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# Cardioprotective Herbal Plants: A Review

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***Abstract:*** ***Plants play a vital role in providing food and various essential needs of human since beginning of human race,let it be the basic needs to medicinal drugs for well being and progress towards health of an human race as the time has past human had progress in medicial field.Progress in technology has driven human race to higher progression in lesser time as progress is rapid it has given birth to various cardiological disease and to cure them various synthetic cardiac drugs have been used. To overcome and keep cardiac health of humans protected from drugs humans have turn back to nature to and use of phtoconstituents is increased A number of bioactive compounds found in cardioprotective plants, such as antioxidants, flavonoids, anthocyanin, tannins, ellagic acid, terpenoids, carbohydrates, have been shown to improve cardioprotection and thus reduce the risk of cardiac disorders.Purpose of this review article is to provide and educate individuals about drugs present in nature and include in daily diet to enhance there cardiac health and damage cause due to synthetic drugs.***
***Keywords: Cardioprotective, Myocardial Infraction ,Cardiovascular disease***

## I. INTRODUCTION

The cardiovascular system consists of heart & blood vessels which circulate blood throughout the body. It is responsible for transporting oxygen, nutrients, and hormones to body and removes cellular waste products from the body. The term cardiovascular disease [CVD] is very much familiar which commonly refers to a group of diseases that affects heart and its parts, whereas the term CVD mostly refers to MI [Myocardial infarction], angina pectoris, hypertension, stroke and other circulatory diseases. The common heart diseases that have been reported are coronary artery diseases, congestive heart failure, cardiac arrest, arrhythmias, and peripheral artery diseases.[1]

It was known that number 1 cause of death globally is due to cardiovascular diseases because annually more people die from heart diseases than from any other grounds. Approximately 17.5 million people died from CVDs in the year 2012, representing 31% of all global deaths. Of these deaths, 7.4 million were due to coronary heart diseases and6.7 million deaths were due to heart stroke. Out of the 16 million deaths under the age of 60 due to non-communicable diseases, 85% are in low and middle income countries and 40% are caused by CVD[1,2] Myocardial infarction is the acute condition of necrosis of the myocardium that occurs as a result of imbalance between coronary blood supply and myocardialdemand. The increasing amount of experimental and clinical evidences reveals the involvement of reactive oxygen species (ROS) in cardiovascular diseases. More specifically in pathological or disease conditions, such as MI, diabetes, or stroke, the production of free radicals may override thescavenging effects of antioxidants leading to oxidativestress. Reactive oxygen species, which possesses highlyreactive and toxic properties, can be generated as a result of ischemia and exacerbate the degree of myocardial damagesustained by the ischemic myocardium.[3]

Myocardial Ischemia Reperfusion(I/R) injury occurs in a wide spectrum of disorders ranging from cardiac arrest to acute myocardial infarction and represents a major public health concern. Ischemia induces several pathological changes due to lack of oxygen supply to the myocardium, and postischemic reperfusion worsens the injury. Modulation of the adaptive response to ischemic heart disease has become a major research interest. Pharmacological preconditioning plays a prominent role in reducing such tissue damage.[4]

## II. LIST OF (HERBAL) DRUGS : USED AS CARDIOPROTECTIVE

### *A. Daucus Carota Linn*

Daucus carota inhabits dry fields and waste places at low altitudes throughout the northern United State from Vermont to Virginia west to Washington and California and north into Canada. The root of the Daucus carotat is used as a diuretic and inotropic . The volatile oil from the seeds possess analgesic and anti-inflammatory activity .The roots are reported to possess hepatoprotective property. Extensive phytochemical investigations carried out on Daucus carota revealed the presence of many chemical constituents including flavanoids and glycosides such as apigenin-4-o-β-glucoside and apigenin.[5,6] Experimental refrence Inotropic and cardioprotective effects of Daucus carota Linn. on isoproterenol-induced myocardial infarction.[7]

