

Chapter 2

Hair Oils

Abstract We are exposed to lots of chemicals from our environment either knowingly or unknowingly. These chemicals enter our body and induce damage to different organs. One such organ affected is the hair. Damage to hair, weakens them and causes hair fall. In order to reverse this damage, the nourishment to hair has to be reinstated which is possible by increasing blood circulation to the scalp and also by massaging with oils that provide external nutrients. This chapter provides a list of plant drugs that can be incorporated in hair oils, along with their beneficial effects for hair.

Keywords Aloe • Green tea • Coconut oil • Hibiscus

2.1 Introduction

Hair oils come under the category of hair tonics used for hair disorders such as dandruff, hair fall and dryness of hair. Regular application of hair oil provides resistant to breakage with no split ends, provides luster and shine to hair and moisturizes the scalp. Hair oils also act as a medium to supply essential nutrients to the root of hair for their proper growth. Below we have mentioned few ingredients which can be incorporated in hair oils for the above mentioned uses.

The base oils has to be a non-sticky oil and the choice may be one of the following.

2.2 Types of Hair Oils

2.2.1 Almond Oil

It is the oil obtained from the fruits of *Prunus dulcis*/*Prunus amygdalus*, family Rosaceae. It is native to Middle East and South Asia. The oil is extracted by

pressing the dried fruits either by cold or hot press. The other alternative for almond oil extraction is solvent extraction (Li et al. 2006). The crude oil is purified by filtration. In *Ayurveda* almond oil has been attributed with aphrodisiac properties and as a nervine nutrient (Burlando et al. 2010).

Chemical composition

Almond oil comprises of monounsaturated fatty acid oleic acid and polyunsaturated fatty acid i.e. linoleic acid. The others include stearic acid, palmitic acid and linolenic acid. It is also a rich source of Vitamin E.

Benefits for hair

It is used to soften and moisturize dry hair. It is also used to stimulate hair growth and provide elasticity to the strands making them strong. It also helps to cleanse the scalp (Kumar et al. 2012).

2.2.2 Argan Oil

The oil is obtained from the kernels of *Argania spinosa*, family Sapotaceae, found in the desert regions of Morocco. The fruit is dried, pulp removed and the nut is opened to get the kernel. These kernels are roasted, cooled and then grinded to get the oil. The oil is allowed to stand, it is then decanted and filtered to remove the impurities.

Chemical composition

The oil contains tocopherols, phenols, major fatty acids like oleic, palmitic, stearic, linoleic and linolenic acids (Rueda et al. 2014). It also contains squalene, steroids-schottenol and spinasterol (Khallouki et al. 2003).

Benefits for hair

The oil is considered to be nourishing for hair and also a good moisturizer. It brings shine to hair (Monfalouti et al. 2010). It also prevents hair loss (Guillaume and Charrouf 2011).

2.2.3 Apricot Seed Oil

It is extracted from the kernels of *Prunus armeniaca*, family Rosaceae. It is grown wildly in the northern part of India, USA, Australia. It is indigenous to East and Central Asia, largest producer being Turkey. The pulp of the fruit is separated, followed by separation of the kernels from the seed coat. The kernels are then put into expellers to get the oil. The oil obtained using this method may have the presence of hydrocyanic acid. An alternative method is solvent extraction, which eliminates the presence of hydrocyanic acid in the oil (Gupta and Sharma 2009).

Chemical composition

The oil is very similar to almond oil. The oil contains unsaturated fatty acids namely palmitic, palmitoleic, linoleic, linolenic and oleic acid. The oil also shows the presence of proteins (Dwivedi and Ram 2008). It also contains small quantity of glycolipids, phospholipids, sterols, tocopherols, amino acids and minerals (Alpaslan and Hayta 2006).

Benefits for hair

It provides a conditioning effect to the hair. It keeps the scalp moisturized, stimulates the hair follicles and enhances hair growth, due to presence of Vitamin E. It makes the hair soft and manageable.

2.2.4 Babassu Oil

It is extracted from the kernels of the palm tree *Attalea speciosa* (*Orbignya oleifera*), belonging to the family Arecaceae. It is found in the Amazon region. Once the fruits are ripe the nuts are opened and the oil is cold pressed from the kernels.

Chemical composition

The oil has similar composition as that of coconut oil and comprises of lauric, myristic, palmitic, oleic and stearic acid (Ferrari and Soler 2015).

