SHUKRALA (SPERMATOGENIC) POTENTIALITY OF MADHYAMA PANCHAMOOLA- A REVIEW

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ABSTRACT
Propagation of human race get affected by both male and female factors. Male infertility contributes 50% of total infertility. *Ksheenashukra* (Oligospernia) is one of the commonest conditions for male infertility caused by Vata pitta dosha. Ayurvedic approach to rectify pathology of *Ksheenashukra* is through *Vrushya* (Aphrodisiac), *Shukrajanaka* (Spermatogenic) *Shukravardhaka* (enhancing semen and sperm) *Shukrapravataka* (improve the ejaculatory process) and *Shukrala* etc pharmacological activities. The drug which enhances Shukra (Semen and Sperm) is named as Shukrala (Spermatogenic) activity. *Madhyama panchamooola* a group of drugs comprising of *Bala* (*Sida cordifolia*), *Punarnava* (*Boerhavia diffusa*), *Eranda* (*Ricinus communis*), *Mudgaparni* (*Teramnus labialis*) and *Mashaparni* (*Vigna trilobata*). Review of literature reveals that each of these drugs has *Balya* (Strength promoter), *Vrushya*, *Rasayana* (Rejuvenation), *Jeevaniya* (Life promoting) and *Shukrajanana* (Spermatogenic) properties. *Madhyama panchamooola* as a group not had been evaluated for its potentiality as *Shukrala* but each of them individually proven for antioxidant, spermatogenic, anti-diabetic and hepatoprotective activities. Phytoconstituents present in this viz., Ecdysterone, Boeravione, Rotenoids, Octacosanol, Vitexin, Quercetin and Bengerin have been confirmed for spermatogenic activity. Reactive oxygen species identified as cause for male infertility. Hence antioxidant is used as a source of treatment. Components of *Madhyama panchamooola* in addition to antioxidant activity have other required pharmacological activities in the management of *Ksheenashukra*. This review upholds the compatibility ingredients of *Madhyama pancha moola* to be potential *Shukrala* combination.

KEYWORDS: *Madhyama panchamooola*, *Shukrala karma*, Antioxidants, Spermatogenic activity.

INTRODUCTION
Infertility as a medical and social problem has acquired global dimension, and its incidence is supposed to be increasing by day and every decade. It is affecting global population about 8-12%[1]. Low sperm count (Oligospernia) and poor sperm quality are responsible for male infertility in more than 90% of cases[2]. *Vrushya karma* has been described as *Shukra janana* meaning any drug which helps for spermatogenesis[3]. Drugs with *Guru*, *Snigdha guna*, *Madhyama rasa*, *Brumhana*, *Balya* and *Harshana* activities said to have *Vrushya karma*[4]. *Madhyama panchamooola* is one of such combination having five drugs consisting of *Bala*, *Punarnava*, *Eranda*, *Mudgaparni* and *Mashaparni* mentioned for the first time by Acharya Vagbhata in *Astanga hrudaya*[5], *Bala* is *Vrushya*[6] *Punarnava* is *Rasayana*[7], *Eranda moola* is drug of choice for *Vrushya* and *Vatahara* activity[8], *Mudgaparni* and *Mashaparni* are grouped under *Jeevaniya* and *Shukravanana gana*[8,10]. The members of *Madhyama panchamooola* are used in various *Vrushya yogas* (Aphrodisiac formulations). The members of *Madhyama panchamooola* as a group not referred to as *Shukrala* in classics. Research updates are not available for this group till date. Therefore in this article an attempt is made to explore *Madhyama panchamooola* as a group for *Shukrala* activity.

OBJECTIVES
1. To explore the *Shukrala karma* of each drug in *Madhyama panchamooola*.
2. To establish *Shukrala karma* (Spermatogenic activity) of *Madhyama panchamooola*.

MATERIAL AND METHODS
Literary review of classical texts namely Charaka samhita, Sushruta samhita, Astanga hrudaya, Sharangadharas, Dhanvantari, Kavyadeva nighantu, Data base on medicinal plants and conventional system of medicine.
**Madhyama Panchamoola**

Categorization of Dravyas (Drugs) into smaller group based on morphology, property, action and parts used are listed in the texts. Group of five drugs under the head Panchakas like Kaniyaka, Bruhat, Valli, Kantaka and Truna panchamoola. The group of drugs in Madhyama panchamoola as mentioned by Vagbhata find their place as ingredients in Bramha rasayana explained by Acharya Charaka. Under the list of ingredients as one among Panchamoolas- ‘Punarnavam shurpararnau balamearadameva cha’ The commentator Gangadhara mentioned these as Vallipanchamoola.[11] Further Acharya Vagbhata had given the nomenclature as Madhyama panchamoola for this group and added Kaphavathara and Sara guna properties. The commentator of Astanga hrudaya Hemadri in his commentary Ayurveda Rasayana he named Madhyama panchamoola as Baladi panchamoola.[12] Afterwards Madhyama panchamoola name continued by later authors of Dhanvantari, Kaiyadeva nighantu etc.

