

A Review on Medicinal Properties of Chickpea and Its Profile

Puneet Gulati*

Abstract

Cicer arietinum is the most well-known vegetable and seen everywhere in the world, particularly in Afro-Asian nations. It has a place with family Fabaceae and appropriated in tropical, sub-tropical and calm districts. It is an annual crop with 20–100 cm tallness and the stems are spread, erect while root framework is vigorous and leaves are made of 11–15 individual handouts which are oval fit as a fiddle. The blossoms are delivered independently or two by two and can be white, pink, purple or blue in shading. Its normal names incorporate hummus, Bengal gram, chickpea, garbanzo and some more. The parts utilized are seed, leaves and seed case. It is essentially found in two principal assortments: *Microsperma* called *Desi* type and *Macrosperma* called *Kabuli* type. It is a decent wellspring of sugars, proteins, nutrients, alkaloids, phytosterols, tannins, phenolic mixes, glycosides, sapiens, flavonoids and minerals and so forth consequently, it has an extraordinary significance in clinical field alongside its culinary employments. The conventional use incorporates therapy of skin issues, (like skin inflammation, bubbles, dandruff, earthy coloured spots etc.) kidney issues, urinary issues and gastric issues, and so on while drug utilizations incorporate different properties like it goes about as Spanish fly, estrogenic, cell reinforcement, antidiabetic, mitigating, against malignant growth, hostile to diarrheal specialist and furthermore help in weight reduction, keeping up bone wellbeing, boosting memory, mental health alongside antifungal, against microbial, astringent, hostile to nephrolithiasis properties and have many other pharmacological impacts. This survey was intended to feature all the ethnobotanical and drug employments of chickpea.

Keywords: Chickpea plant profile, ethnobotanical utilizes drug employments

INTRODUCTION

During the most recent couple of many years, therapeutic species are acquiring significance because of their huge wellbeing related advantages and in this manner, now days these restorative plants are under examination by different specialists. Chickpea is one among these useful and healthy crop which had spread their restorative and culinary impact across the world. It is an old and one of seven Neolithic founders crop a prolific bow of the Near East. It was first begun in Southern Caucasus, Northern Persia, Turkey, and Syria. At present, it is grown across 50 nations of Indian subcontinent. It is a decent wellspring of starches, proteins, minerals, follow elements, nutrients, and dietary fiber. Absence of fundamental oils in seeds of chickpea is a favourable position in exploration work for looking through less poisonous medication like particles. It is third significant vegetable underway, close to dry beans and field peas.

*Author for Correspondence

Puneet Gulati

Student, Department of Botany, Mata Gujri College, Fatehgarh Sahib, Punjab, India

Received Date: January 09, 2021

Accepted Date: February 05, 2021

Published Date: April 29, 2021

Citation: Puneet Gulati. A Review on Medicinal Properties of Chickpea and its Profile. Research & Reviews: Journal of Crop Science and Technology. 2021; 10(1): 1–11p.

It was grown around 7000 years in the Mediterranean and Middle East and was first found in Western Asia. In India, it was first grown in UP from around 4000 BC and it initially it grows as wild structures as well and these days it is been

grown the whole way across the world. India drives all the nations in the creation of Chickpea. Different nations creating chickpea are Pakistan, Turkey, Australia, Myanmar, Ethiopia, Iran, Mexico, Canada, and USA. Chickpea is filled in tropical, subtropical, and mild districts. Chickpea is found in two assortments: *Microsperma* called Desi Channa and other assortment is *Macrosperma* called Kabuli Channa. Desi type comprises of thick covered and hued chickpea found in different shades and mixes of green, yellow, earthy coloured and dark. These are little sized 89 and precise with unpleasant surface and around 80–85% of chickpea developed region is of this type [1–12]. The Kabuli type seeds are white or beige-shaded with flimsy seed cover having ram's head shape and smooth surface with huge size 105 and furthermore have high market esteem. The seed weight goes from 0.1–0.3 and 0.2–0.6 g in Desi and Kabuli type respectively.

Chickpea has high healthy benefit and it contains many huge medications and other naturally dynamic mixes and subsequently the plant shows a wide scope of pharmacological, helpful, and ethnobotanical exercises.

