Ayurvedic, Phytochemical, Therapeutic and Pharmacological overview for Kapikacchu (Mucuna pruriens Linn.)

Pansare. T. A¹, Sadabal. B. G²
Associate Professor¹, PF Scholar²
Department of Dravyaguna
Government Ayurvedic College, Osmanabad, Maharashtra, India

Abstract:
The field of herbal medicine is getting popularized both in developed and developing countries in the last few decades as the herbal medicines are cheap and have natural origin with higher safety margins with lesser or no side effects. Ayurveda consisting of treasure of important information about medicinal plants is one of the supreme gifts of ancient India to the mankind. Kapikacchu (Mucuna pruriens Linn.) belonging to Fabaceae family is popularly known as ‘Magic bean’ in Indian System of Medicine. It is commonly used in Ayurveda for its potent Vrishya (aphrodisiac) and Balya (tonic) activities. It is a well known herbal drug utilized for the management of male infertility, diabetes mellitus, cancer and nervous disorders. It is the most excellent natural source of the amino acid L-3,4-dihydroxy phenyl alanine (L-DOPA) which is the direct precursor to the neurotransmitter dopamine, extensively used in the treatment of Parkinson’s disease. Besides L-DOPA, serotonin, oxtiriptan, nicotine, N,N-DMT, and bufotenine are the other chemicals found in this plant. It possesses multi-dimensional pharmacological actions like Aphrodisiac, Anti-oxidant, Anti-diabetic, Hypo-glycaemic, Neuro-protective, Anti-microbial, Anti-protozoal, Anti-depressant, Anti-tumor, Anti-proliferative, Anti-cancer, Analgesic, Anti-inflammatory, Anti-pyretic, Anti-fungal, Anti-inflammation, and Antiparkinson’s activities. An overview of Ayurvedic information of Kapikacchu, its chemical constituents and pharmacological activities are summarized in the present paper. This review highlights the importance of Kapikacchu on the basis of ayurvedic and modern aspect to provide useful information for future scope of research on this valuable plant.

Keywords: Kapikacchu, Mucuna pruriens, pharmacological, phytochemical, Vrishya.

I. INTRODUCTION

Plants play an important role in maintaining human health and improving quality of life. The complexity in formulating chemical based drugs in addition to their health related side effects and uprising cost has led global researchers to focus on medicinal plant research. Ayurveda is a wide-ranging scientific system of medicine evolved in India. Kapikacchu (Mucuna pruriens Linn.) is a nutritive tonic generally used in Ayurveda as an aphrodisiac and to support proper function of the reproductive system. It boosts sexual energy and strengthens and tones the reproductive organs. Kapikacchu sustains potency, stamina and control in male. It augments the sperm count by improving the testosterone level. It supports a healthy libido and fertility in female. Kapikacchu is an agent that aids the body in building up the mass with endurance and also helps the body to enhance the muscular strength.

The vitality imparted by Kapikacchu nourishes the whole body and calms the nerves making it an outstanding rejuvenator for vata. It is also natural source of levodopa (L-Dopa) which is an important precursor to the neurotransmitter dopamine, widely used in the treatment of Parkinson’s disease. This herbal drug is used for the treatment of male infertility, diabetes mellitus, cancer and nervous disorders. Serotonin, oxtiriptan, nicotine, N, N-DMT, and bufotenine are the other chemicals also found in this plant. So, it can be proved that this magic bean performs multidirectional work. This review provides broad and distinctive information about ayurvedic and modern aspect of kapikacchu under one umbrella which will be useful to researchers and pharmaceutical industries to develop the pharma worth of this marvel drug.

