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Review Article

Dynamism of Chanaka (*Cicer aritienum Linn.*) for Human Health: A Review

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Abstract Chanaka or Chick pea is an old world pulse and considered to be better than other pulses because of good source of carbohydrate and protein, and protein quality is considered to be better than other pulses. It has significant amount of all the essential amino acids. It is rich in unsaturated fatty acids such as linoleic and oleic acids. Beta-sitosterol, campesterol and stigmasterol are important sterol present in Chanaka. According to contemporary research based studies show that chick pea fiber source-lowering the risk of cardiovascular disease, diabetes, obesity and other lifestyle disorders. Ancient lexicons say that it is the best among all grams and advocates its use on daily basis. Review on Chanaka (*Cicer arietinum* Linn.) was collected from Kosha, Nighantus and data search on the basis of their synonyms and pharmacological properties. This review throws light on some of the important aspect of Chanaka as an effective health promoter as well as its uses in various lifestyle disorders, which will be more valuable for future researchers and practitioners.
Keywords: *Ayurveda; Bengal gram; Cardiovascular disease; Health; Lifestyle disorders*

1. Introduction

Proper diet is an integral part of Ayurvedic dietetics. Ayurveda provides the first approach that can be helpful in creation and maintenance of perfect health and to alleviate the symptoms of illness. Among three sub-supporters (Ahara~Balanced diet, Nidra~Proper sleep and Brahmacharya~Absitence) Ahara~Balanced diet is the first and foremost pillar of Ayurveda. According to W.H.O., balanced diet that contains the proper proportions of carbohydrates, fats, proteins, vitamins, minerals and water necessary to maintain good health. Ahara is fundamentally preventive in nature and enhances vitality, strength and makes the body sturdy. So the method and quality of taking food should be systematically as described in Ayurveda (Kashinath and Gorakhnath, 2010).

Chanaka (*Cicer arietinum* Linn.) also called as Chick pea or Bengal gram or Garbanzo bean, is a popular lentil in India. Globally, it is mostly consumed as a seed food in several different forms and preparations are determined by ethnic and regional factors (Muehlbauer and Tullu, 1997; Ibrikci et al., 2003). In the Indian subcontinent, Chanaka is split (cotyledons) as dhal and pulverize to make flour

(besan) that is used to prepare different snacks (Chavan et al., 1986; Hulse, 1991). In other parts of the world, especially in Asia and Africa Chanaka is used in soups/salads and consumed in roasted, boiled, salted and fermented forms (Gecit, 1991). These different forms of consumption provide valuable nutrition and potential health benefits. Chanaka has been consumed by humans since ancient times owing to its good nutritional properties. Furthermore, it is of interest as a functional food with potential beneficial effects on human health. In spite of these nutritional properties it has not received due attention for research like other founder crops (e.g. wheat or barley). There is limited information relating to its review and nutritional components to health benefits. This paper attempts to review the literature regarding the nutritional and therapeutical values of Chanaka and their potential health benefits described in Ayurveda and contemporary research.

1.1. Chanaka - An Ayurvedic Perspective

The word Chanaka in Sanskrit means “Sasyavishesh” i.e. extraordinary in many crops (Raja, 1967). According to Acharya Charaka, it has light, cold, sweet, slightly astringent, roughning, beneficial for pitta and kapha and useful as pulses and paste, while Acharya Susruta says that the same when combined with ghrita is excellent pacifier of Vata (Kashinath and Gorakhnath, 2010). The plant is refrigerant. The exudates from the plant are astringent and useful in bronchitis. Boiled leaves are applied to sprains and dislocated bones. The leaf juice is stomachic and laxative. The seeds are stimulant, tonic, aphrodisiac, antihelminthic and useful in bronchitis and biliousness. They are useful in leprosy and other skin diseases. Seeds are astringent and given in dyspepsia, vomiting, indigestion and constipation, also in diarrhea, dysentery and snakebite. Powdered seeds along with seeds of *Psoralea corylifolia* and neem leaves are reported to cure leucoderma. They are used for headache, sore throat and cough. Boiled gram is used in pulmonary, uterine and anal diseases. Gram mixed with *Dhatura* is used as poultice for edema and toothache (Gupta and Sharma, 2008). The plant is used in dysentery, snake bite, diabetes, renal stone, vomiting, worms, acidity and gastric problems, constipation and dyspepsia. Seeds are used as tonic, in amoebic dysentery to cure cough and coryza and taken internally to control urination. Seed powder is applied as paste to remove lies and dandruff. Leaves are useful in tooth stolling and stomach disorders. Young shoots are used for ailments due to sunstroke (Gupta and Sharma, 2008).