PLANT PROFILE

Equivalent Names

Cicer arietinum L., *Cicer arietinum* subsp., *Cicer edessanum* Bornm., *Cicer grossum* Salisb, *Cicer nigrum* Hort., *Cicer physodes* Rchb., *Cicer rotundum* Alef, *Cicer sativum* Sckuhr and *Cicer sintonis* Bornm.

Ordered Classification

Kingdom: Plantae
Division: Magnoliophyte
Class: Magnoliopsida
Order: Fabales
Family: Fabaceae
Subfamily: Faboideae
Genus: *Cicer*
Species: *arietinum*

Other Names

Arabic: Hummus, Hommos, Lablabi
Chinese: Yingzuidou
English: Bengal gram, Chickpea, Garbanzo
French: Pois chiche
German: Kichererbse
India: Kala Chana, Bengal gram
Italian: Cece
Portuguese: Grao-de-bico
Spanish: Garbanzo
Swedish: Kikart
Turkish: Nohut
Sindhi: Chola
Ethiopia: Shimbra

Portrayal: it is yearly spice with tallness of 20–100 cm. It is a little shrubby having spreading and diffused branches and it is covered by glandular and non-glandular hairs. Leaves are compound, having 3–8 sets of ovals, toothed pamphlets. Blossoms are purple, pink in shading and lone in leaf axils. The organic product is case having 2–3 cm length and contains 1–2 seeds.

Part Used

Leaves, seeds and seed pod.

ETHNOBOTANICAL USES

Brown Spots

Flour of *Cicer arietinum* (Chickpea) is blended in with *Cocos nucifera* L. (Coconut) oil and applied to the influenced region in District Khairpur (Sindh) for restoring earthy coloured spots and skin inflammation in Districts Thatta, Nawabshah, Kamber Shadad Kot, and Tando Muhammad Khan (Sindh). It is additionally used to fix hand consume and canker in District Khairpur and Thatta (Sindh) [13].

Skin Inflammation

C. arietinum flour is blended in jaggery and applied to influenced part for the treatment of skin inflammation in District Nawabshah (Sindh) [14].

Bubbles

Dalbergia sissoo Roxb (North Indian Rosewood), leaves of *Ziziphus nummularia* L. (Chinese apple), and *C. arietinum* flour are blended and utilized for restoring bubbles in District Naushahro Feroze (Sindh) [15].

Dandruff

Paste of *Brassica campestris* L. (Mustard) leaves, *Curcuma Longs* L. (Turmeric), and *C. arietinum* is made and applied on the scalp for treating dandruff in District Nawabshah (Sindh) [16].

Eliminate of Face Hair

The glue of chickpea flour, almond flour and squeezed orange is applied on the face to eliminate face hairs and proceeded for one month in the District Nawabshah (Sindh) to get legitimate results [17].

Other Medicinal Applications

Glandular emission of leaves, stems and cases comprises of oxalic acids, giving a sharp taste are successful for bronchitis, catarrh, catamenia, cholera, blockage, looseness of the bowels, dyspepsia, tooting, snake nibble, sunstroke and moles. In India, these acids are extricated by extending far muslin over harvest during night and in the first part of the day that equivalent material is wrung out and acids are gathered in jugs and taken at whatever point required. Seed are likewise considered as hostile to bilious [18].

Used as a Feed

It is additionally utilized as nourishment for domesticated animals. Grain husks and green or dried stem and leaves are fundamentally utilized as stock feed [19].

Improves Milk

It is utilized conventionally for restoring inadequate milk [20].

Kidney Stones and Urinary Problems

Several researchers accepted that kidney stones and urinary issues can be treated with chickpea after crafted by Spanish doctor and botanist Andres Laguna [21].

Initiate Menstruation

Earlier menstruation is likewise prompted by eating bubbled chickpea and the individuals of Kerala broil the seeds of *Cicer arietinum* powder them and blended in with jaggery and take it during first feminine cycle [22].

Diuretic

Dioscorides (Ist Century Physician) generally utilized chickpea as diuretic. He additionally said that chickpea would help ladies in works invigorate breast milk and encourage menstruation [23].

Decrease Menstrual Pain

In India, they are utilized as "sitz" shower of warm water where a couple of modest bunches of dried chickpea plant are added to reduce feminine pain [24].

