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Role of Phytochemicals in the Prevention of Diseases

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Abstract:

Plant materials have medicinal effects due to the combination of secondary products present in plants, known as phytochemicals. Phytochemicals are chemical compounds that are biologically active in nature found in the fruits, vegetables and grains. These compounds are not essential for body but they play a role in promoting the health and preventing from diseases. Flavonoids, Alkaloids, Sterols, Terpenoids, Phenolic acids, Stilbenes, Lignans, Tannins and Saponins are some phytochemicals. These phytochemical compounds also have the properties of antioxidant and anti-inflammatory activity as the excessive production of oxidant in the organism develops the chronic diseases such as cardiovascular disease (CVD), different types of cancer etc. These antioxidant compounds depress the level of oxidative stress of organisms. This review present different sources of phytochemicals that play a beneficial role in the prevention and treatment of the diseases. By their bioactive properties, it suppress and treat the different types of diseases.

Keywords: *Phytochemical, Antioxidant, Diseases.*

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Introduction

Longevity, youthfulness and health are the desires of every human. In living organism, the level of functional or metabolic efficiency comes under the health. Every individual has the ability to face physical, mental and social challenges. According to World Health Organization (WHO) health is defined as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (Venkatalakshmi, Vadivel, and Brindha, 2016).

For manufacturing the drugs and perfumery products, medicinal and aromatic plants are the vital source. Their raw materials are used for the manufacture. The natural medicine that are derived from these plants are safer than the synthetic alternatives used as therapeutic benefits and more affordable treatment.

Medicinal plants play a vital role in healing and curing of human disease because of the biochemical constitutes, known as phytochemicals or phyto constitutes. Phyto chemical constitutes are found in leaves, vegetables, roots of the medicinal plants that work the nutrients and fibers and form an integrated part of security system against numerous diseases and strain condition.

Phytochemicals have mainly two groups according to their function in plant metabolism.

- **Primary Constitutes:** It contains common sugars, amino acid, protein and chlorophyll etc.
- **Secondary Constitutes:** It contains alkaloids, terpenoid, steroids and flavonoids etc. In which terpenoid have numerous phytochemicals activities such as anti-inflammatory, anti-cancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and anti-bacterial activities (Thilagavathi *et al.,* 2015).

Screening of Phytochemicals

For synthetic drugs, medicinal plants have many bio resources of drugs, modern medicine, pharmaceutical intermediates and chemical entities. So, there is necessary to extract these sources from the plants by the extraction methods. Extraction is generally a separation of bio resources which are medicinally active form the plants tissues using particular solvents by standard methods. The main purpose of standard method is to attain the therapeutically desired portions with the removal of unwanted materials using a selective solvent called menstrum. After the extraction, the obtained extract is used as tincture, or fluid extract or in the form of tablet or capsules which contain a mixture of various medicinal plant constituents like alkaloids, glycosides, terpenoids, flavonoids and lignans. There are many technique for the extraction of medicinal plant extract: maceration, infusion, percolation, digestion, decoction, hot continuous extraction (Soxhlet) aqueous-alcoholic extraction by fermentation, countercurrent extraction, microwave-assisted extraction etc.

The production of compounds with specific activities to treat various health ailments and chronic disease can be estimated by the correlation between plant's phytochemicals and plant's bioactivity. To know the significant values of any medicinal plant, there is need of the screening of phytochemical in plant. Screening, a valuable step in the detection of bioactive principles in the medicinal plants. A standard method is followed to screen the phytochemicals for the detection of tannins, flavonoids, phenolics, saponins, steroids, cardiac glycosides and alkaloids presence. In screening, different types of tests are performed to know the presence of these compounds such as Gelatin Test for Tannins, Ferric Chloride Test for Phenol etc.

Sources of Phytochemicals

Many global health problems like chronic diseases (cardiovascular diseases, diabetes, and cancers) that cause death and disability to millions of people. Against the development of these chronic diseases, many fruit, vegetables and grains give a protective effect attributed to the phytochemical in them. More than 10,000 phytochemicals have been identified in which tannins, flavones, triterpenoids, steroids, saponins, and alkaloids are some phytochemicals. Phytochemicals work on the basis of their antioxidant activity. There are two kinds of antioxidant phytochemicals: Polyphenols and Carotenoids.

Polyphenols: In phytochemicals extract of different fruits, total phenolic content has a direct relationship with total antioxidant activity as when fruits have stronger antioxidant activity with a high phenolic contents.

