

# Development of Eaglewood Essential Oil Blood-Letting Needle and Its Application in Traditional Medical Training

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**Abstract:** Objective: To release the essential oil of aloes after acupuncture and bloodletting to reduce inflammation of wound. At the same time, the needle can be safely stored after use. So that students can understand the knowledge of traditional Chinese medicine and oral cavity and familiar with a series of processes of invention patents. Enable students to participate in the whole cycle of personnel training process. Methods: The design is a blood-letting needle that can release eaglewood essential oil, including an output tube and a tube body for storing eaglewood essential oil. The bottom of the output tube is connected with the top of the tube body. The tube body is provided with a first piston moving relative to it, and a second piston is provided below the first piston, which moves relative to the tube body. The top of the second piston is provided with a fixed connection with the top rod, the bottom of the second piston is provided with a fixed connection with the bottom rod, the bottom rod is provided with a fixed connection with the propulsion mechanism, the bottom of the rod is provided with a fixed connection with the bloodletting needle, the bottom of the tube body is provided with a shrink. Results: A kind of blood-letting needle which can release eaglewood essential oil was successfully designed. This device is designed to reset the needle propulsion mechanism, which is convenient for storage and avoid accidental injury to the operator. The piston is set to facilitate the operator to apply the essential oil of eaglewood from the output pipe to the wound of the patient to reduce inflammation and eliminate redness. The device has the advantages of simple structure and easy operation. Conclusion: This needle solves the problem that the existing bloodletting needle only has the function of bloodletting when used, and the needle can cause skin damage, redness and inflammation after puncturing the skin. The existing bloodletting needle cannot be stored after use, and it is easy to make mistakes and stab the operator. It also stimulates students' enthusiasm for learning and innovation consciousness, and integrates theory into practical innovation.

**Keywords:** Eaglewood, Bloodletting, Needling Instrument, Traditional Medical Training

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## 1. Introduction

Eaglewood, as a precious aromatic medicine for regulating qi, has been used in medicine for more than 1,000 years. According to statistics, there are more than 160 kinds of

Chinese patent medicine containing eaglewood [1]. Eaglewood is mainly distributed in southern provinces of China, such as Hainan, Guangzhou and other low-altitude areas. It is a kind of aromatic medicinal plant with bitter taste and gentle nature [2]. Aromatic medicinal plants contain moniterpenoids, sesquiterpenoids, flavonoids, alkaloids and

aromatic components, and have significant analgesic and anti-inflammatory effects [3]. Eaglewood essential oil is extracted by distillation and extraction of aloes, which is a good medicine for stopping bleeding and relieving pain. It has obvious anti-inflammatory effect and miraculous effect on removing scars. Evenly applied eaglewood essential oil will immediately stop bleeding and has especially outstanding anti-inflammatory effect on wounds [4]. Bloodletting therapy, also known as puncturing blood therapy, and traditional acupuncture, moxibustion, fire needle, buried thread are ancient Chinese external treatment, which uses three edge needle, dermatology needle or blood collection needle and other blood-letting tools in the skin or superficial exposure of the complex blood to treat diseases [5]. As one of the important and appropriate techniques for meridians and collaterals of traditional Chinese medicine and for the treatment of non-diseased diseases, bloodletting therapy can be applied for symptoms as small as colds and headaches, as large as acute and severe diseases. It often plays a "turn-around" and unexpected curative effect with small adverse reactions [6].

However, the existing bloodletting needle only has the function of bloodletting when used, and the needle puncturing the skin will lead to skin damage, redness and swelling, which is easy to cause inflammation. At the same time, the existing bloodletting needle cannot be stored after use, and it is easy to make mistakes and stab the operator. Therefore, it is very necessary to design a device that is convenient for storage and can release eaglewood essential oil for anti-inflammatory purposes when the bloodletting needle plays the function of bloodletting. By integrating agarwood with traditional Chinese medicine and oral theories, it significantly enhances students' innovative abilities. Moreover, it may lead to the exploration of agarwood in new fields.