Traditional Snack Food

Chickpea are devoured as conventional nibble food in practically all nations from pre-notable occasions. In Turkey, individuals eat chickpeas by broiling or puffing of vegetables by exposing them to high temperature. The processing stages incorporate cleaning and evaluating, drenching, hardening (preheating and testing), bubbling, resting, simmering and dehulling. Towards the end, the chickpea swells, mellows and subsequent to simmering becomes crisp [25].

The vast majority of the Americans customarily eat hummus (supplement thick plunge or spread produced using cooked) squashed chickpeas, mixed with tahini, olive oil, lemon squeeze and flavours.

Seeds are ground and flour is utilized as soup, dhal and to make bread arranged with pepper, pungent and lemon. It is filled in as side dish.

Dhal is part chickpea without its seed coat, dried and cooked into thick soup or ground into flour for tidbits and sweet meats. Grown seeds are eaten as vegetables or added to servings of mixed greens. Youthful plants and green units are eaten as spinach. A little extent of canned chickpea is likewise utilized in Turkey and Latin America to deliver matured food.

Looseness of the Bowels

Chile, a cooked chickpea milk (4:1) combination was useful for taking care of babies, successfully controlling diarrhoea [26].

Diabetes

Uygur individuals of China utilized chickpeas in home grown drugs for treating hypertension and diabetes for more than 2500 years.

In mid-4th century BC, the individuals of Greek referenced it as purgative, diuretic, nutritious and remembered for classification of cathartic substances. Drinking chickpea decoction fixes gastric issues. For treating breaking down of urinary framework, individuals drink water which is utilized for drenching chickpea beans blended in with wine. Roots and leaves as cataplasms are applied both remotely and inside to treat numerous wellbeing related disorders [27].

PHARMACOLOGICAL USES

Heartbeats have been burned-through from thousands of years prior because of their potential medical advantages and dietary characteristics out of which Chickpea utilization has some physiologic advantages and in this manner considered as 'utilitarian food'. (i). "One enveloping stimulating item including, changed food or fixing that may give medical advantages past conventional ingredients". (ii). "nourishments that, the uprightness of the presence of physiologically-dynamic segments, give a medical advantage past fundamental nutrition".

Against Cancer Impact

Chickpea contains certain minerals, phytochemicals, nutrients, strands, isoflavone and other compounds which keep our body away from different kinds of cancer. For example, a chief SCFA called butyrate present in chickpea helps to stifle cell proliferation and furthermore initiates apoptosis, hence diminishes the danger of colorectal cancer. Protease inhibitors additionally smother carcinogenesis by various components yet their objectives are at this point unclear. Chickpea seeds contain an oxygenated carotenoid called lycopene, which forestalls prostate cancer. As indicated by contemplates, there is a carotenoid rich eating routine and diminished rate of lung and different sorts

of malignancy because of quality of cancer prevention agent properties in carotenoids which secure cells against free revolutionary damage. Biochanin A, a chickpea isoflavone represses the division of stomach disease cells and furthermore diminishes tumour development in mice. Saponins, phytochemicals present in chickpea forestall the increase of disease cells and spreading all through the body. Folate present in chickpea assumes significant job in blend of DNA and its maintenance and consequently forestalls the development of malignant growth cells and changes in DNA. High fiber admissions additionally answered to bring down the danger of colorectal cancer. A mineral selenium present in chickpea helps the proteins of liver to work appropriately and detoxify some malignancy causing mixes in body and furthermore diminishes tumour development rates.

C-25 is the protein removed from chickpea whose cytotoxic movement was concentrated on typical cells and malignant growth cells. It diminished cell expansion of oral disease cells and had no harmful impact on typical cells.

Heart Health—Cardiovascular Disease and Coronary Heart Disease

The high fiber, vitamin K, vitamin C and vitamin B-16 substances of chickpea all help great soundness of heart. The high fiber content brings down the measure of cholesterol in blood and accordingly keeps away from different heart diseases. Various bioactive mixes (for example, phytosterols, saponins and disaccharides) combined with dietary fiber and low glycemic list bring down the danger of cardiovascular disease [28–30].

Isoflavones are diphenolic auxiliary metabolites that bring the coronary illness down due to restraint of LDL-C oxidation and expansion of aortic smooth muscle alongside the upkeep of actual properties of blood vessel walls.

B-Carotene alongside different nutrients and supplements present in chickpea is additionally useful in decreasing the occurrence of cardiovascular disease. Admission of saponins and folic corrosive decrease plasma cholesterol by 16–24% and homocysteine levels by 13.4–51.7% respectively.

