IJPSR (2013), Vol. 4, Issue 12 (Review Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 20 July, 2013; received in revised form, 30 October, 2013; accepted, 29 November, 2013; published 01 December, 2013

AN OVERVIEW ON *ARACHIS HYPOGAEA* PLANT

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Keywords:

Peanut varieties, Chemical constituents, Pharmacological activities, Allergy

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ABSTRACT: The peanut or groundnut (*Arachis hypogaea*) is a species in the legume family (Fabaceae). There are different varieties like Virgina group, Spanish group, Runner group, Valencia group, Tennessee red and Tennessee white. Peanut consists of 30 essential nutrients and phytonutrients. Peanuts are a good source of vitamins & metals. Peanut hulls consist of crude fiber, cellulose, water, crude protein, ash and fat. Chemical constituents present in the plant are acids, arachin, lecithin protein, flavonoids, beta-carotene, amino acids, minerals, fat, carbohydrates etc. It has varies pharmacological activities like antimicrobial, antifungal, antiviral, antioxidant, anticancer, antihypertensive, neuroprotective, antimutagenic, antiproliferative, anti-inflammatory. Peanuts can help to enrich the soil. Peanuts are legumes and are able to fix nitrogen in their roots. Peanut oil used as a liniments, plasters, soap & lubricant. Roots are used alternative fuel & cosmetic purpose. Peanut allergy is the most common cause of deaths from food allergy.

INTRODUCTION: Plants have played a significant role in maintaining human health and improving the quality of human life for thousands of years and have served humans well as valuable components of medicines, seasonings, beverages, cosmetics and dyes.

Herbal medicine is based on the premise that plants contain natural substances that can promote health and alleviate illness. Today, we are witnessing a great deal of public interest in the use of herbal remedies. Furthermore, many western drugs had their origin in plant extract.

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.4(12).4508-18

Article can be accessed online on: www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.4(12).4508-18

There are many herbs, which are predominantly used to treat cardiovascular problems, liver disorders, central nervous system, digestive and metabolic disorders. Given their potential to produce significant therapeutic effect, they can be useful as drug or supplement in the treatment / management of various diseases.

The peanut or groundnut (*Arachis hypogaea*) is a species in the legume or "bean" family (Fabaceae). The peanut was probably first cultivated in the valleys of Peru. It is an annual herbaceous plant growing 30 to 50 cm (1.0 to 1.6 ft) tall. *Hypogaea* means "under the earth", after pollination, the flower stalk elongates causing it to bend until the ovary touches the ground. Continued stalk growth then pushes the ovary underground where the mature fruit develops into a legume pod, the peanut – a classical example of geocarpy. Pods are 3 to 7 cm (1.2 to 2.8 in) long, containing 1 to 4 seeds [1].

Pharmacognistic study:

Synonyms: Peanuts are known by many other local names such as **e**arthnuts, ground nuts, goober peas, monkey nuts, pygmy nuts and pig nuts. Despite its name and appearance, the peanut is not a nut, but rather a legume [2].

SCIENTIFIC CLASSIFICATION:

Binomial name: *Arachis hypogaea* [1]

Kingdom : Plantae

Division : Magnoliophyta

Class : Magnoliopsida

Order : Fabales

Family : Fabaceae

Subfamily : Faboideae

Tribe : Aeschynomeneae

Genus : Arachis

Species : *A. hypogaea*

Geographical source: The center of origin of groundnut is north-eastern Nigeria and northern Cameroon. It is found in the wild from central Nigeria eastwards to southern Sudan and is now cultivated throughout tropical Africa and to a lesser extent in tropical parts of the Americas, Asia and Australia. Its use as a pulse in West Africa was recorded by Arabic travelers in the 14th Century. Its importance declined after the introduction of groundnut from the New World tropics.

Varieties: There are vast varieties of groundnut that are grown in the world but the most popular varieties are mentioned below. All these varieties have different backgrounds, different characteristics and various other features that differentiate them from each other [3].

