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Naretive Review Article

**THE USE OF CAPER PLANT IN PHARMACEUTICAL INGREDIENTS:
IN TRADITIONAL MEDICINE AND MODERN MEDICINE**

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Abstract:

Background and Objective: Nowadays, the general interest in complementary medicine and traditional medicine is increasing. Traditional Iranian medicine is one of the oldest forms of complementary medicine. The aim of this study is to introduce Caper drug combinations and their application in the treatment of diseases based on traditional medicine sources, with the goal of establishing complementary studies for the development of effective drugs in the treatment of multiple diseases.

Method: A review of the traditional medicine books on Caper drug products and the introduction of Caper properties in new findings has been done in the present study.

Findings: Caper with the scientific name of (Capparis soinosa) is of the cappariaceae family. Due to its unique and diverse pharmaceutical and nutraceutical properties, Caper is widely used today. Caper is widely used in traditional Iranian medicine. In traditional medicine sources, it has been used in various forms of medicine and nutrition for the treatment of diseases. Today, various Caper products (tablets, capsules, oils, pickles, etc.) are available in the food and pharmaceutical market of Iran and the world. In this study, a variety of pharmaceutical products based on traditional Iranian sources of medicine is introduced. Nine types of food-drug and ten types of drug products are listed for Caper. The most famous and most commonly used forms of medicine are pills, syrups, powders and poultice. According to this study, the most common use of Caper is in the treatment of spleen, digestive, musculoskeletal, infectious and respiratory diseases. Many cases of Caper usage have been confirmed based on new findings. Using the results of this study could be the basis for evidence-based and supplemental studies in the treatment of diseases.

Keywords: *Traditional Iranian Medicine; Caper; Pharmaceutical; Pharmaceutical product*

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INTRODUCTION:

Caper with the scientific name of *Capparis spinosa* is one of the most prominent medicinal herbs in the capparidaceae (Caryophyllaceae) family. This plant is scattered in the Mediterranean, Western and Central Asia, in countries such as Iran, France, Spain and etc (1). This wild plant grows in different regions of Iran, including the Alborz, Northern, and Northwest and Center of Iran (2). According to new studies, Caper possesses special nutraceutical and pharmaceutical properties (3). It has a great application in the world of complementary medicine (4). Traditional Iranian medicine is considered as one of the most important components of complementary medicine (5).

Caper had a special role as a medicinal plant in the Iranian traditional medicine. For example, Heravi has mentioned it as a noble drug (6). In traditional medicine sources, Caper has been used as a medicine alone or in combination with other medicinal herbs in various forms of medicine (7). This study introduces these forms of medicine and its compounds in traditional Iranian medicine. Many of the properties mentioned on the basis of traditional Iranian texts for Caper have also been confirmed in recent studies. The purpose of this study is to introduce the specific medicine forms of Caper and its uses.

MATERIAL AND METHODS:

This descriptive study is conducted on Caper drug products and its use in Iranian traditional medicine sources. For this study, traditional medicine books on medicinal herbs and treatment of diseases were used. Then, all findings are categorized based on the drug form. Firstly, different forms of medicine in traditional medicine of Iran are described. Then, formulations containing Caper are sorted according to the site of its use and its application. For the overall compliance with new findings, the keyword *Capparis* has been searched in Google scholar, Pubmed, and Scopus.

RESULT AND DISCUSSION:

In the traditional medicine of Iran, Caper and its compounds are used in the form of food and medicine for the treatment of diseases (8). In this study, the drug products and their applications are only introduced. Traditional medicine practitioners used a variety of drug forms to treat illnesses based on the site of its use, type of composition, and conditions of the patient (9). Oral and topical forms of Caper include tablets, powder, syrup, poultice, oil, Tela (lotion), smoke, enema, and gurgle.