II. AYURVEDIC ASPECT

Niruki (Etymological derivation) of Kapikacchu
Kapi: - It causes purities for monkeys if monkeys sit on the trees where this creeper is twining around the stem, the pods may produce itching (Kacchu) on hip of monkeys.¹¹

Synonyms- The drug has roma (hairs) on its pods and the monkeys also have hair on their body. Due to this similarity of roma (hairs), various synonyms are given to Kapikacchu [²³]

Pradhan Nama (Main Name)- Kapikacchu (Causes itching to monkeys also, Atmagupta.( Protects self with the help of its hair))

Synonyms on basis of various factors
Upma (Representive)-
Markati, Vanari,Kapiloma, Kapi- Hairy like monkeys tail.
Kapiromphala-Pod hair like that of monkeys hairs.
Svarupa(Morphology)
Roma- hairy pod
Valli-It is a Climber
Shuka shimbi-Pods with hairs
Durabhiragra-The fruits are difficult to handle
Vyango-Fruits are curved
Vanshakari- Climber grows widly

Karma (action) -
Sadyashoth Due to itching, it produces immediate inflammation

Vrishya-Seeds act as aphrodisiac
Kacchura, Kendura -Causes itching

Vernacular names [³]
Sanskrit - Atmagupta, Kapikacchu, Kapiloma, Kapi, Markati, Vanari
Hindi - Kevanch, Kaunch, Gonca

**Gujarati - Kavach**

**Marathi - Khajal-Kuhali**

**Tamil - Amudari, Poonaikkaali**

**Telegu - Pilli-addu**

**Kannada - Nasugumni**

**Malayalam - Nayakkuruma**

**Bengali - Alkushi**

**English name - Cowhage, Horse-eye Bean, Velvet bean, Cowitch**

**Unani name - Konch**

**Trade name - Koncha, Kaunch beej**

**III. TYPES OF KAPIKACCHU**

Two types of Kapikacchu Bijare described as wild and cultivated. Wild variety has better utility in clinical practice than cultivated. According to seed colour, two types are explained by some authors as Shweta Bijare (white seed) and Krishnahbi (Black seed).

**Prayojyanga of Kapikacchu (Useful part)**

Seed, Root, Pod Hairs, Leaves, Flower

**HABITAT**

It is found wild throughout India from Himalayas to cape camorin in the plain district and up to 3000ft. elevation in the hills. It is common in Bengal, Assam, Khasi hills and Deccan as well as in the east and west coast region.

**Raspanchak**

Rasa: Madhura and Tikta rasa

Virya: Ushna

Vipaka: Madhura

Guna: Snigdha.

**Classification of Kapikacchu**

Samhitas and Nighantus have classified Kapikacchu in different Ganas or Varga (groups) as following:

- Charaka Samhita
- Vangasena Samhita
- Madana kamadeva rasa
- Rativallabha modaka
- Shatavari modak
- Ashwagandha ghrita
- Vanari vatika
- Priya Nighantu
- Nighantu Aadarsch
- Laaghutrayi and Chikitsa grantha

Like in Samhitas, Kapikacchu is also mentioned in Chikitsa granthas as a synonyms viz Atmaagupta, Kundura etc. and in the management of several diseases.

**Chakra Datta (Chakrapani in 11th Cent A.D.)**

Kapikacchu is mentioned for different diseases apart from its vajikarana activity along with other drugs. For Vatavyadi Balamuladi Nasya, Chatushtayam Mashadi Kashaya (Maha Baladi kwath) (C.D.22-27, 28) were used. Svayamgtudi leha in Mutraghata (C.D.33-17,18); Svayamgtudi churana, Goksh uraad churana and Godhumadihya ghrita used for Vrshiya (C.D.67/6; 66/26-34; 67/26-36).

**Vangasena Samhita**

Kapikacchu is mentioned in Vajikarana activity along with other drugs such as Brihat Aswagandhadhi ghrita (V.S.84/22-27); Medicated Ghrita (V.S.84/65-66); Gokshura Kapikacchu beeea siddha ksheera (V.S.84/73); Masha Ghrita (V.S.84/75-79); Godhumadi Ghrita (V.S.84/80-89) and Jeevanti Yamaka indicated in Anuvasana, Nasya, Panaarth, Urdhva jatraguta roga (diseases of head and neck, throat) (V.S.84/93-95).