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*B. Nerium Oleander*

Nerium oleaander usually found northern Africa and the eastern Mediterranean area. Cardiac glycosides are naturally occurring plant or animal compounds whose actions include both beneficial and toxic effects on the heart.Despite their toxicity,oleanders have been used in the past as folklore medicine, abortifacient, a remedy for ‘‘dropsy’’(congestive heart failure), leprosy, malaria, ringworm, indigestion, and venereal disease.Recently, the leaves of has been reported to possess cardiotonic, antibacterial, antispasmodic, neuroprotective, antitumor, immunestating effect research work done.[8’9] Experimental reference Cardioprotective Effect of Nerium oleander Flower Against Isoproterenol-Induced Myocardial Oxidative Stress in Experimental Rats.[10]

*C. Amaranthus Virdis*

Amaranthus virdis is usually found tropical and subtropical regions.It has various anti-inflammatory, antihepatotoxic, antiulcer antiallergic, antiviral actions.The chemical constituents present are flavonoids, saponins, glycosides, terpenoids, amino acids, alkaloids, carbohydrates, phenolic compounds and proteins. due to presence of this chemical constituents in Amaranthus Virdis cardioprotective, anti-inflammatory,antiulcer.[11,12]

Experimental reference Cardioprotective activity of Amaranthus viridis Linn: Effect on serum marker enzymes, cardiac troponin and antioxidant system in experimental myocardial infarcted rats.[13]

*D. Coriander*

C.sativum is native of the Mediterranean region. In India, it is grown in Andhra Pradesh, Tamil Nadu, Karnataka, Rajasthan and Madhya Pradesh its extract provides significant protection from heart failure possibly due to its ability to improve left ventricular functions and baroreflex sensitivity, attenuate lipid peroxidation, and modulate the expression of endothelin receptors.The chemical constituents present in Coriandrum sativum are phenolic acids, phytosterols, and terpenes, flavonoids due to presence of this cardioprotective, antihyperlipidemic, anti-atherogenic, antihypertensive, antiarrhythmic effects are shown.[14,15]

Experimental reference Cardioprotective Efficacy of Coriandrum sativum (L.) Seed Extract in Heart Failure Rats Through Modulation of Endothelin Receptors and Antioxidant Potential.[16]

*E. Ginkgo Biloba*

Ginkgo biloba, commonly known as ginkgo or gingko, also known as the maidenhair tree, is a species of tree native to China, chemical constituents present in Gingko Biloba are flavones,glycosides, flavonol,ascorbic acid,diterpen lactones,catechin, ssesquiterpes, resins, essential oils, tannins, carotenoids, quercetin, and myricetin due to presence of this they posses antioxidants, antimicrobial, antiinflammatory, memory enhancer, antiaging hepatoprotective,[17,18]

Experimental reference Cardioprotective effect of a chronic treatment of ginkgo Biloba phytosomes in isoproterenol-induced cardiac necrosis in rats: involvement of antioxidant system.[19]

*F. Neem Tree*

Neem tree is native of the Mediterranean region. In India, it is grown in Andhra Pradesh, Tamil Nadu, Karnataka, Rajasthan and Madhya Pradesh. It has different chemical constituents present in it that are Reducing sugar, tannins, flavonoids, steroids,terpenoids, glycosides,and alkaloid due to presence of this constituents they posses Cardioprotective, chemopreventive, antiplasmodial, anti-inflammatory ,immunomodulatory, anti-inflammatory, antihyperglycaemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, antioxidant, antimutagenic and anticarcinogenic .Different phytochemicals such as quercetin and azadirachtin and liminoids such as nimbin, nimbinin, and nimbidin have been purified from the different parts of the plant.[20,21]

Experimental reference Cardioprotective effect of gedunin on isoproterenol-induced cardiotoxicity through the attenuation of NF-κB-Mediated inflammatory pathway in rats.[22]