Definitions of different forms of medicine in Traditional Iranian Medicine

1. Tablet and Pill: Among other forms of medicine, they are used in traditional medicine, which are used in the same way as current pills. Pills often had a cylindrical shape and had easier swallowing (10).
2. Caper syrup: Syrups that are often referred to as "wine" in traditional medicine sources, are liquid and edible form of pharmaceutical compounds (11).
3. Caper powder: refers to a variety of oral drugs. It is the best drug for stomach and peppermint and also is the best drug used for weak liver, spleen and kidney (10).
4. Poultice: This category includes powdered and screened medicines that are mixed with liquid and fluid and put on the members. Poultices are often used to relieve pain, swelling, etc. (10).
5. Tela: is a semi-solid product, often used in dermatological and mucosal diseases (10). Tela is almost the equivalent of Lotion (11).
6. Oil: has a variety of uses in traditional medicine. The major use of oils is locally (10).
7. Smoke: In Iranian traditional medicine, smoke of herbal medicines is used to locally treat skin and sometimes sinusitis treatment (10).
8. Gurgle / Mouthwash: Mouthwash astringent drugs are used to treat oral and dental illness. The patient throws it out of the mouth after mouthwash using medicine. The drugs used for Gurgle are used to rinse the throat in order to treat throat and mouth diseases (11).
9. Enema: is one of the treatments in traditional medicine of Iran. It means getting medicinal fluids to the body through the vagina or the anus. This therapeutic method is a few thousand years old since Hippocrates and Galen. In modern medicine, enema is also used to treat many diseases (12).

The use of Caper in pharmaceutical compositions of Iranian traditional medicine for the treatment of diseases:**Teriagh (anti toxin)**

From the perspective of physicians, Teriagh is any singular or compound drug that has an antidote property. This drug has the potential to eliminate toxins and is resistant to toxins. This toxicity may be due to the stinging of animals, the ingestion of poisons, or corrupt temperament (11). Since one of the mentioned effects of Caper is its Teriagh property (9), it has been used in many pharmaceutical compositions of anti-inflammatory drugs. Depending on the composition, the application of these Teriagh is different. Teriagh may be used as anti-venom insect bites or some medications (Table 1).

Spleen:

The main application of Caper in Iranian traditional medicine is the treatment of spleen diseases (13). Our studies have shown that in most

sources, Caper has been used as a drug specific for the spleen alone and in combination with other drugs or vinegar to increase penetration into spleen (Table 2). Vinegar is used in drug products as a drug carrier specifically in the spleen (13).

The use of Caper in some diseases of the spleen in traditional medicine includes splenomegaly, spleen rigidity, pain in the LUQ area, and a specific type of spleen disease called "inflammation" (Table 2). Splenomegaly occurs for any reason, including deposition of waste materials (13). Traditional Iranian medicine is divided into four temperaments. These temperaments include melancholic (black bile), sanguine, phlegmatic, and choleric (yellow bile). Any change in the rate or quality of these temperaments in any organ leads to disease (14). The large size of the spleen may be due to the sedimentation of each of these temperaments. Spleen stiffness is often due to excess soda deposits. Inflammation in traditional medicine has the same definition of fluid infiltration and excessive substances. One of the functions of the spleen is the extraction of excess soda from the blood. Any impaired spleen function causes obstruction. Occasionally, this obstruction occurs due to a change in the nature or degree of temperaments, especially soda in the spleen (13, 15).

Medicinal compounds affecting the spleen are tablet, powder, enema and poultice (Table 2).

Central and peripheral nervous system diseases

The three members of the brain, the heart and the liver in traditional medicine are among the main members of life that are considered as the main and vital members of body (15). Caper is directly effective in the brain and liver.

Traditional medicine believes that physiopathology of epilepsy is the existence of barriers to neural transmission and the normal process of brain function. These obstructions lead to abnormal movements in the members (13). These types of obstructions may be vascular or in the brain itself (neuronal cells). As an auxiliary therapy, in addition to antiepileptic drugs, Caper and its combinations may also be used in the form of gurgle to treat epilepsy. Gurgle of boiled Caper is also used as an auxiliary treatment for amnesia (16, 17).

Some of these barriers in the nervous system sometimes have symptoms such as sneezing. Caper-containing syrup is used to treat this disease, which is called "relaxation" in traditional medicine (8, 13) (Table 3).

A headache has different causes in traditional medicine. Headache treatment is done based on the elimination of its cause and its effects (13). Based on the view of traditional medicine, the Caper drug in the form of pill, poultice and enema is effective in the treatment of some of these headaches (Table 3).

In traditional medicine, stuttering occurs due to problems with the nervous system and muscle of the tongue. Rinsing the mouth with the boiled Caper can improve stuttering by disposing waste materials and improving muscle function and possibly local nerves of tongue (17).

Liver and digestive system

Caper is used as pharmaceutical and nutraceutical products for the gastrointestinal tract. We have introduced effective drug combinations below.

The liver, as one of the main members, has an effective role in supplying the natural body force through interactions and digestion (15). The effect of Caper on liver is, direct or indirect.