## 2. Materials and Methods

In view of the above existing technology, the device is designed to provide a blood-letting needle that can release the essential oil of eaglewood, which has the functions of acupuncture and blood-letting, anti-inflammatory, and safe storage of the needle after use. The utility model relates to a bloodletting needle which can release eaglewood essential oil, including an output tube and a tube body for storing aloes essential oil. The bottom of the output tube is connected with the top of the tube body, the tube body is provided with a first piston moving relative to it, and a second piston is arranged below the first piston. The second piston moves relative to the tube body, and the top of the second piston is provided with a jacking rod fixed with it. The bottom of the second piston is provided with a base rod which is fixed connected with it, and a propelling mechanism which is fixed connected with it. The bottom of the base rod is provided with a bloodletting needle which is fixed connected with it, and the bottom of the tube body is provided with a repulsive mouth to put the essential oil into the tube body. With the

function of the propelling mechanism, when the patient needs to be bloodletting, the needle is pushed to move away from the tube body through the propelling mechanism. That is, downward movement can make the bloodletting needle emerge from the tube body, and then the patient can be targeted for bloodletting by acupuncture. After the completion of the bloodletting work, the propulsive mechanism can be reset, so that the bloodletting needle can be placed into the tube body, which can avoid the accidental injury of the operator by the bloodletting needle. Then, the propulsive mechanism can continue to move towards the internal movement of the tube body through the propulsive mechanism. That is, the top moves upward, contacts the first piston through the top rod of the second piston, and pushes the first piston, so that the essential oil of eaglewood in the tube can flow out through the output tube under the compression of the first piston, and it is convenient for the operator to apply the essential oil of eaglewood from the output tube to the wound of the patient, so as to reduce inflammation and eliminate redness and swelling of the patient's wound. Moreover, the structure of this device is simple. At the same time the operation is simple and convenient.

The propulsion mechanism comprises a screw block and a slot on the surface of the tube body, the bottom rod is located away from the center of the second piston, the surface of the bottom rod is provided with an external thread (not shown), the outer wall of the screw block through the groove, the screw block is provided with a through hole, the through hole on the inner wall of the screw block is provided with an internal thread (not shown), the through hole between the bottom rod and the screw block through the hole through the thread connection, The bottom rod is located away from the center of the bloodletting needle, the second piston is provided with a fixed block, the inner wall of the tube body is provided with a chute, the fixed block is located in the chute, by screwing the screw block, because the screw block relative to the rotation of the bottom rod, so that the bottom rod can be rotated in the screw block under the action of the through hole, not only can drive the bloodletting needle up and down, but also can make the top rod up and down movement, Thus, the bloodletting needle can be extended from the tube body, and the first piston can be pushed through the ejector rod to achieve the extrusion of eaglewood essential oil. The outer part of the screw block is provided with a non-slip layer, through the effect of the anti-slip layer, can reduce the phenomenon of hand slip. The bottom of the tube body is provided with a retract, and the cross-sectional area of the retract is an inverted right Angle trapezoid, which is convenient for receiving the bloodletting needle and preventing the operator from stabbing.

Benefits of this device: The essential oil of eaglewood is put into the tube body. With the function of the propulsion mechanism, when the patient needs to be bloodletting, the propulsion mechanism pushes the bloodletting needle to move away from the tube body, so that the needle can be exposed from the tube body, the patient can undergo

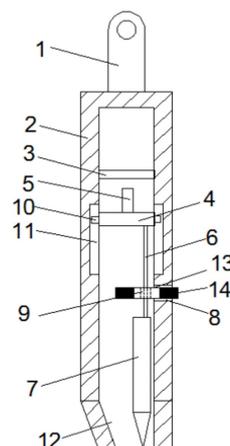
bloodletting therapy. After the completion of the needed bloodletting, the propulsion mechanism can be reset. In this way, the bloodletting needle is inserted into the tube to avoid accidental injury to the operator. Then, through the propulsion mechanism, the propulsion mechanism moves towards the inner part of the tube, and then contacts the first piston through the top rod of the second piston and pushes the first piston, so that the eaglewood oil in the tube can flow out through the output tube under the compression of the first piston. It is convenient for operators to apply the eaglewood oil from the output pipe to the wound of the patient, thus reducing inflammation and eliminating redness and swelling of the patient's wound. Moreover, the device has the advantages of simple structure and easy operation.

### 3. Results

A kind of blood-letting needle which can release eaglewood essential oil was successfully designed. The device including an output tube and a tube body for storing aloe essential oil. The bottom of the output tube is connected with the top of the tube body, and the tube body is provided with a first piston moving relative to it, and a second piston is provided below the first piston, and the second piston moves relative to the tube body. The top of the second piston is provided with a fixed connection with the top rod, the bottom of the second piston is provided with a fixed connection with the bottom rod, the bottom rod is provided with a fixed connection with the propulsion mechanism, the bottom of the rod is provided with a fixed connection with the bloodletting needle, the bottom of the tube body is provided with a shrink. The propulsion mechanism comprises a screw block and a slot on the surface of the tube body, the bottom rod is located away from the center of the second piston position, the surface of the bottom rod is provided with an external thread, the outer wall of the screw block through the groove, the screw block is provided with a through hole, the inner wall of the hole is provided with an internal thread, threaded between the bottom rod and the through hole, the bottom rod is located away from the center of the bloodletting needle position, The second piston is provided with a fixing block, the inner wall of the tube body is provided with a chute, the fixing block is located in the chute. The outer perimeter of the screw block is provided with a non-slip layer, and the cross-sectional area of the retraction is an inverted right Angle trapezoid.

