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Use of leeches to cure diseases by a folk herbalist of Tangail district, Bangladesh

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Abstract
Leeches have been used in traditional medicinal practices from ancient times and is making a comeback in modern medicine in recent days. The objective of this study was to document the therapeutic practices of a folk herbalist (FH) in Tang ail district, Bangladesh who used a combination of leeches and plant-derived oil mainly to treat various types of pain. However, interestingly, leeches were not used by the FH for sucking blood; rather, leeches were fried or decomposed in olive or coconut oil and the oil used for treatment of various types of pain and skin disorders. This type of particular use of leeches is novel and to our knowledge not previously reported from Bangladesh. The practice also suggests that leeches might possess chemical substance(s) in their body, which can assuage pain and skin infections.

Keywords: Folk herbalist, leech, Tangail, Bangladesh

Introduction
Folk medicinal practitioners (FMPs) play an important role in the delivery of health-care to the poor rural population and the urban slum population of Bangladesh. However, depending on experience and medical skills, FMPs can be frequented by the affluent and the literate sections of the population, more so when allopathic practitioners declare that the disease has progressed beyond their treatment capacities. FMPs are a versatile group. Without the need for any formal education, training or registration for practice, anybody with the knowledge (even rudimentary) can start practicing as a FMP and gain experience with time through trials, errors, picking up knowledge from other FMPs or from books. The primary therapeutic ingredients of most FMPs are plants or plant parts with sometimes animal and mineral items thrown in, although some other esoteric treatment methods exist like amulets and incantations.
In this article a folk herbalist (FH) is defined as a FMP but who works with only one or two ingredients and specializes in treatment of one or two specific types of diseases. From this view point, besides more established traditional methods of treatment in Bangladesh like Ayurveda, Unani and homeopathy, folk (variant tribal medicine) medicine can be differentiated as being practiced by FMPs, FHs and family experts (usually an elderly lady) who specializes in home remedies ("totka chikitsha" in Bengali). These diverse and to the uninitiated possibly bewildering varieties of treatment have one thing in common in that they use plants as their main therapeutic ingredient. It is therefore important to document these treatment modes and the ingredients used for such documentation has the capacity for putting new knowledge into a scientists hand leading to discovery of novel drugs. For this reason, we had been documenting such treatments for quite some time [1-31], more so, because ethno medicinal studies are still in its infancy in Bangladesh. At the same time, only a fraction of our studies as referenced in this paper [1, 31] suggest that the ethno medicinal studies have rewarding potential in not only identifying the medicinal plants of the country, but also their therapeutic uses and conservation priorities. Moreover, our various studies have thus far documented that FMPs, FHs and home remedy knowledgeable persons can differ widely in their selection of plants for treatment of a given disease, which points to the rich diversity of knowledge among these people.
Leeches have been used for medicinal purposes since ancient times. In the medieval ages, leeches were used as a substitute to cuts and incisions to drain some amount of blood from the body, which was considered to be beneficial to maintain a healthy body. In recent years, allopathic doctors are using leeches for various therapeutic purposes (hirudotherapy) like

salvage of flaps and grafts, and for treatment of osteoarthritis, chronic wounds, post-phlebitis syndrome and inflammatory skin diseases [32]. However, these uses have involved sucking of blood by leeches and in the process introducing anti-inflammatory or anti-coagulant compounds into the human body by the leeches. During the course of a survey, we observed actual use of fried or fermented bodies of leeches along with plant-derived oil to assuage pain and skin disorders. The objective of this study was to document this hirudotherapy combined with phytotherapy practices of a folk herbalist in Tangail district, Bangladesh.

Materials and methods

The information was obtained from a folk herbalist (FH), namely Md. Shukur Ali, male, 57 years age, Korotia village, Purbo Para, Tangail district, Bangladesh. Prior informed Consent was obtained from the FH. He mentioned that his specialty is hirudotherapy, where he uses fried or fermented leeches to assuage pain and several skin disorders. The type of leech that he used was a species of cattle leech, mostly found in buffaloes since they wallow in the mud where leeches are plentiful. Hence the local name of the leech was moisha jok, moisha being the Bengali for buffaloes and jok the Bengali for leech. The two plant oils that he used with the leeches were olive and coconut oil, both oils as well as the leech species very commonly available in Bangladesh and so could be identified with certainty easily. Consent was obtained from the FH to disseminate the provided information in any way that the authors desired.

