Comparison Of Honey-Ghee Dressing With Collagen Dressing In The Management Of Superficial Burn Wounds In Children

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Background: Options available for local management of burns include occlusive dressing and delayed skin grafting, open method and immediate excision followed by immediate skin grafting. Methods: A randomised controlled clinical trial was conducted in Mulago Hospital, Kampala to compare Honey-Ghee dressing and Collagen dressing in the management of superficial burn wounds. : A total of 52 children with superficial burn injury were studied to assess the efficacy and the safety of Collagen as a dressing in comparison with Honey-Ghee dressing.

Results: The mean duration of wound healing of the 26 patients dressed with Collagen was 9.9 days while that for the 26 patients dressed with Honey-Ghee was 12.3 days. Collagen dressed wounds healed significantly faster than Honey-Ghee dressed wounds. Four (15.38%) patients of the 26 patients dressed with collagen developed wound infection while 5 (19.23%) of the 26 patients dressed with Honey-Ghee dressing developed wound infection. There was no significant difference between the percentages. The organisms causing wound infections were Staphylococcus aurous (33.3%), Pseudomonas aeruginosa (33.3%), Citrobacter freundii (22.2%) and Escherichia coli (11.1%).

Introduction

The modern management of burns utilizes the closed method of treatment, which through several studies has been shown to be superior to the open method. In Mulago Hospital Paediatric Surgical ward, closed dressing is used for superficial and deep burns. Honey and ghee impregnated gauze is used. For a long time, honey has been used for dressing worldwide[1]. There is evidence that it increases the rate of wound healing, reduces infection, has an analgesic effect and is affordable and available.[1,2,3] Bovine Collagen is a product introduced over the last two decades. It is not in use in most health units in Uganda, Mulago Hospital inclusive. Studies carried out in Asia, Europe and The United States show that it is very effective at promoting wound healing and reducing infection.[4,5]

Patients and Methods

A total of 52 cases of superficial thermal burns involving up to 30% of the total body surface area were treated over the period between September 2002 and February 2003 in Mulago Hospital (Paediatric Surgical Ward and Accident and Emergency Ward; 3BE). Only fresh burns (< 24 Hrs old) involving children up to 12 years old were recruited into the study. A detailed history was obtained regarding the mode and time of injury. A thorough physical examination was performed with emphasis on the type and extent of burns. The cases were allotted at random to two groups.

The general management of the patients remained the same in the two groups and included administration of intravenous fluids, analgesics, antibiotics, tetanus toxoid and antacids. Prior to cleaning the wound, a sterile swab was taken for microbial culture. Specific local treatment of the burn involved cleaning of the burn with warm hypertonic saline (4.39%) solution and application of either a Honey-Ghee mixture or Collagen to the burn.

Group 1 (26 patients) was treated with pure, unprocessed, undiluted honey mixed with ghee (pure animal fat) in a 1:1 ratio. The purpose of ghee was to provide lubrication and make the honey easily applicable. Dry, sterile cotton gauze was thoroughly impregnated with this mixture then uniformly applied to the wound. This was then covered with dry cotton gauze followed by dry cotton wool and another layer of cotton gauze. This was bandaged or secured with Elastoplasts. The dressing was changed every third day or when ever there was

evidence of infection. At these times the amount of discharge, foul smell, slough, presence of pus, oedema of surrounding area and signs of wound healing were noted. At the first change of dressing another sterile wound swab was taken for microbial culture.

Group 2 (26 patients) the wounds were covered with Collagen. This dressing was not changed unless there was evidence of infection. It spontaneously sloughed off when the wound healed. In the presence of infection, all the dressings were removed and a swab taken for microbial culture and the wound thoroughly debrided and cleaned with hypertonic saline. Wound infection was considered present if a coloured, purulent or foul smelling discharge or frank was observed. The patients were reviewed daily.