*G. Onion*

Onion across North America, including New England reduces blood pressure by antiaggregating the thrombyocytes, stimulates haematopoiesis, reduce asthma attack,anticholesterolemic, antidiabetic and effective against cardiovascular disease,presence of different bioactive compounds and secondary metabolites chemical constituents present in garden Onion are allicin, quercetin, fisetin, other sulphurous compounds: diallyl disulphide and diallyl trisulphide.due to presence of this constituents they posses Cardioprotective, antibacterial, antioxidant, hypouricemic.[23,24]

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Experimental reference Cardioprotective and Antioxidant activity of Onion (Allium cepa) Leaves Extract in Doxorubicin Induced Cardiotoxicity in Rats.[25]

### *H. Carissa Opaca*

Carissa opaca is an evergreen, thorny shrub distributed in Himalayan mountainous regions of Pakistan and India, c***arissa opaca*** is known for its many ethnomedicinal uses. Carissa opaca leaves extract are use to make Cardioprotective drugs due to presence of chemical constituents trapezoids, sterols,cardiac glycosides, lignans and many other phenolics.[26,27]
Experimental reference Cardioprotective role of leaves extracts of Carissa opaca against CCl4 induced toxicity in rats.[28]

### *I. Turmeric*

Turmeric, a plant in the ginger family, is native to Southeast Asia and is grown commercially in that region, primarily in India. Its rhizome (underground stem) is used as a culinary spice and traditional medicine, investigation into the prevention and treatment of abnormal cholesterol levels or heart injury complications, with a simple and common nutritionalplant like Curcuma longa, is an important step in maintaining optimum health. study showed that the aqueous extract of Curcuma longa has effect on lipid metabolism and prevents cardiomyopath, chemical constituents present in turmeric are Curcumin,arturmerone, b-sesquiphellandrene, curcumenol, sesquiterpenes, and phenolic constituents due to presence of this constituents they posses Cardioprotective, anti-inflammatory, antioxidant.his research was to evaluate the antidyslipidaemic and cardioprotective effects of aqueous extract of curcuma longa.[29,30,31] Experimental reference The cardioprotective effects of nano-curcumin against doxorubicin-induced cardiotoxicity.[32]

### *J. Olive*

Olive has a beneficial effect on several aspects of cardiovascular disease via its vasodilatory, anti-platelet aggregation, anti-inflammatory and antioxidant properties, it is a phenolic rich fruit which has varios other antioxidant activity,Anti-inflammatory effect,anti-atherogenic effect,anti-hypertensive effect,anti-plateletChemical constituents present in olive are Flavonoids, iridoids, secoiridoids, flavanones, benzoic acid,derivatives,and triterpene they posses Antidiabetic, anticancer, antimicrobial, and cardioprotective.[33,34] Experimental reference Effects of the Olive Tree Leaf Constituents on Myocardial Oxidative Damage and Atherosclerosis.[35]

### *K. Saffron*

Saffron is a spice derived from the flower of Crocus sativus, commonly known as the "saffron crocus",it has antioxidant properties; it is, therefore, helpful in maintaining healthy arteries and blood vessels. Saffron is also known to have anti-inflammatory properties, which are beneficial to cardiovascular health, chemical constituents present in Saffron are Carotenoid compounds, crocetin, crocin, safranal, glucoside picrocrocin, anthocyanins, delphinidin, petunidin due to presence of this constituents they posses Cardioprotective, hypnotic, anxiolytic,anticancer.[36,37] Experimental reference Cardioprotective Effect of Saffron Extract and Safranal in Isoproterenol-Induced Myocardial Infarction in Wistar Rats.[38]

### *L. Cinnamon*

Cinnamon is also used as a traditional medicine to alleviate pain and inflammation in patients those who suffer from arthritic rheumatism. Plant contains cinnamaldehyde, cinnamic acid, cinnamate, and numerous other components which show strong therapeutic effects against cancer and inflammatory, cardioprotective, and neurological disorders.Polyphenols showed good antioxidant, anti-inflammatory, antidiabetic, antimicrobial, anticancer effects Phytochemical analysis of C. tamala leaf extract revealed presence of important saponins, phytosterols, fatty acids, carbohydrates, monoterpene, sesquiterpene, geraniol and linolol, bornyl acetate, caryophylene oxide, p-coumaric acid and vanillic acid.[39,40,41]
Experimental reference Cinnamomum zeylanicum Blume (Ceylon cinnamon) bark extract attenuates doxorubicin induced cardiotoxicity in Wistar rats.[42]

