Chapter 64

Piper SkinFix

Hartini Yusof[a], Mohamad Azlan Abd Majid[b], Reena Leeba Richard[b], Zarith Nazirah Mohd Zakaria[a] & Shahrul Azam Abdullah[c]

[a]*Centre of Medical Laboratory Technology, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, 42300 Bandar Puncak Alam, Selangor, Malaysia.*
[b]*Department of Parasitology, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia.*
[c]*Faculty of Mechanical Engineering, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia.*

Abstract

Wound infection indicates the localized injury, excavation of the skin or underlying soft tissue in which pathogenic organisms have been able to penetrate into the viable tissue that surrounds the wound area. The infection prompted our body's immune system, resulting in inflammation and tissue damage that leads to the decreasing rate during the healing process. In addition to the emergence of multi-resistant organisms and harsh chemical content of numerous products available in the market, natural wound care had been produced to promote healing using the local herb. The wound can be safely and effectively treated using '*Piper* SkinFix' consisting of gel and antiseptic spray. The main ingredient of the products is derived from fresh leaves extract, known as *Piper sarmentosum* or '*Kaduk*' which has the inhibitory effects on bacteria and fungus. Besides its' therapeutic properties, this herb is easily grown locally and has also been widely used for traditional treatment. Laboratory data indicate the natural *Piper sarmentosum* was effective against a variety of common pathogens such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Candida albicans*. This natural-based product will be a good alternative to more expensive, advanced wound products, hence, supporting the sustainable growth of plant materials as a primary source of health care.

Introduction

Infected wound literally refers to the localized injury, excavation of the skin or underlying soft tissue caused by the invasion of pathogenic organisms. The organisms are able to penetrate into the viable tissues that surround the wound area and led to infection. The affected area can eventually cause severe infection if it is left untreated as the region may supply nutritious and favourable environment for microbial colonization and proliferation (Mama *et al.*, 2014) of various potentially pathogenic microorganisms (Dai *et al.*, 2010). There had been numerous studies documented on several microorganisms (i.e. bacteria, fungi, protozoa, virus) that potentially invaded the wound site (Bowler *et al.*, 2001; Cooper *et al.*, 2003). Nonetheless, wound infection prompted our body's immune system, resulting in inflammation and tissue damage. This condition will critically influence the healing process.

Besides, the infected wound can cause undesirable odour, pain, and inconvenience for the patient (Kotz *et al.*, 2009), while in other worst case scenario, can lead to death. The continuation usage of topical and systemic antimicrobial agents for treatment had resulted in the emergence of antibiotic-resistant strains (Mama *et al.*, 2014) and coupled with increased costing as well as the decreased rate of new drug discovery

(Cooper *et al.*, 2002), had since become worse. Besides, the harsh chemicals contained in the drugs used for treating wound infection had also become another factor of consumers in acquiring better alternative, hence, natural wound care had been produced to promote healing, using our own local herbs. The wound can be safely and effectively treated using '*Piper* SkinFix' set consisting of gel and antiseptic spray. *Piper sarmentosum* or locally known as 'Kaduk' was selected as the main ingredient for these products. Not only the plant can be conveniently found in Malaysia (Ugusman *et al.*, 2012), the plant has also been known for its therapeutic properties that had been extensively used for wounds, osteoporosis, anti-inflammatory, anti-nociceptive, and antioxidant (Zakaria *et al.*, 2010), to name a few.

Content

Fresh *Piper sarmentosum* leaves were collected and processed according to Vijayakumar (2012) and Ayshwarya and Sudha Rameshwari (2015). Laboratory findings such as Antimicrobial Susceptibility Testing (AST) and Minimum Inhibitory Concentration (MIC) tests had been employed to further proven the efficacy of the crude extract (Syed Abd Rahman *et al.*, 2016). The extract was effective against a variety of common pathogens such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Candida albicans*. Other works had also documented similar findings (Masuda *et al.*, 1991; Zaidan *et al.*, 2005; Hussain *et al.*, 2012; Panomket *et al.*, 2012). Furthermore, phytochemical compounds were performed to screen for the presence of glycoside, flavonoids, terpenoids, alkaloids, and phenolics (Banu & Cathrine, 2015). Toxicity tests were also carried out to determine active or toxic constituents such as potassium (K), magnesium (Mg), iron (Fe), aluminium (Al), lead (Pb), calcium (Ca), zinc (Zn), arsenic (As), copper (Cu), manganese (Mn) and sodium (Na). The data provide us with possible risks that can be harmful to humans (Ifeoma & Oluwakanyinsola, 2013). Besides, the data also revealed that the leaves extract contained inhibitory effects on bacteria and fungus. A previous report by Sanusi *et al.* (2017) reviewed that *P. sarmentosum* contained antibacterial and antifungal activities. Moreover, the light-weight formulation of the gel and antiseptic spray permits smooth penetration onto the skin and assisting in the healing process.

Conclusion

'Piper SkinFix' set has the potential to be used in wound treatment. Its effectiveness in eliminating possible skin infections and cost-effective are essential and considered as an alternative approach. Nonetheless, further studies can also be added as to provide additional insights into the plant's beneficial values as well as contributing to the sustainable growth of plant materials as the primary source of health care.