Enema containing Caper can be also used in the treatment of obstructive jaundice which is still not feverish (possibly without cholangitis) with the ability to eliminate obstruction. In the traditional medicine viewpoint, due to the role of the spleen in the excess soda removal, Caper indirectly improves liver function (13) (Table 2).

In traditional medicine, Caper oil (all Caper parts or just the seed alone) along with cupping therapy is locally very effective in the treatment of bloat (18).

Caper root peel smoke with *Citrulluscolocynthis*, Myrrh, and *Cupressus nutmeg* are used to treat hemorrhoids (19).

Skeletal System and Joint Diseases

According to traditional medicine, the cause of pain and swelling in the joints is the presence of abnormal temperament. Any drug or drug combination that can penetrate joints and remove temperaments from the joint can affect the pain and swelling of the joint (13) (Table 3).

We know that sciatica pain is due to problems with the joints of the spine or muscles of the waist and pelvis. Caper compounds are effective in improving and reducing referral and sciatica pain. Caper products with similar compounds used in joint pain are used to treat arteritis (Table 3).

Gout is one of the metabolic diseases that occurs due to the abnormal amount of uric acid for various reasons, especially in the joints.

Infectious and parasitic diseases

Drinking boiled Caper with *Trachyspermum* is helpful in treating acute fever (20).

In pharmaceutical compositions, Caper is used in the form of tablet and enema to dispose and eliminate intestinal parasites (Table 3).

Uterine and genital tract

In traditional medicine, poultice is used after taking oral medications to remove kidney stones. A poultice containing Caper is used in cases when the patient is unable to take oral medication (13). This poultice is produced by combining the Caper root peel with a number of other herbs (Table 3).

Most aquatic treatments are used in the treatment of kidney stones as urinary duct and pain killer. Compounds of this aquatic extract include boiled Caper root peel, petiolate, chamomile, marmalade, dill, cabbage, alfalfa, pomaceum, perissauchan, fenugreek, ispaghula, purslane, violet and sesame (21).

Caper alone is emmenagogue (9).

Jorjani, quoted from Bou-Ali Sina, says that Caper leaf can be locally used for the treatment of cancerous masses of the womb. In general, Caper is used to treat a variety of masses (17).

Oral, teeth, and throat

Caper Tela is used to improve the color of enamel. This drug contains Caper root peel, along with mastic gum, and rose oil (13).

In addition to the treatment of enamel color change (22), rinsing mouth with boiled Caper is useful in improving the pain of dental caries (23), and bad breathe (13).

Gurgle of the boiled Caper removes hoarseness (13, 22).

Caper in new researches

Today, commonly used forms of Caper are often edible. In most studies, roots, fruits, seeds, stems,

buds and leaves of Caper have been used. These forms include pills and capsules, which often contain an aqueous or alcoholic extract of a Caper part or Caper seed oil. Caper is known as a plant with a variety of pharmaceutical properties (24).

Caper has hepatoprotective properties against some toxins (25, 26). It has anti-oxidant, anti-inflammatory (27-29), antimicrobial (30, 31), antifungal, antiviral (32), immunomodulatory (33, 34), antiparasitic (35, 36), antidiabetic (4, 37), hypoglycemic (38), and hypolipidemic (39) properties. Also, the effects of Caper in melanogenesis are anti-allergic (3), antihistamine (40), and anti-complement (41).

One of the anti-microbial properties of Caper is its effect on stomach helicobacter pylori (42).

Caper has positive properties in joint pain (43). The anti-inflammatory properties of Caper are important in arthritis inflammation (44) and prevention of joint damage in inflammation (45, 46).

Caper is used as an additive with anticancer properties (47). Caper oil and extract have anticancer properties (48).

The organs used in these studies, which have been done in vivo and invitro, and human specimens, include seed oil, alcoholic and aqueous extracts of fruit, buds, foreign organs, and root of Caper. Accordingly, the form used in modern medicine is edible (24, 49).

Taghavi et al. showed that besides the beneficial properties, Caper has no adverse effect on the pancreas, kidneys, liver and stomach.