Hostile to Diabetic

Chickpea contains higher measure of safe starch and amylose. Polymerization of amylose renders the starch in chickpea more impervious to processing in small digestive system bringing about lower accessibility of glucose because of which glucose enters gradually into the blood and decreases the interest of insulin and consequently brings down glycemic record (GI) and insulinemic Postprandial reaction these outcomes in seriousness of type II diabetes by improving glucose resilience and insulin sensitivity.

Studies have demonstrated that individuals with type 1 diabetes who burn-through chickpea have high fiber slims down lower blood glucose levels and the individuals with type 2 diabetes, chickpea admission may improve glucose, lipid and insulin levels. Admission of seeds likewise decreases postprandial plasma glucose was helpful in treatment of diabetes which is demonstrated by the analysis led on mice indicating antihyperglycemic movement of oil either concentrate of *Cicer arietinum* (PEECA).

Mitigating

The methanolic and ethanolic concentrates of chickpea seeds at various portions (250 and 500 mg/kg body weight) show calming activity against carrageenan and histamine, actuated paw edema in rodents. Among these concentrates, the methanolic 500 mg/kg and ethanolic 500 mg/kg separates shows greatest mitigating activity.

The choline found in chickpeas helps to keep up the structure of cell layers, helps in transmission of nerve motivations, aids ingestion of fat and decreases ongoing inflammation [31–35].

Cholesterol Control

Studies show that chickpea brings down the measure of low-thickness lipoprotein or cholesterol in blood and expanded utilization of solvent fiber from nourishments brings about diminished serum complete cholesterol. All hydrolysates tried display better hypocholesterolemia action when contrasted and protein segregated from chickpea. Saponin and folic corrosive rich food including chickpea are accounted for to decrease plasma cholesterol by authoritative to dietary cholesterol or bile acids and accordingly expanding their discharge through faeces. B-sitosterol (predominant phytosterol in chickpea) is useful in diminishing serum cholesterol levels and hence forestalling coronary heart disease [36–38].

Hostile to Diarrheal Impact

Intestinal confusion like diarrheal sicknesses is one of the main sources of grimness and mortality of millions of individuals every year and along these lines WHO had begun Diarrheal Disease control program which manages the utilization of restorative plants including *Cicer arietinum* to fix such dangerous infection.

The counter diarrheal action of the hydroalcoholic concentrate of *Cicer arietinum* roots and its $(CH_3)_2CO$ and methanol part were contemplated dependent on their impact on castor oil prompted the runs in mice. The outcomes show that Loperamide (5 mg/kg) restrain loose bowels by 75.37% which is prompted by castor oil while most noteworthy decrease was seen in hydroalcoholic remove (24.63%). It happens by expanding the pace of intestinal assimilation, decline intestinal emission or by lessening intestinal motility.

Weight Reduction/Obesity

Chickpea have high fiber substance and consequently have high volume alongside high supplement thickness, yet they are low in calories and our body cannot process carbs from fiber. Admission of nourishments wealthy in dietary fiber frequently led to bring down weight record (BMI) as dietary filaments work as building specialists in stomach related framework. These mixes increment satiety (a sensation of fullness) and diminish hungers causing individuals to feel calorie consumption. Also, chickpea is considered as low GI food which increment cholecystokinin (hunger suppressant) hence help in stoutness decrease.

Processing and Regularity Maintenance

Because of their high fiber content, chickpeas help to forestall obstruction and advance consistency for a stimulating stomach related parcel since dietary strands require long and ideal opportunity to bite and process in intestine [39, 40].

Chickpea flour has zero wheat, grain, rye or cross-tainted oats consequently It is thoroughly liberated from gluten and any remaining grains and presence of gluten affect the gut, processing insusceptible reactions and inside syndrome.

Circulatory Strain

Linoleic corrosive, a PUFA is significant as it is engaged with creation of prostaglandins which is engaged with bringing down of pulse and smooth muscle constriction. Phytosterols like beta-sitosterol is likewise useful in lessening circulatory strain. Linoleic corrosive and beta-sitosterol are the major PUFA and phytosterol in chickpea seeds respectively. Thusly chickpea seeds could be joined as a piece of customary eating routine that may assist with decreasing blood pressure.