## III. CONCLUSION

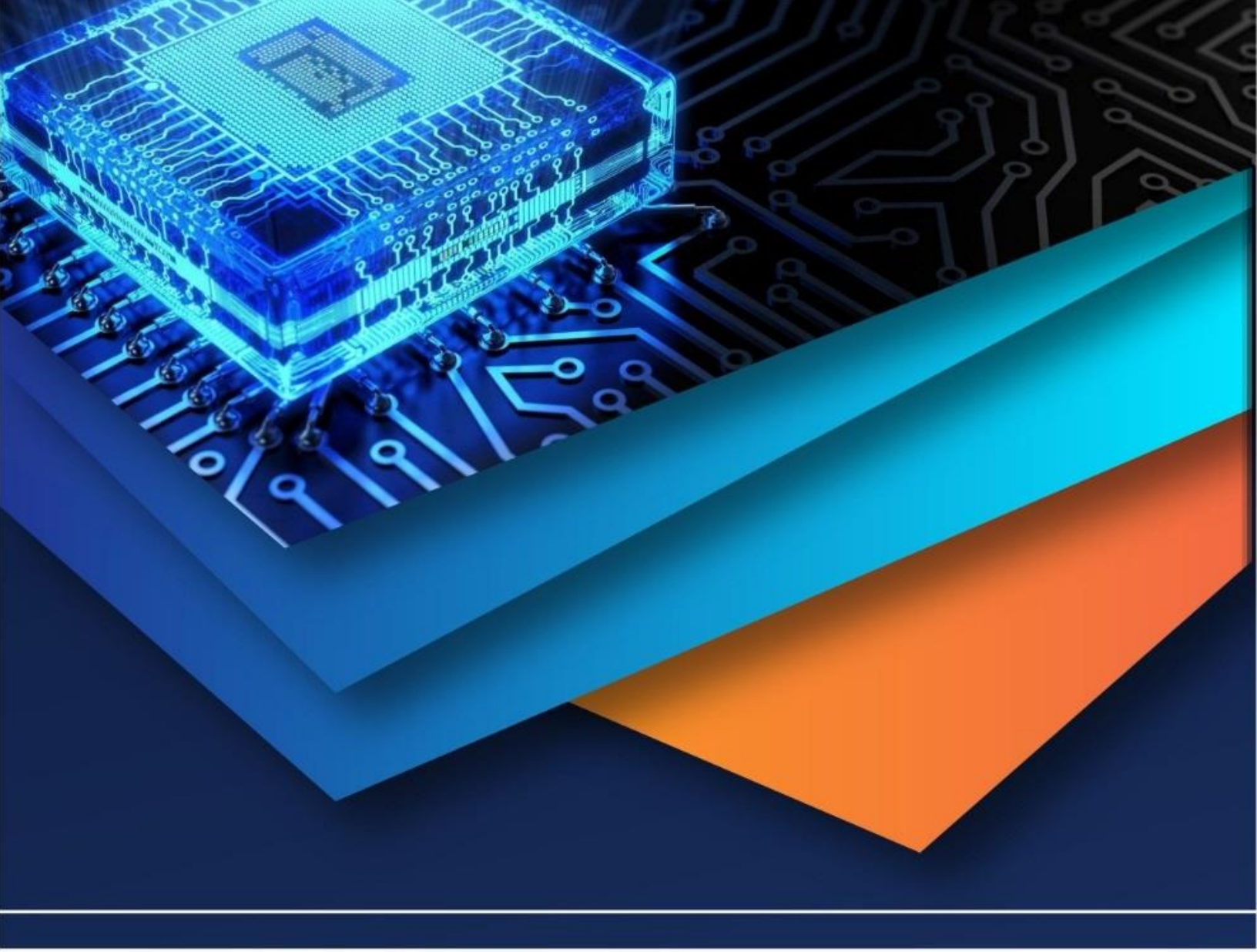
Last century has driven human attention towards herbal drugs,there is an increasing interest worldwide in herbal medicines and formulations accompanied with increased laboratory investigations into the pharmacological properties of the bioactive & cardioprotective ingredients and their ability to treat various diseases.

