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RESEARCH ARTICLE

CURRENT SCENARIO OF HERBAL MEDICINE IN INDIA

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ABSTRACT

People are using herbal medicines from centuries for safety, efficacy, cultural acceptability and lesser side effects. Plant and plant products have utilized with varying success to cure and prevent diseases throughout history. Due to side effects of synthetic products, herbal products are gaining popularity in the Indian market. Scenario and perceptions of herbal medicine are discussed. According to pharmacopeia of world, at least 119 distinct chemical substance derived from plant are important drugs currently use within 62 therapeutic categories and 91 species are the source of this drugs. The present article deals with the Current scenario of herbal medicine in India.herbal product are as old a human race. As herbal preparation gives various advantages over synthetic ones. Herbal formulations are getting popularity in the Indian market. Traditional pharma sectors as well as modern pharma sectors involved in production of nutraceuticals, cosmeceuticals and biopesticide. This review gives an account on current scenario of herbal product in Indian market like neutraceuticals, cosmeceuticals and biopesticide which are preferred nowadays.

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INTRODUCTION

Ayurveda is a medical system primarily practiced in India that has been known form early 5000 years. It includes diet and herbal remedies, while emphasizing the body, mind and spirit in disease prevention and treatment. (IARC Monographs, Volume 82).India has a rich tradition of herbal medicine as evident from Ayurveda. Ayurveda which literally means knowledge (Veda) of life (Ayur) had its beginning in Atharvaveda (Circa 1500-1000 BC). Charak Samhita and Sushruta Samhita are the two most famous treatises of Ayurveda several other were compiled over the centuries such as Bela Samhita, Kashyap Samhita, Agnivesh Tantra, Vagbhata's Ashtang hridaya (600), Madhava Nidan (700 AD). Vegetable products dominated Indian Meteria Medica which made extensive use of bark, leaves, flower, fruit, root, tubers and juices. The theory of rasa,vipaka, virya and prabhava formed the basis of Ayurveda pharmacology, which made no clear distinction between diet and drug, as both were vital component of treatment. Charak, Sushruta and Vagbhata described 700 herbal drugs with their properties and clinical effects. Based on clinical effects 50 categories of drug have been described – such as appetizers, digestive stimulant, laxatives, anti-diarrhea, anti-hemorrhoid, anti-emetic, anti-pyretic, anti-inflammatory, anti-pruritic, anti-asthmatic, antiepileptic, anti-helminthic, haemoptietic, haemostatic, analgesic, sedative, promoter of life (Rasyana), promoter of strength, complexion, voice, semen and sperm, breast milk secretion, fracture and wound healing, destroyer of kidney stones etc (Pal *et al*., 2003). India is sitting on a gold mine of well-recorded and well practiced knowledge of traditional herbal medicine.

The basic requirements for gaining entry into developed countries include:

- Well-documented traditional use.
- Single plant medicines.
- Medicinal plants free from pesticides, heavy metals, etc.,
- Standardization based on chemical and activity profile.
- Safety and stability.

However, mode of action studies in animals and efficacy in human will also be supportive. Such scientifically generated data will project herbal medicine in a proper perspective and help in sustained global market. The major traditional sector pharmas, namely Himalaya, Zandu, Dabur, Hamdard, Maharishi, etc. and modern sector pharmas, namely Ranbaxy, Lupin, Allembic, etc (Kamboj, 2000)

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Herbal medicine

The WHO has recently defined traditional medicine (including herbal drugs) as comprising therapeutic practices that have been in existence, often for hundred of years, before the development and spread of modern medicine and are still in use today. Traditional medicine is the synthesis of therapeutic experience of generations of practicing physicians of indigenous system of medicine. Traditional preparations comprise medicinal plants, minerals and organic matter etc. Herbal drugs constitute only those traditional medicines which primarily use medicinal plant preparations for therapy. The herbal medicines / traditional medicament shave therefore been derived from rich traditions of ancient civilizations and scientific heritage (Pal *et al*., 2003). Recently ,herbal medicines or herb used for various purpose like netraceticals which prevent disease or optimum nutrition, cosmaceuticals which includes use of herbs in cosmetics as they give better effect and least side effect.and biopesticides which are biologically or herbs used widely as having no side effect or toxic effect on consumers health.a brief introduction about nutraceuticals,cosmaceutical and pesticides given below including classification serbs and marketed preparation.