**Yoga Ratnakar**

In this text, Kapikacchu is described in Uttarakhanda, Vajikarana adhyaya. Preparations and indications in which Kapikacchu is mentioned for Vajikarana purpose like Vanari gutika (Y.R.Ut.11/27-31); Kesar paka (Y.R.Ut.11/49-56); Rati modaka (Y.R.Ut.11/57-60); Kameshwar modaka (Y.R. Ut.11/68); Kameshwar samdi paka modaka (Y.R.Ut.11/77-83). Madana kamadeva rasa (Y.R. Ut. 11/117); Rativialabha Pugapaka (Y.R. Ut. 11/61,67); Satavaryadi churana (Y.R. Ut. 11/146); Kapikacchu paka (Y.R. Ut. 11/156-160).

**Bhaishajya Ratnavali**

Kapikacchu preparations along with other drugs such as Gokshuradi yoga (B.R. 70/15); Godhumadya ghrirtam (B.R. 70/18); Brihadawagandha ghrirtam (B.R.70/19); Briccha taviari modaka (B.R.70/21-24); Rativialabha modaka (B.R.70/25); Mahakameswara modaka (B.Ra,70/26); Kamagni sandipana modaka (B.R.70/27); Mamadhhabha rasa (B.R.70/29) were used in vajikarana activity. Preparation of Savyam gupta, Ikshuraka yoga used in Dhaatuksahaya (depletion of body tissues) (B.R.70/14). Preparation like Yavana krit yoga (Mophura-Mopharava) was consumed by Kings for vrishya purpose and also in all diseases (B.R.70/30).

**Gada Nigrah**

Gada Nigrah mentioned different yoga (formulations) of Kapikacchu for Vajikaranaartha such as Mashi Ghrirtam (G.Ni.9-12); Vajikarapayas Yoga (G.Ni.14); Vajikaram Masha parnyadi churnam (G.Ni.16); Vajikaram Swayamguptadi churnam (G.Ni.19; G.Ni.29); Vajikaram Swayamguptadi Modakam (G.Ni.31-35,37); Vajikaram Sharmuladi Yoga (G.Ni.40-42); Vajikari Godhumadi Pupalika (G.Ni.43-44); Vajikarak Ikshuraki Churnam (G.Ni.49).

**Harita Samhita**

Harita Samhita mentioned preparations (formulations) of Kapikacchu like Visadi churana (H.Sa.47/9); Godhumadhya ghrita (H.Sa.47/13,14) for Veerya vardhaka and Vajikaran.

**IV. IMPORTANT FORMULATIONS**

- Brihat Masha Taila
- Vanari vatika
- Ashwagandha ghrita
- Shatavari modak
- Kameshwar modak
- Mahakameshwar modak
- Rativialabha modak
- Godhumadya ghrita
- Mopharava

**THERAPEUTIC USES**

Kapikacchu is useful in Vatavadyadi (disorders of Vata). Seeds of Kapikacchu help in making nervous system work to the optimum levels. They are very helpful in increasing the muscle mass of the body naturally. They are very much useful in increasing the sperm count when used with milk and sugar. They increase the stamina of the body. They significantly ameliorate psychological stress and seminal plasma lipid peroxide levels along with improved sperm count and motility. Seeds are astringent, laxative, anemhlimtic, aphrodisiac, alexipharmic and tonic. They are useful in gonorrhea, consumption, sterility and general debility. Its roots are bitter, sweet, thermogenic, emollient, stimulant, purgative,
aphrodisiac, diuretic, emmenagogue, anthelmintic, febrifuge and tonic. They are used in vitiated conditions of vata and pitta, constipation, nephropathy, stranguary, dysmenorrhoea, amenorrhoea, elephantiasis, dropsy, nephropathy, ulcers, helminthiasis, fever, cholera and delirium. They are useful in hemiparesis and facial palsy. Leaves of Kapikacchu are aphrodisiac, antihelmintic, tonic and are useful in ulcers, inflammation, and general debility. Pods are used as anti helminthic. The hairs of legumes and flowers are vermifuge to expel ascarids.[38-39] Seed powder is useful in Parkinson disease.[32] Seeds are useful in Avabahutka (Frozen shoulder). An ointment prepared with pod hair acts externally as a local stimulant to vesica.[33] Pod hairs are useful in krimi.[34-35] The hair on fruit of Kapikacchu along with jiggery is beneficial in worm. Mucuna is also traditionally used in various other applications like dye[36] treatment of pain and numbness of joints and irregular menstruation.[37]

DOSE – Seed powder 3-6 g.

