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RESEARCH NOTE

An investigation into medicinally important lichens

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Abstract

Medicinally important lichens are presented in this research note along with reported ethnomedicinal uses and their pharmacological potentials.

INTRODUCTION

Lichens are the combined life of algae and fungi (Mahanti and Kumar 2017). They are important agents in nutrient cycling and act as producers which many higher taxa feed on. They show different colors, sizes, and forms. Major identification key structures of lichens are fruticose, foliose, substrate, crustose and leprose (Galloway 1999; Figure 1-4). Throughout history, several lichen species have been utilized medicinally. They have been shown to be beneficial in treating a variety of illnesses, such as cancer, hemorrhoids, ulcers, dysentery, and tuberculosis (Turkeu et al. 2012). It is revealed that, following safety assessments, they might be conveniently obtained sources of natural medications that could be utilized in the pharmaceutical business or as a potential food supplement. Nevertheless, the specific nature and/or biological roles of many lichens remain unclear (Turkeu et al. 2012). According to

Thadhani et al. (2017), lichens are a rich source of new bioactive chemicals with well-established antioxidant properties. Numerous research demonstrates a strong correlation between lichens' antioxidant and antidiabetic properties, and they highlight the importance of assembling fragmented and hard-to-find biological activity data to make efficient use of them (Thadhani et al. 2017). Extracted lichens, particularly those of Paramotrema and Ramalina species, have demonstrated encouraging results in tests for antioxidant and antidiabetic properties. In both antidiabetic and antioxidant assays, ubiquitous compounds—zeorin, methylorsellinate, methyl-β-orcinol carboxylate, methyl haematomate, lecanoric acid, salazinic acid, sekikaic acid, usnic acid, gyrophoric acid, and lobaric acid—have demonstrated promising potential, underscoring their potential for successful treatment of diabetic mellitus and its related complications (Thadhani et al. 2017). Keeping the importance of lichens, an attempt has been made to gather the information on medicinal potential of lichens to draw attention towards their pharmacological potentials through literature survey. Photographs are taken from the field and presented in this Research Note.

METHODOLOGY

A literature survey was made and data was collected from different websites, research papers, reports, and several literature sources and platforms (Turkez et al. 2012; Srivastava et al. 2013; Thadhani et al. 2017).

RESULTS AND DISCUSSION

The literature survey indicated that lichens are unexplored but they are highly potent pharmacological agents. In chronology, the works of several researchers are presented here. Turkez et al. (2012) studied the genetic and oxidative effects of water extracts of three different lichen species; *Hypogymnia physodes, Ramalina polymorpha* and *Usnea florida* in cultured human blood cells (n = 5) for the first time. All lichen species were collected from the Erzurum and Artvin provinces (in Turkey) during August 2010. In the study, in-vitro test systems, it was observed that all tested lichen extracts had no mutagenic effects on human lymphocytes. Furthermore, these extracts exhibited antioxidant properties due to the type of lichen species added to the cultures. In conclusion, these lichens can be a new resource of therapeutics as recognized in this study with their non-mutagenic and antioxidant features. According to Zambare and Christopher (2012), lichen-derived bioactive chemicals have a lot of potential for use in biopharmaceutical applications as cytotoxic, antioxidant, and antibacterial agents as well as in the creation of novel formulations and technologies that will improve human health. In

the year 2013, the medicinal values of *Usnea ghattensis* was studied. It was noticed that ethanol extract of *U. ghattensis* was most effective against *Bacillus cereus* and *Pseudomonas aeruginosa* with a zone of inhibition 29.8 ± 0.6 mm and 12.3 ± 0.5 mm diameters at a concentration of 0.2 mg/mL. Acetone and methanol extract demonstrated almost similar activity against *Staphylococcus aureus* and the zone of inhibition was 24.6 ± 0.5 and 24.7 ± 0.4 mm. Only methanol extract was showing activity against *Streptococcus faecalis* with a 13.5 ± 0.8 mm zone. MIC value noted against *Staphylococcus aureus* and *Streptococcus faecalis* was 6.25 μg/mL and 25 μg/mL, whereas against *Bacillus cereus* and *Pseudomonas aeruginosa*, MIC calculated was 3.125 μg/mL and 200 μg/mL, respectively. *Conclusion*. The present study demonstrates the relatively higher activity of this lichen against not only gram (+) but significantly also against gram (−) bacteria. This indicates that this lichen might be a rich source of effective antimicrobial agents (Srivastava et al. 2013).