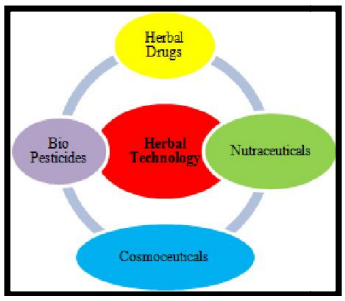

Fig. 1. Scope of Herbal Drugs

Nutraceuticals

Is a broad umbrella term that is used to describe any product derived from food sources with extra health benefits in addition to the basic nutritional value found in foods. Nutraceutical, a portmanteau of the words "nutrition" and "pharmaceutical", is a food or food product that reportedly provides health and medical benefits, including the prevention and treatment of disease. A product isolated or purified from foods that is generally sold in medicinal forms not usually associated with food. A nutraceutical is demonstrated to have a physiological benefit or provide protection against chronic disease (Gupta *et al*., 2013).

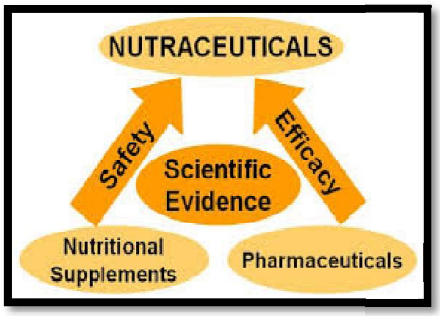

Fig. 2. Scope of nutraceutical

Nutraceuticals on the market today consist of both traditional foods and non-traditional foods.

- Traditional nutraceuticals are simply natural, whole foods with new information about their potential health qualities. There has been no change to the actual foods, other than the way the consumer perceives them. Example includes lycopene in tomatoes, omega-3 fatty acids in salmon.
- Non Traditional Nutraceuticals, are foods resulting from agricultural breeding or added nutrients and/or ingredients, to boost their nutritional values. Examples include β-carotene-enriched rice, and soybeans, orange juice fortified with calcium, cereals with added vitamins or minerals (Rajat *et al*., 2012).

The Indian nutraceutical market valued at $ 1,480 million in 2011 could grow to $ 2,731 million in 2016, a report said today. According to the report by business research and consulting firm Frost & Sullivan, functional foods will be the quickest growing category followed by dietary supplements until 2015.However, dietary supplements specifically herbal and dietetic supplements will form the greatest opportunity areas for nutraceutical manufacturers (Gupta *et al*., 2013).

The food products used as nutraceutical are categorized as

- Probiotic
- Prebiotic
- Dietary fiber
- Omega 3 fatty acid
- Antioxidant. (Pandey *et al*., 2010).

Probiotics are "good" bacteria that help keep your digestive system healthy by controlling growth of harmful bacteria. 'Probiotics' mean 'for life' and are defined as live microorganisms, which when consumed in adequate amounts, confer a health effect on the host. They are friendly bacteria that promote healthy digestion and absorption of some nutrients (Singh *et al*., 2012).

Prebiotics are carbohydrates that cannot be digested by the human body. They are food for probiotics. Prebiotics are dietary substances (mostly consisting of nonstarch polysaccharides and oligosaccharides poorly digested by human enzymes) that nurture a selected group of microorganisms living in the gut. They favor the growth of beneficial bacteria over that of harmful ones. Commonly known prebiotics are: Oligofructose, Inulin, Galacto-oligosaccharides, Lactulose, Breast milk oligosaccharides. Lactulose is a synthetic disaccharide used as a drug for the treatment of constipation and hepatic encephalopathy. The prebiotic oligofructose is found naturally in many foods, such as wheat, onions, bananas, honey, garlic, and leeks. Oligofructose can also be isolated from chicory root or synthesized enzymatically from sucrose (WGO Global Guideline Probiotics and prebiotics 2011).