1. Spanish group –
    - Small seeded
    - Mostly cultivated in South Africa and southeastern and southwestern America
    - Includes - Dixie Spanish, Improved Spanish 2B, GFA Spanish, Argentine, Spantex, Spanette, Shaffers Spanish, Natal Common (Spanish), White Kernel Varieties, Starr, Comet, Florispan, Spanhoma, Spancross and Wilco I.
2. Runner group –
    - Better flavor, better roasting characteristics and higher yield
    - Grown in Georgia, Alabama, Florida, and South Carolina
    - Includes - Southeastern Runner 56-15, Dixie Runner, Early Runner, Virginia Bunch 67, Bradford Runner, Egyptian Giant, Rhodesian Spanish Bunch, North Carolina Runner 56-15, Florunner and Shulamit.
3. Virgina group –
    - Large seeded, high quality
    - Found in Virginia, North Carolina, Tennessee and Georgia
    - Includes - NC 7, NC 9, NC 10C, NC-V 11, VA 93B, NC 12C, VA-C 92R, Gregory, VA 98R, Perry, Wilson, Georgia Green
4. Valencia group –
    - Coarse, reddish stem and large foliage
    - Largely cultivated in New Mexico
5. Tennessee red and Tennessee white –
    - Same as Valencia group except the color of the seed. Rough pods, irregular pods and having a small number of kernels.

Nutrition Value: Peanuts are rich in nutrients providing over 30 essential nutrients and phytonutrients. Peanuts are a good source of niacin, foliate, fiber, magnesium, vitamin E, manganese and phosphorus. They also are naturally free of trans-fats and sodium and contain about 25% protein (a higher proportion than in any true nut) as shown in **table 1** [4].

List of Vitamins in Peanuts per 100g:

TABLE 1: VITAMINS RAW PEANUTS WITHOUT SALT COOKED PEANUTS WITH SALT

Vitamins Raw	Without salt	With salt
Vitamin C	0	0
Vitamin B1 (thiamin)	0.640mg	0.259 mg
Vitamin B2 (Riboflavin)	0.135mg	0.063 mg
Vitamin B5 (Pantothenic acid)	1.767mg0. 825 mg	
Vitamin B6 (Pyridoxine)	0.348mg0.152 mg	
Vitamin A	0 IU	0 IU
Folacin	240mcg	75 mcg
Niacin	12.06mg	5.259 mg
Vitamin E	9.13mg	3.170 mg

Peanut hulls: The National Peanut Board website states, "Many people report they enjoy peanuts by including the shell and food scientists indicate that it's okay." The Peanut Board breaks down peanut shell content as follows by 60 percent crude fiber, 25 percent cellulose, 8 percent water, 6 percent crude protein, 2 percent ash and 1 percent fat. The composition differs based on peanut varieties and manufacturing environments. Other than dietary fiber, peanut shells offer virtually no nutritional value.There are 305 calories in 1 cup, in shell, edible yield of Peanuts in Shell (Shell Not Eaten). Calorie breakdown: 73% fat, 9% carbs, 18% protein [5].

Macroscopy: It is an annual herbaceous plant growing 30 to 50 cm (1.0 to 1.6 ft) tall. The leaves are opposite, pinnate with four leaflets (two opposite pairs; no terminal leaflet) each leaflet 1 to 7 cm (⅜ to 2¾ in) long and 1 to 3 cm (⅜ to 1 inch) broad. The flowers are a typical peaflower in shape 2 to 4 cm (0.8 to 1.6 in) (¾ to 1½ in) across yellow with reddish veining (**fig. 1**) [6].

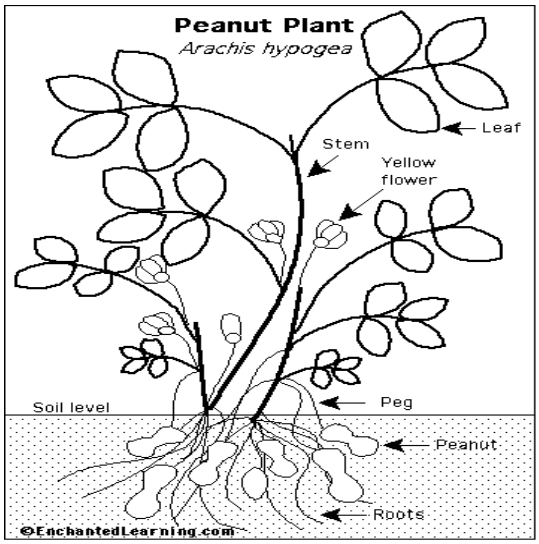


FIG. 1: MACROSCOPIC CHARACTERISTICS OF PEANUT

Microscopy:

Shoot components: Plant shoots, including leaves and stems, are composed of just three types of tissue:

- Dermal**,** that covers the outside,
- Vascular, that transports water, food and minerals inside the plant, and;
- Ground, that makes up the bulk of a plant's body (**fig. 2 & 3**).