V. MODERN CLASSIFICATION –

Scientific classification[30]

Botanical name- Mucuna pruriens

Kingdom- Plantae

Division- Magnoliophyta

Class- Magnoliopsida

Order- Fabales

Family- Fabaceae

Trib- Phaseolae

Genus- Mucuna

Species- Mucuna pruriens (L.)

Morphology –

The plant is an annual, climbing shrub with long vines that can reach over 15 m in length. When the plant is young, it is almost completely covered with fuzzy hairs, but when older, it is almost completely free of hairs. The leaves are tripinnate, ovate, reverse ovate, rhombus-shaped, or widely ovate. The sides of the leaves are often heavily grooved, and the tips are pointy. In the young plant, both sides of the leaves have hairs. The stems of the leaflets are 2-3 mm long, and additional adjacent leaves present are about 5 mm long. The flower heads take the form of axially arrayed panicles. They are 15-32 cm long and have two to three or many flowers. The accompanying leaves are about 12.5 mm long, the flower stand axes are from 2.5 to 5 mm. The bell is 7.5-9 mm long.

Phytochemical screening -

It contains Alkaloids, Reducing sugar, Anthraquinones, Flavonoids, Saponins, Tannins, Cardiac glycosides, Phenols and Steroids.[30] Seeds of Mucuna pruriens generate the unusual nonprotein amino acid 3-(3, 4-dihydroxyphenyl)-1-alanine (L-Dopa). [31] It also contains Glutathione, Gallic acid and Betasitosterol. It has unidentified bases like Mucunine, Mucuna and dine, Prurienine and Prurieninine. Other bases and Betasitosterol. It has unidentified bases like Mucunine, alanine (L-Dopa).

Unusual nonprotein amino acid 3-(3, 4-dihydroxyphenyl)-1-methoxyharman. Serotonin is present in pods. Seeds contain oil including Palmitic stearic, Oleic and linoleic acids.[33] GC-MS analysis showed the presence of photochemicals like-n-hexadecanoic acid (48.21%), squalene (7.87%), Oleic acid (7.62%) and ascorbic acid (3.80%), Octadecanoic acid (6.21%) were present in the extract.[34] The leaves contain about 0.5% L-DOPA, 0.006% DMT, 0.0025% 5-MeO-DMT and 0.003% DMT n-oxide.[35]

Pharmacognostical studies[36]

a) Macroscopic:

Seed ovoid, slightly laterally compressed, with a persistent oblong, funicular hilum, dark brown with spots; usually 1.2-1.8 cm long, 0.8-1.2 cm wide, hard, smooth to touch, not easily breakable; odour, not distinct; taste, sweetish-bitter.

b) Microscopic:

Mature seed shows a thin seed-coat and two hard cotyledons; outer testa consists of single layered palisade-like cells; inner testa composed of 2 or 3 layers, outer layer of tangentially elongated, ovoid, thin-walled cells, inner 1 or 2 layers of dumb-bell or beaker-shaped, thick-walled cells; tegmen composed of a wide zone of oval to elliptical, somewhat compressed, thin-walled, parenchymatous cells; some cells contain starch grains; cotyledons poised of polygonal, angular, thin-walled, compactly arranged, parenchymatous cells, containing aleurone and starch grains; starch grains small, simple, rounded to oval measuring 6-41 μ in dia., but not over 45 μ in dia.; a few vascular bundles with vessels showing reticulate thickening or pitted present.