Benefits for hair

One advantage of this oil over coconut oil is it doesn't clog the pores of the scalp. It may be used as a pre shampoo treatment. It can also be mixed with shea butter or other ingredients to enhance its efficacy. It provides excellent moisturizing effect and can soothe itchy and dry scalp. There are many hair care formulations that make use of babassu oil.

2.2.5 Castor Oil

The oil is obtained from the seeds of *Ricinus communis*, belonging to family Euphorbiaceae. The plant is found in all tropical and sub-tropical countries, India being the major producer. The oil is obtained from the decorticated seeds of the plant which are fed in the oil press to get the oil. This oil is filtered and steamed to remove ricin, a toxic component in the oil and lipase to prevent rancidity in the oil.

Chemical composition

It chiefly contains glycerides of ricinoleic, isoricinoleic, stearic and dihydroxy-stearic acid. Ricinoleic acid an omega-9 fatty acid is the main component of castor oil, is used for the treatment of baldness.

Benefits for hair

Hydrogenated castor oil which is a white waxy solid is also used in different hair cosmetics. It is extensively used as a hair tonic. It is also incorporated in many hair care preparations (Sagarin 2008). Being rich in omega-9 fatty acids, it provides nourishment to the hair and follicle. It has a good penetrability and hence can easily provide nourishment to the follicles.

2.2.6 Coconut Oil

It is the oil obtained from the kernel or meat of fruits of *Cocos nucifera*, family Arecaceae. It is indigenous to India, Sri Lanka, Indonesia, Malaysia, Australia and South America. It can be used for different purposes like deep conditioning, to control dandruff, for hair growth and as a base for hair colour. For the preparation of oil, there are two processes used:

- (a) Dry process which makes use of the dried pulp of coconut. It is pressed to obtain crude oil. The crude oil is then refined to remove impurities.
- (b) Wet process which extracts the oil from the raw coconut. The oil obtained is initially in the form of an emulsion due to the presence of proteins. The oil is extracted by breaking the emulsion either by boiling, centrifugation or pre-treatment with salts, enzymes or acids (McGLONE et al. 1986).

Chemical composition

Coconut oil contains saturated fatty acids and is one of the richest source of medium chain fatty acids. The major fatty acids are lauric acid, myristic acid and capric acid. (Marina et al. 2009). It additionally contains phenolic acids and antioxidants like tocopherol (Appaiah et al. 2014).

Benefits for hair

Coconut oil prevents the protein loss from hair (Rele and Mohile 2003). It is generally used as a pre-wash conditioner. It also prevents the penetration of water in the hair shaft and the subsequent swelling and chipping off the hair cuticle. It also prevents the loss of moisture from hair and thus provides moisturizing effect (Keis et al. 2007). It helps to control dandruff (Fife 2013).

2.2.7 Hemp Oil

The oil is extracted from the seeds of the plant *Cannabis sativa*, family Cannabaceae. It is common to be confused with the banned entity marijuana and hemp plant. The oil is obtained from industrial hemp plants, which contain very low levels of tetrahydrocannabinol (THC) (Bosy and Cole 2000). The oil is extracted by

cold press method, solvent extraction (petroleum ether or naphtha) or by more recent technique like supercritical CO₂ extraction.

Chemical composition

The oil is rich in essential fatty acids, proteins—edestin and albumin, amino acid—arginine and vitamins (Callaway 2004). It contains high levels of linoleic acid along with α - and γ -linolenic, palmitic, stearic, oleic acids. In addition it also contains tocopherols (Anwar et al. 2006).

Benefits for hair

Hemp oil moisturizes the scalp and hair, stimulates hair growth and prevents hair breakage. Massaging with hemp oil increases blood circulation to the scalp. It also helps to control dandruff.

2.2.8 Jojoba Oil

It is the liquid present in the seeds of *Simmondsia chinensis*, family Simmondsiacaceae. It is native to South America: Arizona, California and Mexico. The oil is obtained by pressing the seeds followed by purification using solvents for leaching the oil. An alternative for extraction of oil is direct solvent extraction.

Chemical composition

It contains wax esters of fatty acids, major ones being eicos-11enoic, octoдец-9-enoic docos-13 enoic, the major alcohol being docos-13-enol (Wisniak 1987).