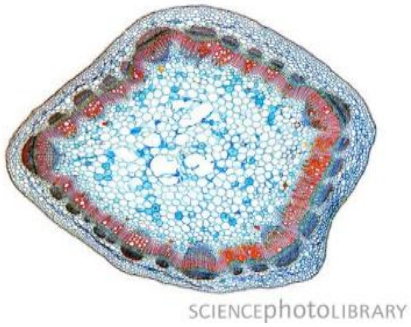


FIG. 2: MICROSCOPIC CHARACTERISTICS OF PEANUT

Leaf Components:

- A leaf is composed of a cuticle or outermost tissue layer, the upper epidermis, two layers of parenchyma cells, comprising the bulk of leaf tissue and the lower epidermis.
- Leaf veins running between the top and bottom layers contain the xylem that transports water and nutrients.
- The lower epidermis is also the site of the stomata, the cells that store and release water into the atmosphere.

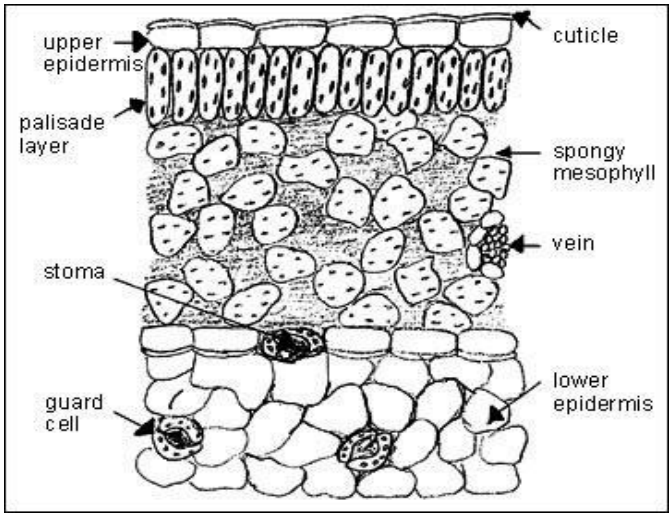


FIG. 3: MICROSCOPICE CHARACTERISTICS OF PEANUT

Root Components:

- The root system of plants takes the form of simple roots, nodules.
- Smaller threadlike roots grow off the main root of most plants, serving as the contact point for water and mineral uptake.
- The main branch root is composed of the epidermis, or outer layer, the endodermis, or inner layer of tissue, the procambium, which transports water into the plant and the meristem, where cell growth for the entire plant is determined.

Seed Components:

- Pericarp: The outer most layer of a monocot seed is called the pericarp. The pericarp is responsible for protecting the seed from the outside elements.
- Endosperm: The next structure is known as the endosperm. This substance nourishes the developing plant. There is both hard endosperm and soft endosperm.
- Embryo: The embryo is the baby plant after germination.
- Scutellum: The scutellum removes the waste produced as the embryo uses the endosperm to develop.
- Coleoptile: The coleoptile is a sheath of material designed to help the new plant push through the soil to the surface.
- Plumule and Radicle: The plumule is the uppermost part of the embryo and is where the leaves of the immature plant reside. The radicle is the immature root of the new plant [7].

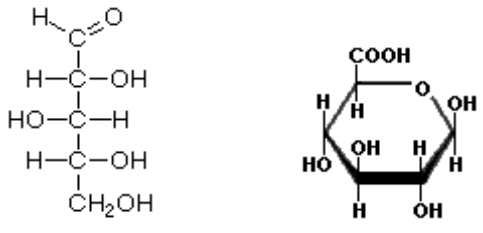
Chemical Constituents:
In Plant:

- Acids: Arachidic acid, aspartic acid, behenic acid, chlorogenic acid, stearic acid, gadoleic acid, gentisic acid, lauric acid, linoleic acid, oleic acid, p-coumaric acid, palmitic, palmitoleic (seeds), ascorbic acid (leaves and seeds) caprylic (plant)
- Arachin (seeds)
- Lecithin(seeds)
- Protein (plant)
- Flavonoids: quercetin, rutin (Plant)
- Beta-carotene (leaves)
- Amino acids: aspartic acid, glutamic acid, alanine, arginine, cystine, phenylalanine, glycine, histidine, isoleucine, leucine, lysine, methionine, proline, serine, Tyrosine, threonine, tryptophan and valine (seeds)
- Minerals: Aluminum, sulfur, boron, cadmium, zinc, cobalt, copper, iron, selenium, sodium (seeds), calcium (seeds and leaves), magnesium, phosphorus, potassium (plant)
- Fat: (seed, plant)
- Carbohydrates, cellulose (seeds)
- Vitamins: niacin, folacin, riboflavin, thiamin, (seeds and leaves) [8]