The device can put aloe essential oil into the tube body. When the patient needs to be bled, the screw block is used to push the bleeding needle downward so that the needle can be exposed from the tube body, and then the patient can be needled and bled through bleeding. After the work is completed, the needle can be placed into the tube body through the reverse rotation of the screw block. The retracted orifice is set to prevent puncture damage, and then continue to reverse rotate the screw block to make the top rod of the second piston contact the first piston and push the first piston. Because essential oil is not easy to flow out in the closed

cavity of the tube body, the essential oil in the tube body can flow out through the output tube under the compression of the first piston. It is convenient for operators to apply the essential oil from the output pipe to the wound of the patient, which can reduce inflammation and eliminate redness and swelling of the patient's wound. Moreover, the structure and operation of the device are simple.



**Figure 1.** Structural design of a blood-letting needle that can release eaglewood essential oil.

1 output tube, 2 tube bodies, 3 first piston, 4 second piston, 5 ejector rod, 6 bottom rod, 7 bleed needle, 8 through groove, 9 through hole, 10 fixing block, 11 chute, 12 retracting, 13 screw block, 14 anti-skid layer.

### 4. Discussion

Eaglewood is an aromatic medicinal plants, and terpenoids have antibacterial and anti-inflammatory activities [7]. As a commonly used medicine for regulating qi in traditional Chinese medicine, eaglewood has been recorded to have the effect of "relieving pain by qi, warming and stopping vomiting, and relieving breath by qi". Modern pharmacodynamic studies show that aloe has a wide range of pharmacological activities, such as sedation, analgesia, antibacterial, anti-inflammatory and anti-tumor [8]. The existing eaglewood are mostly distributed in the low-altitude mountain and hilly areas in Guangdong, Guangxi, Hainan and Fujian. However, with the continuous development of society and economy, the normal growth of aloe plants in our country is affected negatively. Eaglewood has been listed in the "National Secondary Protected Plant List" and "IUCN Red List of Endangered Species", becoming a vulnerable plant [9]. Different extraction methods of eaglewood and different kinds of aloe have different anti-inflammatory effects. The results show that the composition of eaglewood essential oil by supercritical extraction is different from that by steam distillation. More fatty acids and chromones can be extracted by supercritical extraction [10]. The essential oils obtained by the same extraction method were similar to those obtained by the plant-head and whole-body fragrances, while *Chinanium aloe* contained more aroma substances and 2-(2-phenylethyl) chromone compounds. Among the three kinds of essential oil, *Qinan* essential oil has the best anti-inflammatory ability [11].

Acupuncture therapy and bloodletting therapy are both external treatment methods of traditional Chinese medicine. Based on the basic theory of traditional Chinese medicine, they summarize the accumulation of valuable clinical experience of predecessors. They use the needle such as the harmless needle and the three-edge needle to pierce the acupoints or certain parts of the human body [12]. The ancients called it "pricking the collaterals" for bloodletting therapy. The two kinds of therapy have the characteristics of simple operation, less side effects, quick curative effect, saving time and low cost [13]. It can dredge local veins, play the effect of relaxing tendons and dredging collaterals. Proper bloodletting can eliminate metabolic waste in the body and improve the hematopoietic function of the human body. In addition, it can also play the role of promoting blood circulation, removing blood stasis and relieving pain. It can also be used to treat lumbago, joint pain, alopecia areata, heat stroke, headache and other symptoms [14]. And Tibetan medicine records, it can also be used to treat gout, hypertension, heart disease, skin disease, lower extremity vascular disease and so on [15]. But bloodletting therapy is not suitable for anyone, infants, the elderly, hematopoietic dysfunction, excessive obesity and other people are not applicable. And after bloodletting therapy, the wound is easy to cause infection, therefore, after bloodletting therapy, the wound should pay attention to local care, keep the wound clean and dry and anti-inflammatory and antibacterial treatment, to avoid bacterial infection.