**Bala (Sida cordifolia)**

Bala is country mallow belongs to Malvaceae family. It is an annual or perennial, short, erect grayish - green softly hairy or pubescent woody under shrub. Flower bisexual, light or sulphur yellow to cream white in colour. Its root contains ec dysone viz sidasterone A and B, Ephedrine, Vascinne, Vasicinol, Vasicinone, β sitosterol, stigmasterol and N-Methyl tryptophan. Its pharmacological actions include anti-inflammatory, hypoglycemic, immunostimulant, hepatoprotective, adaptogenic and antioxidant activities[13]. In vitro study of the aqueous extract of Sida cordifolia was significant in enhancement of sperm parameters[14]. Research formulation made from roots of Sida cordifolia and Glycyrrhiza glabra showed significant (p<0.05) therapeutic efficacy through enhancement in hormonal and seminal parameters validating its spermatogenesis effect without any toxic or adverse effects[15].

**Punarnava (Boerhavia diffusa)**

It is a spreading hog weed, perennial, diffusely branched prostate herb belongs to Nyctaginaceae family. Leaves ovate or oblong and cordate long petioled, flowers red, pink or white in small umbrellas. Root has large tuberous cylindrical to narrowly fusiform, conical tapering brown or brownish grey in colour,[16] The root contains Alanine, Arginine, Aspartic acid, Glutamic acid. Flavonoid derivatives quercetin, kaempferol and retenoids Boeravinone and possess antioxidant property[17], This plant rejuvenates liver, male reproductive system, aphrodisiac, increase quality and quantity of semen.[18] An experimental study revealed that B.diffusa leaf extract supplementation attenuates sodium fluoride (NaF) induced testicular impairment in rats.[19]

**Eranda (Ricinus communis)**

Tall annuals, sometimes shrubby or tree like leaves are alternate, broad palmately 5-11 lobed, serrate, flowers monoecious, in terminal sub paniculate racemes. The roots are light weight, profusely branched, outer surface yellowish brown, and rough due to presence of longitudinal wrinkles, odourless and granular fracture. It contains inorganic material like Potassium, Calcium, Sodium, magnesium, Iron, Aluminium, Gallotannins, ricintri glyceride, 3- acetoxyl acid, stigmasterol, ricinine, methyl-3-dihydroxy benzoate, galic acid, aleuritic acid, ethyl brevifolinacrylate, 9-hydroxytridecyl decosanote, lupeol, luteolin, palmic acid, octacosanol and octadecane[20]. Roots are anti-diabetic anti-inflammatory and antioxidant activities [21].

**Mudgaparni (Vigna trilobata Linn)**

A diffuse prostrate or trailing herb belongs to family Fabaceae. Leaves 3 foliate, leaflets membranous, shallowly lobed, middle lobe is largest. Flowers yellow in colour. It has phytochemicals like Dalbergiodin, kievitone, phaseollidin and flavonoid glycosides viz., Quercetin, Kaempferol, Vitexin, Isovitexin, friedelin, epifriedelin, stigmasterol, and tannins. The fruit of this plant contains proteins, minerals, and vitamin K and C. The bean contains...
methionine, tryptophan, and tyrosine and the seed protein bears lysine, valine, leucine and phenylalanine. It possesses hepatoprotective and antioxidant activities.[23]

Fig 7. Mudgaparni (Vigna trilobata) Fig 8. Mudgaparni root

Mashaparni (Teramnus labialis Spreng)

A widely spreading twining herb, stems slender more or less hairy belongs to Fabaceae. Leaves 3-foilate, flowers reddish. It has root with lateral roots occur in cylindrical, branched pieces, light brown to dark brown with longitudinal and transverse cracks lateral roots thin, smooth, moderately woody fracture short and laminated.[23] It contains Crude protein, fat, nitrogen free extracts, the essential amino acid, lysine, leucine, isoleucine, arginine, valine, and histidine, minerals such as potassium, magnesium, calcium and phosphorus also phenols, tannins, L-DOPA, Hydrogen cyanide phytic acid, flavonol glycoside, vitexin, bergenin.[24] A comparative clinical study on efficacy of Mashaparni and Kapikachu in Oligospermia has shown that both the drugs have equal effect in Oligospermia.[25]