Results and discussion

The leech species used was *Hirudinaria granulosa* (Family: Hirudinae), otherwise known as Indian cattle leech in English and Moisha jok in Bengali. The FH used only two formulations, which are detailed (below).

1. Diseases treated: arthritic pain, joint pain, skin infections, pain due to bone fracture, eczema. At first a few leeches are collected and stored in a glass bottle. Then the leeches are crispy fried in olive oil (oil obtained from pressing whole olive fruits, *Olea europaea*; family Oleaceae) over an earthen oven. Crispy frying brings out the inner contents of the leeches in the oil. The crispy fried leeches with the oil are stored in a glass container. 4-5 drops of the oil are massages for 5-6 days on the affected areas.
2. Diseases treated: pain (headache, sprain), pain due to skin infections like abscesses. A few leeches are collected and put in a glass container. A ripe coconut (fruit of *Cocos nucifera* L., family Arecaceae), that is a fruit with a hard shell is taken and a small hole is made in the shell. The leeches are put inside the fruit (which would contain coconut water and fruit pulp) and the hole plugged with earth. The coconut containing the leeches is then put inside the earth for three months. By this time the leeches and the fruit pulp will have fermented and rotted inside the hard shell. The fermented product is heated over an earthen oven to obtain oil, which is stored in a glass container. 4-5 drops of the oil are massaged onto affected areas for 5-6 days.

Although both formulations were used to alleviate various types of pain and skin disorders, there are some interesting similarities and differences. Among the similarities, in both formulation preparations, live leeches were first collected and put in glass containers. One reason could be that in glass containers, it is easy to see the condition of the leeches, especially if the actual formulation was made a few days later. To be noted is that the final products (oil containing fried or fermented leeches) were also stored in glass containers. This may be not only to see with ease how much of the product is depleting with time, but also unlike earthen containers, glass containers may be inert and so unlikely to chemically alter the composition of the oil. It is also possible that since glass containers can be tightly capped, the oil would be less likely to get rancid through contact with air (earthen container would be porous and so some air can possibly pass through).

On the other hand, although both formulations were used to treat pain, the nature of the pain, oil used and mode of use of leeches differed with the formulation used. In the first case, oil was olive oil in which leeches were crisp-fried. In the second case, leeches were fermented within a ripe coconut fruit along with water and pulp of the fruit for quite an extensive period, followed by boiling the fermented product to obtain oil. The first formulation was used to treat pain arising from arthritis, joint pain, and pain from bone fracture; the second formulation was used for pain arising from headache, sprain, and from skin abscesses (boils). Notably, the first formulation but not the second was used to treat skin infections including eczema.

Although the oil used was different in the two formulations, both oils would have one common effect, namely to facilitate absorption of lipophilic chemicals through the skin [33]. This suggests that the active product from the leeches was lipophilic in nature. The use of oil along with a plant product for therapeutic purposes (mostly topical application) by FMPs or FHs is not uncommon in Bangladesh. Mostly mustard oil (oil obtained from seeds of *Brassica juncea*) or ghee (clarified butter) is used [34, 35]. The oil or ghee facilitates both massaging and absorption. It cannot be ruled out that chemical components present in olive and coconut oil also contributed to pain and skin disorder relief. In fact, anti-inflammatory and analgesic activities of olive oil have been observed *in vivo* [36]. The same applies for coconut oil [37]. Leeches secrete more than 20 bioactive substances including antistasin, eglins, guamerin, hirudin, saratin, and bdellins, some of which have analgesic, anti-inflammatory or anti-microbial properties [38]. Secretion of these bioactive substances means that these compounds are present within the leeches. Thus the FH's combination of hirudotherapy and phytotherapy to assuage pain and skin disorders (infections) appear to have scientific validation, even though it may seem esoteric at first glance.

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