Dietary fiber or roughage is the indigestible portion of food derived from plants. It has two main components:

Table 1. Classification of nutraceuticals

Sr. No.	Chemical constituent	Source	Potential benefit
1.	Carotenoids(Isoprenoids)	Tomatoes, grapefruit, guava, papaya,	Antioxidant activity, protects against formation of cancer
1.1	Lycopene	watermelon	Mainly prostate, bladder, cervical, leukemia.
1.2	Lutin	Corn, avocado, egg yolk, spinach	Anticancer activity (colon), cataracts, protects the eyes Against development of age related muscular degeneration.
1.3	Carotene	Carrots, various fruits and vegetables Carrots Oranges, Corn, avocado	Antioxidant activity which neutralizes free radicals, protect cornea against UV light. Antioxidants, anticancer
2.	Dietary fibres		
2.1	Soluble fibre	Legumes, oats, barely, some fruits	Anticancer, helpful in maintaining the digestive tract
2.2	Insouble fibre	Whole grain foods Wheat and corn bran, nuts	Anticancer(colon), helpful in maintaining the digestive tract
3.	Probiotics/Prebiotics	Yogurt, other dairy and non dairy Applications	May improve gastrointestinal health and systematic Immunity
4.	Omega 3 Fatty Acids	Salmon, Flax seed	Potent controllers of the inflammatory processes, Maintenance of brain function, Reduce cholesterol disposition.
5.	Antioxidants		
5.1	Flavonones	Citrus fruits	Antioxidants, Anti cancer
5.2	Flavones	Fruits, Vegetables, Soyabean	Antioxidants, Anti cancer
5.3	Flavonols	Onions, apples, tea, broccoli	Antioxidants

Table 2. List of marketed nutraceuticals

Sr. No	Marketed Nutraceutical	Category	Ingredients	Manufacturer
1.	Proteinex®	Protein supplement	Predigested proteins, vitamins, minerals and carbohydrates	Pfizer Ltd., Mumbai, India
2.	Calcirol D-3®	Calcium supplement	Calcium and vitamins	Cadilla healthcare limited, Ahmedabad, India
3.	Threptin® Diskettes	Protein supplements	Proteins and vitamin B	Raptakos, Brett & Co. Ltd., Mumbai, India
4.	Beneflora® probiotic	Maintain gastrointestinal health	Lactobacillus acidophilus, bifidobacterium bifidum	Nupro, USA
5.	Ferradol Food® Powder	Nutrition supplement	Carbohydrates, proteins, Niacinamide, calcium, iron, zinc, vitamins	Pfizer Limited , India
6.	Revital ®	Daily health supplement	Ginseng, vitamins and minerals	Ranbaxy
7.	Glowelle®	Beauty drink	antioxidants, vitamins and botanical and fruit extracts	Nestlé

Fig. 3. Marketed Product for Nutraceutical

- Soluble fiber, which dissolves in water, is readily fermented in the colon into gases and physiologically active byproducts, and can be prebiotic and viscous.
- Insoluble fiber, which does not dissolve in water, is metabolically inert and provides bulking, or it can be prebiotic and metabolically ferment in the large intestine. Bulking fibers absorb water as they move through the digestive system, easing defecation. (https://en.wikipedia.org/wiki/Dietary_fiber).

Omega-3 fatty acids(ω-3 fatty acids or n-3 fatty acids)-are polyunsaturated fatty acids (PUFAs) with a double bond (C=C) at the third carbon atom from the end of the carbon chain. The fatty acids have two ends, the carboxylic acid (-COOH) end, which is considered the beginning of the chain, thus "alpha", and the methyl (CH_3) end, which is considered the "tail" of the chain, thus "omega." The way in which a fatty acid is named is determined by the location of the first double bond, counted from the methyl end, that is, the omega (ω-) or the n- end. The three types of omega-3 fatty acids involved in human physiology are α-linolenic acid (ALA) (found in plant oils), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA) (both commonly found in marine oils). Marine algae and phytoplankton are primary sources of omega-3 fatty acids. Common sources of plant oils containing the omega-3 ALA fatty acid include walnut, edible seeds, clary sage seed oil, algal oil, flaxseed oil, Sacha Inchi oil, Echium oil, and hemp oil, while sources of animal omega-3 EPA and DHA fatty acids include fish oils, egg oil, squid oils, and krill oil. Dietary supplementation with omega-3 fatty acids does not appear to affect the risk of death, cancer or heart disease.