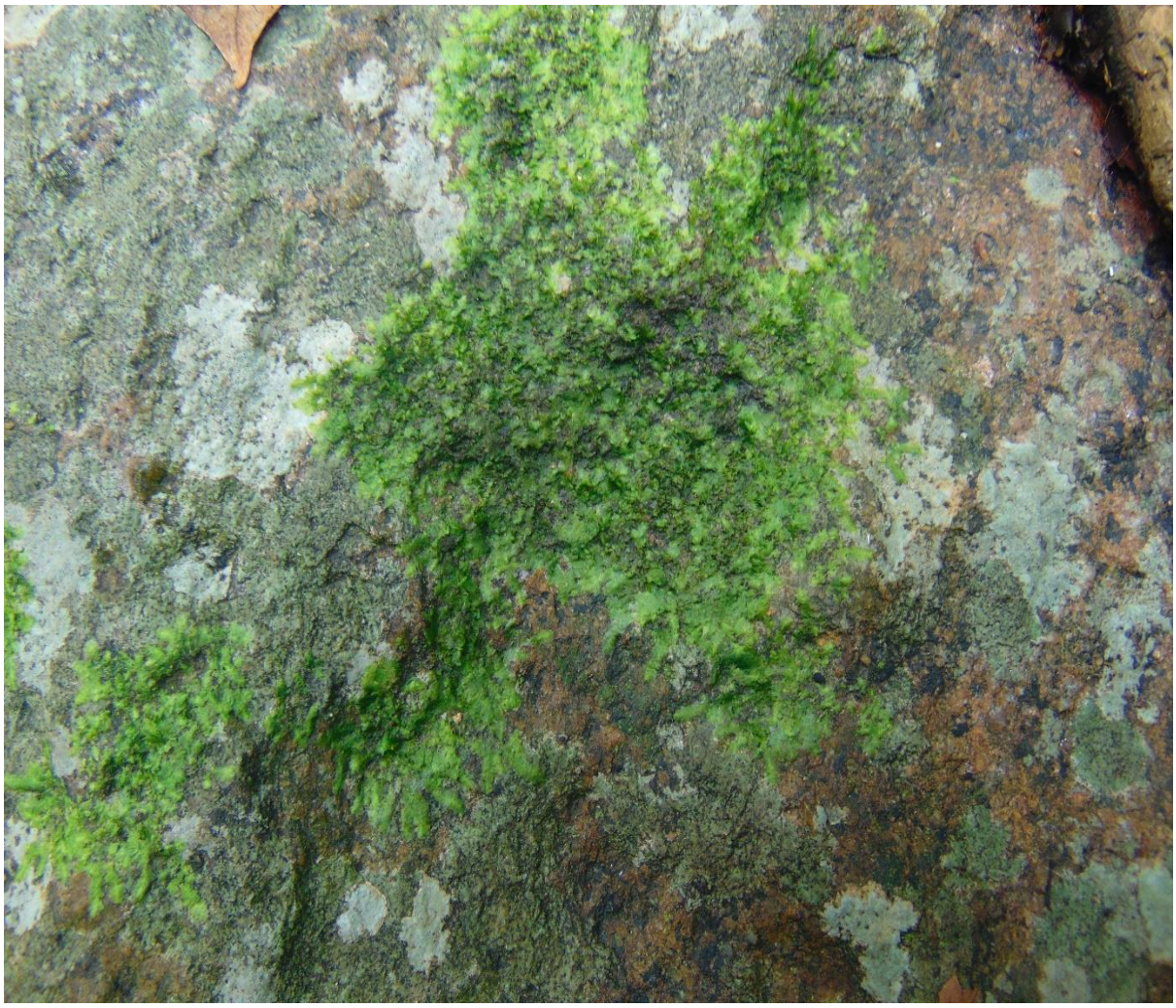

Figure 1: Lichens on the rock in wild

Figure 2: Lichens on the tree trunk

Figure 3: Lichens on the tree trunk in wild

Figure 4: Lichens with branches on Rock

Figure 5: Lichens fallen in the forest ground

Lichens are being used in several ways by different communities of Nepal. We recorded the ethnic use of seven species of lichens belonging to four families (Parmeliaceae, Physciaceae, Ramalinaceae and Usneaceae) and six genera (*Heterodermia, Everniastrum, Parmotrema, Ramalina, Thamnolia* and *Usnea*) among the Limbu, Sherpa, Lama, Gurung, Rai, Dalit, Tamang, Chhetri and Brahman communities. The present study revealed six use values namely; Medicinal value (MV), food value (FV), ritual and spiritual value (RSV), aesthetic and decorative value (ADV), bedding value (BV) and ethno-veterinary value (EVV) from different parts of Nepal. Three lichen species, *Everniastrum cirrhatum, E. nepalense* and *Parmotrema cetratum* were consumed by the Limbu and Rai communities. The Limbu and Sherpa ethnic groups are regarded as most lichenophilic communities while respondents from Brahman, Chhetri and Tamang communities showed less interest in lichen uses (Devkota et al. 2017).

CONCLUSION

Present study concludes that there are several pharmacological values of lichens still they are unexplored. There is a need to evaluate them for the development of future drugs.

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