Gut Health and Laxation

Studies have indicated that admission of chickpea results increment in dietary fiber which brings about progress in entrail wellbeing joined by expanded recurrence of poo. Accordingly, advance laxation or gut work by helping in development of material through stomach related system.

Bone Health

Chickpeas are healthy in iron, phosphate, calcium, Mg, Mn, Zinc and nutrient K which add to building and keep up bone structure and strength. Minerals present in chickpea additionally help to forestall age related problems like osteoporosis. Bone matrix development requires the minerals Mn, Fe and Zn which assume critical parts underway and development of collagen. The phosphate present in chickpea alongside calcium helps in appropriate bone mineralization. Nutrient K improves Ca assimilation and may decrease urinary discharge of calcium ensuring that enough Ca is accessible for building and fixing bone. Low admission of nutrient K is related with high danger of bone fracture [41–45].

Diuretic and Anti-nephrolithiasis Effects

The diuretic and against nephrolithiasis exercises of *Cicer arietinum* ethanolic seed separated were assessed in pale skinned person rodents. The action was concentrated by utilizing ethylene glycol prompted nephrolithiasis model. Cystone was utilized as standard medication. Two test dosages of *Cicer arietinum* ethanolic seed extricate were utilized. The absolute length of assessment was 28 days. Pee volume, pee examination serum investigation was utilized to survey the effectiveness of test drug. The outcomes uncovered that the concentrate diminished urinary stones in the kidney with great diuretic property.

Pharmacological Impacts of Allantoin

Allantoin is a significant metabolic moderate which is delivered from uric corrosive. It goes about as cream and treats skin aggravations (for example diaper rash, skin consumes from radiation treatment).

The allantoin, 5-ureide-hydantoin goes about as a pharmacological dynamic compound which is available in chickpea and its pharmacological impacts included injury mending, guideline of fiery reaction, incitement of fibroblastic multiplication, improvement extracellular frameworks union, against bothering, hydrating and remover of necrotic tissues, animating the phone mitosis, advertiser of epithelial incitement, pain relieving activity and keratolytic activity.

Astringent Properties

A corrosive education from the seedpods is powerful in treating stomach issues like dyspepsia, retching, acid reflux, costiveness, loose bowels and diarrhoea consequently goes about as astringent.

Purging and Saturating Specialist

The spice *Cicer arietinum* is important as it cleans skin and scalp hence utilized in tenderly child cleanser, protein cleanser delicate day by day care, protein conditioner delicateness and sparkle, hostile to hair fall hair oil, Himfartin.

Treat Nervous System Disorders

Chickpea contains nutrient folate or folic corrosive which is basic for fetal neural cylinder development and subsequently keeps from neural cylinder imperfections, for example, spina bifida and anencephaly.

Anticipation of Anemia

Iron is likewise one significant constituent in chickpeas which helps in arrangement of RBCs in the body along these lines no all the more sensation of fatigue or nausea

Sensory System Disorders

The mineral Mo present in chickpea helps underway of cell energy and improvement of sensory system. Chickpea likewise gives essential amine acids, nutrients and minerals to cerebrum including nutrient B9 or folate which assumes significant part in the guideline of amino acids which are needed for legitimate working of nervous System.

Detoxification of Sulfites

Certain vegetables, dried foods grown from the ground contain sulfites which are acidic mixes and causes results like migraines and bewilderment. Chickpea are incredibly high in Mo which check these results caused due to sulfides.

Lift Memory

Chickpeas are phenomenal wellspring of choline, which help to improve rest, muscle development, learning and furthermore, support energy.

Mental Health

Chickpea contains choline (a micronutrient) that guides in cerebrum and spinal rope advancement and furthermore, fabricates sound nerves.

Sexual Behavior

Intake of chickpea prompts stir sexual conduct as it expands creation of semen (because of health benefits, carminative and warming properties), and furthermore increments the cholesterol of serum and testosterone levels. It was concentrated by methanolic concentrate of chickpeas (MECA) in explicitly drowsy male pale skinned person as the oral organization of MECA at 200 and 400 mg/kg expanded body weight, mount recurrence, intromission recurrence, discharge recurrence, discharge idleness while intromission inertness and mount dormancy were diminished. These all outcomes are may be because of quality of alkaloids, saponins and flavonoids.