Table 1

	Usage	Composition	Explanations	Reference
1	Grasshopper bite	Caper root peel, Colocynth, Roman absinthe, round Aristolochy, wild chicory	Asgari Teriagh	19
2	Insect bites	Caper root peel, Gentian, absinthe, Round aristolochy, wild chicory	Take with fig or milk	50
3	Eight temperament Teriagh	Aristolochia longa, Chinese Rhubarb, Caper root peel, oregano, Gentian, Galangal, Turmeric, Myrrh	Mix with honey in a glass container after 40-60 days	8, 9
4	Millipede bite	Aristolochia longa, Gentian, Caper root peel, vicia ervilia flour	Mix with honey.	9
5	Scorpion bite	Caper root peel, Aristolochia longa and round, absinthe, wild chicory	Mix with honey.	23
6	Mouse bite	Caper root peel	Mix with bovine oil	21
7	Rat bite	Peppers, Aristolochy, Orris, Nardin, Rabbit rennet, Auricle, Nigella Sativa, Nutron, pomegranate, Cinnamon, Lacquer, Opium extract, claustrophilia, Myrrh	Mix with Caper water and Take with medical rubbing or fleawort or fresh milk	50
8	Poisoning with opium	Garlic, Caper and nutmeg		16
9	Mouse bite	Caper root		13

Table 2:

	Usage	Composition	Pharmaceutical form	Explanations	Reference
1	Spleen	Caper root peel, rheum, Euphorbia milii, aloe vera, celery seed, polyporus off, borax	Pill	Take with Salix alba and honey	(51)
2	Splenomegaly	Caper root peel, Chinese rheum, aloe vera, Euphorbia milii, celery seed, polyporus off, borax	Pill	Mix with orange blossom water and Salix alba and Take with honey.	(8)
3	Spleen	Caper root peel, cucumber seed, rose leaf, chicory, chestnut, burned pumpkin, Tamaricaceae, Chinese rheum, orris	Tablet	Moderate temperament	(8)
4	Spleen	Chicory seed, pumpkin seed, aper root peel, fennel root peel, orris, Aristolochia longa, Rubia	Tablet	Nearly moderate temperament: Take with Sekanjabin	(13)
5	Spleen pain without fever	Caper root peel, lemon balm seed, Aristolochia longa, ruta leaf, Acorus, Nigella Sativa, Ammmoniacumm	Tablet	Mix Ammmoniacumm with vinegar. Take with honey and Sekanjabin	(13)
6	Spleen	Caper root peel, Vitex agnus-castus, Scolopendre, Aristolochia longa, dried ruta, Peganum harmala, Acorus, Nigella Sativa, Ammmoniacumm	Tablet	Mix Ammmoniacumm with vinegar.	(13)
7	Spleen	Caper root peel, Ammmoniacumm, Vitex agnus-castus, pepper, Aristolochia longa	Tablet	Mix Ammmoniacumm with vinegar. Take with Sekanjabin	(52)
8	Spleen	Caper root peel, Aristolochia longa, lemon balm seed, black pepper, Ammmoniacumm	Tablet	Mix Ammmoniacumm with vinegar. Take with Sekanjabin	(53)
9	Spleen	Caper root peel, Vitex agnus-castus, Rubia, lavandula, asatabacca, mastic, Absinthium extract	Tablet	Take with Sekanjabin	(17)
10	Spleen	Caper root peel, Aristolochia longa, Vitex agnus-castus, black pepper	Tablet		(8)
11	Spleen	Caper root peel, Aristolochia longa, Vitex agnus-castus, black pepper	Tablet		(8)
12	Spleen	Dried hyssop, Caper root peel, Solanum alatum, Perissauchan, Vitex agnus-castus, Ruta seed	Powder	Take with Sekanjabin	(8)
13	Spleen	Dried hyssop, Caper root peel, Solanum alatum, Perissauchan, Vitex agnus-castus, Ruta seed	Powder	Take with Sekanjabin	(54)
14	Spleen	White mustard, Vitex agnus-castus, Trachyspermum, Fennel, Anisum, Dried Ruta, Dodder, Hyacinth, Rhubarb	Powder	Take with Sekanjabin	(19)
15	Spleen	Caper root, Ammmoniacumm, Sekanjabin, fig with grape vinegar	Immortal		(9)
16	Spleen	Mustard, Caper root peel, Netron, lime	Poultice	In the form of poultice with vinegar	(13)
17	Spleen	Caper root peel, dill seed, Orris, mustard, Myrrh	Poultice	In the form of poultice with honey	(13)
18	Spleen	Caper root peel, Dodder, chicory seed, pomegranate, wild chicory leaf,	Poultice	In the form of poultice with vinegar	(13)

