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Original Article

Althaea Officinalis in Traditional Medicine and modern phytotherapy

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ABSTRACT

Althaea (Marshmallow) has been under consumption over the past few centuries to manage some of diseases including fever, eczema, constipation and cough. The aim of this study is to investigate the traditional and modern uses of marshmallow in children and adults. This study was a narrative review, in which the medicinal properties of marshmallow were collected from credible pharmacopeias and therapeutic books of Traditional Medicine (TM). Further, electronic databases including PubMed, Scopus, Magiran, and Web of Science were explored for this purpose. Marshmallow has been prescribed in various forms such as tablet, syrup, gargle, vaginal suppository, vaginal douche, rectal enema, as well as ophthalmic and nasal drop for different diseases by PM scholars. Some of its traditional effects including anti-inflammatory, antitussive, anti-infective, and anti-pyretic properties have been confirmed in new studies. Phytochemical investigations revealed that the whole part of marshmallow contains a mucilage, phenolic acid, scopoletin, and flavonoids. Considering the comparatively extensive uses of marshmallow in traditional medicine and the confirmation of some of these applications in modern medicine, we can examine the other benefits of this plant, especially in pediatric medicine with regards to digestion and fever. It is also possible to find better ways to treat diseases by integrating both traditional and classic medicine.

Keywords: Marshmallow, Alcea, Althaea, Traditional Medicine

Introduction

Complementary and alternative medicine refers to diverse medical and health care systems, products, and practices, which are not part of the usual medications and treatments. One of those systems is Unani medicine. Unani medicine includes an East Indian medical system, and derived from Persian medicine, practiced primarily in the Muslim community; Also called "hikmat" [1]. Since our study has been carried out at the Faculty of Traditional Persian Medicine (TPM), the content about *Althaea* has been collected from the books of TPM.

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Marshmallow, commonly known as *Althaea* and *Alcea*, belongs to *Malvaceae* family[2]. Marshmallow is called "*Khatmi*","*Panirak*" or "*Moloukhia*" in TPM[3]; other names include "*Althea, Moorish Mallow, Cheeses, Mallards, Mortification Root, Sweet Weed, Schloss Tea,* and *White Maoow* "[4]. The therapeutic effects of *Alcea* are roughly the same as those of *Althaea;* In general, none of the *Althaea* species in Iran are used in the herbal market for marshmallow; instead the flowers of *Alcea* genus are consumed[2]. This plant has lived more than one thousand years ago, especially in wet areas such as south of Europe, Iran, Iraq, and Turkey[2]. In addition, marshmallow grows in most parts of Iran including *Gorgan, Mazandaran, Gilan, Khorasan, Azarbaijan* and *Kermanshah*[2]. TM is a comprehensive medical management system which is based on the concept of humor and temperament. TM scientists believed that everything consists of four elements (*fire, air, water,* and *soil*). Humor is a fluid or semifluid substance, which is formed in liver after the food digestion, and includs *blood, Phlegm*, *yellow bile*, and *black bile*. Temperament (Mizaj) is called the dominant quality, which results from the quality of the elements contained in

everything[3]. The temperament concept is found in many traditional medicines such as Iranian, Chinese, Unani, and Indian[5]. The marshmallow has been known since ancient times, and "Pedanius Dioscorides" the author of "Materia Medica" or "Hashayesh", has described it(40-90 AD)[6]. Galen believed that the temperament of marshmallow is *cold* and *wet*, but Avicenna believed it was *mildly warm*. According to the view point of TM scholars, marshmallow has *cold* and *wet* temperament and reduces inflammation, irritation, eczema, infections and fever[3]. Marshmallow contains mucilage (polysaccharides), flavonoids, phenolic acid, and scopoletin[4, 7]. In this review, applications of marshmallow, the pharmacological properties, adverse events, and toxicity are evaluated based on both classic and traditional medicine among, children and adults. Further, beneficial approaches might be provided for future new pharmaceutical compounds of marshmallow, and clinical trials made

Materials and Methods

Study design

This study is a review of marshmallow properties in TM and classical medicine.

In this study, we used a two-step search. The first search aimed at exploring major TM text-books to find the properties of marshmallow. Some of the medical and pharmacopeia books studied are presented in Table 1.