The present review has accentuate on the effects of cardiovascular disease and there treatment of allopathic medicine due other disease are prone to which various the cardioprotective phytoconstituents present in the plants, the various biochemical estimations and several in-vitro, in-vivo and human studies carried out in the papers .The brief survey of literature evidences us that the traditional medicinal plants have no known side effects and the presence of cardioprotective bioactive compounds in plant extracts, nature has always been prime source for every human need towards health and for every need of human.

## REFERENCES

[1] Mallapu KV, Jaya SR, Naga AS, Jilani BY, Sudha R, Swaroopa P. Cardioprotective activity of medicinal plants: a review. International Research Journal Pharmacy. 2017;8(12):4-11.
[2] Wijesinghe, M., Perrin, K., Ranchord, A., Simmonds, M., Weatherall, M. and Beasley, R., 2009. Routine use of oxygen in the treatment of myocardial infarction: systematic review. Heart, 95(3), pp.198-202.
[3] Freemantle, N., Cleland, J., Young, P., Mason, J. and Harrison, J., 1999. β Blockade after myocardial infarction: systematic review and meta regression analysis. Bmj, 318(7200), pp.1730-1737.
[4] Yang, C.F., 2018. Clinical manifestations and basic mechanisms of myocardial ischemia/reperfusion injury. Tzu-Chi Medical Journal, 30(4), p.209.
[5] Chatatikun, M. and Chiabchalard, A., 2013. Phytochemical screening and free radical scavenging activities of orange baby carrot and carrot (Daucus carota Linn.) root crude extracts. Journal of Chemical and Pharmaceutical Research, 5(4), pp.97-102.
[6] Patil, M.V.K., Kandhare, A.D. and Bhise, S.D., 2012. Pharmacological evaluation of ethanolic extract of Daucus carota Linn root formulated cream on wound healing using excision and incision wound model. Asian Pacific Journal of Tropical Biomedicine, 2(2), pp.S646-S655
[7] Muralidharan, P., Balamurugan, G. and Kumar, P., 2008. Inotropic and cardioprotective effects of Daucus carota Linn. on isoproterenol-induced myocardial infarction. ||| Bangladesh Journal of Pharmacology|||, 3(2), pp.74-79.
[8] Bandara, V., Weinstein, S.A., White, J. and Eddleston, M., 2010. A review of the natural history, toxinology, diagnosis and clinical management of Nerium oleander (common oleander) and Thevetia peruviana (yellow oleander) poisoning. Toxicon, 56(3), pp.273-281.
[9] Garima, Z. and Amla, B., 2010. A review on chemistry and pharmacological activity of Nerium oleander L. Journal of chemical and pharmaceutical research, 2(6), pp.351-358.
[10] Cardioprotective Effect of Nerium oleander experimental proof Flower Against Isoproterenol-Induced Myocardial Oxidative Stress in Experimental Rats.
[11] Reyad-ul-Ferdous, M., Shahjahan, D.S., Tanvir, S. and Mukti, M., 2015. Present biological status of potential medicinal plant of amaranthus viridis: a comprehensive review. Am J Clin Exp Med, 3(5), p.12.
[12] Emmanuel, A.M., Roger, K.K., Toussaint, D.G. and Koffi, K., 2018. Acute and subacute toxicity of the aqueous extract of Amaranthus viridis (Amaranthaceae) leaves in rats. J Phytopharmacolo, 7(4), pp.366-372.
[13] Saravanan, G., Ponmurugan, P., Sathiyavathi, M., Vadivukkarasi, S. and Sengottuvelu, S., 2013. Cardioprotective activity of Amaranthus viridis Linn: effect on serum marker enzymes, cardiac troponin and antioxidant system in experimental myocardial infarcted rats. International journal of cardiology, 165(3), pp.494-498.