		Solanum alatum			
19	Splenomegaly	Black fig in vinegar, Costus, bitter almond, Caper root, Scolopendre, Solanum alatum leaf, Tamarix, Ammoniacum	Poultice		(13)
20	Spleen	Caper root, Bdellium	Poultice	In the form of poultice with vinegar and rose oil	(13)
21	Obstructive jaundice without fever	Caper root, Cymbopogon Schoenanthus, Thyme, Absinthium, water corn, rose, Bdellium, Ammoniacum	Poultice		(19)
22	Spleen *	Caper root peel, celery, fennel root, Cymbopogon Schoenanthus, Anisum, currants, figs, Turbith	Enema	Sugar, boletus **, Armenian borax, almond oil	(13)
23	Liver and spleen obstruction	Caper root, celery root, fennel, Cymbopogon Schoenanthus, cranberry seed, Ruta, white Turbith		Rheum, Armenian borax, Netron, bitter almond oil	(13)
24	Liver and spleen obstruction	Formula of liver obstruction only: Caper roots, fennel, celery seed, Cymbopogon Schoenanthus, chicory		Absinthium wine	(21)

Table 3:

	Usage	Composition	Pharmaceutical form	Explanations	Reference
1	Dismissal of worms and insects	Caper root peel, Chinese rheum, burned Euphorbia milii, celery seed, polyporus off, clack salt	Pill		(13)
2	joint's pain	burned Euphorbia milii, aloe vera, celery seed, white polyporus off, borax, caper root peel, Chinese rheum	Pill	Mix with Salix water and Take with honey.	(13)
3	Headache	Caper root peel, Ammoniacum, Aristolochia, sweet costus, dried ruta, lemon balm seed	Tablet		(17)
4	Some types of headaches	Caper along with vinegar	Poultice		(19)
5	Some types of headaches	Caper root peel, Allium schoenoprasum, Euphorbia, Gum	Poultice	Use as poultice with basil wine. Best for headaches in the temporal region	(17)
6	Mass of the womb	Caper root peel, Cheese	Poultice	Use with honey.	(17)
7	kidney stone	Caper root peel, dill, cranberry, Carthamus seed, cabbage seed	Poultice	Use with jasmine oil.	(19)
8	Sciatica pain	Caper root peel, radish seed, water corn, Anamirta paniculata, Colchicum, Withania Somnifera, mustard, horseradish seed, castor oil	Enema	Mix with castor oil with a ratio of one to ten.	(19)
9	An auxiliary drug in some types of headaches	Caper root peel, Colocynth, Carthamus seed, Roman nattle, Lavender	Enema	Boletus and olive oil	(13)
10	Hip joint pain	Formula 1: caper root, Colocynth, water corn	Enema	With Sorrel and cresses and Commiphora opobalsamum	(13)
11	Hip joint pain	Formula 2: Caper root peel, Tribulus	Enema	Costus oil, Nardin, violet,	(13)

		terrestris, Carthamus tinctorious, dill, chamomile, Ruta, water corn, Foenugreek, Linum Usitatissimum, Senna, what bran, cumin		boletus, Armenian borax, cassia	
12	Gout and arthralgia	Caper root, Achillea millefolium, Aristolochia, fumitory, mustard leaf, water corn, thyme, colchicum, Colocynth, mezereum	Enema	Formula 2 and if not effective, formula 1	(55)
13	Gout, Arthralgia	Salt, bran, Tribulus Terrestris, Senna, dill, chamomile, Ruta, water corn, caper root peel, celery root, Foenugreek, cumin, borax	Enema	Along with sesame oil	(55)
14	Anti-parasite	Boiled Caper root	Enema	Boletus, olive oil	(13)

DISCUSSION AND CONCLUSION:

There were forms of medicine or what is referred to as the drug delivery system in traditional medicine books. By reviewing various sources of traditional medicine, there were various drug delivery systems in the pharmaceutical drug structure of Caper included smoke, chewing, primates, to the first generation of drug delivery, such as pills, creams and ... (57). Due to the mixing or manufacturing of products with certain drugs that are referred to as drug delivery, they have also used the fourth generation of drug delivery systems. This system is often supplied with vinegar and its derivatives in Caper pharmaceutical products. On the other hand, there are many similarities in the use of Caper drug combinations in traditional Iranian medicine with its wide application and effects in modern medicine. It seems that by combining traditional and modern methods and formulations, it is possible to take an effective step in the treatment of certain diseases. This article provides interested readers with useful backgrounds for these studies.

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