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REVIEW ARTICLE

Phytoconstituents and medicinal value of *Mentha piperita*

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Abstract

Medicinal plants are the most important bio resource of Nepal. The production and consumption of medicinal plants are growing nowadays. The main objective of this study is to investigate the therapeutic potential of *Mentha piperita*. Information regarding *Mentha piperita* (peppermint) was collected from a secondary source. Data related to chemical composition, medicinal value were collected from online portals where a total of 45 articles were reviewed and presented in a tabular and descriptive manner. The result showed that peppermint can grow i n a tropical, subtropical and warm climate, mostly grows in a wet environment and moist soils. It was mostly used as an antioxidant, antimicrobial, antiseptic and carminative agent. It is also used to cure several infectious diseases like intestinal peristalsis, indigestion, bronchitis, asthma and dyspepsia. So further exploration should be done regarding the medicinal uses of this traditional herb to cure a variety of illnesses.

Keywords: Chemical composition, essential oil, medicinal plant, pudina, traditional medicine.

Introduction

Nepal is praised all over the world with diversified medicinal herbs. Among 7,000 species of medicinal plants recognized all over the world, more than 900 types are said to be found in Nepal(Chhetri et al., 1970). Plants found in Nepal are used in traditional healing systems like Ayurvedic, Homeopathic. Peppermint (*Mentha piperita*) belonging to the family *Lamiaceae* is a hybrid mint and has more than 600 varieties, each having a range of flavors. As a source of diet, people cultivate peppermint and has been used for curing several diseases like muscle spasms, pain, neuralgia and headache. Based on the WHO reports advanced countries have used medicinal plants for both clinical therapy and food industries.

We can obtain peppermint oil from flowering Mentha piperita by steam distillation (Pittler & Ernst, 1998). Active ingredients of peppermint oil provide carminative effects and serotonergic which are supposed to be far better than using tricyclic antidepressants, antispasmodics and fiber (Cash et al., 2016). Peppermint oil which is supposed to have antispasmodic properties have been used in the prevention of irritable bowel syndrome. Different kinds of antispasmodics, smooth muscle relaxants have been used with the failure of intaking dietary fiber which makes benefit on intestinal transit time. Irritable Bowel Syndrome (IBS) includes symptoms of abdominal pain with hypersensitivity and a combination of smooth muscle spasm (Ford et al., 2008).

For the treatment of IBS which is considered as chronic relapsing only minorities are referred to as secondary care (Ford et al., 2008). Diagnosis is made with the prevalence of symptoms such as weight loss and rectal bleeding. Though its efficiency can't be obtained on long term data, its uses on breast feeding and in pregnancy are likely to be safe according to the National Institute of Health (Shams et al., 2015). When taken orally menthyl acetate isomenthone which is the main ingredients of peppermint oil is excreted in urine. To decrease the burdensome symptoms like bleaching upto 24%, altered a sensation of mouth upto 11% peppermint oil is advantageous with a release of ileocolonic (Weerts et al., 2020). There is a lack of mutual understanding of the possible effect of peppermint oil. So, the aim of

this study is the identification of the main ingredients of peppermint oil and its chemical constituents and phytotoxic potential.

Materials and Methods

Information regarding the Peppermint was collected from a secondary source. Data related to chemical composition and medicinal values were collected from online portals like google scholar and research gate where a total of 45 articles were collected and reviewed. The description such as chemical constituents, medicinal value essential oil is used to search the articles. The articles were content analyzed and their chemical composition, medicinal value, medicinal importance, phytochemical constituents and conventional uses are represented descriptively.

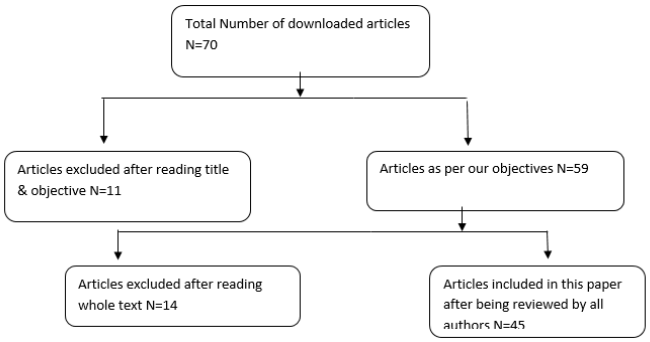

Figure 1. Prisma flowchart for the study of medicinal values of Mentha piperita.

Results and Discussion

Table 1. Taxonomy of *Mentha piperita*.