Benefits for hair

The pure oil is used as a moisturizer for hair. The liquid wax has high affinity for sebum which allows high penetration and delivery to deeper skin layers. It provides hydration, antibacterial and anti-parasitic effects. It is used clinically to strengthen hair. It is used to cleanse the scalp and hair. It reduces the oiliness at the same time improving gloss and manageability of hair (Wisniak 1987).

2.2.9 Linseed Oil

It is the oil obtained from the seeds of *Linum usitatissimum*, Linaceae. It is indigenous to India, but also cultivated in Canada, China and US, Turkey and Afghanistan. For the extraction of oil, the seeds are made free of other materials by sieving and oil is produced by the use of expellers. The oil obtained this way is subjected to decanting, alkali treatment followed by bleaching, to remove the mucilage, free fatty acids and coloring matter respectively. The oil is used as a

nutraceutical and is recommended to prevent coronary heart disease, cancer, neurological and hormonal disorders.

Chemical composition

The oil contains glycerides of palmitic, stearic, oleic, linoleic and linolenic acids. It also contains sterols, tocopherol and squalene.

Benefits for hair

As a hair oil it helps to control dandruff, alleviate hair fall and also works as a conditioner for dull hair (Tripathi et al. [2013](#)).

2.2.10 Mustard Oil

Commonly referred as Sarson ka tel in India, it is obtained from the seeds of *Brassica nigra*, family Cruciferae. The plant is cultivated in India, china, Canada and England. The oil is obtained by expression of the seeds, followed by purification.

Chemical composition

It contains glycerides of arachidic, behenic, eicosenoic, erucic, lignoceric, linoleic, linolenic, oleic, palmitic and myristic acids (Chowdhury et al. [2007](#)). Apart from these, it contains a glycoside sinigrin, tocopherol and carotenoids (Vaidya and Cho [2011](#)).

Benefits for hair

It is an edible oil but also used for its medicinal properties such as a rubefacient. It is used for hair growth promoting effects, to prevent premature greying of hair and hair loss. It may also help to control infections of the scalp. It improves the texture of hair and provides additional conditioning effect.

2.2.11 Nigella sativa Oil

It is commonly known as black cumin or kalonji. The oil is obtained from the fruits of *Nigella sativa*, family Ranunculaceae. It is indigenous to Europe, Southwest Asia, Africa but is cultivated in other countries. The oil may be extracted by cold press method or solvent extraction.

Chemical composition

The oil contains unsaturated fatty acids: linoleic acid, oleic acid, eicosadienoic acid and dihomolinoleic acid, saturated fatty acids like palmitic and stearic acid. Thymoquinone, nigellone, α -sitosterol, and stigmasterol as major components (Ahmad et al. [2013](#)).

Benefits for hair

It has been used in the Unani system of medicine for treatment of hair problems. The oil strengthens the follicles and prevents hair loss. It also claims to treat baldness by causing hair re-growth.

2.2.12 Olive Oil

It is the expressed from the pericarp of fruits of *Olea europaea*. Family Oleaceae. It is a native to Mediterranean countries. The ripe fruits are collected, the pulp removed and the seeds are pressed lightly to extract the oil. This oil is mixed with water to remove coloring impurities and oil is skimmed off.

Chemical composition

The oil chiefly contains olein and a little of palmitin, linolein and arachin (Wallis 2005, Textbook of Pharmacognosy). The virgin olive oil contains many antioxidants like phenolics, flavonoids, lignans and secoiridoids (Servili et al. 2009).

Benefits for hair

It has emollient properties. It forms a protective coating over the hair shaft and prevents from damage. It may be used for the treatment of dandruff, to moisturize and soften hair.

2.2.13 Rice Bran Oil

The rice bran comprises of the embryo and endosperm of the seeds of *Oryza sativa*, family Graminae. It is produced in Asian countries like China, India, Bangladesh and Japan. The fresh bran is pressed and then extracted with solvent (hexane) to get the oil. The oil can also be obtained by supercritical CO₂ extraction.

Chemical composition

It contains glycerides of oleic, linoleic and palmitic acid and antioxidant like tocopherols. It also contains oryzanol which is a mixture of ferulic acid esters of triterpene alcohol, one of the active constituents (Patel and Naik 2004). It contains oleic, linoleic, alpha-linolenic, palmitic and stearic acid. It also contains free sterols (Cicero and Gaddi 2001).