In Hulls: The chemical composition of peanuts shells varies with the peanut variety and shelling conditions but here is their approximate composition: Crude Fiber 60%, Cellulose 25%,

Water 8%, Crude Protein 6%, ash 2% and Fat 1%. Groundnut shell hemicellulose A_1 has been shown to contain residues of D-xylose and D-glucuronic acid.

The methylated polysaccharide gave on hydrolysis 2, 3, 4-tri-O-methyl-D-xylose,2, 3-di-methyl-D-xylose and 2-O-(2, 3, 4-tri-O-methyl-D-glucuronosyl)-3-O-methyl-D-xylose in the molar ratio of 1: 30: 1. A structure is proposed for the hemicellulose which has a straight chain of carbohydrate. 30, 1: 4-linked β-D-xylopyranose residues with D-glucuronic acid existing as a side chain through the C_2 position of one of the xylose residues [9] (**fig. 4**).



A **B**

FIG. 4: STRUCTURES OF CARBOHYDRATES A) XYLOSE B) GLUCURONIC ACID

Pharmacological activities: Peanut plant has shown different pharmacological activities [10].

Antimicrobial activity: Peanut shells contain large amounts of the flavonoid decomposition compound 5, 7-dihydroxychromone (DHC). DHC was found to inhibit the growth of two pathogenic fungi *Rhizoctonia solani* and *Sclerotium rolfsii* with ED_{50} values of 18 and 26 uM, and radicle elongation of peanut ED_{50} values of 65 uM. DHC did not promote the growth of symbiotic nitrogen-fixing bacteria; although related compounds did significantly increase their growth rate. DHC had no effect on the growth of *Bradyrhizobium* sp. at 10 uM/in medium containing low (1.0 g/L) mannitol as the carbon source. When added to high (10.0 g/L) mannitol medium DHC initially inhibited growth, but by 120 h after inoculation the growth of all treatments were similar. These results suggest a role for DHC released from peanut shells in suppressing pathogenic fungal infection and competing plant growth but not for *Brady-rhizobium* growth promotion [11].

Antifungal activity: Since peanut phytoalexins appear to play a role in plant defense mechanisms, the stilbenoids were evaluated first for their antifungal effects against plant pathogenic fungi. The fungal species tested are economically important worldwide for many crops, including peanut. Botrytis blight of peanuts is caused by *Botrytis cinerea. Phomopsis* spp. frequently produces fruiting structures in the peanut necrotic tissue of leaf scorch lesions (secondary invasion of leaf tissue) [12].

Antiviral activity: Peanut butter contains a substance called resveratrol. Resveratrol appears to inhibit viral infection/replication by regulating inflammatory responses and cellular stress pathways, rather than interacting directly with virus. To be more specific, resveratrol inhibits activation of the NF-kB pathway in response to TNF, and increases activation of p53. NK-kB is a "key regulator" of the inflammatory response. By inhibiting its activation, resveratrol acts as an anti-inflammatory. Since host NF-kB is necessary for efficient replication of several viruses, including Influenza A, HSV-1, and HIV-1; resveratrol is likely inhibiting viral replication when it inhibits NK-kB. By increasing activation of p53, a cellular protein involved in type I interferon-mediated antiviral responses; resveratrol is also likely increasing antiviral immunity[13].

Antioxidant activity: Plant parts were freeze dried and extracted with methanol and aqueous methanol. Antioxidant activity of the extracts was tested using ORAC and DPPH assays. Total phenolics were measured using the Folin-Ciocalteau method. Chlorophyll was tested with the ORAC assay to dispel concern for potential chlorophyll antioxidant activity. TLC and HPLC were used for separation and preliminary identification of compounds. The identified phenolic compounds were assayed individually.

Leaves had the highest antioxidant capacity and total phenolic content, followed by NC roots and TX roots. The total phenolic content was highly correlated with the antioxidant activity of the ORAC and DPPH suggesting that phenolic compounds may contribute to the antioxidant activity. Compounds identified in the peanut leaves and roots were phydroxybenzoic acid, caffeic acid, chlorogenic acid, ferulic acid, catechin, epicatechin, and gallocatechingallate [14].

