

Mikania micrantha mixed woven fabric for quick blood clotting and wound healing

Abstract

The aim of this paper is to introduce novel dressing with *Mikania Micrantha* for quick blood clotting and wound healing. When epidermis of human skin is cut or scrapped, sometimes too much bleeding occurs. Excessive bleeding may cause death, if bleeding is not stopped immediately. To promote blood clotting & wound healing natural based bio materials are still insufficient in medical textile sector. To fill up this scarcity, woven fabric treated with *Mikania micrantha* leaf juice & leaf powder was examined. *M. micrantha* exhibits good blood clotting time in comparison with available dressing materials. Woven fabric (bandage) that contains *M. micrantha* can be used for cut wounds healing purpose. The experiments were carried out in environment friendly way which indicates the production & processing of these dressing materials can have enormous contribution to sustainable operations and products.

Keywords: *Mikania micrantha*, blood clotting, wound healing, skin

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Introduction

Mikania micrantha is a tropical herb known as "Jarmany-lota" in Bangladesh.¹ *M. micrantha* is one of the various herbs grows in abundance in nature. Different parts of *M. micrantha* are greatly effective as poultice for blood clotting and wound healing.² Its' leaves are being used as a source of several medicines since ancient times.³ *M. micrantha* contains lots of medicinal characteristics and potentials to obstruct and heal different diseases such as haemostatic, fever, dysentery.⁴ This species has been traditionally used for wound dressing and healing of sores.⁵ This plant is thought to be one of the world's worst invaders in nature.⁶ It grows expeditiously as a perennial weed in Bangladesh and this sub-continent.⁷ Many pharmaceutical laboratories have accepted plants from the *Mikania* family as a source of natural medicine.⁸ This plant possesses high antioxidants such as phenolic compounds.⁹ Tannins and flavonoids have been reported to activate collagen production and increment in the number of granulation tissue, which increase the wound healing rate.¹⁰ Extracts from seed and leaves of *M. micrantha* have the ability to repel the ear inflammation in rodent in response to the application of 12-O-tetradecanoylphorbol-13-acetate,¹¹ and significant antibacterial and anti-inflammatory properties.¹² This plant has also been proven to possess as anti-stress properties.¹³ An extensive range of biological activities have been done on *M. micrantha* and isolation of the potential compounds was conducted. There is no scientific evidence of conducting experiments on the wound healing effects from *M. micrantha* and its dermal toxicity.¹⁴ Therefore, work was carried out to identify the efficiency and escalation rate of wound healing & blood clotting activity from *M. micrantha* leaf extract.

Material and methods

Preparation of *Micania Micrantha* coated sample

Preparation of *M. micrantha* solution: *M. micrantha* powder has

solubility in acetic acid. *M. micrantha* powder was liquefied to apply on woven fabric cloth. *M. micrantha* powder solution was prepared by dissolving *M. micrantha* powder 1.4% (w/v) in 2% (w/v) in acetic acid. The standard solution of *M. micrantha* powder was prepared after adding 7gm of *M. micrantha* powder in 500ml of 2% (w/v) acetic acid. The solution was stirred using magnetic stirrer. And, the juice was extracted from *M. micrantha* leaf by using electric juice extractor (Brand name:Miyako). Figure 1 shows the *Micania micrantha* leaves.



Figure 1 *Micania micrantha* leaves.

Application of *Micania micrantha* on woven cloth: At the beginning of application of *Micania micrantha*, the bleached woven cloth was cleaned and washed well with 1000mL of de-ionized water for 15 minutes at temperature of 80 degree Celsius, followed by squeezing and sun drying. Then, three (3) square and strip shaped pieces were cut from the woven cloth. These pieces were labeled as Control Lutfor-1, Standard Lutfor-2, Test Lutfor-3. The Control Lutfor-1 sample was immersed only in 500mL distilled hot water, where no *Micania micrantha* or chemical was used. The Standard Lutfor-2 sample was immersed in 500 ml of distilled water in a steel bath, and 200 mL of *Micania micrantha* leaf powder solution were mixed.

Then 4 cc of glycerin¹⁵ was added into the bath for fixation of powder extract and the solution was heated by electric heater for 15 minutes at temperature of 80 degree Celsius. After hot wash, the Standard Lutfor-2 sample was squeezed and dried by electric heater, and kept in a sealed zipper bag. The test Lutfor-3 sample was also immersed in 500mL of distilled water, and 100mL of *Micania micrantha* leaf juice was poured in the bath. The mixture was heated for 5 minutes at 40 degree Celsius. Then 5gm beeswax¹⁶ was added for fixation of leaf juice in the bath and allowed for heating for 3 minutes at the temperature of 60 degree Celsius. After hot wash the sample was squeezed and allowed to dry at room temperature for 8 hours. Figure 2 shows the application of *Micania micrantha* on woven fabric.



Figure 2 Application of *Micania micrantha* on woven fabric.

Blood clotting test: The clotting activity was examined as follows¹⁷:

- The finger tips were pricked using lancet needle and the blood was made to flow without any interruption.
- Started stopwatch simultaneously at the time of pricking.
- Drops of blood were blotted after every 30 seconds time intervals on one sample at a time. The same procedure was carried out for the rest of two samples and the blood clotting time was evaluated.