Benefits for hair

It stimulates hair growth and makes hair thicker. It strengthens the hair follicles. It is used as a hot oil treatment. It may help to control dandruff by moisturizing the scalp. It also acts as a sunscreen (Nagendra Prasad et al. 2011) and also prevents split ends. Linoleic acid and γ -oryzanol induce hair growth by stimulating the

mRNA expression levels of VEGF (vascular endothelial growth factor), IGF-1 (insulin like growth factor-1), KGF (keratinocyte growth factor) and reduction of TGF-beta (transforming growth factor beta) and thus could be used for treatment of hair loss (Choi et al. 2014). It may also help to prevent greying of hair (Unna and Sampson 1940).

2.2.14 Rosehip Oil

It is the oil obtained from the rose hip seeds, *Rosa canina*, *R. moshata*, *R. rubiginosa* belonging to family Rosaceae. The oil is extracted either by cold press method or solvent extraction method from plants growing in the Andes, South Africa and Europe. Recently the supercritical CO₂ extraction is being advocated.

Chemical composition

The major fatty acids found in the oil are linolenic, palmitic and stearic acid (Szentmihályi et al. 2002). It has other nutrients like tretinoin, lycopene and beta carotene.

Benefits for hair

It works as a good moisturizer and is good for dull and dry hair. It is also said to cure dandruff and provide shine to hair. One of the study indicates that the incorporation of oil prevents damage to hair following the use of permanent wave solution (Miyeon and Kyoungsook 2013). Since the oil is rich in antioxidants it may help to prevent the damage to hair follicles and prevent graying of hair.

2.2.15 Safflower Oil

It is obtained from the ripe seeds of *Carthamus tinctorius*, family Compositae. It is indigenous to Middle East but is largely grown in India, USA, Ethiopia and Mexico (Ekin 2005). The oil is prepared by expression with a hydraulic press. The oil is filtered and decolorized.

Chemical composition

It contains glycerides of palmitic, stearic, arachidic, oleic, linoleic and linolenic acid. It also shows the presence of tocopherols and tocotrienols (Lee et al. 2004).

Benefits for hair

The oil is medicinally used as a dietary supplement in the treatment of hypercholesterolemia and atherosclerosis. The advantages of using safflower oil is it is inexpensive. It provides excellent moisturizing effect. It is used for hair growth, to impart shine to hair and to prevent hair loss.

2.2.16 *Sea Buckthorn Oil*

The oil is obtained from the seeds of the berries of *Hippophae rhamnoides*, Elaeagnaceae family. It has long been used by the Tibetians for various health problems. It is native to the sandy areas along the coast of Europe and Asia. The oil may be extracted by any one of the following methods: cold or hot press, solvent extraction, maceration in other carrier oils, but the best suited is supercritical CO₂ extraction.

Chemical composition

It is a rich source of omega 3, 6, 7 and 9 fatty acids and vitamins essential for hair growth and good health of hair. The oil is rich source of tocotrienols, tocopherols, carotenoids, vitamin A, C and E and trace elements. The major fatty acids are linoleic, alpha-linoleic, palmitic and palmitoleic acid (Suryakumar and Gupta 2011).

Benefits for hair

The oil needs to be mixed with a carrier oil like coconut, jojoba or olive oil and massaged onto the scalp. Regular use of sea buckthorn oil prevents premature hair fall, helps to clean the hair follicles, aids in hair elasticity and moisturizes the hair shaft. It has been used in Russia for treatment of dandruff and prevention of hair loss (Ruan et al. 2007).

2.2.17 *Sesame Oil*

The plant being indigenous to India, is commonly known as til oil in India. It is obtained from the seeds of *Sesamum indicum*, family Pedaliaceae. It is found in India, China, Egypt and Middle East. The white variety of seeds are expressed to yield oil which is then purified by refining methods.

Chemical composition

It contains glycerides of oleic, linoleic, palmitic, stearic and arachidic acids. It also contains sesamol responsible for the stability of oil and lignin derivatives: sesamin and sesamol.

Benefits for hair

It has very good emollient properties and is used as an oil base for many *Ayurvedic* hair oils (Angadi 2009). Regular use of sesame oil helps to have healthy hair. It also enhances the growth of hair and prevents premature greying of hair.

2.2.18 *Sunflower Oil*

It is obtained after the cold compression of seeds of *Helianthus annuus*, belonging to family Asteraceae. It is the second most widely used base oil in the hair cosmetics.