Anticancer properties: Resveratrol is a stilbene-typearomatic phytoalexin found in peanuts reported to exhibit several physiological activities including anti-cancer activities *in vitro* and in experimental animal models, aswell as in humans. Anticancer activity of this compound is mainly due to induction of apoptosis via several pathways, as well as alteration of gene expressions, all leading to a decrease in tumor initiation, promotion, and progression. A protective role of phytosterols (PS) especially beta-sitosterol, from colon, prostate, and breast cancer. Roasted peanuts contain 61-114 mg PS/100 g depending on the peanut variety, 78-83% of which is in the form of beta-sitosterol. The data suggest that peanuts and its products, such as peanut oil, peanut butter, and peanut flour, are good sources of PS [15].

Anti-inflammatory: Resveratrol exhibits its anti-inflammatory activity via different pathways that are mostly centered on COX-1 and COX-2. In addition to inhibition of COX-1 and COX-2 expression, through upstream suppression of the activity of NF-kB and I-kB kinase, 52 resveratrol reduced the production of prostaglandin E2 (PGE2) and the formation of ROS in Lipopolysaccharide (LPS)-activated microglial cells. Candelario-Jalil *et al*. [48] reported that this activity of resveratrol is based on the inhibition of the expression ofmicrosomal PGE2 synthase-1 (mPGES-1) and not COX-2 in rat microglia. MPGES-1 is directly involved in the synthesis of proinflammatory PGE2 (**fig. 5**).

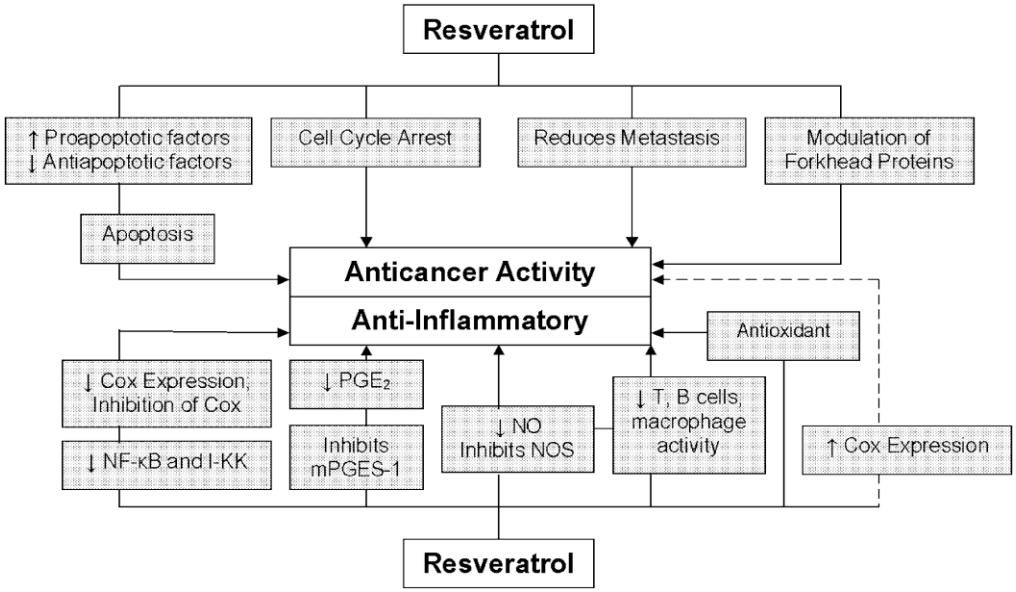


FIG. 5: RESVERATROL AS A CHEMICAL CONSTITUENTS PRESENT IN PEANUTS

Antihypertension: ACE a dipeptydyl carboxypeptide is known to play a vital role in the regulation ofblood pressure. It achieves this by converting Angiotensin I (an inactive decapeptide) into Angiotensin II (a salt retaining octapeptide and vasoconstrictor) by cleaving a dipeptide from the carboxyl terminal of Angiotensin I and inactivates bradykinin (a vasodilator nonpeptide) by the same mechanism. Therefore inhibiting ACE cumulates in positive hypotensive effect [16].