Antioxidants-are substances that may protect cells from the damage caused by unstable molecules known as free radicals. Antioxidants interact with and stabilize free radicals and may prevent some of the damage free radicals might otherwise cause. Free radical damage may lead to cancer. Examples of antioxidants include beta-carotene, lycopene, vitamins C, E, A and other substances. An antioxidant is a molecule capable of slowing or preventing the oxidation of other molecules. Oxidation is a chemical reaction that transfers electrons from a substance to an oxidizing agent. Oxidation reactions can produce free radicals, which start chain reactions that damage cells. Antioxidants terminate these chain reactions by removing free radical intermediates and inhibit other oxidation reactions by being oxidized themselves. As a result, antioxidants are often reducing agents as thiols, ascorbic acid or polyphenols (Pandey *et al*., 2010).

Natural antioxidant classified as

- Minerals - These are co factor of antioxidants enzymes. Their absence will definitely affect metabolism of many macromolecules such as carbohydrates. Examples include selenium, copper, iron, zinc and manganese.
- Vitamins – It is needed for most body metabolic functions. They include-vitamin C, vitamin E, vitamin B.
- Phytochemicals - These are phenolic compounds that are neither vitamins nor minerals. These include: Flavonoids: These are phenolic compounds that give vegetables fruits, grains, seeds leaves, flowers and bark their colours. Catechins are the most active antioxidants in green and black tea and sesamol. Carotenoids are fat soluble colour in fruits and vegetables. Beta carotene, which is rich in carrot and converted to vitamin A when the body lacks enough of the vitamin. Lycopene, high in tomatoes and zeaxantin is high in spinach and other dark greens. Herbs and spices-source include Diterpene, rosmariquinone, thyme, nutmeg, clove, black pepper, ginger, garlic and curcumin and derivatives (Hamid *et al*., 2010)

Cosmeceuticals Cosmetology is defined as the science of alteration in the appearance. (Saraf *et al*., 2014) Cosmeceuticals are cosmetic products with biologically active ingredients purporting to have medical or drug-like benefits. Herbal Cosmetics, referred as Products, are formulated, using various permissible cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide defined cosmetic benefits only, shall be called as “Herbal Cosmetics”. Herbal cosmetics are the modern trend in the field of beauty and fashion. These agents are gaining popularity as nowadays most women prefer natural products over chemicals for their personal care to enhance their beauty as these products supply the body with nutrients and enhance health and provide satisfaction as these are free from synthetic chemicals and have relatively less side-effects compared to the synthetic cosmetics (Joshi *et al*., 2015)

According to Ayurveda, a number of factors determine skin health and youthfulness. These include proper moisture balance (Kapha in balance), effective functioning of the metabolic mechanisms that coordinate all the various chemical and hormonal reactions of the skin (Pitta in balance) and efficient circulation of blood and nutrients to the different layers of the skin (Vata in balance). The health of the following three Dhatus types of body Tissue are especially reacted in the skin: nutritional fluid (Rasa) blood (Rakta) and muscle (Mamsa). Rasa supports all the body tissues, particularly keeping the skin healthy, Rakta in association with liver function, helps detoxify the skin of toxins, while Mamsa provides firmness to the skin. An effective Ayurvedic anti-aging cosmeceutical should provide support to all these three areas. Example such as Anti aging treatment includes two types of therapies Urjaskara (promotive) and Vyadhihara (curative) (Jain *et al*., 2010).