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Specific treatment of the burn wound involved cleaning of the wound with warm hypertonic saline (4.39%) and application of either a Honey-Ghee mixture or Collagen to the wound. Prior to cleaning of the wound a sterile swab was taken for microbial culture. In Group 2 (26 patients) the wounds were covered with Collagen. This dressing was not changed unless there was infection. It spontaneously sloughed off when the wound healed. In the presence of infection all dressings were removed a swab taken for microbial culture and the wound thoroughly debrided and cleaned with hypertonic saline. Wound infection was taken as being the presence of a fever; hyperaemia and warmth around the wound; a coloured, purulent, or foul smelling discharge; or frank pus. Fresh dressings were then applied. The patients were reviewed daily. For both groups the time taken for completion of wound healing was noted. The mean healing duration was calculated.

The difference in means was compared using the independent samples T test. The number of wound infections and there percentages was calculated and the difference compared using the Chi-square test.

Results

Of the 52 patients with burns, 35 (67%) were males and 17 (33%) females. The mean age was 2.96 years. The youngest patient was 6 months and the oldest 11 years. Most of the patients (82.69%) were in the age group of 1 to 5 years. 45 (87%) patients were injured in a kitchen environment. In patients treated with Honey-Ghee dressing, the minimum healing duration was 9 days and the maximum 16 days with a mean of 12.3 days. Collagen dressed wounds had a minimum healing duration of 8 days and a maximum of 12 days with a mean of 9.9 days. The mean for both groups was 11.1 days. The time taken for wound healing differed significantly between the two groups (P-value <0.0001).

Of the 52 patients, 44 had bacterial growths from their burn wound swabs. 8 swabs yielded no bacterial growth. The most common organism cultured was Staphylococcus aureus (32.69%) followed by Pseudomonas aeruginosa (15.38%). The least common was Staphylococcus epidermidis with 3.85% (Table 1). Of the 26 wound swabs taken from honey-ghee dressed wounds at the change of dressing, 5(19.23%) yielded bacterial growth. 21 swabs yielded no growth. There were 9 cases of wound infection. Of these, 3 infections were caused by Staphylococcus aureas, 3 by Pseudomonas aeruginosa, 2 by Citrobacter freundii and 1 by Escherichia coli. Five patients of the honey-ghee group developed an infection, which is 19.23%.

Four patients of the collagen group developed infection, which is 15.38%. Using the Yates-corrected Chi-square test, a P-value of 0.8787(>0.5) was found. There was no significant difference between the two percentages.