Antimutagenic effects &Antiproliferative effects: Antimutagenic and antiproliferative effects of roasted and defatted peanut dregs on human leukemic U937 and HL-60 cells. The antimutagenic effects on Salmonella typhimurium TA98 and TA100 strains and antiproliferative effects on leukemia cell lines (U937 and HL-60) of peanut protein isolate (PPI), peanut protein isolate enzyme hydrolysate (PPIEH), roasted and defatted peanut dregs (RDPD), and roasted and defatted peanut dregs enzyme hydrolysate (RDPDEH) were investigated.

The antimutagenic effects on B(a)P and 4-NQO toward the TA98 and TA100 strains were found to follow a diminishing order: RDPD > RDPDEH >> PPI = PPIEH with dose-dependency. Antiproliferative effects on leukemia cells U937 and HL-60 were also detected. RDPD was found to be the most effective of all the peanut preparations.

At 100 microg/mL concentration, RDPD inhibited the proliferation of U937 and HL-60 cells by 56% and 52%, respectively. We propose to consider RDPD and RDPDEH in the development of natural chemotherapeutic or chemopreventive dietary supplements against leukemia and to upgrade the utilization of these by-products in peanut oil production [17].

Reduce cardiovascular disease risk: Peanut consumption improves indices of cardiovascular disease risk in healthy adults. Diets containing nuts reduce cardiovascular disease (CVD) risk factors. Subjects were provided 500 (+136) kcal as peanuts during an eight-week free feeding (FF) diet. The same amount of peanuts was added during a three-week addition (ADD) diet or replaced an equal amount of other fats in the diet during an eight-week substitution (SUB) diet. Energy intake from fat was increased through greater intake of MUFA and polyunsaturated fatty acids, while saturated fatty acid intake remained relatively stable under all conditions. Triacylglycerol (TAG) was reduced by 24% during ADD by 17% during SUB ($p<0.05$) and by 14% during four-weeks of FF, but then rebounded to baseline by week 8. Dietary fiber, magnesium, folate, alpha tocopherol, copper and arginine increased during all treatments. Serum magnesium increased in 13 of 15 subjects during FF ($p<0.05$).Regular peanut consumption lowers serum TAG, augments consumption of nutrients associated with reduced CVD risk and increases serum magnesium concentration [18].

Improves glutathione and HDL-cholesterol levels in experimental diabetes: To find the lipid profile in Streptozotocin (STZ) induced diabetic rats 32 rats were divided into 4 groups as control, control + peanut, diabetic, diabetic + peanut. Control and diabetic groups were fed on standard rat chow whereas control + peanut and diabetic + peanut were fed on standard rat chow supplemented with 0.63 g % peanut for 12 weeks. Serum glucose levels, lipids, Glutathione (GSH), lipid peroxidation (LPO) and atherogenic index (AI) levels were determined at the end of the experiment. In the diabetic group TG (Triglyceride), TC (Total cholesterol), LDL-C (LDL-cholesterol) levels and atherogenic indexes increased significantly whereas HDL-C (HDL-cholesterol) level decreased significantly compared to the control group. The supplementation with peanut in the diabetic group led to significantly higher HDL-C levels and lower AI levels compared to diabetic group. Peanut consumption increased GSH levels significantly both in control and diabetic groups. Peanut consumption may improve oxidant-antioxidant status in healthy and diabetic status without increasing blood lipids. Moreover, increased HDL-C levels and decreased AI levels in diabetic rats indicate that, peanut consumption may have protective effects against cardiovascular complications of diabetes [19].

***In vitro* amoebicidal activity of ethanol extracts of *Arachis hypogaea*:** The *in vitro* amoebicidal activity of ethanol extracts of *Arachis hypogaea* L. (peanut). *Acanthamoeba* were isolated from keratitic patients, cultivated on 1.5% non-nutrient agar, and then incubated with different concentrations of plant extracts which were further evaluated for their cysticidal activity. The results showed that all extracts had significant inhibitory effect on the multiplication of *Acanthamoeba* cysts as compared to the drug control (chlorhexidine) and non-treated control, and the inhibition was time and dose dependent. The ethanol extract of *A. hypogaea* had a remarkable cysticidal effect with minimal inhibitory concentration (MIC) of 100 mg/ml in all incubation periods, while the concentrations of 10 and 1 mg/ml were able to completely inhibit growth after 48 and 72 h, respectively [20].