Cosmeceuticals are that cosmetic products which having biological active substances that have advantage similar to drugs or medicine. The beauty of hair and skin fundamentally depends on the individual health, diet, job routine, climatic condition and maintenance. From the 20th century the popularity of cosmetics has increased suddenly (Kole *et al*., 2005).Many manufactures separates the decorative cosmetic from care cosmetics. The word cosmetics is defined as that article which is rubbed, poured, sprinkled or applicable to any part of human body for the purpose of cleansing, Beautifying or enhancing the appearance is called as cosmetics (Saraf *et al*., 2014).

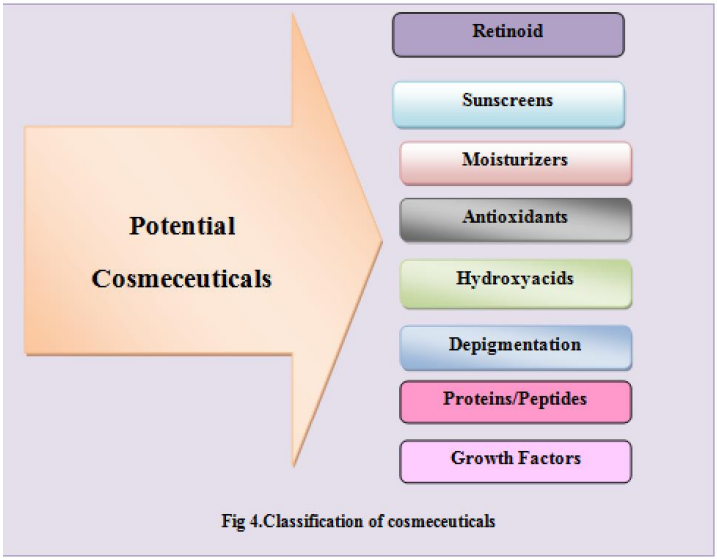

Fig 4.Classification of cosmeceuticals

Table 3. Herb used in cosmetics

Sr.No.	Chemical constituent	Source	Potential benefit
1.	Glycyrrhizin Glycyrrhitinic acid	liquorice	Reduces skin discolorations and Anti-inflammatory.
2.	Carnosic acid	Rosemary	Antioxidant
3.	Allicin and adenosine	Garlic	Skin healing
4.	Saponin, Sugars	Shikakai	Shampoo, Soaps.
5.	Limonoids, Tetranortriterpenoids	Neem	Toothpastes, Soaps, Shampoo
6.	Saccharides, Carotenoids, Tannins	Water melon	Sebum secretion
7.	Cucurbitacins	Cucumber	Moisturizing
8.	Saponins Saccharides Flavonoids	Fennel	Deodorant
9.	Safranal, Carotenoid	Saffron	Post bath massage
10.	Flavonoids Triterpenoids	Lemon	Whitening, astringent depigmentation
11.	Saponins Saccharides	Cactus	Moisturizing tightening of skin
12.	Sesquiterpene lactones	Chicory	Skin of blemishes
13.	Hanno-tannic acid, Glucoside	Henna	Shampoo
14.	Saccharide Flavonoids Triterpenoids	Apple	Anti-ageing Moisturizing
15.	Sesquiterpenes, Sesquiterpenols	Sandal wood	Skin lotions
16.	Flavonoids Triterpenoids	Rhubarb	UV absorption Free radical scavenger

Table 4. Marketed preparations

Sr. No.	Product	Brand name	Company
1.	Face Wash	Deep Cleansing Apricot Face Wash	Himalaya herbals
2.	Shampoo	Anti-Dandruff Shampoo-Volume & Bounce	Himalaya herbals
3.	Hair oil	Amla Brahmi hair oil	Ayur Herbals
4.	Cream	Herbal massage cream	Ayur Herbals
5.	Anti-Ageing cream	Dabur Uveda Age Renew 5 cream	Dabur
6.	Hair oil	K-7 Taila Kesh Rakshe Medhavi	Ajmera

Bio-pesticides: Are ecofriendly pesticides which are obtained from occurring substances (biochemical), microbes and plants. Not all natural products are biopesticides. There are many disadvantages associated with the use of chemical pesticides like:

- Genetic variations in plant populations,
- Reduction of beneficial species,
- Damage to the environment or water bodies,
- Poisoning of food and
- Health problems such as cancer which makes biopesticides to come into picture.