Table 1: Properties and pharmacological actions of Madhyama panchamoolo drugs

| S.no | Name of the drug  | Properties                |
|------|------------------|---------------------------|
|      |                  | Rasa | Guna           | Veerya | Vipaka | Karma                                      |
| 1    | Bala             | Madhura | Snigdha, Pichhila | Sheeta | Madhura | Vatapittashamaka, Brumhana, Balya, Shukrala, Ojovardhana[26] |
| 2    | Punarnava        | Madhura | Tikta          | Laghu, Rooksha | Ushna | Madhura | Tridoshahara, Deepana Anulomana, Vrushya Rasayana[27] |
| 3    | Eranda           | Madhura | Snighda, Teekshna, Sukhma | Ushna | Madhura | Vatahara, Balya, Vrushya, Shukrashodhana[28] |
| 4    | Mudgaparni       | Tikta | Madhura        | Laghu, Rooksha | Sheeta | Madhura | Tridoshahara, Deepana, Anulomana, Jeevaneeya Shukrala, Vrushya[29] |
| 5    | Mashaparni       | Tikta | Madhura        | Laghu, Rooksha | Sheeta | Madhura | Vata pitta shamaka Deepana, Anulomana Balya, Jeevaniya Shukrajanana[30] |

Shukrala Karma

Vajikarana is composed of three fold actions; a) Shukra janaka b) Shukra pravartaka and c) Shukra janaka and Pravartaka.[31] Vrushya and Vajikarana terms are used for Shukrala karma.[32,33] Vrushya has been specified as Shukra janaka whereas Vajikarana has Shukra pravartaka actions.[34] According to Acharya Sharangadhara, Shukrala karma means the drug which increases the Shukra is called Shukrala.[35] In Kaiyadeva nighantu Shukrala is understood as Shukra janana which means spermtogenic activity.[36] Shukrala has varied activities, mainly comprise both Shukra janaka and Pravartaka.[37]

Antioxidant and Spermatogenesis

Antioxidants are molecules that fight against free radicles. Molecule that contain unstable oxygen can cause damage to cell are reactive oxygen species. High percentage of Reactive Oxygen Species (ROS) have been noticed in the semen samples of 25% to 40% of infertile men.[38] It damages the sperm plasma membrane that leads to loss of sperm motility and ability of sperm to fuse with oocytes resulting in infertility. Seminal oxidative stress is one of the main factors in pathogenesis of male infertility. Oxidative stress can be quantified by Malondialdehyde (MDA) and total antioxidant assay of the semen plasma. Antioxidants are most commonly used for oxidative stress-induced infertility. Clinical studies demonstrated that beneficial effect of oral antioxidant in male infertility.[39]
DISCUSSION

The ancient seers of Ayurveda have identified hundreds of pharmacological activities. Specific Karma mentioned in relation to Shukravaha srotas are Shukrakaranaka, Shukravardhaka, Shukraprada, Shukrashodhaka, Shukrastambhaka, Shukrechaka and Shukrala etc. The terms Vajikarana, Vrushya and Shukra are often used synonymously based on their applicability each one has specific meaning.

Vajikarana is one amongst branches of Ayurveda, which comprises multi therapeutic modalities. Vrushya is the word indicating pharmacological activities utilized in Vajikarana treatment. Shukrala is specific vital activity required in treating Shukradusti. Shukrala is having three fold activities namely Shukra janaka, Shukra pravataka and Shukra Janaka and Pravataka.

Drugs possessing these activities are named as Shukrala drugs. Madhyama panchamoola term given to group consisting of Bala Punarnava, Eranda, Mudgaparni and Mashaparni. All these drugs commonly having Madhura rasa and Madhura vipaka. Bala, Mudgaparni and Mashaparni are Sheeta veerya drugs where Punarnava and Eranda are Ushana veerya. Bala, Eranda and Masha parni are Vatapittahara, Punararava and Mudgaparni are Tridosahahara. These five drugs have action on Shukravaha srotas with Eranda has Shukrashodaka Mashaparniand Mudgaparni are Shukrakaranaka. Except Eranda all four drugs are Rasayan. Mudga parni, Mashaparni and Punarnava have Deepana activity too.

Dathu parimana (metabolism) is the key factor in production of Shukra which depends upon Agni. The mental factors for Shukrapravatana influenced by Vata Pitta dosha and Bala. Thus Shukrala has sub pharmacological activities like Deepana, Jeevaniya, Bhrumhana, Balya, Harshana, Shukrajanan, Shukra shodhana and Tridosahara and Vatapitta shamaka etc. Drugs in Madhyama panchamoola collectively have all these requisite pharmacological actions.

It is established that spermatogenesis requires antioxidants. These drugs are proven antioxidants and also these drugs rectify impairment of seminal parameter and libidinal functions. Madhyama panchamoola as a group can be potential Shukra.

CONCLUSION

Drugs of Madhyama panchamoola individually potent and have proven effect for Shukrala and antioxidant activity. With the variant of additional pharmacological activities Madhyama panchamoola can be potential Shukrala combination.

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Cite this article as: Nagendra Chary,M, Lalitha B.R, T.Anil Kumar. Shukrala (Spermatogenic) Potentiality of Madhyama Panchamoola- A Review. International Journal of Ayurveda and Pharma Research. 2020;8 (12):25-30.

Source of support: Nil, Conflict of interest: None Declared

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