Powder - Pale cream coloured; shows fragments of testa with palisade-like cells thin walled parenchyma, reticulate and pitted vessels, aleurone and starch grains small, simple, rounded to oval measuring 6-41 μ in dia., but not over 45 μ in dia.

IDENTITY, PURITY AND STRENGTH -

Foreign matter , Not more than 1 Per cent, Appendix 2.2.2

Total ash, Not more than 5 Per cent, Appendix 2.2.3

Acid-insoluble ash, Not more than 1 Per cent, Appendix 2.2.4

Alcohol-soluble extractive, Not less than 3 Per cent, Appendix 2.2.6

Water-soluble extractive, Not less than 23 Per cent, Appendix 2.2.7

Fixed oil, Not less than 3 Per cent, Appendix 2.2.8

PHARMACOLOGICAL ACTIONS:

Aphrodisiac Activity:

In this study Kapikacchu Churna effectively raised the sperm count. The results on sperm count found highly significant. It also showed good improvement in other seminal parameter like Volume of semen, Ph of semen, motility of sperms etc. It showed mild significant result in Non progressive sperm (NP) and Not significant in Slow linear progress of sperm (SLP). It also significantly increased the sexual desire, penile rigidity, erection and duration of ejaculation with orgasm.[37]

Effect on Fertility:

Mucuna pruriens improves male fertility by its action on the hypothalamus-pituitary-gonadal axis. M. pruriens significantly improved serum testosterone, luteinizing hormone, dopamine, adrenaline, and noradrenaline levels in infertile men and reduce the levels of follicle stimulating hormone (FSH) and prolactine hormone (PRL). Sperm count and motility were significantly recovered in infertile men.[38] The quality of seminal changes due to psychological stress was assessed after treating the case with M. pruriens seed powder at 5g/ day orally. For carrying out morphological and biochemical analysis, semen samples were collected twice, first before starting the treatment and second after 3 months of treatment.
The results demonstrated the decreased sperm count and motility in subjects who were under psychological stress. Moreover, serum cortisol and seminal plasma lipid peroxide levels were also found elevated along with decreased seminal plasma glucose levels (GSH) and ascorbic acid contents, reduced superoxide dismutase (SOD) and catalase activity. Treatment with M. pruriens significantly ameliorated psychological stress and seminal plasma lipid peroxide levels along with improved sperm count and motility. Treatment also restored the levels of SOD, catalase, GSH and ascorbic acid in seminal plasma of infertile men. M. pruriens not only reactivates the antioxidant defense system of infertile men but also helps in the management of stress and improves semen quality. The effects of M. pruriens on the gonads of male Guinea pigs were investigated and found to be the potential male anti-fertility agent even at a lower dosage of 70mg/kg. The methanolic extracts of M. pruriens significantly increased the relative weight of the testis, serum and testicular testosterone level, testicular cholesterol level, protein level in the testis and epididymis, and epididymal alkaline phosphatase activity.[39]

Antioxidant Activity:
The various parts of this plant contain total phenols which might have antioxidant activity. The similar findings were observed for this plant where free radical scavenging activity was evaluated via nitric oxide scavenging method. The alcohol extract showed significant antioxidant activity which was comparable with standard ascorbate and total phenol content.[40]

Antiparkinson’s Activity:
Its seeds contain levodopa, a direct precursor of the neurotransmitter dopamine; it has shown to be as effective as pure levodopa /carbidopa in the treatment of Parkinson’s disease.[41]

Hypoglycemic Activity:
The hypoglycaemic activity of seeds aqueous extract was evaluated using streptozotocin induced diabetic, normal and glucose load condition rat models. The seed extract of M. Pruriens at doses of 100 and 200mg/kg body wt. reduced oral glucose load from ~ 127 to 75mg% after 2 h of oral administration. In another experiment there was reduction of blood glucose from ~ 250 to 90mg % in streptozotocin diabetic rats after 21 days. The investigation suggested that the antidiabetic activity may be due to its dietary fiber content.[43]

