 [ ]

2. What is your gender?

Female [ ]    Male [ ]

3. What is your highest level of education completed?

No formal education [ ]    Primary education [ ]    Secondary education [ ]

Tertiary education [ ]

4. What is your current employment status?

Employed (Private & government) [ ]    Unemployed [ ]    Self-employed [ ]

Student [ ]    Retired [ ]

5. Which wealth quintile do you believe you belong to?

Low wealth quintile [ ]    Middle wealth quintile [ ]    High wealth quintile [ ]

### **B Awareness of honey in wound management and healing**

1. Have you heard about the use of honey in wound management before?

a. Yes [ ]    b. No [ ]

2. If yes, how did you become aware of the use of honey in wound management? (Select all that apply)

a. Healthcare professional [ ]

b. Family or friends [ ]

c. Media (TV, radio, internet) [ ]

d. Other (please specify): \_\_\_\_\_

3. How would you rate your knowledge about the use of honey in wound management?
- a. Very knowledgeable [ ]                      b. Medium/average knowledgeable [ ]
- c. Low knowledge [ ]
4. Do you believe that honey can be effective in wound healing?
- a. Yes [ ]                      b. No [ ]                      c. Not sure [ ]
5. What potential benefits of honey in wound management have you heard of? (Select all that apply)
- a. Anti-bacterial properties [ ]                      b. Anti-inflammatory properties [ ]
- c. Promotes faster healing [ ]                      d. Reduces scarring [ ]
- e. Other (please specify): \_\_\_\_\_
6. Are you aware of any potential risks or side effects associated with using honey in wound management?
- a. Yes [ ]                      b. No [ ]
7. If YES, please describe the risks or side effects, you are aware of.
8. Have you ever used honey in wound management?
- a. Yes [ ]                      b. No [ ]
9. Would you consider using honey as a wound management option in the future?
- a. Yes [ ]                      b. No [ ]                      c. Not sure [ ]

### Appendix 6: Wound Assessment Tool

The assessment tool is a modified Bates-Jensen Wound Assessment Tool in which the rating sheet assesses wound's status (Connie Harris et al., 2010). The variable is graded respectively according to the best description of the wound. The total score is then determined and the higher the score the more severe the status of the wound. Size is determined by measuring the longest and widest areas of the wound and multiplying them

In this assessment tool, the initial measurement will determine the progress of wound healing and noting the extent of the variables in the progressive assessment. For example, wound size will be measured initially and done sequentially while noting increase or decrease. This tool will be used within a span of 12 days with assessment done on the first, seventh and 12<sup>th</sup> day to note progress.

ITEM	ASSESSMENT	Initial Score	After 7 <sup>th</sup> Score	After 12 <sup>th</sup> Score
<b>Size</b>	1 = Length x width <4 sq cm 2 = Length x width 4--<16 sq cm 3 = Length x width 16.1--<36 sq cm 4 = Length x width 36.1--<80 sq cm 5 = Length x width >80 sq cm			
<b>Pain</b>	1 = No Pain 2 = Mild 3 = Moderate 4 = Severe 5 = Unbearable			
<b>Edges</b>	1 = Indistinct, diffuse, none clearly visible 2 = Distinct, outline clearly visible, attached, even with wound base 3 = Well-defined, not attached to wound base 4 = Well-defined, not attached to base, rolled under, thickened 5 = Well-defined, fibrotic, scarred or hyperkeratotic			
<b>Exudate</b>	1 = None			



<b>type</b>	2 = Bloody 3 = Serosanguineous: thin, watery, pale red/pink 4 = Serous: thin, watery, clear 5 = Purulent: thin or thick, opaque, tan/yellow with or without odor			
<b>Exudate Amount</b>	1 = None, dry wound 2 = Scant, wound moist but no observable exudate 3 = Small 4 = Moderate 5 = Large			
<b>Skin Color Surrounding wound</b>	1 = Pink or normal for ethnic group 2 = Bright red & or blanches to touch 3 = White or grey pallor or hypopigmented 4 = Dark red or purple & or non-blanchable 5 = Black or hyperpigmented			
<b>Tissue Edema</b>	1 = No swelling or edema 2 = Non-pitting edema extends <4 cm around wound 3 = Non-pitting edema extends >4 cm around wound 4 = Pitting edema extends <4 cm around wound 5 = Crepitus and/ or pitting edema extends >4 cm around wound			
<b>TOTAL</b>				