Improves Visual Perception

Chickpea is profoundly healthy in carotenoids than brilliant rice likewise subsequently utilized as a decent wellspring of dietary carotenoids which support numerous formative cycles in our body, like cell division/separation, bone development and the main vision. Nutrients C and E present in chickpea ensure vision and zinc present in chickpea help in vehicle of nutrient A from liver to retina alongside avoidance of movement of molecular degeneration.

Estrogenic Impacts

Chickpeas are acceptable wellspring of phytoestrogen as it is accounted for to have 993 µgm of estrogens per 100 gm which help to increment in uterine weight, epithelial stature, organ number and chemical discharge. The menopausal and postmenopausal indications like hot blazes, night sweats and emotional episodes, and so forth are countered by devouring chickpeas. It is considered when watery, drunkard and chloroform concentrate of chickpea was given to female pale skinned person rodent from 11 to multi-day of pregnancy at portion level of 100, 200 and 400 mg/kg body weight. The portion of 400 mg/kg body weight of watery concentrate goes about as abortifacient and furthermore helps to build the heaviness of conceptive.

Cell Reinforcement Impacts

All of the phytosterols, avenasterol and phytonutrients present in chickpea work as cell reinforcements which hinder oxidation and forestall or moderate harm to cells brought about by free revolutionaries. The cancer prevention agent estimation of crude chickpea in ORAC units is 847 micromole TE/100 g. hydrolysates of chickpea show better cancer prevention agent exercises particularly decreasing force and DDPH searching impacts. Three techniques, beta carotene dying strategy, lessening power and 2,2-diphenyl-1-picrylhydrazyl (DDPH) extremist rummaging impact are utilized to test cancer prevention agent action. The presence of cell reinforcements diminishes oxidative pressure in body and forestalls persistent diseases.

ACE-Restraint

Chickpea goes about as an angiotensin-changing over compound inhibitor which is drug for therapy of hypertension, congestive cardiovascular breakdown, hypertension, scleroderma, headaches and

other clinical issues. It was seen by treatment of chickpea with Alcalase which yield hydrolysates which are acceptable wellspring of peptides with angiotensin changing over chemical inhibitory activity.

Anticonvulsant Impact

A dichloromethane was separated from products of chickpea by permeation as anticonvulsant which is utilized for treatment of epileptic seizures or continuous arrangement of seizures, forestall headaches, treat cerebrum problems, neuropathic torment, etc. [46–50].

CONCLUSION

Chickpea is a restorative plant utilized as a medication to treat generally a wide scope of unexpected issues. The examination of phytochemistry, proteins, amino acids and different minerals present in chickpea are demonstrated useful for treating numerous wellbeing issues and subsequently have huge incentive in remedial and pharmacological uses, consequently serve the mankind.