Figure 1. Duration of wound healing

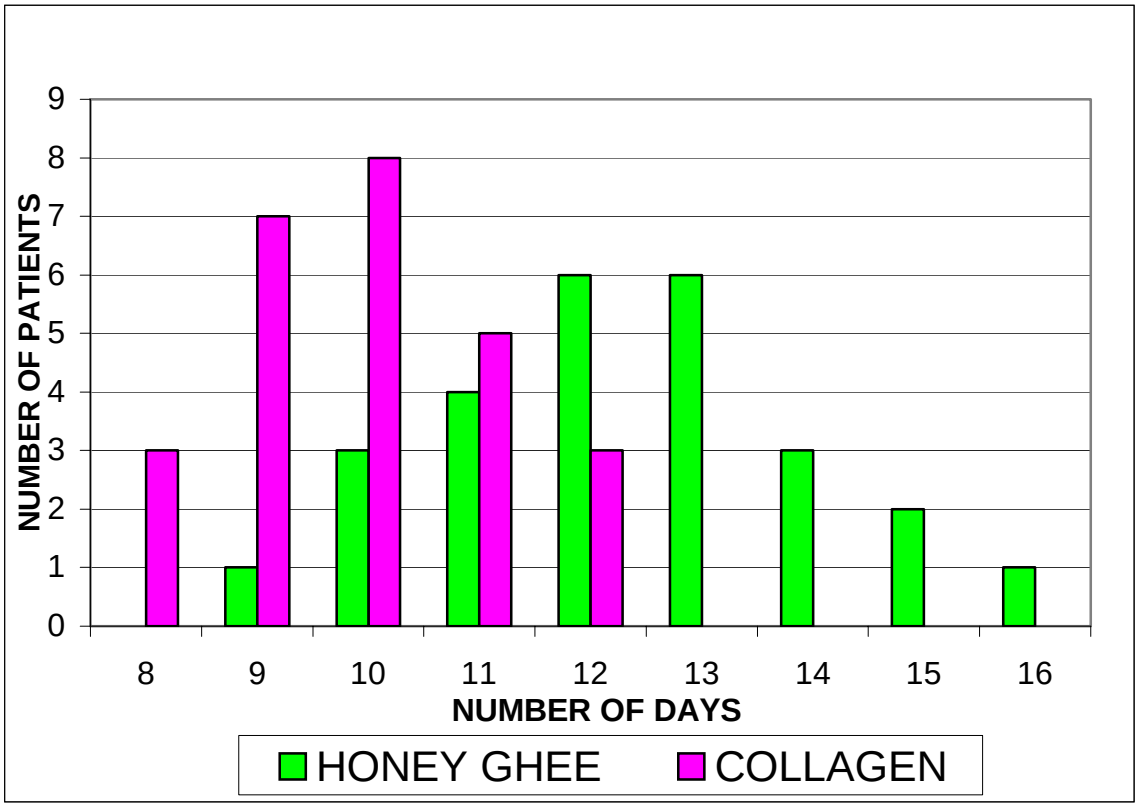

Table 1. Bacteria cultured from fresh wound swab

BACTERIA	FREQUENCY	PERCENTAGE
Staphylococcus aureus	17	32.7%
Pseudomonas aeruginosa	8	15.4%
Klebsiella spp.	4	7.7%
Citrobacter freundii	4	7.7%
Proteus mirabilis	3	5.8%
Escherichia coli	3	5.8%
Enterococcus faecalis	3	5.8%
Staph epidermidis	2	3.9%
No Bacterial growth	8	15.4%
Total	52	100%

Table 2. Healing Duration (Days) By Method

	Honey-Ghee	Collagen	Total
Number Of Observations	26	26	52
Sum	321	258	579
Mode	12.0	10.0	10.0
Median	12.0	10.0	11.0
Mean	12.346	9.923	11.135

Discussion

In this study the wounds dressed with Collagen healed significantly faster than those dressed with Honey-Ghee (P-value<0.0001). This can be explained by collagen's non-inflammatory properties; fibroblast facilitation and microvascular cell migration; and its facilitation of synthesis of neodermal collagen matrices.[4,5,6] Collagen being an animal protein that is an integral part of skin, acts as an artificial dermis.[6]

Of the 52 patients in the study, 44 (84.6%) patients' fresh wounds yielded a bacterial growth. 8 (15.4%) wounds yielded no bacterial growth. The presence of Staphylococcus aureus as the commonest organism is due to its predominance as normal flora of the skin.[7,8] Pseudomonas' presence may be due to the fact that the organisms thrive in a moist environment in hospital wards and thus get their way to the wounds. Pseudomonas if present at the wound site will also thrive in the moist aerobic environment there.

At the change of honey-ghee dressing, five swabs yielded growths out of 26 swabs. These swabs were taken on the3rd day after initial dressing. This shows a reduction in positive cultures when compared with the fresh burn wound swab. There was no significant difference between the percentages of infections in the two groups (p value > 0.5). The two methods seem to have a similar ability to prevent infection. This is in keeping with Efem et al[2] findings in which they reported 100% bacterial growth inhibition in 100% pure honey yet a partial inhibition in a medium containing 50% honey. In this study we had a 50% mixture (the other 50% of volume being ghee). This probably explains the presence of infections. There is a partial inhibition of bacterial growth in this mixture. A 100% pure honey application would probably have resulted in no bacterial growth. The chance of infection would be reduced.

The impermeability of collagen to bacterial migration explains why bacteria that colonized the wound prior to the application of collagen dressing caused infection.[4,6] No infection was caused by bacteria that were not present in the wound before the application of the collagen dressing. The development of infection can further be explained by the fact that collagen is not known to have direct bacteriocidal/bacteriostatic properties[4,5]. It however limits infection through the following properties: it does not evoke inflammation; it promotes angiogenesis; it reduces oedema; and it facilitates cellular migration to the wound[4,5,6].

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