Table 1: Some of the pharmacopeia and medical books in TM

Book	Definition	Autor	Year	Reference
Al-Havi fi al-tibb	The Liber Continents	Rhazes	865–925 A.D.	[8]
Al-Qanun fi al-tibb	The Canon of Medicine	Avicenna	980–1037 A.D.	[9]
Al-Shamel fi sanaat al-tibbie	Medical Encyclopedia	Ebn-e-Nafis	1211-1289 A.D.	[10]
Makhzan al-Advie	Encyclopedia of Medicinal Plants	Aghili Khorasani	1770 A.D.	[3]
Zakhireh Kharazmshahi	Treasure of the Khwarazm Shah	Jorjani	1042–1136 A.D.	[11]
Tadbir Hobali va Atfal va Sebiyan	Prevention for the health of Pregnant and children	Ahmad Albaladi	980 A.D.	[12]
Tadbir Alsebiyan	Prevention for the health of children	Rhazes	865–925 A.D.	[13]

Further, electronic databases including PubMed, Google Scholar, Scopus, Magiran, and Web of Science were explored for the second search with the keywords of *"Marshmallow", "Alcea", "Althaea",* and "*Children"* to check the pharmacological effects of marshmallow by searching for English and Persian articles from 1990 to 2018. Finally, the health and medical properties reported from marshmallow will be reviewed for its effectiveness in children and adults.

Results

Marshmallow from the perspective of TM

- ### The History and Temperament of Marshmallow in TM

The marshmallow has been used in the treatment of various diseases from thousand years ago. According to TM, scientists believed that everything consists of four elements (*fire, air, water*, and *soil*), and the temperament means the interaction of four basic qualities (*hot, cold, wet*, and *dry*). Some of the TM scientists believed that the temperament of marshmallow is *cold* and *wet*, but Avicenna believed it is *mildly warm*[3, 10].

- ### Mode of application in TM

✓ **Effects on children**

Marshmallow is used to treat swelling of the testicles with plaster and compress, bladder stone with sitz bath, delayed tooth eruption with herbal toothbrush[12] and constipation with syrup, suppository and enema[12]. It is also used to treat seizures in the form of enema, and meningitis with compress[12]. Bathing a baby with the extract of marshmallow is effective in treating itching and rash[13]. The use of decoction of marshmallow roots is effective in the form of compress on the head for treating pediatric seizures[13]. This plant is also used to treatment otalgy[12, 13].

✓ **Ophthalmic effects**

Marshmallow can treat some of ophthalmic diseases including puffy and swollen eyelids, conjunctivitis, eye discharge and hordeolum. Leaf juice has been used as drop or compress as well as oral form[3, 10, 14].

✓ **Ears, Nose and Throat (ENT) effects**

Marshmallow can treat pharyngitis, auricular lymphadenopathy, coryza, hoarseness, Common cold, throat pain, otalgia, toothache, halitosis, loose teeth, oral lesions, tonsillitis, and gingivitis by decoction, gargling the juice of the leaves, nasal inhalation, ear drops, and applying the compress of leaves on the affected location[3, 8, 15].

✓ **Respiratory effects**

Marshmallow is advised for cough, pneumonia, tuberculosis, hemoptysis, pleuritic pain, asthma, which can be used as decoction and incense[3, 15].

✓ **Gastrointestinal effects**

Marshmallow is effective to treat gastritis and colitis, dysentery, diarrhea, hemorrhoid, stomachache, intestinal ulcers, vomiting, nausea, jaundice, constipation, and dyspepsia through oral ingestion, enema, suppository, and compress[3, 8, 15].

✓ **Hepatic, and splenic effects**

Marshmallow extract can treat obstructive diseases and inflammation of liver and spleen[3, 15].

✓ **Obstetrics and Gynecology effects**

Marshmallow is prescribed in facilitating delivery, pelvic pain, cervical ulcer, endometritis and menometrorrhagia in oral, vaginal, sitz bath, plaster or enema form. It has also an emmenagogue effect[9, 12, 16].This plant is effective in the treatment of mastitis and coagulation of milk in the breast, and is commonly used as compress[12, 16]. Further it is one of the galactogogoue plants and effective herbs in increasing the amount of milk[17].

✓ **Urinary effects**

Marshmallow is prescribed in kidney disease such as kidney and bladder stone, cystitis and nephritis. It has diuretic and lithotriptic effects and advised for dysuria, hematuria, and bladder or kidney pain. It is prescribed orally or topically (plaster or oil) , sitz bath or enema[15, 16].