REFERENCES

1. Al-Snafi. The medical importance of *Cicer arietinum* – A review. IOSR J Pharm. Mar 2016; 6(3): 29–35.
2. Newby PK, Muller D, Hallfrirch J, Andres R, Trucker KL. Food patterns measured by factor analysis and anthropometric changes in adults. Am J Clin Nutr. 2004; 80(2): 504–513.
3. Zia-Ul-Haq M, Iqbal S, Ahmed S, Imran M, Niaz A, Bhanger MI. Nutritional and compositional study of desi chickpea (*Cicer arietinum* L) cultivars grown in Punjab, Pakistan. Elsevier Journal. May 2007; 105: 1357–1363.
4. Duke JA. Handbook of legumes of world economic importance. New York, USA: Plenum Press; 1981; 52–57.
5. Huisman JA, Vander Poel AFB. Aspects of nutritional quality and use of cool season food legumes in animal feed. In Muehlbauer FJ, Kaiser WS, editors. Expanding the production and use of cool season food legumes. Dordrecht: Kluwer Academic Publishers; 1994; 53–76p.
6. Williams PC, Singh U. Quality screening and evaluation in pulse breeding. In: Summerfield RJ, editor. World crops, cool season food legumes. Dordrecht, The Netherlands: Kluwer Academic Publishers; 1988; 445–457.
7. Jukanti AK, Gaur PM, Gowda CL, Chibbar RN. Nutritional quality and health benefits of chickpea: a review. Br J Nutr. Aug 2012; 108(81): 511–526.
8. Lev-Yadun S, Gopher A, Abbos. The cradle of Agriculture. Science. 2000; 288(5471): 1062–1063.
9. Al-snafi. antimicrobial effects of medical plants (part 3): plant based review. IOSR J Pharm. Oct 2016; 6(10): Version 3: 67–92.
10. Moreno M, Cubero JI. Variation in *Cicer arietinum* L. Euphytica. 1978; 27(2): 465–485.
11. Frimpong A, Sinha A, Tar' B, *et al.* Genotype and growing environment influence chickpea (*Cicer arietinum* L.) seed composition. J Sci Food Agric. 2009; 89(12): 2052–2063.
12. Pande S, Siddique KHM, Kishore GK, *et al.* Ascochyta blight of chickpea: biology, Pathogenicity and disease management. Aust J Agric Res. 2005; 56: 317–332.
13. Chibbar RN, Ambigaipalan P, Hovver R. Molecular diversity in pulse seed starch and complex carbohydrates and its role in human nutrition and health. Cereal Chem. 2010; 87(4): 342–352.
14. Geervani P. Utilization of chickpea in India and scope for novel and alternative uses. In proceedings of a consultants meeting, India: ICRSAT. 1991; 47–54.
15. Agriculture and Agri- Food Canada. Chickpea: situation and outlook. Biweekly Bulletin. 2006; [http:// www.agri.gc.ca](http://www.agri.gc.ca)
16. Wood JA, Grusak MA. Nutritional Value of chickpea. In: Yadav SS, Redden R, Chen W, Sharma B, editors. Chickpea breeding and management. Wallingford, UK: CAB International; 2007; 101–142.

17. Kokoszko M, Krysztof J, Jolanta J. The Chickpea as a Medicinal Foodstuff and Medicine in selected Greek Medical Writings. *Studia Ceranea*. 2017; 7: 99–120. e ISSN: 2449–8378.
18. Qfuya ZM, Akhidue V. The Role of pulses in Human Nutrition: A review. *J Appl Sci Environment Mgt*. 2005; 9(3): 99–104.
19. Sardari S. Anticonvulsant effect of *Cicer arietinum* seed in animal models of epilepsy: Introduction of an active molecule with navel chemical structure. *Iran Biomed J*. 2015; 19(1): 45–50.
20. Roberts SB, Hajduk CL, Howarth NC, Rurs R, Mc Crory MA. Dietary variety predicts low body mass index and inadequate macronutrient intakes in community dwelling older adults. *J Gerontol A Biol Sci Med*. 2005; 60(5): 613–621. Doi:10.1093/gerona/60/5–613.
21. Augustin LS, Chiavaroli L, Campbell J, Ezatagha A, Jenkins AL, Esfahani A, Kendall CW. Post – prandial glucose and insulin responses of hummus alone or combined with a carbohydrate food: A dose response Study. *Nutr J*. 2016; 27: 13.
22. Al-snaifi. Medicinal plants with antidiabetic effects (part 2): plant based review. *IOSR J Pharm*. Jul 2016; 6(7): Version 2: 49–61.
23. Jenkins DJ, Wolever TM, Taylor RH, Barker HM, Fielden H. Exceptionally low blood glucose response to dried beans; comparison with other carbohydrate food. *Br Med J*. 1980; 281(6240): 578–580.
24. Arora M, Kaur P. Pharmacognestic and Phytochemical Evaluation of selected seeds of *Cicer arietinum* linn. Seeds from Roopnagar, Punjab. *Int J Pharma Sci Invent*. 2013; 2(11): 18–29.
25. Kou X, Gae J, Xue Z, Zhang Z, Wang H, Wang X. Purification and identification of antioxidant peptides from chickpea (*Cicer arietinum* L.). albumin Hydrolysates. *LWT-Food Sci Technol*. 2013; 50(2): 591–598p.
26. Bone health: Looking Beyond Calcium. Jan 11, 2017. retrieved from <http://www.consultant360.com/n411/content16one-health-looking-beyondcalcium>.
27. Singh A, Rani R, Sharma M. Medicinal herbs of Punjab (India). *Biol Forum Int Jl*. 2018; 10(2): 10–27.
28. Masnoor P, Baig SG, Ahmed SM, Husan M. Analgesic, anti-inflammatory and diuretic activities of *Cicer arietinum* L. *Pak J Pharm Sci*. Mar 2018; 31(2): 553–558.
29. Al-snaifi. Arabian medicinal plants for the treatment of intestinal disorders- plant based review (Part I). *IOSR J Pharm*. Jun 2018; 8(6): Version II: 53–66.
30. Al-Snaifi. Medicinal plants passes antioxidant and free radical scavenging effects (part 3). *IOSR J Pharm*. Apr 2017; 7(4): Version I: 48–62.
31. Al-Snaifi, A.E., 2018. Arabian medicinal plants with antiurolithiatic and diuretic effects-plant based review (Part 1). *IOSR Journal of Pharmacy*, 8(6), pp.67–80.
32. Thompson LU. Potential health benefits and problems associated with antinutrients in foods. *Food Res Int*. 1993; 26(2): 131–149.
33. Gestener B, Assa Y, Henis Y, *et al*. Interaction of Lucerne saponins with sterols. *Biochem Biophys Acta*. 1972; 270(1): 181–187.
34. Sidhu GS, Oakenful DG. A mechanism for the hypocholesterolemia activity of saponins. *Br J Nutr*. 1986; 55(3): 643–649.
35. Zulet MA, Martínez JA. Corrective role of chickpea intake on a dietary- induced model of hypercholesterolemia. *Plant Foods Hum Nutr*. 1995; 48(3): 269–277.
36. Ling WH, Jones PJ. Dietary phytosterols: a review of metabolism, benefits and side effects. *Life Sci*. 1995; 57(3): 195–206.
37. Clark J. Tocopherols and sterols from soybeans. *Lipid Technol*. 1996; 8: 111–114.
38. Moreau RA, Whitaker BD, Hicks KB. Phytosterols, phytosterols, and them conjugates in foods: structural diversity, quantitative analysis, and health- promoting uses. *Prog Lipid Res*. 2002; 41(6): 457–500.
39. Al-snaifi. Arabian medicinal plants affected female fertility—plant based review (part 1). *IOSR J Pharm*. Jul 2018; 8(7): version 1: 46–62.
40. FAOSTAT. 2011. <http://faostat.fao.org/site/567/DesktopDefault.aspx>. (Accessed 12th Dec 2011).