Hypoglycemic and hypolipidemic effects: The hypoglycemic and hypolipidemic effect of aqueous extract of Arachis hypogaea was investigated in normal and alloxan-induced diabetic rats. The extract caused a significant ($P < 0.05$) decrease of fasting blood glucose of both normal and alloxan-induced diabetic rats from 102.60 [+ or -] 1.65 mg/dl to 88.79 [+ or -] 0.94 mg/dl for normal and 189.0 [+ or -] 30.79 mg/dl to 107.55 [+ or -] 1.54 mg/dl for alloxan-induced diabetic rats. The extract also caused a significant ($P < 0.05$) decrease in serum triglyceride, total cholesterol, HDL-cholesterol and LDL-cholesterol in both normal and alloxan-induced diabetic rats [21].

Neuroprotective supplement for Alzheimer's disease: Resveratrol reducing the risk of neurodegenerative disorders, especially Alzheimer's disease (AD).

AD is characterized by a progressive dementia, and is one of the most common neurodegenerative disorders in the elderly. It has been reported that resveratrol exhibits neuroprotective benefits in animal models of AD. Resveratrol promotes the non-amyloidogenic cleavage of the amyloid precursor protein, enhances clearance of amyloid beta-peptides, and reduces neuronal damage. Despite the effort spent trying to understand the mechanisms by which resveratrol functions, the research work in this field is still incomplete. Many concerns such as bioavailability, biotransformation, synergism with other dietary factors, and risks inherent to its possible pro-oxidant activities still need to be addressed. This review summarizes and discusses the neuroprotective effects of resveratrol on AD, and their potential mechanisms [22].

USES:

Peanuts: Peanuts are nutritious foods that contain more than 30 vitamins, minerals and phytonutrients. In fact, one ounce of dry-roasted unsalted peanuts has 2.3 grams of fiber, 7 grams of proteins that satisfies and are a good source of folate (the naturally occurring form of folic acid); niacin, and manganese. And, like all plant-based foods peanuts are naturally trans-fat and cholesterol-free with 12 grams of unsaturated (good) fat which has been shown to have heart protective benefits[23].As part of a crop rotation program, peanuts can help to enrich the soil. Peanuts are legumes and are able to fix nitrogen in their roots. When peanut plants are tilled back into the soil, that nitrogen improves the soil for other crops, such as cotton or wheat, which require nitrogen to grown well.

Leaf:

- Petioles were higher in K and Mg contents, whereas the blades were higher in P, Ca, B, Mn, Zn, and Cu contents.
- An extract of peanut leaf consists of 42.2% carbohydrates, 25.4% ash , 18.0% protein , 8.8% fat , 4.6% moisture and 0.8% fiber on a dry basis.
- Over 65% fatty acids comprised of linoleic,palmitic ,linolenicacids;the concentration of oleic acid is high in moist leaf tissues.
- Amino acid composition of protein in peanut leaf extract was comparable to that of similar extracts derived from other leaf tissues lacking in sulfur containing amino acids.

Oil: Peanut oil obtained by cold pressing is used for medical treatments. Peanut oil is the basis for many therapeutic preparations. It has skin softening properties. Peanut oil is also edible and can be used in the kitchen. Peanut oil is used to cure Catarrh of The Bladder or Cystitis (pain and tenderness in the region of the bladder) [24].

Peanut cake or peanut oil meal is rich source of proteins which are crude proteins. These crude proteins are used as cattle feed or as raw material for the preparation of protein isolate [25].

- It is used as a solvent for intramuscular injections.
- Used in the preparation of liniments, plasters and soap.
- Used as a lubricant.
- Produces a firm and white soap.
- It is principally edible oil.

Root:

1. **Uses in Cuisine:** While the peanut itself is often soaked in enriched oils, baked and dressed with sugar or salt before it's consumed, the peanut plant root, having been buried underneath soil, retains nutritional minerals and plant proteins without added the sugar or fat. Peanut root is also rich with the antioxidant resveratrol, which aids in cancer prevention, lowered cholesterol and heart health. You can serve peanut root in dishes like peanut root soup.
2. **Use in Cosmetics:** The moisture-rich antioxidants found in the root of a peanut plant are often found in cream conditioners, shampoos and body washes, because the caffeic acid found within the plant's roots stimulate hair roots and prolong skin elasticity. The antioxidant resveratrol, found in both the plant's roots and leaves, combats age lines and boosts skin brilliance.

3. **Use as Alternative Fuel*:*** The root of the peanut plant is rich not only in minerals and antioxidants, but also in high-protein peanut oil. The oil found within the peanut plant's roots combines with other food oils and a low grade petroleum blend to create biodiesel fuel. Biodiesel fuel is as biodegradable as sugar and burns at a much higher temperature than petrodiesel, reducing the risk of highway explosions and fiery wrecks [26].