Chemical composition

It contains mono and polyunsaturated fatty acids mostly oleic and linoleic acids and minor quantities of palmitic and stearic acid (Putt and Carson 1969). It also contains carotenoids and tocopherols.

Benefits for hair

It stimulates the natural growth of hair, acts as a good moisturizer and conditioner. It prevents thinning of hair, nourishes the hair and prevents damage to hair.

2.2.19 Wheat Germ Oil

It is extracted from the germ of kernels of wheat, *Triticum aestivum*, family Graminae. It is largely cultivated in Asia and Europe. The oil is extracted via pressing or solvent extraction (Knowles et al. 2014).

Chemical composition

The oil consists of fatty acids: palmitic acid, oleic, linoleic and linolenic acid, (Megahad and El Kinawy 2002) tocopherols, sterols, flavonoid pigments and xanthophylls (Barnes 1982). Wheat germ oil contains vitamin E, A and D which is easily absorbed by the skin and the scalp. Also at the same time it prevents the oil from getting rancid. It also contains proteins and lecithin (Kumar et al. 2011).

Benefits for hair

The oil may be used for the repair of dry and dull hair. It may be possible to delay hair loss if not complete prevention using this oil. It stimulates hair growth and helps to maintain the elasticity of hair.

Below we have mentioned few ingredients which can be incorporated in hair oils to enhance benefits of the oils.

2.3 Herbal Oil Ingredients**2.3.1 Allium cepa (Onion)**

It is commonly known as onion, belongs to the family Liliaceae. It is the most widely cultivated species in this genus. The crop is harvested after the leaves wither away and dried onions are ready for use or storage.

Chemical constituents

The seeds show high amounts of fixed oil, fibre, crude protein, calcium, potassium, low amounts of sodium and cysteine derivatives. It is a rich source of free amino

acids such as Threonine, Aspartic acid, Valine, Asparagine, Glutamic acid, Serine, Glycine, Glutamine, Histidine, Arginine, Alanine, Proline, Tyrosine and GABA (Dini et al. 2008).

Benefits to hair

Sulfur is the building block of hair, onions being rich source of sulfur help in providing the required nourishment and helps in hair growth. It prevents the premature graying of hair and also have beneficial effects for scalp infections due to anti-bacterial property. A blend of three tablespoons of onion juice, one tablespoon of coconut oil and a tablespoon of olive oil, massaged into the scalp at least three times a week, is good for treating hair loss, particularly if the scalp feels dry and itchy. A blend of onion juice and honey when massaged on the scalp, provides nourishment to hair.

2.3.2 *Allium sativum* (Garlic)

It is commonly known as garlic, is native to central Asia and has long been a staple as well as a frequent seasoning in the Mediterranean region.

Chemical constituents

It contains carbohydrates and proteins. The major sulfur-containing compounds in intact garlic are γ -glutamyl-S-allyl-L-cysteines and S-allyl-L-cysteine sulfoxides. It also contains a sulfur containing amino acid alliin which is converted to allicin which is a thiosulfinate when garlic is cut or crushed. S-allyl-cysteines (SAC), a major transformed product from γ -glutamyl-S-allyl-L-cysteine, is a sulfur amino acid. The volatile components include diallyl sulfide (DAS), diallyl disulfide (DADS), diallyl trisulfide, methylallyl disulfide being the major ones. It also contains phosphorous, iron and copper (Amagase 2006).

Benefits to hair

The benefits of garlic are again attributed to the presence of sulfur and would be the same as mentioned for onion. Garlic oil may be incorporated in the hair oil, but to mask the odour of garlic another strong aromatic constituent needs to be added. Lemon oil can be an alternative to mask the strong odor of sulfides.

2.3.3 *Aloe barbadensis* Mill (Aloe vera)

Aloe vera is a succulent plant species. It is indigenous to eastern and southern Africa and cultivated in Europe and many parts of India. The species is frequently cited as being used in herbal medicine. Extracts from *Aloe vera* are widely used in

the cosmetics and alternative medicines, claiming to have rejuvenating, healing, or soothing properties.