[14] Önder, A., 2018. Coriander and its phytoconstituents for the beneficial effects. Potential of essential oils, 165.
[15] Parsaeyan, N., 2012. The effect of coriander seed powder consumption on atherosclerotic and cardioprotective indices of type 2 diabetic patients.
[16] Dhyani, N., Parveen, A., Siddiqi, A., Hussain, M.E. and Fahim, M., 2020. Cardioprotective efficacy of Coriandrum sativum (L.) seed extract in heart failure rats through modulation of endothelin receptors and antioxidant potential. Journal of dietary supplements, 17(1), pp.13-26.
[17] Panda, V.S. and Naik, S.R., 2009. Evaluation of cardioprotective activity of Ginkgo biloba and Ocimum sanctum in rodents. Alternative Medicine Review, 14(2), p.161.
[18] Liebgott, T., Miollan, M., Berchadsky, Y., Drieu, K., Culcasi, M. and Pietri, S., 2000. Complementary cardioprotective effects of flavonoid metabolites and terpenoid constituents of Ginkgo biloba extract (EGb 761) during ischemia and reperfusion. Basic research in cardiology, 95, pp.368-377.
[19] Panda, V.S. and Naik, S.R., 2014. Cardioprotective effect of a chronic treatment of ginkgo Biloba phytosomes in isoproterenol-induced cardiac necrosis in rats: involvement of antioxidant system. J Phytopharmacol, 3, pp.222-3.
[20] Rahmani, A., Almatroudi, A., Alrumaihi, F. and Khan, A., 2018. Pharmacological and therapeutic potential of neem (Azadirachta indica). Pharmacognosy Reviews, 12(24), pp.250-255.
[21] Rakesh, S.U. and Salunkhe, V.R., 2009. Target Molecules as Medicines from Natural Origin. Research Journal of Pharmacy and Technology, 2(1), pp.12-20.
[22] Sun, Y. and You, H., 2022. Cardioprotective effect of gedunin on isoproterenol-induced cardiotoxicity through the attenuation of NF-κB-Mediated inflammatory pathway in rats. Pharmacognosy Magazine, 18(80).
[23] Chiu, H.F., Shen, Y.C., Huang, T.Y., Venkatakrishnan, K. and Wang, C.K., 2016. Cardioprotective efficacy of red wine extract of onion in healthy hypercholesterolemic subjects. Phytotherapy research, 30(3), pp.380-385.
[24] Kharadi, G.B., Patel, K.J., Purohit, B.M., Baxi, S.N. and Tripathi, C.B., 2016. Evaluation of cardioprotective effect of aqueous extract of Allium cepa Linn. bulb on isoprenaline-induced myocardial injury in Wistar albino rats. Research in Pharmaceutical Sciences, 11(5), p.419.
[25] Nausheen, Q.N., Ali, S.A. and Subur, K., 2014. Cardioprotective and antioxidant activity of onion (Allium cepa) leaves extract in doxorubicin induced cardiotoxicity in rats. Ann Exp Biol, 2, pp.37-42.
[26] Dhatwalia, J., Kumari, A., Verma, R., Upadhyay, N., Guleria, I., Lal, S., Thakur, S., Gudeta, K., Kumar, V., Chao, J.C.J. and Sharma, S., 2021. Phytochemistry, pharmacology, and nutraceutical profile of Carissa species: An updated review. Molecules, 26(22), p.7010.
[27] Kaunda, J.S. and Zhang, Y.J., 2017. The genus Carissa: An ethnopharmacological, phytochemical and pharmacological review. Natural products and bioprospecting, 7, pp.181-199.
[28] Sahreen, S., Khan, M.R., Khan, R.A. and Alkreathy, H.M., 2014. Cardioprotective role of leaves extracts of Carissa opaca against CCl 4 induced toxicity in rats. BMC research notes, 7, pp.1-9.