✓ **Musculoskeletal effects**

Marshmallow is prescribed in musculoskeletal diseases such as cracked heel, joint stiffness, muscle rigidity and bone fracture as anointment and compress [3, 9, 15].

✓ **Neurological effects**

This plant has been used to treat epilepsy, febrile convulsion, inflammation of the brain and layers, ciatalgia, tremor, flaccidity, bell's palsy, vertigo, dizziness, headache, fracture of scalp, elderly insomnia, and melancholia along with other herbs in the form of oral, ear drop, nasal drop, enema, incense, anointment, and compress[3, 10].

✓ **Dermatological effects**

Marshmallow is advised for skin diseases such as purulent wound, deep wound, abscess, leukoderma, vitiligo, wheel, scrofula, blotch, freckles, dry skin, dermatitis, irritation, insect bite, bee sting, burning, spider bite, erysipelas, prurigo, eczema, and trichoschisis. It has been used orally or topically (shampoo, plaster or ointment) on the wound[9, 15, 16].

Marshmallow from the perspective of modern medicine

- ### Malvaceae family and habitat

Marshmallow belongs to the *Malvaceae* family. It was indigenous to central Asia. Marshmallow later expanded to southeast Europe[4]. In general, none of the *Althaea* species in Iran are used in the herbal market for marshmallow; instead the flowers of *Alcea* genus are consumed[2].

- ### Morphology

The flowers are in terminal or axillary clusters. There are five heart-shaped petals. Stamens fused together to a column. The seeds are kidney-shaped, dark-brown, and compressed. The ovaries are fixed in a ring. It has a thick erect root up to 50 cm long with secondary roots. The leaves have short petioles. They have an ovate and blade shape apex[4].

- ### Indications of Marshmallow in Commission E

Marshmallow leaf has been approved by commission E for the treatment of bronchitis and cough , while its root has been approved for the gastritis as well as oral or pharyngeal irritation [4].

- ### Mode of application in Classical medicine

✓ **Effects of children**

The dried root of *A.officinalis* is chewed by teething children. It is used as a toothbrush. It helps to reduce toothache. It has a mechanical effect on the gums[18]. The administration foot bath of marshmallow can reduce fever more quickly than with tepid water bath. The effect of tepid sponging is similar to that of propacetamol for reducing body temperature in febrile children[19].

✓ **Ears, Nose and Throat (ENT) effects**

Althaea extract can treat local irritation, stimulates phagocytosis, and inhibits mucociliary activity. It also functions as an anti-inflammatory and anti-complementary agent and immune stimulant. It is used as a gargle to treat inflammation of the mouth and throat[4]. Marshmallow is used to treat warm catarrh[20].

✓ **Respiratory effects**

Althaea extract and isolated mucilage have been tested for antitussive activity in cats with cough induced by mechanical stimulation. Both extract and isolated polysaccharide significantly treated the frequency and the intensity of cough. Polysaccharides of marshmallow exhibited significant cough-suppressing activity[21]. *A.officinalis* has been prescribed for patients with hypertension who have taken angiotensin converting enzyme inhibitors (ACEI)s] and have been suffering from a cough. The patients receiving *A.officinalis* extract were significantly treated [21-23]. It has also bronchodilatory and β-adrenergic effects on isolated tracheobronchial smooth rat muscles. In one study, the effect of *Alcea sulphurea* and bromhexine on chicken trachea was compared. The oral *A.S* extract significantly increasing the size and the number of cilia and mucous glands[24]. The extract of *Althaea* inhibited tracheal smooth muscle contractions in rats and proved useful in the treatment of chronic obstructive pulmonary disease(COPD)[25].

✓ **Gastrointestinal effects**

In a study on four groups of rats, the effectiveness of marshmallow, zingiber, and famotidine was compared on gastric ulcer. *A.officinalis* showed anti-ulcer activity. The gasteric protection of *A.officinalis* could be attributed to flavonoids and mucilage polysaccharides[26]. *A.officinalis* has also antioxidant and gastric ulcer prevention effects[27]. Further, the extract of *Althaea* is used for the treatment of constipation[28]. Moeini et al. indicated that *A.digitata* and *Malva sylvestris* powdered flowers prevented some gastrointestinal side effects of radiotherapy in prostate cancer. They can delay the complications, and reduce anal discomfort as well as the need to anti-diarrheal and analgesic drugs[29].