Kingdom	Plantae
Sub-kingdom	Tracheobionta
Superdivision	Spermatophyta
Phyllum	Angiospermophyta
Class	Magnoliopsida
Order	Lamiales
Family	Lamiaceae
Genus	Mentha
Species	Mentha *Piperita (Peppermint)

Distribution

Peppermint which is cross-breeding of spearmint and water mint includes 13 to 18 species (Mainasara et al., 2018). It is a perennial herb and from its aerial parts oil, leaf extract, leaf water and leaf can be extracted. Peppermint is cultivated mostly in the USA, Australia, Argentina and European countries. In the plains, planting is done in the winter months whereas in temperate climates. planting is done in autumn or spring. A temperature of 20-25 degree Celsius promotes vegetative growth and well-drained loamy, silty loam to clayey loam soil rich in organic matter is referred. It grows in tropical, sub-tropical and sub temperate climate. Peppermint oil is a pale yellow liquid that contains limonene, menthyl acetate, pulegone and is used in pharmaceutical products, food, phototherapy which possess antioxidant, antifungal, antibacterial and insecticides properties (Herro & Jacob 2010). The plant which is indigenous to the Middle East and Europe has a purplish or pinkish color which is irregular in shape and found as cultivated or wild (Ks & Shinde 2019). It possesses chemopreventive, antimicrobial and antitumor potentially used for nervous system action and digestive disorders in which phytochemical analysis was done to test the presence of alkaloids, tannin, flavonoids and phenols (Bhoora et al. 2020).

Chemical Constituents

Peppermint fresh herb contains oil from 0.4% to 0.6% which is composed of secondary metabolites.

Figure 2. *Mentha piperita* plant.

Table 2. Chemical constituents present in major parts of *Mentha piperita*.

Plants parts	Chemical constituents	Uses
Leaves	Alkaloids,Flavonoids, tannins, phenols, saponins, steroids, terpenoids, proteins, carbohydrate, ethanol, methanol, ethyl acetate	-All varieties of mint leaves are used in brewing as a tea. - Ease sun burn pain. -Breath fresher. -Moth repellent.
Root	Chloroform, hexane, petroleum ether	They are used for flavor syrups and sauces that have a minty note like colonial shrubs or homemade mint.
Stem	Ethanol, methanol, ethyl acetate, chloroform, hexane, petroleum, ethane	-These can be used for wound healing and septicemia. -They are used to flavor sauces, soups and stews.

The main chemical constituents of peppermint are Limonene, Menthone, Cineole, Menthofuran, Methyl acetate, Isopulegol, pulegone, Menthol, Carvone and other constituents including flavonoid glycoside(e.g., Narirutin, Luteolin-7-o-rutinoside, Hesperidin), phenolic acids (caffeic, vanillic, ferulic and chlorogenic (Aparna et al., 2017). The various chemical constituents present in Mentha piperita are listed in Tab. 1.

(Sources: Sarma, 2017; Bodalska et al., 2020; Aparna et al., 2017)

Propagation

It can be propagated by cutting root/runners/stems, suckers and stolons. For this by stem cutting the thicker stem of 3.4 inches should be taken for propagation. For this, from a grocery store or existing plant some mint is taken then from each stems leaves are stripped off which is dipped in a growth hormone and then placed in a glass of water until roots are matured and kept in humid climate and water for a few weeks from which we can obtain new mint plant (Seran & Thuraisingham 2019).

Conventional Uses

This herbal is mostly used in personal hygiene products, pharmaceutical product, cosmeceuticals due to its fragrance and flavoring properties. It is used in bath preparation, mouthwashes, therapeutic uses and pharmaceutical drug preparation (Herro & Jacob, 2010). It is mostly used in the medical and culinary fields for the treatment of headaches, nausea and vomiting (Sujana et al., 2013). It is a bio active compound that serves as an antimicrobial agent and is used for the treatment of gastrointestinal conditions, Irritable Bowel Syndrome (IBS), dyspepsia and biological control of bacterial culture (Shams et al. 2015; Pratim Sarma 2017). It possesses antinociceptive, antimicrobial, anti-inflammatory and antioxidant properties which are used to prevent diabetes, cardiovascular disease, chronic degenerative disease and inflammation process (Trevisan et al., 2017). It is used in the development of insecticides; antibiotics repel disease- spreading Dipterian vector (Patil et al., 2016).

Medical application

Brain health: By smelling the aroma of peppermint oil while driving or before to testing increased alertness and decreased level of frustration, fatigue and anxiety. It can treat Alzheimer's symptoms by promoting brain health and increasing alertness (Soares et al., 2022).

Digestive health: Due to its antiseptic and antibacterial properties, it relieves indigestion, promotes the digestive system and stomach infections. By taking peppermint oil which calms the stomach and helps release acidity that helps treat irritable bowel syndrome (IBS) (Singh et al., 2021; Soares et al., 2022).