1.2. Botanical Illustration of Chanaka

Synonyms (The Ayurvedic Pharmacopoeia of India, 2008)**:** Harimantha, Sakalapriya, Vajimantha

Regional Language Names (The Ayurvedic Pharmacopoeia of India, 2008)

Ass.: Imas

Ben.: Chholaa

Eng.: Bengal gram, Chick pea, Gram

Guj.: Chanaa, Chanya

Hin.: Buut, Chanaa, Chunnaa, Chane, Chholaa

Kan.: Kadale

Mal.: Katal

Mar.: Harbaraa, Chane

Punj.: Chholaa

Tam.: Katalai, Kadalai, Kondakkadalai

Tel.: Sangalu

Taxonomical Classification (United State Department of Agriculture (USDA))

Kingdom - Plantae - Plants Subkingdom - Tracheobionta - Vascular plants Superdivision - Spermatophyta - Seed plants Division-Magnoliophyta - Flowering plants Class - Magnoliopsida - Dicotyledons Subclass - Rosidae Order - Fabales Family - Fabaceae - Pea family Genus - Cicer Linn. - Cicer Species - Cicer arietinum Linn. - Chick pea

1.3. Pharmacognostical Features (The Ayurvedic Pharmacopoeia of India, 2008)

Macroscopically fruit of Chanaka is turgid, pod with persistent calyx and short stalk; 1.5 to 2.0 cm in length and 5 mm to 1 cm in breadth; apex acute, base tapering, surface light brown, pubescent; seeds 1 to 3, brown, triangular, with pointed apex, micropyle present below the apex; cotyledons 2, yellowish to dark yellow; odour, mild but specific; taste, slightly astringent. Microscopically fruit shows single layered epicarp covered with cuticle, covering and glandular trichomes similar to stem; mesocarp consists of thin walled parenchyma cells, a number of vascular bundles similar to leaf present in a row; lower mesocarpic region shows a band of 3 to 4 layers of lignified sclereids with narrow lumen, followed by a row of thick walled and lignified fibres, inner most region show 2 to 3 layers of parenchyma cell; seed coat shows 2 rows of palisade like macrosclereids, linea lucida present in outer layer; followed by a zone of thin walled parenchymatous cells, outer 2 to 3 layers thin walled and tangentially elongated cells, remaining cells circular to oval, lower parenchyma cells tangentially elongated and collapsed, small vascular bundles and vascular strands present; cotyledon shows thin walled parenchyma cells, most of them loaded with aleurone and starch grains; starch grains simple, mostly oval with cleft shaped central hilum, measuring up to 20 µ in length.

2. Materials and Methods

2.1. Mode of Action of Chanaka as per Ayurveda (Pharmacological Effects)

Due to kashaya rasa (astringent) Chanaka is useful in wound healing property and a very good absorbent especially to dry up impaired doshas in disease state (Kashinath and Gorakhnath, 2010). The laghu guna which gets digested easily make it a good dietary component. The ruksha guna act as a good absorbing agent specially in clearing the obstruction to digestive and metabolic pathway. Further, the sheeta veerya (cold potency) of Chanaka make it nourishing, strength promoting and body growth promoting. It is a relatively inexpensive source of different vitamins, minerals and several bioactive compounds (phytates, phenolic compounds, oligosaccharides, enzyme inhibitors, etc.) that could help in lowering the chronic diseases (Wood and Grusak, 2007; Duke, 1981; Huisman and Van der Poel, 1994). Recent reports of chickpea or Chanaka consumption in relation to health are discuss such as increased consumption of soluble fiber from foods result in reduced serum total cholesterol and LDL-cholesterol and has an inverse correlation with CHD mortality (Kushi et al., 1999; James et al., 2003; Marlett et al., 2002; Anderson and Hanna, 1999; Noakes et al., 1999; Fehily, 1999). LA and Beta-sitosterol are the major PUFA and phytosterol, respectively, in chick pea seeds or Chanaka; therefore chickpea seeds could be incorporated as part of a regular diet that may help to reduce