Antidiabetic Activity:
Mucuna pruriens makes seed is significant in the management of stress and improves semen quality. The effects of M. pruriens on the gonads of male Guinea pigs were investigated and found to be the potential male anti-fertility agent even at a lower dosage of 70mg/kg. The methanolic extracts of M. pruriens significantly increased the relative weight of the testis, serum and testicular testosterone level, testicular cholesterol level, protein level in the testis and epididymis, and epididymal alkaline phosphatase activity.[39]

Antimicrobial Activity:
The methanolic extract at whole plant had antimicrobial properties against gram +ve and gram -ve organism. This extract is mainly effective against Escherichia coli, Salmonella typhi, Bacillus subtilis and Shigella dysenteriae. The antimicrobial potency was evaluation by zone of inhibition (ZI) where Escherichia coli showed higher ZI (2.8cm) than Bacillus subtilis ZI (2.1cm).[44]

Antivenom activity:
Fung et al (2010) investigated antivenom activity of seeds where there was reduction in neuromuscular and cardiovascular depressant effects of Naja Sputatrix venom in rats which was pretreated with M. Pruriens seed.[45] The same group of researchers also described similar effects against Calloselasma rhodostoma venom. Where M. Pruriens aqueous extract was given intra-peritoneal for 3 weeks. After 3 weeks, Calloselasma rhodostoma venom was administered intravenous and studied various pharmacology parameters like blood pressure, heart rate, respiratory rate and muscle twitch tension in rats. All pharmacological responses were found to be decreased in treated groups with respect to control group. Seed part showed strong antivenom activity which might be due to presence of higher amount of phytochemicals.

Anti-diabetic Activity:
The presence of these cyclotol is of interest due to the insulin-mimetic effect of d-chiro-inositol, which constitutes a novel signaling system for the control of glucose metabolism.[37,43] M. pruriens seeds are used at a dose of 500 mg/kg to reduce plasma glucose level.[44] These and other data demonstrated that the amount of seeds necessary to obtain a significant antidiabetic effect contain a total of approximately 7 mg of d-chiro-inositol. The antidiabetic properties of M. pruriens seed ethanol/water 1:1 extract are most likely due to d-chiro-inositol and its galacto derivatives. The seed extract of M. pruriens at doses of 100 and 200 mg/kg body weight reduced oral glucose load from ~127 to 75 mg % after 2 h of oral administration. In another experiment, there was reduction of blood glucose from ~250 to 90 mg % in streptozotocin diabetic rats after 21 days. The investigation suggested that the antidiabetic activity may be due to its dietary fiber content.[43]

Neuro-protective Activity:
Reports suggested that the seed powders of Mucuna pruriens are more beneficial to Parkinson’s patients than the synthetic drug, when it is used for long term.[46] An n-propanol extract of M. pruriens seeds yields the highest response in neuro-protective testing involving the growth and survival of DA neurons in culture. Interestingly, n-propanol extracts, which contain a negligible amount of L-DOPA, have shown significant neuro-protective activity, suggesting that a whole extract of M. pruriens seeds could be superior to pure L-DOPA with regard to the treatment of Parkinsonism. The dopamine content in brain tissue is reduced when the conversion of tyrosine to L-DOPA is blocked. L-DOPA, the precursor of dopamine, can cross the blood-brain barrier and undergo conversion to dopamine, restoring neurotransmission.[5]

Anti-depressant activity:
The anti depressant activity by M. pruriens in acute and chronic model of depression was studied. Psychopharmacological investigation involved treatment (14 days) of M. pruriens in forced swim test (FST), tail suspension test (TST) in mice and olfactory bulbectomy in rats, respectively. With dose of Mucuna (10-20 mg/kg i.p.) significantly enhanced the anti-depressant action of fluoxetine and bupropion in mice FST and TST respectively. Potentiation of 5-Hydroxytryptophan induced head twitches response (in mice) and reversal of reserpine induced hypothermia (rats) were observed at same dose level. Further, the behaviour anomalies exhibited by olfactory bulbectomised rats (OBX) were attenuated by chronic Mucuna treatment as observed in open field.[43]

Anti-protozoal effect:
Methanolic extract of leaves of Mucuna pruriens has the potency to eradicate Lichthryphiilus multifilis infection (90%) in gold fish after treatment in baths of plant extracts at 200 mg/ liter and parasite induced fish mortality was reduced significantly [47].