Rich in Nutrients: Peppermint can provide a healthy dose of balanced nutrition. Mint leaves can be used as a leafy vegetable as a source of dietary nutrients (Arzani et al., 2007).

Treatment of Irritable Bowel Syndrome: Peppermint oil contains menthol which treats IBS symptoms through its relaxing effects on the muscle of the digestive tract. Peppermint oil which is extracted from leaves, stems and flowers is used for the treatment of IBS because of its relaxing effect on smooth muscle (Rogers et al., 1988).

Relieve indigestion: It occur when food sits in the stomach for long before passing into the digestive tract. Mint is useful in relieving digestive problems such as indigestion. Peppermint oil reduces spasms of the intestinal tract and acts as a carminative herb, carminative means to relieve indigestion (Spirling & Daniels, 2021).

Decrease breastfeeding pain: After breastfeeding applying peppermint water was more effective in preventing nipple and arela cracks, which resulted in less nipple pain.

Improves cold symptoms: Menthol is an effective nasal decongestant that can get rid of congestion and improves airflow and breathing. Mint act as a host of phytonutrients that promotes health and wellbeing having an antiseptic and anti-inflammatory effect (Sharangi & Guha, 2013).

Mask Bad Breath: Breath mints are those in that people reach for when trying to prevent or get rid of bad breath. Mint provides a momentary smell that can mask unfavorable malodor to reduce bad breath (Godha et al., 2016).

Treats asthma: Peppermint can ease chest congestion. The methanol in mint acts as a decongestant that helps loosen mucus collected in the lungs and also shrinks swollen membranes in the nose to allow breathing easier. Mint possesses antioxidant, antimicrobial, antidiabetic which result in inhibition of in vitro oxidation and are helpful for the therapy against various health disorders (Davar, 2018).

Cures headache: Peppermint contains menthol that helps relax muscles and ease the pain. Mint possesses menthyl esters, dimethyl sulfide, sabinene, ocimene and has a therapeutic benefit when employed as an inflammation- inducing process and helps in the alleviation of headache, indigestion (Shaikh, 2014).

Treats stress and depression: Mint is a widely used

herb in aromatherapy. It has a strong refreshing smell that can ease stress and refresh the body and mind.

Makes healthy skin: Peppermint has anti-inflammatory and antibacterial properties which help treat acne and pimples on the skin. Mint is rich in antioxidant and anti-inflammatory effects having minerals and vitamins which help to cure skin disease and juice extracted from mint can be applied to the face and make skin moist (Sharangi & Guha,2013).

Oral care: chewing pudina leaves improves oral hygiene and dental health. The essential oil in the pudina helps to get fresh breath. Mint controls the growth of bacteria, fungus and its leaves can cure bad breath and are rich in vitamin D, E, iron, phosphorous, calcium (Sharangi & Guha,2013; Poudel et al., 2021; Pariyar et al., 2021).

Improves memory: Mint can improve memory and retrieve the cognitive function of the brain. Consuming pudina can increase brain power by improving alertness and monthly retention. Peppermint aroma enhances memory and alertness which helps in boosting memory, concentration and focus (Jissa et al., 2014).

Boost immunity: Mint is full of vitamins and antioxidants to improve immunity. Those plant-based vitamins help to protect cells from damage. Also, mint leaves can prevent tumor formation. Dietary peppermint boosts the immunity system by increasing antibody production by using antioxidant properties which protect the cell from oxidative damage (Mehri et al. 2015).

Healthy Hair: Mint leaves extract and antioxidants that promote hair growth and prevent hair growth and prevent hair fall. Peppermint oil has antidandruff, pediculicide properties which accelerates hair growth, deepens the depth of hair follicle which helps to reduce stress and headache (Kothari et al., 2018).

Ease allergies: Mint had anti allergic properties and helps in the treatment of different types of allergies. Mint contains anti-inflammatory properties and rosmarinic acid which is used to treat allergic symptoms (Aparna et al., 2017).

Conclusion

The result showed that medicinally important constituents are present in the peppermint plant which has useful medicinal properties. Most people use it as a source of diet and precursor of drugs as it possesses Antiviral properties, Antimicrobial properties, Antioxidant properties and is used for the treatment of IBS, gastritis, dysentery & fever. Modern technology is needed to convert plant materials into useful medicine. From the leaf extract of peppermint we can find various substances like Carbohydrates, tannins & flavonoids. Mentha Piperita can be a bed rock for future medicines. So, further investigation is required. Comprehensive research is needed for further exploration this plant which is safe for human use.

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