blood pressure (Ling and Jones, 1995; Clark, 1996; Moreau et al., 2002). Chickpea or Chanaka have a higher amount of resistant starch and amylase which lower the bioavailability of glucose results lowering the GI and insulinaemic postprandial response (Pittaway et al., 2007; Kendall et al., 2004; Osorio-Diaz et al., 2008). Butyrate has been reported to suppress cell proliferation and induce apoptosis which may reduce the risk of colorectal cancer (Cummings et al., 1981; Mathers, 2002). Lycopene, an oxygenated carotenoide present in chickpea seeds or Chanaka may reduce the risk of prostate cancer (Giovannucci et al., 1995). Biochanin A is an isoflavone, inhibits the growth of stomach cancer cells in vitro and reduces tumor growth when the same cells are transferred to mice (Dixon, 2004; Yanagihara et al., 1993). Chick pea or Chanaka being a low-GI food could be an effective choice in weight-loss programmes (Swinburn et al., 2004; Brand-Miller et al., 2002; Hole et al., 1992). This helps in improving fat metabolism and could be helpful in correcting obesity related disorders (Yang et al., 2007). Chickpea or Chanaka supplementation in the diet resulted in increased satiation and fullness (Murty et al., 2010). The above mentioned researches establish the potential if Chanaka in preventing the occurrence of certain chronic and life threatening disease conditions on daily consumption and also in several disease conditions.

Table 1: *Different forms of medicament prepared from Chanaka*

Form	Indication	Reference
Yush (Soup)	Pitta and Kaphaja disease	Charaka Sutrasthana 27/27
Lepa (Mask)	Best to pacify Pitta and Kapha	Charaka Sutrasthana 27/28
Yush (Soup)	Jvara (Fever)	Charaka Chikitsa 3/188
Yush (Soup)	Rakta-Pitta (Bleeding disorder)	Charaka Chikitsa 4/37
Yush (Soup)	Yakshma (Tuberculosis)	Charaka Chikitsa 8/116
Hima (cold infusion)	Chardi (Emesis)	Charaka Chikitsa 20/31
Lehya (semisolid preparation)	Chardi (Emesis)	Charaka Chikitsa 20/37
Yush (Soup)	Visarpa (Erysipelas)	Charaka Chikitsa 21/110
Yush (Soup)	Trishna (Polydipsia)	Charaka Chikitsa 22/31
Yush (Soup)	Vata-shonita (Gout)	Charaka Chikitsa 29/51
Pathya	Pathya	Susruta Sutrasthana 20/5
Ghrita	Tridoshasamaka	Susruta Sutrasthana 46/32
Chanaka prayoga	Prameha (Urinary disorders and Diabetes)	Sushruta Chikitsa 11/6
Yush (Soup)	Jvara (Fever)	Sushruta Uttaratantra 39/150
Yush (Soup)	Kaphaja jvara (Fever with predominance of Vata)	Ashtanga Hridya Chikitsa 1/71
Chanaka	Nasa roga (Nasal disease)	Ashtanga Hridya Uttaratantra 20/3