Anti-tumour activity:
The anti-tumour effect of methanolic extract of Mucuna pruriens seed against Erlich Actes Carcinoma (EAC) bearing Swiss albino mice were studied.[48] The effect of the methanolic extract of M. pruriens seed in mice with respect to delayed hypersensitivity reaction (DTR), primary and secondary antibody response and in vivo inflammatory response to delayed type hypersensitivity reaction (DTR) was evaluated.
leucocyte mobilization, respectively and hence, *M. pruriens* can probably influence immune response in mice [49].

**Anti-proliferative activity:**
The anti-proliferative potential of aqueous leaf extract of *Mucuna pruriens* was evaluated on 7, 12 dimethyl benzenean thracene (DMBA)-induced-breast cancer in female albino rats [50]. Both the Ethyl acetate and Methanol extract of MP seed had antiproliferative effect in Huh-7 cells. Later, cytotoxicity assay on THLE-2 cells revealed that the ME extracts expressed less toxicity on normal human hepatocytes using MTT reagent [51]. The Antiproliferative action of isolated M1 (6, 7-dimethoxy-1, 2, 3, 4- tetrahydroiso quinoline-3-carboxylic acid) from *M. pruriens* seeds using human hepatic carcinoma cell line (Huh-7 cells). Initially, docking studies was performed to find out the binding affinities of M1 to caspase-3 and 8 enzymes. M1 possessed antiproliferative activity on Huh-7 cells (EC50 = 13.97 μM) and inhibited the action of caspase-8 enzyme, signified process of apoptosis. M1 was active against Huh-7 cells that may be useful for future hepatic cancer treatment [52].

**Anti-cancer activity:**
The study was made in comparison between the anticancer potential of different extracts of *M. pruriens* seeds in vitro against sertoli (GC) prostate cancer and ZR-75 breast cancer cell lines was investigated. In the term of half maximum inhibitory concentration (IC50), or cytotoxicity, cell viability count, and growth inhibition of both cell lines at different concentration of each extracts. The MEMP (IC50-14.74 μg) and PEMP (IC50-15.50 μg) was found more cytotoxic than AEMP (IC50-16.64 μg) against GC cells, but MEMP (IC50-15.06 μg) and AEMP (IC50-15.35 μg) was more cytotoxic than PEMP (IC50-16.63 μg) against ZR-75 cells. (Sanjeev Soni et al., [53]) the reports that acute systematic toxicity and tropical of melatonin extract of *M. pruriens* seeds on albino mice and rabbits respectively [54].

**Antimicrobial activity:**
*Mucuna pruriens* is also used for antimicrobial properties for extracting plant metabolites against plant pathogenic bacteria and fungi [50]. The methanolic extract of *M. pruriens* of whole plant had antimicrobial properties against gram +ve and gram -ve organism This extract is mainly effective against *Escherichia coli*, *Salmonella typhi*, *Bacillus subtilis* and *Shigella dysenteriae*. [57].

**Anti fungal activity:**
It has anti fungal activity against *Curvularia lunata*, *Fusarium oxysporum*, *Pencillium expansum*, *Rhizoctonia solani*, *Tiarosporella phaseolina*, *Ustilago pomaydis* was shown by *M. pruriens* extracts. *M. pruriens* extracts possess the various degrees of significant inhibitory effect against the tested organisms [58].

**Alternative Food/Feed Perspectives and cultivation:**
*Mucuna pruriens* (velvet bean) are important feed resources, as they are high in protein, total ash and phosphorus [44, a]. The proximate nutritional composition, total protein content and in vitro protein digestibility of *M. pruriens* seeds is analogous to other edible legumes. Physical and biochemical methods used to process *M. pruriens* beans include soaking, cooking, dehulling followed by drying and milling into flours.