✓ **Hepatic, and splenic effects**

Fallahpour et al. showed that with administration of *Altaea* extract to carp fish, their biochemical parameters, blood cells, and liver enzymes did not change, but the levels of cholesterol and triglycerides dropped[30]. In the same study on the carp fish, administration of *Altaea* extract influenced the plasma biochemical parameters, activity of hepatopancreatic enzymes, total protein, albumin and globulin levels. These

parameters significantly improved, and plasma glucose, cholesterol, amylase, and lipase decreased in the fish fed with *Althaea*[31].

✓ **Obstetrics and Gynecology effects**

Topical marshmallow preparations have been advocated for treating sore, cracked nipples, and breast pain. Orally, marshmallow is a purported galactogogue and is included in some proprietary mixtures promoting milk supply elevation[17]. There is no problem during pregnancy and lactation, if taken orally [23].

✓ **Urinary effects**

The extracts of *A.rosea* can reduce calcium oxalate deposits in the kidney, and prevented urolithiasis. *A.rosea* extracts can also reduce urine oxalate, which has been increased due to ethylene glycol[32]. The *A.rosea* seeds are also used in renal disorders [33].

✓ **Dermatological effects**

The aqueous extracts of *Althea* can reduce DNA[1] damage in human skin and lung fibroblasts, which is caused by UVA[2]. Further, the chemical components contained in the *Althea* root extract can be a useful component of skin formulations[34]. Miroliaei et al were shown *Althea* extract have been proven wound healing and eczema in the rat[35]. The aqueous extract of *Althaea* is also effective in reducing the symptoms of latex sensitivity[36], stimulate macrophage and phagocytosis, and is used to treat wound and eczema[37].

✓ **Neurological effects**

Karimi et al. in a study on five groups of mice exposed to acoustic stress, revealed that aerobic exercises along with administration of *Alcea* extracts are effective on serotonin receptors which are involved in the process of anxiety and depression[38]. The extract of marshmallow is useful to reduce the pain in rat[39].

✓ **Musculoskeletal effects**

Cavero et al. worked on a large number of medicinal herbs such as marshmallow and examined its effects on musculoskeletal pain[40]. *A.officinalis* extract has an analgesic effect and can be used for treating musculoskeletal pain[41].

✓ **Immune effects**

Water extract of *A.rosea* boosted the production of T- helper 2 cytokine, and interleukin-4. It suppressed the production of T-helper 1 cytokine, and gamma-interferon[42]. In vitro study, the polysaccharides contained in the *A.rosea* extract exhibited anti-complement activity in the human serum[23]. The aqueous extracts of the roots stimulated phagocytosis, as well as the release of leukotrienes and oxygen radicals from human neutrophils in vitro. It also induced the release of interleukin-6, cytokines, and tumor necrosis factor from human monocytes in vitro[23, 43]. The aqueous extracts of *A.officinalis* stimulated macrophage and phagocytosis and used to treatment wound and eczema[37]. They also have anti-inflammation and antioxidant effects due to the presence of tocopherol and mucin[43] along with flavonoids, mucilage, and pectin[44]. According to another study, the extracts are widely used for treatment and regeneration of irritated mucous membranes, which are related to the presence of mucilaginous polysaccharides and bio adhesive [45]. The *A.rosea* ethyl acetate extract showed cytotoxic activity against brine shrimp[46].

✓ **Cardiovascular effects**

Ziai et al. unveiled that marshmallow extract has an inhibitory effect on ACE, which is one of the most important treatments for heart failure, hypertension and diabetic nephropathy[47]. The alcoholic extract of *A.rosea* increased the circulation of coronary artery of pig's heart. The extract of *A.rosea* dilated the blood vessels of the rat organs. The extract inhibited platelet aggregation and thrombosis formation, and exhibited a transient hypotensive effect on anesthetic cats[48].

✓ **Anti-bacterial effects**

The methanolic extract from the marshmallow root can inhibit the activity and reduce pathogens in the oral cavity. The Antimicrobial effects of *alcea* extract against Proteus vulgaris, Pseudomonas aeruginosa, and Staphylococcus aureus have been confirmed. Also, antimicrobial activity of hexane extracts has been proved against gram-positive and gram-negative bacteria. The effects of methanol, ethanol, n-hexane, and water extracts of *A.rosea* were investigated against some genus of gram-positive and gram-negative bacteria[20, 41, 48].