Table 2: *Therapeutic uses of Chanaka*

Form	Indication	Reference
Chanaka	Aggrevate Vata and cure bleeding diathesis	Dhanvantari Nighantu, Suvarnadi Varga 34/89
Chanaka	Pacifies Kapha and Pitta, cures blood diseases, indigestion emesis and fatigue, aggravates vata and acts as tonic, spermopiotic and appetizer.	Dhanvantari Nighantu, Suvarnadi Varga 34/90
Chanaka	Kaphaja roga (cures kapha roga) alleviates Raktapitta, Medohara (reduced fat)	Sodhal Nighantu, Guna Sangraha, Simbidhanya Varga , 22/939-940
Chanaka	Kaphasrikpittapunsatvghna, vatala, hima	Madhava Dravyaguna, 5

Chanaka	Raktapittakaphapaha, Vistambhi, Vaatala, Kusthanashana	Madanpala Nighantu, Dhanyadi Varga, 40
Chanaka	Mehajitavatapittakrit, Diptavarnakaro, Balya, Ruchya	Raja Nighantu, Shalyadi Varga, 85
Chanaka	Visthambhi, Punsatvakaraka, Pittasrakaphanashana	Kaiyadeva Nigantu, Dhanya Varga, 41/70
Chanaka	Pittaraktakaphapaha, Vatala, Jwaranashana	Bhavaprakash Nighantu, Dhanya Varga, 11/53
Chanaka	Jwarapittaraktakaphapaha, Vatala, Jwaranashana	Gunaratnamala, Dhanya Varga, 9
Chanaka	Kaphapittasrikhrit, Punsatvanashyati	Priya Nighantu, Dhanya Varga, 10/30
Chanaka	Deepana, Varnakara, Balakaraka, Ruchikaraka	Sankara Nighantu, 257

3. Discussion

3.1. Nutritional Facts of Chanaka

Table 3: *Nutrient composition of Chanaka (Cicer arietinum L.) in g 100-g (32) Crop (United States Department of Agriculture, 2010)*

	Carbohydrate	Fat	TDF	Total sugars
Chanaka (*Cicer arietinum* L.)	60.7	6.0	17.4	10.7

Table 4: *Amino* acid content in Chanaka (Cicer arietinum L.)

Amino acid	Rao and Subramanian (1970) (*)	Wang and Daun (2004) (†)	Alajaji and El-Adawy (2006) (†)	Wang et al. (2006) (‡)
Lysine	45-79	5.90 (5.2-6.90)	7.70	5.55
Methionine	7-31	1.50 (1.1-1.70)	1.60	2.05
Cystine	7-18	1.40 (1.1-1.60)	1.30	0.15
Phenylalanine	30-68	5.30 (4.5-5.90)	5.90	5.42
Tyrosine	20-35	2.30 (1.4-3.10)	3.70	2.55
Isoleucine	44-60	3.60 (2.5-4.40)	4.10	3.70
Threonine	28-48	4.30 (3.7-4.70)	3.60	3.23
Valine	38-63	4.00 (2.8-4.70)	3.60	3.60
Arginine	-	9.80 (8.3-13.6)	10.30	8.11
Histidine	-	2.20 (1.7-2.70)	3.40	2.66
Alanine	-	4.1(3.6-4.53)	4.40	3.40
Aspartic acid	-	12.80 (11.1-15.9)	11.40	10.59
Glutamic acid	-	16.00 (13.4-19)	17.30	16.70
Glycine	-	3.90 (3.3-4.20)	4.10	3.12
Proline	-	4.80 (4.0-6.30)	4.60	3.95
Serine	-	6.00 (5.5-6.90)	1.10	4.96

D-Desi; N/D not determined; * - in mg g-1 protein; † - in g 16-g N; **‡ -** in g 100-g; * & **† -** Chanaka type is not specified.

4. Conclusion

The information presented here shows the literary review of Chanaka or chickpea as well as its nutritional importance and its role in improved nutrition and health. Chanaka or chickpea is a protein

rich legume, it is cholesterol free and good sources of protein, dietary fibre vitamins and minerals. Scientific studies provide some evidence to support the potential beneficial effects of chickpea components in lowering the risk for various chronic diseases, although information pertaining to the role of individual chickpea components in disease prevention and the mechanisms of action are limited to date. There is a growing demand for Chanaka due to its nutritional value. This research work paved a path to reveal the nutritional benefits of Chanaka.

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