.

References

Ayshwarya, M., & Sudha Rameshwari, K. (2015). Antimicrobial activity of the plant extracts of *Brassica Oleracea Var. Capitata Rubra*. *Journal of International Academic Research for Multidisciplinary, 3*, 10.

Banu, S. K., & Cathine, L. (2015). General techniques involved in phytochemical analysis. *International Journal of Advanced Research in Chemical Science, 2*(4), 25-32.

Bowler, P. G., Duerden, B. I., & Armstrong, D. G. (2001). Wound microbiology and associated approaches to wound management. *Clinical Microbiology Reviews, 14*(2), 244-269.

Cooper, R. A., Molan, P. C., & Harding, K. G. (2002). The sensitivity to honey of Gram-positive cocci of clinical significance isolated from wounds. *Journal of Applied Microbiology, 93*, 857-863.

Cooper, R., Kingsley, A., & White, R. (2003). Wound Infection and Microbiology. Medical Communications (UK) Ltd for Johnson & Johnson Medical.

Dai, T., Huang, Y.-Y., Sharma, S. K., Hashmi, J. T., Kurup, D. B., & Hamblin, M. R. (2010). Topical antimicrobials for burn wound infections. *Recent Patents on Anti-Infective Drug Discovery, 5*(2), 124-151. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2935806/pdf/nihms232370.pdf

Hussain, K., Hashmi, F. K., Latif, A., Ismail, Z., & Sadikun, A. (2012). A review of the literature and latest advances in research of *Piper sarmentosum*. *Pharmaceutical Biology, 50*, 1045-1052.

Ifeoma, O., & Oluwakanyinsola, S. (2013). Screening of herbal medicines for potential toxicities. In: Gowder, S. (Ed.), New Insights into Toxicity and Drug Testing. doi: 10.5772/54493.

Kotz, P., Fisher, J., McCluskey, P., Hartwell, S. D., & Dharma, H. (2009). Use of a new silver barrier dressing, ALLEVYN Ag in exuding chronic wounds. International Wound Journal, 6(30), 186-194. Retrived from https://www.researchgate.net/publication/26303064_Use_of_a_new_silver_barrier_dressing_ALLEVYN_Ag_in_exuding_chronic_wounds

Mama, M., Abdissa, A., & Sewunet, T. (2014). Antimicrobial susceptibility pattern of bacterial isolates from wound infection and their sensitivity to alternative topical agents at Jimma University Specialized Hospital, South-West Ethiopia. *Annals of Clinical Microbiology and Antimicrobials, 13*, 14. Retrieved from https://ann-clinmicrob.biomedcentral.com/track/pdf/10.1186/1476-0711-13-14

Masuda, T., Inazumi, A., Yamada, Y., Padolina, W. G., Kikuzaki, H., & Nakatani, N. (1991). Antimicrobial phenylpropanoids from *Piper sarmentosum*. *Phytochemistry, 30*, 3227-3228.

Panomket, P., Wanram, S., Srivorasmas, T., & Pongprom, N. (2012). Bioactivity of plant extracts against *Burholderia pseudomallei*. *Asian Biomedicine, 6*(4), 619-623.

Sanusi, N. A., Umar, R. A., Zahary, M. N., Rohin, M. A. K., Pauzi, M. R., & Ismail, S. (2017). Chemical compositions and antimicrobial properties of *Piper sarmentosum* – A review. *IOSR Journal of Dental and Medical Sciences, 16*(8), 62-65.

Syed Ab Rahman, S. F., Sijam, K., & Omar, D. (2016). Antibacterial activity of the crude extract of *Piper sarmentosum* against *Pseudomons fuscovaginae*. *International Journal of Applied Biology and Pharmaceutical Technology, 7*(1), 67-72.

Ugusman, A., Zakaria, Z., Chua, K. H., Mohd Nordin, N. A. M., & Mahdy, Z. A. (2012). Flavonoids of *Piper sarmentosum* and its cytoprotective effects against oxidative stress. *EXCLI Journal, 11*, 705-714.

Vijayakumar, A., Duraipandiyan, V., Jeyaraj, B., Agastian, P., Raj, M., & Ignacimuthu, S. (2012). Phytochemical analysis and in vitro antimicrobial activity of *Illicium griffithii* Hook. F. & Thoms extracts. *Asian Pacific Journal of Tropical Disease, 2*(3), 190-199.

Zaidan, M. R. S., Rain, N., Badrul, A. R., Adlin, A., Norazah, A., & Zakiah, I. (2005). *In vitro* screening of five local medicinal plants for antibacterial activity using disc diffusion method. *Tropical Biomedicine, 22*, 165-170.

Zakaria, Z. A., Patahuddin, H., Mohamad, A. S., Israf, D. A., & Sulaiman, M. R. (2010). *In vivo* anti-nociceptive and anti-inflammatory activities of the aqueous extract of the leaves of Piper sarmentosum. *Journal of Ethnopharmacology, 128*, 42-48.