Their usage reduces risk of exposure to chemicals, reduces water pollution through fertilizer runoff, reduces number of applications, causes less harm to beneficial pests, biodegradable, and provides better nutritional quality (Kandpal *et al*., 2014). The target of pest control can also be achieved by the use of some weeds that possess pesticide properties. It has a widespread application on almost all the pests. They could be used for reducing crop production cost, for repelling the mosquitoes and other insects from the water logged areas, near the drains and residential areas, can be significantly used to repel termites, and can be widely used for organic farming.

Fig. 5. Marketed Products for Cosmeceuticals

Fig. 6. Marketed Product for Biopesticide

Table 5. Biopesticides registered under insecticides act, 1968

Sr. No	Name of the Biopesticide
1.	Bacillus thuringiensis var. israelensis
2.	Bacillus thuringiensis var. kurstaki
3.	Bacillus thuringiensis var. galleriae
4.	Bacillus sphaericus
5.	Trichoderma viride
6.	Trichoderma harzianum
7.	Pseudomonas fluoresens
8.	Beauveria bassiana
9.	NPV of Helicoverpa armigera
10.	Neem based pesticides
11.	NPV of Spodoptera litura
12.	Cymbopogan

Attributes of the invader and invaded community both contribute to successful invasions, so sustainable management of invaders may involve the manipulation of invaded communities and disturbance regimes, as well as direct control of the target species. For successful control, it may be necessary to change disturbance regimes or the succession trajectory of the community by creating favorable establishment opportunities for native competitors and unfavorable opportunities for weed regeneration. Empirical evidence supports the importance of land management and disturbance regimes in combination with herbivory for determining the abundance and persistence of invasive leguminous shrubs (Krishna *et al*., 2013).

Biopesticides fall into three major categories

Microbial pesticides: contain a microorganism (bacterium, fungus, virus, protozoan or alga) as the active ingredient. Microbial pesticides can control many different kinds of pests, although each separate active ingredient is relatively specific for its target pest[s]. For example, there are fungi that control certain weeds, and other fungi that kill specific insects. The most widely known microbial pesticides are varieties of the bacterium Bacillus thuringiensis, or Bt, which can control certain insects in cabbage, potatoes, and other crops. Bt produces a protein that is harmful to specific insect pests. Certain other microbial pesticides act by out-competing pest organisms. Microbial pesticides need to be continuously monitored to ensure they do not become capable of harming non-target organisms, including humans.

Plant-pesticides: Are pesticide substances that plants produce from genetic material that has been added to the plant. For example, scientists can take the gene for the Bt pesticide protein, and introduce the gene into the plants own genetic material. Then the plant, instead of the Bt bacterium manufactures the substance that destroys the pest. Both the protein and its genetic material are regulated by EPA; the plant itself is not regulated.

Biochemical pesticides: Are naturally occurring substances that control pests by non-toxic mechanisms. Conventional pesticides, by contrast, are synthetic materials that usually kill or inactivate the pest. Biochemical pesticides include substances that interfere with growth or mating, such as plant growth regulators, or substances that repel or attract pests, such as pheromones. Because it is sometimes difficult to determine whether a natural pesticide controls the pest by a non-toxic mode of action, EPA has established a committee to determine whether a pesticide meets the criteria for a biochemical pesticide. The growth of total world production of biopesticides is rising and therefore demands and use is also increasing. In India, biopesticide consumption has shown its increased use over the time. **(**Dikshit *et al*., 2010).India has a vast potential for biopesticides. However, its adoption by farmers in India needs education for maximizing gains. Biopesticides represent only 2.89% (as on 2005) of the overall pesticide market in India and is expected to exhibit an annual growth rate of about 2.3% in the coming years. In India, so far only 12 types of biopesticides have been registered under the Insecticide Act, 1968 (www.ncipm.org.in/ biopesticides/ registered.htm).