✓ **Anti-fungal effects**

The antifungal activity of *A.officinalis* seed was found to be effective on microsporum canis, microsporum gypseum and trichophyton mentagrophytes[18]. In the same study, it was also active against aspergillus (fumigatus, niger and flavus) species[41, 49]. Ayatollahi et al. revealed that it has a significant antifungal effect on dermatophytes compared to the griseofulvin[50].

✓ **Anti-viral effects**

The ethanol extract of *A.officinalis*, have been effective on some viruses including adeno virus, coxsackie virus B2, herpes type 1, measles, polio virus 1. Further, the water extract was effective on herpes type 2, vaccinia virus, influenza A2, and polio11[18].

✓ **Phytochemistry of Marshmallow**

A.officinalis contains mucilage 5%, pectin 11%, starch 25-35%, sucrose 10%, mono and di-saccharide, flavonoids, scopoletin, coumarins, phytosterols, asparagine, tannins, and many amino acids[4, 7]. The mucilage is a mixture of colloidally polysaccharides found in flowers and leaves and contains galacturonic rhamnans, arabans, arabinogalactans, glucans, flavonoids, proteins, alkaloids, and minerals[41]. Some of the most important chemical components of the *A.officinalis* are listed in Table 2 [51].

Table 2. Some of the chemical components of Althaea officinalis

Plant Part	Chemical
Root, Seed	Ascorbic-Acid
Root	Beta-Carotene
Root, Flower, Leaf	Caffeic-Acid
Plant, Root	Chlorogenic-Acid
Root, Flower, Leaf	Ferulic-Acid

[1] DNA: Deoxyribonucleic acid
[2] UVA: Ultra Violate A

Root	Kaempferol
Root	Lecithin
Seed	Linoleic-Acid
Root, Leaf	Mucilage
Root, Flower, Leaf	P-Coumaric-Acid
Flower, Leaf	Protocatechuic-Acid
Root, Leaf	Quercetin
Root	Scopoletin
Root	Starch
Root	Tannin
Root, Flower	Vanillic-Acid

✓ Adverse Reactions and Precautions

No side effects have been reported with proper administration of the designated therapeutic dosages[4, 7]. With the simultaneous consumption of marshmallow with other drugs, their absorption will be delayed[4].

✓ Other effects

The mucilage from the root of marshmallow administered to non-diabetic mice significantly reduced blood glucose[52].

Table 3. Comparison of *Marshmallow* applications in TM and classical medicine.

System	Mod of Application	TM	Classical Medicine	Children	Ref.
Ophthalmology	leaf juice ophthalmic drop, compress	puffy and swollen eyelids, conjunctivitis, eye discharge, hordeolum, eye sores	_	_	[3, 10, 15]
Ears, Nose and Throat	Gargle oral extract compress, foot bath, tooth brush	pharyngitis, auricular lymphadenopathy, coryza, hoarseness, common cold, throat pain, otalgia, toothache, halitosis, oral lesions, mouth sores, loose teeth, gingivitis, tonsillitis	irritation, inflammation mouth and throat	delayed tooth eruption, fever, otalgia	[3, 8, 15] [53]
Respiratory	decoction, incense, leaf extract	cough, pneumonia, hemoptysis, asthma, tuberculosis, bronchiectasis, pleuritic pain	cough, antitussive, bronchodilator, increase of mucus gland and cilia, obstructive disease	fever	[3, 15]. [53]
Gastrointestinal	Oral, enema, suppository, compress	thirsty, inflammation of stomach and intestine, dysentery, diarrhea, hemorrhoid, proctitis, vomiting, nausea, constipation	gastric ulcer, mucus protection, constipation anal discomfort , diarrhea	_	[3, 8, 15].
Hepatic, splenic	Extract	Liver tonic, obstructive diseases and inflammation of liver and spleen	Improved hepatopancreatic enzymes, decrease of Chol and TG[in carp fish)	_	[3, 15].
Obstetrics and Gynecology	Oral, vaginal suppository, sitz bath, plaster, enema	facilitating delivery, cervical tightness, pelvic pain, pain and rigidity, cervical ulcer, meno metrorrhagia, emmenagogue effect, mastitis, coagulation of milk in the breast, galactogogoue	Sore and cracked nipples, breast pain.	_	[9, 16, 17]
Urology	Orally, topically (plaster, oil) sitz bath, enema	kidney and bladder stone, pain and inflammation of bladder and kidney, lithotriptic effects, dysuria, hematuria	Prevention of urolithiasis(in rat)	swelling of the testicles	[12]
Musculoskeletal	Anointment, compress	cracked heel, joint stiffness, muscle rigidity and bone fracture	musculoskeletal pain	_	[40]
Neurology	Oral, ear drop, nasal drop, enema, incense, anointment, compress	epilepsy, febrile convulsion, meningitis, ciatalgia, tremor, flaccidity, bell's palsy, vertigo, dizziness, headache, fracture of scalp, elderly insomnia, melancholia	Anti-anxiety and depression(in mice), analgesic effects	Seizures, inflammation of the brain membrane	[38]
Dermatology	orally or topically (shampoo, plaster or ointment)	deep wound, purulent wound, abscess, eczema, leukoderma, vitiligo wheel, carbuncle, fruncle, scrofula , blotch, freckles, dry skin, dermatitis, irritation, insect bite, bee sting, burning, spider bite, erysipelas, prurigo, trichoschisis, hair loss	Reduce damage of UVA wound healing, decrease skin hyper sensitivity	itching, rash	[36, 37]
Cardiology	Extract	_	ACEI effect, increased the outflow of coronary artery(animal)	_	[47]