41. Al-snafi. Medicinal plants affected male and female fertility (part 1)—A review. *IOSR J Pharm.* Oct 2016; 6(10) Version 3: 11–26.
42. Al-snafi. Medicinal plants affected reproductive systems (part 2)—plant based review. *Sch Acad J Pharm.* 2016; 5(5): 159–174.
43. Al-snafi. Anticancer effects of Arabian medicinal plants (part 1)—A review. *IOSR J Pharm.* Apr 2017; 7(4): version 1: 63–102.
44. Mollard RC, Luhovyy BL, Panahi S, Nunez M, Hanley A, Anderson GH. Regular consumption of pulses for 8 weeks reduce metabolic syndrome risk factors in overweight and obese adults. *Br J Nutr.* 2012; 108(Suppl 1): 111–122.
45. Yang Y, Zhou L, Gu Y, Zhang Y, Tang J, Li F, Shang W, Jiang B, Yue X, Chen M. Dietary chickpea reverse visceral adiposity, dyslipidemia and insulin resistance in rats induced by a chronic high fat diet. *Br J Nutr.* 2007; 161: 2573–2578.
46. Hodge AM, English DR, O Dea K, Giles GG. Dietary patterns and diabetes Incidence in the Melbourne collaborative cohort study. *Am J Epidemiol.* 2007; 161: 2573–2578.
47. Villegas R, Gao YT, Yang G, Li HL, Elasy TA, Zheng W. Legume and soy food intake and incidence of type 2 diabetes in the Shanghai Women’s Health Study. *Am J Clin Nutr.* Jan 2008; 87(1): 162–167.
48. Milner JA. Functional foods: the US perspective. *Am J Clin Nutr.* 2000; 71, Suppl. S1654-S1659.
49. Hasler CM. Functional foods: benefits, concerns and challenges—a position paper from the American Council on Science and Health. *J Nutr.* 2002; 132(12): 3772–3781.
50. Kushi LH, Meyer KM, Jacobs DR. Cereals, legumes, and chronic disease risk reduction: evidence from epidemiologic studies. *Am J Clin Nutr.* 1999; 70(3 Suppl): 451S–458S.