**Steroidal activity:**
MP has been recognized as an aphrodisiac agent. The plant and its efficacy in treating sexual disorder has been documented in ayurveda [44-a]. It has reported that the number of spermatozoa increases when the rats were treated with bark extract of MP. Further, it has been reported that the sexual and androgenic activities in adult male rats were sustained while improving the mass of the muscles [44-b]. sexual behaviour tests showed that the ethanolic seed [44-c] extract of MP possesses significant sexual function enhancing activity Mating behaviour test revealed that the test drug at a dose of 200mg/kg significantly increased the MF, IF and EL in all the experimental days when compared to control. The effect on potency was evaluated by testing the effect of the drug on the frequency of penile reflexes such as E, QF and LF. For penile erection, a well-coordinated system of vascular, endocrine and neural networks are required. Hence, a drug that brings about changes in erection and sexual behaviour would induce changes in neurotransmitter levels or at cellular levels.

**VI. CONCLUSION**
This article provides the knowledge of the drug passed on through ancient epoch till modern era. In Ayurveda it is used mainly for its *Vrishya (aphrodisiac)* and *Balya (tonic)* properties. Studies have also shown that natural source of L-DOPA, which is a precursor for dopamine, used in neurotransmitter diseases, is more powerful than synthetic product. Besides L-DOPA, it is reported to possess bioactive compounds like serotonin, oxitriptan, nicotine, N,N-DMT bufotenine and many other compounds which are confirmed to have diverse pharmacological activities like anti-oxidant, anti-diabetic, hypo-glycaemic, Neuro-protective, anti-microbial, anti-protozoal, anti-depressant, anti-tumor, Anti-proliferative, anti-cancer, Analgesic, anti-inflammatory, anti-pyretic, anti-fungal, Antivenom, Antiparkinson’s and Aphrodisiac activities and many other activities. Not only the seed, but the whole plant viz root, leaves, flower, pod hair also have certain medicinal properties. Therefore, it offers a scope for further research to investigate the therapeutic applications of all parts of this wonder drug. Furthermore, it is essential to make the most of the total latent of the drug from different *Mucuna* species.

**VI. REFERENCES**
[1]. Dravya Guna Vijyana: - P.V. Sharma, Part 1, 2 Ed. 1998. 569-571
[5]. Kaviraj Atridev Gupta, Astanga Sangraha, with Hindi Commentary Chaukhambha Sanskrit Sansthana, Varansi, Reprint 569-571.


[22]. Sharma PV., “Cakradatta”, Varanasi; Chaukhambha Oriental, 1994, Vrushyadhihika, 66/6, 9; 26-34.


[33]. Gogate VM, Ayurvedic Pharmacology and Therapeutic Uses of Medicinal Plants (Dravyagunavidnyan), Mumbai; Bharatiya Vidhyabhaban (SPARC), 2000; 329-331.


[38]. http://en.wikipedia.org/wiki/Mucuna_pruriens


[40]. Prof. Siddhinandan Mishra, Bhaishiyaratnavali with Hindi Commentary Siddhiprada, Chaukhambha Surbharti Prakashan, Varanasi 2011, 1141-1149


[44].(c)- Parakh, 1978; Amin et al., 1996.

[46]. API volm II part 3

[47]. Dr. Suresh R. Jadhao, “Physiological study of Shukravaha Srotas and clinical study of kapikacchu Churna in Klaibya with special Ref. to oligozoosperminia” (Thesis), PG Dept. Of Sharir kriya, NIA Jaipur 2013: 141-145


[57]. Ekanem AP, Obiekezie A, Kloas W, Knopf K. Effects of crude extracts of Mucuna pruriens (Fabaceae) and Carica papaya (Caricaceae) against the protozoan fish parasite Ichthyophthirius multifiliis. Parasitol Res.2004; 92: 361-366