Wound healing activity

Preparation of woven fabric (bandage): Bleached woven fabric (Bandage) was prepared using *M. micrantha* powder and *M. micrantha* juice. Sterilization of bandages was done before their usages.

Wound healing test: A renowned first aid clinic & pharmacy, Amir First Aid Pharmacy was chosen for test, at Hazaribag, Dhaka, Bangladesh. The woven fabrics were sterilized. Then, the woven fabric samples (containing *M. micrantha* & without *M. micrantha*) were applied on three volunteers skin. Volunteers were kept under observation for 2 days. And blood clotting rate as well as wound healing rate was observed.

Results and discussion

Comparative study on different characteristics of standard *Micania micrantha* powder and extracted leaf juice from *M. micrantha* herbs showed that *M. micrantha* takes impressively less time to clot blood than that taken by the sample that is not treated with *M. micrantha*, Figure 3 & Tables 1–3. From our meticulous observations of best results it can be said that it took 240 seconds to clot blood when *M.*

micrantha extract was not used. But, it took only 120 seconds for blood clotting in case of *M. micrantha* juice and 180 seconds in case of *M. micrantha* powder added woven fabric. Figure 3 shows different types of woven fabrics (with & without *M. micrantha*). Table 1 shows data sheet for calculation of blood coagulation. Table 2 shows data sheet for calculation of blood coagulation (woven fabric with *M. micrantha* powder). Table 3 shows data sheet for calculation of blood coagulation (woven fabric with *M. micrantha* leaf juice). And Figure 4 shows the blood clotting efficiency comparison. Also the *M. micrantha* leaf juice extracted from *Micania micrantha* herb indicates good wound healing properties. Significant healing effects have been found on cut made on skin, on application of woven fabric immersed into both standard & crude *M. micrantha* respectively.

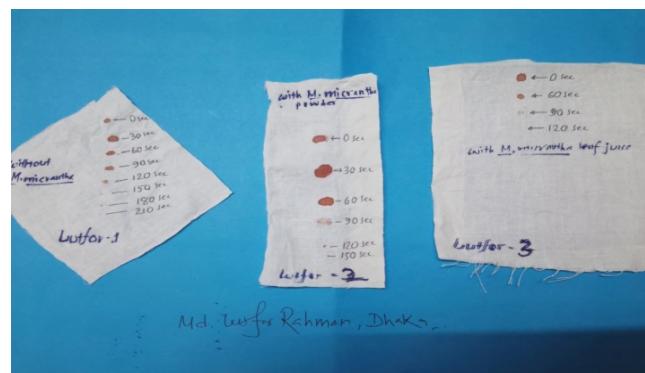


Figure 3 Woven fabric (without *M. micrantha*-Lutfor 1), Woven fabric mixed with *M. micrantha* powder-Lutfor 2 and Woven fabric mixed with *M. micrantha* juice-Lutfor 3.

Blood clotting efficiency comparision

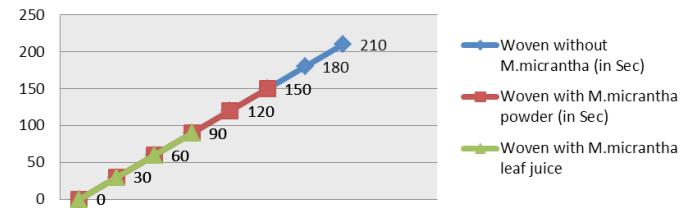


Figure 4 Blood clotting efficiency comparison.

Table 1 Data sheet for calculation of blood coagulation (woven fabric without *M. micrantha*)

Initial time (Sec)	Final time (Sec)	Time differences (Sec)	Total no. of blood spot	Visibility of blood spot (Y/N)
0	30			Yes
30	60			Yes
60	90			Yes
90	120			Yes
120	150	30	8	Yes
150	180			Yes
180	210			Yes
210	240			Yes
240	270			No

Table 2 Data sheet for calculation of blood coagulation (woven fabric with *M. micrantha* powder)

Initial time (Sec)	Final time (Sec)	Time differences (Sec)	Total no. of blood spot	Visibility of blood spot (Y/N)
0	30			Yes
30	60			Yes
60	90			Yes
90	120	30	6	Yes
120	150			Yes
150	180			Yes
180	210			No

Table 3 Data sheet for calculation of blood coagulation (woven fabric with *M. micrantha* leaf juice)

Initial time (Sec)	Final time (Sec)	Time differences (Sec)	Total no. of blood spot	Visibility of blood spot (Y/N)
0	30			Yes
30	60			Yes
60	90	30	4	Yes
90	120			Yes
120	150			No

Blood clotting test: Blood coagulation time (in Seconds): $=30 \times (\text{number of blood drops})$.

For woven fabric (without *M. micrantha*): Coagulation time $=30 \times 8 = 240$ sec.

For woven fabric having *M. micrantha* powder: Coagulation time $=30 \times 6 = 180$ sec.

For woven fabric having *M. micrantha* leaf juice: Coagulation time $=0 \times 4 = 120$ sec.

Conclusion

From the results of our study, it is clear that *M. micrantha* leaves extract containing woven bandages are quicker in promoting blood clotting and also cheaper than chemically sterilized bandages. It may be used to save number of lives from excessive bleeding. It can be considered as a sustainable option in replacement of chemically treated bandages.

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Conflicts of interest

The authors have no conflicts of interest regarding the publication of this paper.

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