

# Anti-Microbial Activity of Aerial Parts of *Morina longifolia*

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**Abstract**-Different extracts of aerial parts of *Morina longifolia* was screened for their phytochemical constituents and anti-microbial activity. The anti-microbial activity of chloroform (MCH), ethyl acetate (MEA), acetone (MAT) and ethyl alcohol (MAL) extracts of aerial parts of the plant was carried out against four fungal species *Fuserium graminearum*, *Aspergillus flavus*, *Nigrospora oryzae*, and *Aspergillus niger* and four bacteria species, *Escherichia coli*, *Bacillus pumilus*, *Salmonella typhi* and *Bacillus cereus*. The results of the study showed that the all the extracts showed significant anti-microbial activity against all the microorganism under investigation.

**Keywords:** *Morina Longifolia*, *Caprifoliaceae*, Antimicrobial Activity and Phytochemicals.

## Introduction

Antimicrobial resistance poses a major challenge to global health, reducing the effectiveness of conventional antibiotics. Medicinal plants have long been used in traditional medicine for the treatment of infectious diseases, primarily due to their rich phytochemical composition. Recent studies show that plant extracts

exhibit strong antibacterial and antifungal activities, offering promising alternatives to synthetic drugs<sup>[1]</sup>. Extracts obtained from leaves, roots, bark, seeds, or whole plants contain diverse secondary metabolites responsible for antimicrobial effects.

*Morina* genus belongs to family *Caprifoliaceae* formerly *Dipsacaceae*, is a small genus of small perennial herbs used traditionally in Tibetan, Himalayan and central Asian herbal medicine system. *M.* species has been reported to possess anti-oxidant, antimicrobial, anti-inflammatory, anti-arthritic and anti-asthmatic activities<sup>[2-4]</sup>. *Morina* species have been reported the presence of iridoids, phenolic acids, flavonoids, terpenoids, aromatic glycosides and essential oils, which possess wide range of pharmacological activities<sup>[5-8]</sup>.

*Morina longifolia* is a small perennial herb, found in temperate and alpine regions of Himalayas from Kashmir to Bhutan at an altitude of 2400-4200 meters, is commonly known as “Whorlflower”. *M. longifolia* produces very

beautiful flowers initially of white colour and then turn pink once they are pollinated. They appear in mid-summer on an elongating flower stem. *M. longifolia* has traditional uses in Tibetan and Indian medicine in curing digestive issues, as an incense, and in treatment of wounds and boils. It is also used for its astringent, emetic and stomachic properties<sup>[9-11]</sup>.

## Material and methods

### Preparation of extracts

The aerial parts of *M. longifolia* were collected from Dayara Bugyal (3300-3500 m asl) District Uttarkashi, Uttarakhand during August, 2024. Air-dried areal parts of *M. longifolia*

were packed in a soxhlet apparatus and were extracted sequentially with chloroform (MCF), Ethyl acetate (MEA), Acetone (MAT), Ethanol (MAL). The organic extracts were dried over vacuum evaporator. Few grams of each extract were subjected to series of purification as per pharmacological profiles. The dried extracts were dissolved in dimethyl sulfoxide (DMSO), ethanol or water prior to analysis depending upon their solubility. The extracts were subjected to further analysis and all the assays were done in triplicates. Qualitative analysis of different extract like solubility test, foam test, alkaloid Meyers test, FeCl<sub>3</sub> test, carbohydrate test and ninhydrin test were performed and are shown in **Table-1**.

**Table-1 Qualitative analysis of crude extracts of different aerial parts of *M. longifolia***

Extract	Solubility test	Foam Test	FeCl <sub>3</sub> Test	Alkaloid Meyers Test	Carbohydrate test	Ninhydrin
MCF	+	++	-	++	++	-
MEA	+	-	+	-	-	-
MAT	++	-	+	-	-	-
MAL	+++	-	-	-	-	-

### Antimicrobial Activity

The microorganisms were obtained from IMTECH, Chandigarh. The organisms were stored on agar slant in McCartney bottles and kept in the refrigerator prior to subculture.

### Antibacterial Activity

Four bacterial species viz., *Escherichia coli*, *Bacillus pumilus*, *Salmonella typhi* and *Bacillus cereus* mutans were taken to evaluate antibacterial potential of the different extracts. All the extracts were dissolve in 30% DMSO and the antimicrobial

activity of the extracts were carried out with the concentration of 100mg/ml by agar well diffusion method.