Chemical constituents

The principle component is aloin, which is a mixture of glucosides. Amongst these glucosides, barbaloin is the chief constituent. Barbaloin is a c-glycoside having aloe-emodin anthrone as its aglycone. The other constituents include isobarbaloin, β -barbaloin, aloe-emodin and resins. The drug also contains aloetic acid, homonataloin, aloesone, chrysophanic acid, chrysamminic acid, galactouronic acid, choline, choline salicylate, mucopolysaccharides, glucosamines, hexuronic acid and coniferyl alcohol. It also contains sugars such as arabinose, galactose, glucose, mannose, rhamnose, xylose, hexuronic acids and sterols such as cholesterol, campesterol, sitosterol and lupeol (Waller et al. 1978).

Three new chromones have been isolated which are 5-(hydroxymethyl)-7-methoxy-2-methylchromone, 5-((4E)-2'-oxo-pentenyl)-2-hydroxymethylchromone, and 7-hydroxy-5-(hydroxymethyl)-2-methylchromone (Zhong et al. 1991).

Benefits to hair

Aloe contains salicylate, carboxypeptidase and magnesium lactate, all being anti-inflammatory in nature. This effect is particularly of benefit in inflammatory conditions like seborrheic dermatitis. Mucopolysaccharides found in aloe gel, are reported to heal wound and could be used to heal scalp wounds. They also provide moisturizing effect to the scalp, improve blood circulation and promote the growth of hair. Thus aloe gel may be used directly as a replacement for hair oil. Certain other ingredients can also be added to aloe gel to improve its efficacy in treating different hair problems (Waller et al. 1978).

2.3.4 Camellia sinensis (Green Tea)

Green tea is indigenous to China, is made from the leaves from *Camellia sinensis* that have undergone minimal oxidation during processing.

Chemical constituents (Graham 1992)

Fresh tea leaf is rich source of polyphenols mainly catechins. Other polyphenolic compounds include flavonoids, chlorogenic acid, coumarylquinic acid and theogallin and theanin, both being unique to tea. The content of caffeine in green tea is very less along with other alkaloids like theobromine and theophylline.

Benefits to hair

The chief polyphenol in green tea is epigallocatechin gallate (EGCG) which promotes hair growth in cell culture. It activates the hair follicles which promote hair growth. It can destroy the bacterial and fungal parasites, which weaken the roots of hair and causes hair fall. It is also known that the methyl xanthine type of alkaloids, caffeine being one of them is used for the treatment of androgenic alopecia.

2.3.5 *Capsicum minimum*

It is also known as cayenne pepper or red pepper, named after the city of Cayenne in French Guinea. The fruits are generally dried and ground, or pulped and baked into cakes, which are then ground and sifted to make the powdered spice of the same name.

Chemical constituents

The main constituent of pepper is capsaicin, which is the pungent phenolic fraction of capsicum. It also contains 6,7-dihydrocapsaicin, ascorbic acid, thiamine and fixed oil. It has several minerals like calcium, phosphorus, iron and potassium and vitamins like thiamine, riboflavin and niacin. *C. annuum* is rich in carotenoid pigments which include capsanthin, capsorubrin, carotene, luteine, zeaxanthin and cucurbitaxanthin A. It is also rich in fats, proteins, Vitamin A and vitamin C.

Benefits to hair

Capsaicin being pungent in nature causes a tingling sensation when applied to the scalp which activates the hair follicles. In addition it increases blood circulation, this enhances blood supply to the follicles provides the required nutrients for hair growth. The quantity of the extract to be used in the oil should be sufficient so as to tingle the scalp but not too much so as to cause irritation of the scalp.

2.3.6 *Centella asiatica*

It is the whole herb of *Centella asiatica*, belonging to family Umbelliferae, found in wet areas in India, Sri Lanka, Pakistan, Indonesia, Africa, Australia. It shows sedative, spasmolytic, anti-anxiety action. It is also used to cure skin diseases.

Chemical constituents

It mainly contains saponins called asiactoside and madecassoside which yield triterpene acids Asiatic acid and madecassic acid on hydrolysis.

2.3.7 *Cocos nucifera (Coconut Milk)*

It known to the world as coconut and belongs to the family Arecaceae, being indigenous to the tropical and subtropical regions. The inner part of the fruit has lots of water and the endosperm is suspended in it. Gradually the endosperm starts depositing layers along the wall of coconut and forms the flesh, which is an edible part. This flesh when made into a paste and filtered yields coconut milk. The same flesh when dried also yields coconut oil.