The utility model relates to a blood-letting needle that can release eaglewood, and a needle pushing mechanism is designed to reset the needle, which is convenient for storage and avoid accidental injury to the operator. The piston is set to facilitate the operator to apply the essential oil of eaglewood from the output pipe to the wound of the patient to reduce inflammation and eliminate redness. The research and application of this device solves the problem that the existing bloodletting needle only has the function of bloodletting when used, but the needle will cause skin damage, redness and inflammation after puncturing the skin, and that the existing bloodletting needle cannot be stored after use, and it is easy to make mistakes and stab the operator. The device has the advantages of simple structure and easy operation.

Our dental school has always attached great importance to the cultivation of students' innovative ability, and is gradually achieving the integration of basic professional competence with innovative basic competence, the integration of professional project production capability with innovative project production capability, and the integration of comprehensive professional competence with innovative entrepreneurial competence. In addition, through guiding students to participate in innovative entrepreneurial projects and exploring innovative points for patents, we are shaping a campus culture of "everyone should innovate, everyone can innovate, and everyone will have achievements." We strive to enable every graduate to enter the workforce with both professional and innovative capabilities, which is an

invaluable asset in their lives.

## 5. Conclusion

It is urgent to solve the problems of skin damage, inflammation caused by redness and swelling after acupuncture and bloodletting, as well as the problem of not being able to store the bloodletting needles after use. It also strengthens students' knowledge reserve. Therefore, it is very important to design and develop the bloodletting needle which can release eaglewood essential oil.

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## Conflicts of Interest

The authors declare no conflicts of interest.

## References

- [1] Su J, Liu Z, et al. Research on the literature of Chinese Herbal prescriptions containing eaglewood [J]. *Chinese Journal of Traditional Chinese Medicine*, 2017, 32 (04): 1853-1855.
- [2] Su X, Chen HQ, et al. Study on 2-(2-phenylethyl) chromone compounds in Worm-leaked Aloes [J/OL]. *Chinese Traditional Medicine*, 2022 (11): 2632-2636.
- [3] Wang CH, Gong B, et al. Study on the analgesic and anti-inflammatory effects of eaglewood produced by whole-body aloes production technology [J]. *Biological Resources*, 2007. 2021, 43 (04): 363-369.
- [4] Gao XL, Zhang Q, et al. Eaglewood essential oil has anti-inflammatory effects by inhibiting p-STAT3 and IL-1 $\beta$ /IL-6 [J]. *Chinese Journal of Pharmaceutical Sciences*, 2019, 54 (23): 1951-1957.
- [5] He XH, He CG, et al. Clinical application of Bloodletting therapy [J]. *Journal of Traditional Chinese Medicine*, 2018, 33 (07): 1285-1288.
- [6] Fu B, Shang H, et al. Application of TCM Puncture Collaterals and Bloodletting therapy in the field of curing diseases [J]. *Chinese Journal of Traditional Chinese Medicine*, 2020, 35 (09): 4533-4535.
- [7] Lu WL. Study on callus culture of eaglewood [J]. *Modern Horticulture*, 2022, 45 (20): 13-14, 58.
- [8] Wang CH, Wang S, et al. Progress in pharmacodynamics of eaglewood produced by whole-body eaglewood production technology and its medicinal development prospects [J]. *Biological Resources*, 2021, 43 (4): 328-335.

- [9] Liu XY, Wang YL, et al. GC-MS analysis of chemical constituents of volatile oils from leaves of four kinds of agarwood [J]. *Journal of Tropical Crops*, 2022, 43 (1): 196-206.
- [10] Shang GJ. Composition analysis of eaglewood essential oil extracted by simultaneous distillation and extraction [J]. *Fujian Analysis and Testing*, 2022, 31 (05): 17-21.
- [11] Chen XQ, Wang CH, et al. Comparative Analysis of chemical constituents and antioxidant and anti-inflammatory activities of six representative essential oils of eaglewood [J]. *Chinese Journal of Traditional Chinese Medicine*, 2022, 53 (18): 5720-5730.
- [12] Zhang QC, Xiang H, et al. Clinical study on the treatment of postherpetic neuralgia by puncture and bloodletting therapy combined with equilibrium cupping [J]. *Primary Medicine Forum*, 2022, 26 (8): 81-83, 92.
- [13] Feng N, Wang YN, et al. Clinical application of acupuncture combined with bloodletting therapy in community diseases [J]. *Health Required Reading*, 2021 (18): 164-165.
- [14] Liu FF, Sa YP. Brief analysis on the clinical research progress of puncture and bloodletting therapy for gouty arthritis [J]. *Chinese Folk Therapy*, 2022, 30 (9): 108-110.
- [15] Liu JW, Wang J. Research progress of the clinical application of blood-letting therapy in Tibetan medicine [J]. *Chin J Ethnomedicine*, 2020, 26 (9): 47-49.