REFERENCES

Chaturvedi S., Sharma P. K., Garg V.K. and Bansal M. 2011.“Role of Nutraceuticals in Health promotion”, *International Journal of Pharmtech Research*,Vol. 3(1):442-448.

Gupta, S. and Dikshit, A. K. 2010. “Biopesticides: An ecofriendly approach for pest control”, *Journal of Biopesticides,* Vol 3(1):186-188.

Gupta, S.K, Yadav, S.K. and Mali Patil, S.M. 2013. “Nutraceutical–a bright scope and oppourtunity of indian healthcare Market”, int. *J. Res. Dev. Pharm. L. Sci.,* Vol. 2(4): 478-481.

Hamid, A., Aiyelaagbe, O. O. , Usman, L. A., Ameen O. M. and Lawal, A. 2010. “Antioxidants: Its medicinal and pharmacological Applications”,African Journal of Pure and Applied Chemistry Vol. 4(8):142-151.

https://en.wikipedia.org/wiki/Dietary_fiber [cited 2016 Jan 2]

https://en.wikipedia.org/wiki/Omega-3_fatty_acid [cited 2015 Dec 15].IARC,Monographs,Vol(82):43-68.

Jain A., Dubey S., Gupta A., Kannojia P. and Tomar V. 2010. “Potential of Herbs as Cosmaceuticals”, *International Journal of Research in Ayurveda & Pharmacy*, Volume 1(1):71-77.

Joshi, L. S. and Pawar, H. A. 2015.“ Herbal Cosmetics and Cosmeceuticals: An Overview”, *Natural Products Chemistry & Research an open access journal*, Vol 3(2).

Kamboj V. P. 2000. “*Herbal medicinecurrent science*”, Vol. 78, (1, 10):35-51.

Kandpal, V. “Biopesticides”, 2014. *International Journal of Environmental Research and Development,Volume* 4(2):191-196.

Kole P.L., Jadhav H.R., Thakurdesai, P. and Naik, N.A. 2005. “Cosmetic potential of herbal- *extracts*”, *fedmaps.*vol4 (4):315-321.

Krishna, M., Khemchandani, T. and Raja, B. R. 2013. “Extraction of a novel biopesticide obtained from Agricultural weeds useful for medicinal plants”, *J. Med. Plants Res.,* Vol. 7(30):2236-2242.

Pal, S.K. and Shukla, Y. 2003. “Herbal Medicine: Current Status and the future”, asian *Pacific Journal of Cancer Prevention*, Vol 4:281-288.

Pandey M., Verma R. K. and Saraf S. A. 2010. “Nutraceuticals: new era of medicine and health”, *Asian Journal of Pharmaceutical and Clinical Research*, Vol.3 (1):11-15.

Prakash, A., Rao, J. and Nandagopal, V. 2008. “Future of Botanical Pesticides in rice, wheat, and pulses andvegetables pest management”, *Journal of Biopesticides*, 1(2):154 - 169.

Rajat, S., Sharma, M., Singh, R., and Kumar, S. 2012. “nutraceuticals: a review”*International research journal of pharmacy*, Vol 3 (4): 95-99.

Saraf S., Jharaniya M., Gupta A., Jain V. and Saraf S. 2014. .“Herbal hair cosmetics: advancements and recent findings*”, World Journal of Pharmaceutical Research*,Vol 3(2): 3278-3298.

Searching for the Cosmeceutical Connection.[cited 2009 May20].Available from: www. The CosmeticSite.com Cosmetics & Toiletries magazine

Shruti, U. S. 2011. “Traditional Indian herbal medicine used as antipyretic, antiulcer, anti-diabetic and anticancer: a review”, *international journal of research in pharmacy and chemistry*, Vol 1(4):1152-59.

Singhand, J. and Sinha, S. 2012. “Classification, regulatory acts and applications of nutraceuticals for health”, *International Journal of Pharmacy and Biological Sciences,* Vol 2:177-187.

World Gastroenterology Organisation Global Guidelines, 2011. “probiotics and prebiotics”, 1-28.

www.ncipm.org.in/biopesticides/registered.htm. [cited 2015 dec 20].

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