Other	Extract	–	Anti-gram-positive and gram-negative bacteria, antifungal, Anti-viral, reduced blood glucose (in mice), Anti-Inflammatory, immune stimulant, antioxidant, regeneration and cytotoxic effects	–	[18, 41, 49, 50], [18]

UVA: Ultra Violate A ACEI: Angiotensin Converting Enzyme Inhibitor Chol: Cholestrol TG: Triglyceride

Discussion

Traditionally, marshmallow has been used for the treatment of dry cough, fever, inflammation, constipation, as well as burns in children and adults. It has the effects of expectorant, diuretic, febrifuge, galactogogoue and emmenagogue. Based on new articles, the antimicrobial and immune-stimulanting properties of the *Althaea* extract confirm the regenerative and anti-inflammatory properties of this traditional medicine. In TM, there is a wider range of use of non-edible treatments prescribed as ointment, compress, suppository, enema, plaster, incense, and foot bath.

As an example, in pediatric medicine, fever is one of the most important symptoms of the disease in children, which is a source of concern for parents. When a child's body temperature rises, most parents become increasingly worried because of the fear of developing febrile convulsion(FC)[54]. Physical methods of cooling combined with antipyretic medication are preferable a treatment for fever in children. In TM, the *Althaea* extract is used for foot bath and fever reduction. The sponging
method and foot bath involving convection and evaporation are good ways to reducing the risk of fever and seizure[55, 56].

Also, due to the increased resistance of bacteria to antibiotics, and antibiotic complications, it seems that the natural components of the medicinal herbs, such as marshmallow, can be effective in reducing infections[20].

However, according to **Table 3**, many of these applications are not yet approved in modern medicine such as ophthalmic disease, and obstetrics and gynecology disease. For the time being alone, the effects of analgesia, anti-anxiety, anti-depression, anti-bacterial, viral, and fungal infections, protection from the formation of kidney stones, ACEI effect, increased the outflow of coronary artery, and reduced blood glucose have been proven in animal studies.

In the future, clinical trials should approve the diverse uses of *Althaea;* and confirm what expert scientists such as Rhazes, Avicenna, and Biruni have claimed about the properties of herbs such as marshmallow including its habitat, temperament, indications, dosage, contraindications, effectiveness, duration of action, toxicity, side effects, and types of preparations[8, 9].

Conclusion

Based on TM and classical medicine, *A.officinalis* (marshmallow) has many medical benefits without serious side effects. Since some of the beneficial properties of marshmallow in TM have not been proven in Classical Medicine, future clinical studies are recommended to confirm its other therapeutic effects, particularly in children. Due to the ease of accesses, affordability and sufficient supply of marshmallow in many countries, as well as being well recognized in the traditional medicine, marshmallow is recommended to be used as a complementary medicine in the treatment of diseases.

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Authors' contributions

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