The Muller Hinton Agar media for antibacterial assay was prepared in a sterile Petri dish and the bacterial culture (10µl) was introduced to the solid surface of agar media with the help of micropipette. Then spread across the surface of solid agar media by means of a sterile spreader and kept at room temperature for 15 min. in agar plate well were prepared by sterile cork borer and 100µl of

extracts were poured in each well using micropipette. The Petri dish then incubated in incubator for 24 hrs. at 37±2°C temperature [12,13]. After

incubation the degree of sensitivity was determined by measuring the zone of inhibition around the disc **Table-2.**

**Table-2 Effect of different extracts of aerial parts of *M. longifolia* on zone of inhibition (mm) of some selected bacterial species tested by well diffusion method.**

Bacteria species	Extracts			
	MCF	MEA	MAT	MAL
<i>Escherichia coli</i>	22±1.01	18±1.15	13±1.08	9±0.65
<i>Bacillus pumilus</i>	10±1.14	15±0.52	14±1.13	8±1.12
<i>Salmonella typhi</i>	17±1.18	13±1.14	15±1.00	11±1.14
<i>Bacillus cereus</i>	14±0.65	12±0.82	10±0.52	9±1.21

**Anti-fungal Activity**

Antifungal activity of the extracts was carried out against four pathogenic fungi namely *Fusarium graminearum*, *Aspergillus flavus*, *Aspergillus Niger*, and *Nigrospora oryza* by the well diffusion method. The fungal culture (0.1 ml) was introduced to the assay media kept in sterile petri dishes with the help of cotton swap and was spread evenly on the surface of solid agar media by

means of a swapper. The wells were punctured on agar growth medium kept in petri dishes using sterile well puncher syringe. 100µg/ml of extracts were poured in each well using micropipette. The Petri dishes then kept in incubator at 25±2°C for 72 hrs<sup>[12]</sup>. After incubation plates were observed for the degree of sensitivity of extracts by measuring the zone of inhibition **Table-3.**

**Table-3 Effect of different extracts of aerial parts of *M. longifolia* on zone of inhibition (mm) of some selected fungal species tested by well diffusion method.**

Bacteria species	Extracts			
	MCF	MEA	MAT	MAL
<i>Fuserium graminearum</i>	15±057	16±1.11	11±1.18	7±0.65
<i>Aspergillus flavus</i>	17±1.53	14±0.58	12±1.00	9±0.78
<i>Nigrospora oryzae</i>	16±1.0	13±0.53	19±1.13	10±0.65
<i>Aspergillus niger</i>	21±1.11	16±1.14	13±1.00	9±1.15

## Results and Discussion

Results of qualitative analysis for phytochemicals of different extracts of *M. longifolia* are shown in **Table-1**. The chloroform extract was found positive for alkaloid, saponins and carbohydrate whereas the ethyl acetate extract and acetone extracts showed positive test for polyphenolic compounds. The alcoholic extract shows negative test for polyphenolic compounds. The results of antibacterial and antifungal activity against the selected microorganism of different extracts of aerial parts of *M. longifolia* are shown in **Table-2** and **Table-3** respectively. The antibacterial activity of different extracts was carried out against four bacterial species, *E. coli*, *S. Typhi*, *B. cereus* and *B. pumilus*. The chloroform extract showed significant inhibition zone against all the tested microorganisms and maximum inhibition ( $22\pm 1.01$ ) was observed against *E. coli*. The ethyl acetate extract showed maximum inhibition ( $18\pm 1.15$ ) against *E. coli* and minimum inhibition ( $12\pm 0.82$ ) against *B. cereus*, whereas, the acetone extracts showed maximum inhibition ( $15\pm 1.00$ ) against *S. typhi* and minimum inhibition ( $10\pm 0.52$ ) against *B. cereus*. The alcoholic extract showed least inhibition against all the bacterial species under investigation.

The results of antifungal activity of different extracts against four fungal species, *S. flavus*, *A. niger*, *F. graminearum* and *N. oryzae* are presented in Table-3. From the table it is evident that the maximum antifungal activity shown by the

chloroform extract. The chloroform extract showed maximum inhibition ( $21\pm 1.11$ ) against *A. niger* and minimum inhibition against *F. graminearum*. The ethyl acetate extract showed equal zone of inhibition against *A. niger* and *F. graminearum*. The acetone extract showed maximum inhibition against *N. oryzae* ( $19\pm 1.13$ ). Among all the tested extracts alcoholic extract showed minimum inhibition against all the fungal strain under investigation. *M. longifolia* have been reported to contain a variety of phytochemicals including terpenoids, triterpenoids, sterols, phenolic compounds like para hydroxy benzoic acid, caffeic acid and essential oils<sup>[2,4,5]</sup>. The antimicrobial activity of various extracts is due to the presence of bioactive compounds. The active antimicrobial constituent like terpenoids, poly phenolics and essential oils may exert their toxic effects through the disruption of bacterial and fungal membrane integrity<sup>[14-15]</sup>.

## Conclusion

From the above study it can be concluded that different extracts of aerial parts of *M. longifolia* possess antimicrobial activity against all bacterial and fungal species. Phytochemical screening showed the presence of polyphenolic compounds in these extracts which are responsible for their antimicrobial activity.

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### Disclaimer Statement

Authors declare that no competing interest exists. The products used for this research are commonly used products in research. There is no conflict of interest between authors and producers of the product.

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