Hulls:

- Antioxidants found naturally in the peanut shell help protect your body from fungal infections and free radicals, which cause cellular damage.
- Peanut shells are used in the manufacture of soap, cosmetics, wallboard, plastics and linoleum, among other things.
- Peanut hulls contain a significant amount of vanillin. The potential benefits vanillin has on human cancer cells before any direct conclusions can be made.
- Synthetic food ingredients replacement
- **A**ntioxidant activity and cytotoxicity
- Hypolipidemic and hepatoprotective effects
- Cardiovascular health
- Use to make hydrogen for fuel [27].

Peanut allergy: Peanut allergy is the most common cause of deaths from food allergy. Peanut allergy accounts for the majority of severe food-related allergic reactions. It tends to present early in life, and affected individuals generally do not outgrow it. In highly sensitized people, trace quantities can induce an allergic reaction [28].

- **Causes:** Peanut allergy occurs when your immune system mistakenly identifies peanut proteins as something harmful. When you have direct or indirect contact with peanuts, your immune system releases symptom-causing chemicals into your bloodstream. It isn't known exactly why some people become allergic to peanuts and others don't.

Exposure to peanuts can occur in different ways:

- **Direct contact.** The most common cause of peanut allergy is eating peanuts or peanut-containing foods. Sometimes direct skin contact with peanuts can trigger an allergic reaction.
- **Cross-contact.** This is the unintended introduction of peanuts into a product. It's generally the result of a food being exposed to peanuts during processing or handling.
- **Inhalation.** An allergic reaction may occur if you inhale dust or aerosols containing peanuts, such as that of peanut flour or peanut oil cooking spray.

Peanut allergy prevalence: Peanut allergy deserves particular attention. It accounts for the majority of severe food-related allergic reactions, it tends to present early in life, it does not usually resolve, and in highly sensitized people, trace quantities can induce an allergic reaction. In this review, we will discuss the prevalence, clinical characteristics, diagnosis, natural history and management of peanut allergy [29].

Storage:

- Always store roasted peanuts in a porous bag, such as a paper bag or even a burlap sack. Keep them in an upper cupboard away from moisture. It's important to keep them dry to avoid mold from forming. Because good air circulation is important, never store them in a plastic bag or plastic container. Peanuts can keep for up to 12 months if stored properly. Raw peanuts should be stored in the refrigerator in a tightly covered container to prevent spoilage.
- The peanuts should be stored in dark areas at low temperatures (under 18°C) and relative humidity. Under optimum conditions, peanuts can be stored for up to 1 year. If the organic product is being stored in a single warehouse together with conventionally grown peanuts mixing of the different qualities must be avoided. This is best achieved using the following methods:

- Training and informing of warehouse personnel
- Explicit declarations/labels in the warehouse (silos, pallets, tanks etc.)
- Color differentiation (e.g. green for the organic product)
- Incoming/dispatched goods separately documented (warehouse logbook)

- It is prohibited to carry out chemical storage measures (e.g. gassing with methyl bromide) in mixed storage spaces. Wherever possible, storing both organic and conventional products together in the same warehouse should be avoided.

CONCLUSION: This review gives an overview on the plant *Arachis hypogaea.* It is mainly focused on pharmacognostic and pharmacological aspects. Peanuts consist of 30 essential nutrients and they are a good source ofniacin, foliate, fiber, magnesium, vitamin E, manganese and phosphorus. A wide variety of chemical constituents are present in peanut plant like acids, proteins, minerals, carbohydrates and fats. Pharmacological it is used as antimicrobial, antifungal activity, antioxidant, anticancer, anti-inflammatory, antihypertension, antimutagenic, Reduce cardiovascular disease risk, amoebicidal activity, hypoglycemic, hypolipidemic effects and neuroprotective activity. Peanut oil is used as lubricant, food industry and in cosmetic industry.

ACKNOWLEDGMENT: Thanks for the CMR College of Pharmacy management and Principal and Research guide, Nadenla Ramarao who motivated us to write the review on *Arachis hypogaea.*

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How to cite this article:
Geetha K, Ramarao N, Kiran RS, Srilatha K, Mamatha P and Rao VU: An overview on *Arachis hypogaea* plant. *Int J Pharm Sci Res* 2013; 4(12): 4508-18. doi: 10.13040/IJPSR. 0975-8232.4(12).4508-18