Carotenoids: A group of phytochemicals, responsible for the colors of food. The main carotenoids in diet and human body are alpha-carotene, Beta-carotene, Lycopene, lutein and cryptoxanthin. In human diet, fruits and vegetables are the major sources of carotenoids.

Prevention of Antioxidant Phytochemicals form several Chronic Diseases

Human body may be imbalanced and lead to oxidative damage to large biomolecules such as lipid, DNA and proteins due to excessive production of oxidants. From these damage, several human diseases such as

cardiovascular disease, certain types of cancers and aging occur. In this case, antioxidant phytochemicals play a vital role in prevention in both cases: in vivo and in vitro. Antioxidant activities may be due to the additive and synergistic effects of phytochemicals in fruits and vegetables. High content of antioxidant phytochemicals fruits and vegetable consumption increase the antioxidant capacity of serum and plasma.

Many antioxidant phytochemicals have anti-inflammatory action that cure the chronic inflammation. The mechanism: inhibition of prostaglandin production and nuclear factor-ķB activity, enzyme inhibition as well as increase the cytokine production can reduce the inflammation. There are some phytochemicals such as resveratrol, anthocyanins and curcumin, help in reducing the inflammation. Generally, Antioxidant phytochemicals have different activities such as free radical scavenging abilities as well as anti-inflammatory action that helps in the other bioactivities and health benefits.

Beneficial roles of phytochemicals: low toxicity, low Cost, easy availability and biological and antineoplastic properties. These biological properties includes antioxidant activities, antimicrobial effects, modulation of detoxification enzymes, stimulation of the immune system, decrease of platelet aggregation and modulation of hormone metabolism. Phytochemicals are not so important for the life but play an important in fighting some disease by their properties.

Review of Literature

Prakash, Gupta and Sharma (2012) proposed the medicinal plant have a long history because of the use of their phytochemical constituents that prevent human from many diseases. The proper choice of food ingredients can make human healthy. The exciting opportunity is hold by the plant extracts in future.

Wadood *et al.* (2013) Studied on the ten medicinal plants and concluded that these medicinal plant play a vital role in preventing diseases. Different types of activities ntidiuretic, anti-inflammatory, antianalgesic, anticancer, anti-viral, anti-malarial, anti-bacterial and anti-fungal activities are seen in these plant due to the presence of secondary metabolites alkaloids, flavonoids, terpenoids, phlobatannins and reducing sugars. The analysis in previous years and in recent time have a same result due to the presence of phytochemical constituents.

According to Belobrajdic and Bird (2013) a limited benefit of cereal's phytochemical component is seen in preventing oxidative stress and in the development of T2D. Also discussed that a direct role of phytochemicals in improving the health would be in the whole food and diets.

Kumar *et al.* (2013) screened the plant Holoptelea integrifolia and Celestrus emarginata. They used only the leaf extract and stated that secondary metabolites of phytochemicals can be used in pharmaceutical industries in the form of drugs that will react against the pediculosis and help in increasing male sex vigour.

Raina *et al.* (2014) studied about the anticancer activity of phytochemicals on in vitro and concluded that the mechanism of phytochemicals contribute to their anticancer nature as kill the dividing cancer cells. Antitumor ability was also observed that inhibit the abnormally expressed growth factors. The medicinal plants help in the treatment of cancer and tumors.

Zhang *et al.* (2015) proposed that chronic diseases are treated by the antioxidant phytochemicals. These phytochemicals have many biological activities and health benefits i.e., antioxidant and free radical scavenging abilities, anti-inflammatory action, anticancer, anti-aging etc. Fruits, vegetables, grains and medicinal plants are sources of the antioxidant phytochemicals. They also discussed that more antioxidant phytochemicals should be separated and identified in food and medicinal plants. The adverse effects of the phytochemicals should be noticed in human beings.

Thilagavathi *et al.* (2015) analyzed or screened the five medicinal plant and concluded that these medicinal plants have high therapeutic value in pharmaceutical field. These plants have different biologically active constituents and secondary products. They also stated that these secondary product are very valuable and should be analyzed and evaluated in future for more benefits.

Nyamai DW *et al.* (2016) studied that 80% world population relies on medicinal plants for their health. These plants are easily available, cheap and do not have adverse effect. Hence, the development of new drugs entities are possible by these phytochemicals.

Venkatalakshmi, Vadivel and Brindha (2016) concluded that the antioxidants phytochemicals have a relationship with immunomodulation in animal and human beings. Significant antioxidant activities of many indigenous plants help in the immunomodulation by targeting oxidative stress or boosting the endogenous levels of antioxidants for the management of diseases and developed the immunity.