Chemical constituents

It is rich source of inorganic ions such as calcium, iron, magnesium, phosphorous, potassium, sodium, copper, zinc, chlorine, sulphur, vitamins like vitamin C, B1, B2, B3, B5, B6, Folic acid, Biotin and Nicotinic acid and amino acids like Alanine, β -Alanine, γ -Aminobutyric acid, Arginine, Asparagine and glutamine, Aspartic acid, Cystine, Glutamic acid, Glutamine, Glycine, Homoserine, Histidine, Isoleucine, Leucine and Phenylalanine (Yong et al. 2009).

Benefits to hair

Coconut milk is rich in iron, potassium and essential fats. It reduces hair fall and breakage. It also promotes hair growth and thus could be one of the essential components in hair oil. Coconut oil derived from the dried flesh itself has long been used as a base for hair oils and has reported benefits for growth of hair.

2.3.8 Cucurbita pepo

It is an oil obtained from the seeds of pumpkin, family Cucurbitaceae. It is a European union protected designation of origin (PDO) product and is an important export commodity of Austria and Slovenia.

Chemical constituents

The oil contains fatty acids, predominantly: linoleic, oleic, palmitic, and stearic acids. It also contains a higher quantity of tocopherol (α and β) and carotenoids (Stevenson et al. 2007; Procida et al. 2013).

Benefits to hair

A recent study has indicated the usefulness of pumpkin seed oil in the treatment of androgenetic alopecia (AGA), which is probably because of the presence of phytoosterols which inhibit 5α -reductase. There are few more plants that do have an effect especially on AGA. *Cuscuta reflexa* via 5α -reductase inhibitory activity, *Panax ginseng* due to anti-inflammatory and blood circulation effect, *Eclipta alba* extract and *Zizyphus jujuba* essential oil, all have showed possibility of alternative treatment of alopecia (Young et al. 2014).

2.3.9 Emblica Officinalis

The dried as well as fresh fruits of *Emblica officinalis*, belonging to family Euphorbiaceae are used. It is found in the deciduous forests in India and distributed in the tropical and subtropical zones. It is one of the important ingredient of *Ayurvedic* preparations: 'Trifala' and 'Chyawanprash'. The oil is extracted by solvent extraction using petroleum ether.

Chemical constituents

It is the richest source of Vitamin C. It contains minerals like phosphorous, calcium and iron, phyllembelin, tannins and amino acids like glutamic acid, aspartic acid, proline, alanine and lysine. The oil contains linoleic, linolenic, oleic acids and myristic, palmitic and stearic acids (Dhar et al. 1951).

Benefits to hair

The fixed oil obtained from the fruits possess hair growth promoting activity. The dried fruits are boiled in coconut oil, application of this oil prevents graying of hair (Kumar et al. 2012). It can also be used to cleanse the hair, to control dandruff, to prevent hair fall (Sharma and Agarwal 2003).

2.3.10 Hibiscus rosa sinensis

Hibiscus rosa sinensis is a flowering plant in the mallow family, Malvaceae, indigenous to warm-temperate, subtropical and tropical regions throughout the world.

Chemical constituents

Leaves and stems contain β -sitosterol, stigma sterol, taraxeryl acetate and three cyclo propane compounds and their derivatives. Flowers contain cyanidine diglucoside, flavonoids and vitamins, thiamine, riboflavin, niacin and ascorbic acid (Rao et al. 2014).

Benefits to hair

Hibiscus flower acts as a wonderful remedy for hair loss problem since this flower has a great combination of vitamin C, phosphorous, riboflavin and calcium. It also helps to soften the hair. It prevents premature graying of hair due to the carotene content. It has a very mild foaming effect and hence can be incorporated in baby shampoos. The leaves and flowers on burning give a black dye which can be used to color hair.

2.3.11 Juniperus communis (Juniper Berry)

It is a tree belonging to the family Cupressaceae, with a wide distribution ranging from the Arctic region, Africa, Central America to Pakistan. It is a cone with fleshy and merged scales giving a berry like appearance.

Chemical composition

They contain volatile oil as the main constituent, invert sugar and resin. These are rich source of antioxidants and are proved to be anti-infective. The volatile oil comprises of monoterpene hydrocarbons such as α -pinene, β -myrcene, sabinene, limonene, terpine-4-ol, β -caryophyllene and β -pinene.