[29] Zhang, H.A. and Kitts, D.D., 2021. Turmeric and its bioactive constituents trigger cell signaling mechanisms that protect against diabetes and cardiovascular diseases. Molecular and Cellular Biochemistry, 476(10), pp.3785-3814.
[30] Hosseini, A. and Hosseinzadeh, H., 2018. Antidotal or protective effects of Curcuma longa (turmeric) and its active ingredient, curcumin, against natural and chemical toxicities: A review. Biomedicine & pharmacotherapy, 99, pp.411-421.
[31] Ahmad, R.S., Hussain, M.B., Sultan, M.T., Arshad, M.S., Waheed, M., Shariati, M.A., Plygun, S. and Hashempur, M.H., 2020. Biochemistry, safety, pharmacological activities, and clinical applications of turmeric: a mechanistic review. Evidence-based complementary and alternative medicine, 2020.
[32] Moutabian, H., Ghahramani-Asl, R., Mortezazadeh, T., Laripour, R., Narmani, A., Zamani, H., Ataei, G., Bagheri, H., Farhood, B., Sathyapalan, T. and Sahebkar, A., 2022. The cardioprotective effects of nano-curcumin against doxorubicin-induced cardiotoxicity: A systematic review. Biofactors, 48(3), pp.597-610.
[33] Tejada, S., Pinya, S., del Mar Bibiloni, M., A Tur, J., Pons, A. and Sureda, A., 2017. Cardioprotective effects of the polyphenol hydroxytyrosol from olive oil. Current drug targets, 18(13), pp.1477-1486.
[34] Sioriki, E., Nasopoulou, C., Demopoulos, C.A. and Zabetakis, I., 2015. Comparison of sensory and cardioprotective properties of olive-pomace enriched and conventional gilthead sea bream (Sparus aurata): The effect of grilling. Journal of Aquatic Food Product Technology, 24(8), pp.782-795.
[35] Efentakis, P., Iliodromitis, E.K., Mikros, E., Papachristodoulou, A., Dagres, N., Skaltsounis, A.L. and Andreadou, I., 2015. Effects of the olive tree leaf constituents on myocardial oxidative damage and atherosclerosis. Planta medica, 81(08), pp.648-654.
[36] Akowuah, G.A. and Htar, T.T., 2014. Therapeutic properties of saffron and its chemical constituents. J Nat Prod, 7, pp.5-13.
[37] Khan, M., Hanif, M.A., Ayub, M.A., Jilani, M.I. and Chatha, S.A.S., 2020. Saffron. In Medicinal Plants of South Asia (pp. 587-600). Elsevier.
[38] Mehdizadeh, R., Parizadeh, M.R., Khooei, A.R., Mehri, S. and Hosseinzadeh, H., 2013. Cardioprotective effect of saffron extract and safranal in isoproterenol-induced myocardial infarction in wistar rats. Iranian journal of basic medical sciences, 16(1), p.56.
[39] Sedighi, M., Nazari, A., Faghihi, M., Rafieian-Kopaei, M., Karimi, A., Moghimian, M., Mozaffarpur, S.A., Rashidipour, M., Namdari, M., Cheraghi, M. and Rasoulian, B., 2018. Protective effects of cinnamon bark extract against ischemia–reperfusion injury and arrhythmias in rat. Phytotherapy Research, 32(10), pp.1983-1991.
[40] Ranjan, M.M.G., 2020. A REVIEW ON VARIOUS MEDICINAL PROPERTIES OF CINNAMON: A MAGICAL DRUG.
[41] Nayak, P.B., 2017. Cinnamon: A Magical Drug. PharmaTutor, 5(4), pp.38-41.
[42] Sandamali, J.A.N., Hewawasam, R.P., Jayatilaka, K.A.P.W. and Mudduwa, L.K.B., 2021. Cinnamomum zeylanicum Blume (Ceylon cinnamon) bark extract attenuates doxorubicin induced cardiotoxicity in Wistar rats. Saudi Pharmaceutical Journal, 29(8), pp.820-832.



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