Shoghil *et al.* (2017) concluded that the phytochemicals play an important role in preventing chronic diseases like cancer, diabetes, coronary heart

disease etc. the sources of phytochemical in India are cereals, pulses, oils and spices. Indian food and diet have more scope for these phytochemicals in protecting against chronic diseases.

Meybodi *et al.* (2017) stated that carcinogenesis process is complex and heterogenous. In this case phytochemicals in fruits and vegetables would be effective that help in preventing form cancer. Different group of phytochemicals that are used in chemoprevention are as phenolics, carotenoid, alkaloids, organosulfur, and nitrogen containing compounds. By different mechanism, they make possible in stopping or postpone or reserve the carcinogensis activity in the body.

Conclusion

Phytochemicals present in the plants are natural chemical compound that have different bioactive action in prevention and treatment of diseases. The different sources like fruits, vegetables, grains as well as the dietry product also have these phytochemicals. This review study shows the importance of phytochemicals because they have a different activities as anticancer, antitumor, anti-inflammatory etc. due to the presence of secondary products such as alkaloids, flavonoids, terpenoids. Ant carcinogenic agents are also made from these products for the treatment of cancer. The proper food can prevent from the chronic diseases such as cardiovascular disease, cancer, tumor etc. The secondary products have more scope due to their bioactive actions. With the benefits of phytochemicals, there is need to detect any side effects of them.

References:

Venkatalakshmi, P, *et al.* "Role of Phytochemicals as Immunomodulatory Agents: A Review." *International Journal of Green Pharmacy,* vol. 10, no. 1, Mar. 2016, pp. 1–18.

Wadood, Abdul, *et al.* "Phytochemical Analysis of Medicinal Plants Occurring in Local Area of Mardan." *Biochemistry & Analytical Biochemistry,* vol. 02, no. 04, 2013.

T, Thilagavathi, *et al.* "Preliminary Phytochemical Screening of Different Solvent Mediated Medicinal Plant Extracts Evaluated." *International Research Journal of Pharmacy,* vol. 6, no. 4, Oct. 2015, pp. 246–248.

Tiwari, Prashant, *et al.* "Phytochemical Screening and Extraction: A Review." *Internationale Pharmaceutica Sciencia,* vol. 1, no. 1, Jan. 2011, pp. 98–106.

Nandagoapalan, V, *et al.* "Phytochemical Analysis of Some Traditional Medicinal Plants." *Bioscience Discovery,* vol. 7, no. 1, Jan. 2016, pp. 17–20.

DW, Nyamai, *et al.* "Medicinally Important Phytochemicals: An Untapped Research Avenue." *Journal of Pharmacognosy and Phytochemistry, vol*. 4, no. 1, Mar. 2016, pp. 35–49.

Zhang, Yu-Jie, *et al.* "Antioxidant Phytochemicals for the Prevention and Treatment of Chronic Diseases." *Molecules,* vol. 20, no. 12, 2015, pp. 21138–21156.

Belobrajdic, Damien P, and Anthony R Bird. "The Potential Role of Phytochemicals in Wholegrain Cereals for the Prevention of Type-2 Diabetes." *Nutrition Journal,* vol. 12, no. 1, 2013.

Raina, Himani, *et al.* "Phytochemical Importance of Medicinal Plants as Potential Sources of Anticancer Agents." *Turkish Journal of Botany,* vol. 38, 2014, pp. 1027–1035.

R, Shoghil, *et al.* "Plant Bioactive Phytochemicals: Their Role in Disease Prevention." International *Journal of Science, Engineering and Management (IJSEM),* vol. 2, no. 12, Dec. 2017, pp. 64–69.

References:

Meybodi, Neda Mollakhalili, *et al.* "Phytochemicals in Cancer Prevention: A Review of the Evidence." *Iranian Journal of Cancer Prevention,* In Press, no. In Press, 2017.

Kumar, R. Suman, *et al.* "Phytochemical Screening of Some Compounds from Plant Leaf Extracts of Holoptelea Integrifolia (Planch) and Celestrus Emarginata (Grah.) Used by Gondu Tribes at Adilabad District, Andhrapradesh, India." *International Journal of Engineering Science Invention,* vol. 2, no. 8, Aug. 2013, pp. 65–70.

Prakash, Dhan, *et al.* "Importance of Phytochemicals in Nutraceuticals." *Journal of Chinese Medicine Research and Development (JCMRD),* vol. 1, no. 3, Oct. 2012, pp. 70–78.