Benefits for the hair

Massaging the scalp and hair at least 2 h prior to washing with a blend of juniper, rosemary and cedarwood essential oils in olive oil, helps to stimulate circulation to the scalp, promotes scalp health and also provides moisturizing effect.

2.3.12 *Oenothera biennis* (Evening Primrose)

This is a species of *Oenothera* native to eastern and central North America. *Oenothera biennis* is a biennial plant, producing flowers on a tall spike. Since they open in the evening the plant is given the name evening primrose.

Chemical constituents

It contains fatty acids, including non-essential ω -6 polyunsaturated fatty acid, γ -linolenic acid, oleic acid, palmitic acid and stearic acid. It also contains steroids: campesterol and β -sitosterol and 3-*O*-trans-caffeoyl esters of triterpene acids (betulinic, morolic, and oleanolic acids).

Benefits to hair

Gamma-linolenic acid is an omega-6 fatty acid, which is one of the essential fatty acids necessary for healthy development and human growth. The same component provides nourishment to the scalp and hair and may be incorporated in hair oils or may be used as a carrier oil.

2.3.13 *Rosmarinus officinalis* (Rosemary)

The plant is commonly known as rosemary, belonging to the family Lamiaceae (Genena et al. 2008). It is a spice and medicinal herb widely accepted as one of the spices with the highest antioxidant activity (Jiang et al. 2011).

Chemical constituents

Rosemary is reported to have flavones, diterpenes, steroids and triterpenes. The antioxidant activity of rosemary is because of carnosic acid and carnosol. α -pinene, bornyl acetate, camphor and 1,8-cineole are the main compounds responsible for the antimicrobial activity (Jiang et al. 2011; Murata et al. 2013).

Benefits to hair

Topical application of leaf extract reverses the interruption in hair growth induced by testosterone treatment in the mice. Extract of *Rosmarinus officinalis* show antiandrogenic activity. 12-methoxycarnosic acid, present in rosemary, inhibited 5 α -reductase enzyme and has been identified as the active constituent. Thus it may be used in hair oils to prevent hair loss (Murata et al. 2013).

2.3.14 *Solanum tuberosum*

It is commonly known as potato and is a rich source of starch from the Solanaceae family. The tubers are used as a part of diet and also for beneficial effects on hair.

Chemical constituents

Potato is rich in Vitamin A, B, C and D. These are essential for healthy hair and can be useful even if one is suffering from alopecia. They also contain protein, starch, iron, fiber, potassium, magnesium, phosphorous, calcium and possess hydrophillic antioxidants (Mouillé et al. 2010; Brautlecht and Getchell 1951).

Benefits to hair

Being a rich source of vitamins, if potato juice is incorporated in the oils, it will not only prevent hair loss but may also prevent the hair from becoming dry and brittle.

2.3.15 *Trigonella foenum-graecum* (*Fenugreek*)

It is an annual plant in the family Fabaceae, with leaves consisting of three small obovate to oblong leaflets. It is cultivated worldwide as a semiarid crop, and its seeds are a common ingredient in dishes from the Indian Subcontinent. It was well known since ancient times and the seeds were used medicinally.

Chemical constituents

Diosgenin, is the main steroid found in fenugreek. Other sapogenins found in fenugreek seed include yamogenin, gitogenin, tigogenin, and neotigogens. Fenugreek seeds contain alkaloids, including trigonelline, gentianine and carpaine compounds. The seeds also contain fiber, 4-hydroxyisoleucine and fenugreekine, a component that may have hypoglycemic activity. Other constituents of fenugreek include mucilage, proteins, bitter fixed oil, volatile oil, and the alkaloids choline and trigonelline. It a rich source of protein, Biotin, iron, Vitamin A, Vitamin B1, Vitamin B2, Vitamin B3, Vitamin B5, Vitamin B6, Vitamin B9, Vitamin B12 and Vitamin D (Mullaicharam et al. 2013).

Benefits to hair

Fenugreek is a potent dihydrotestosterone (DHT) blocker and rich source of multivitamin B which plays major role in hair stimulant property. DHT is synthesized in adrenal glands, hair follicles, testes and prostate by the action of the enzyme 5 α -reductase, which plays a major role in occurrence of alopecia. Both males and females are affected, but men commonly being affected more. Blocking this DHT synthesis helps in preventing hair loss and treating alopecia. Thus fenugreek seed extract could be incorporated in oils or shampoos for hair loss prevention.

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