

The Effect of *NelumboNucifera* seeds and *Hyphaene Thebaica* on Induced Animal's Hyperlipidemia and Hypertension

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Abstract

The life style of the people by large has been adversely affected due to manifold reasons which includes industrialization and eventually making obesity as a very fast growing epidemic worldwide. Consequence of overweight, results in chronic diseases like cardiovascular issues, diabetes, and cancer. Nearly every obese person is found to be hyperlipidemia, which indicates a condition of having high levels of cholesterol, cholesterol esters, triglycerides, low-density lipoprotein and depleted levels of high-density lipoprotein. The high frequency of side effects implications of the drugs available in the market has raised a dire need of discovering and developing a new novel drug. The studies show that the plants have proven to be an upright source of natural as well as multifunctional molecules. The natural molecules flavonoids along with other components have been reported for multi-functionality. *HyphaeneThebaica* and *NelumboNucifera* have direct lowering effect on blood lipids and hypertension. This review explains the effect of *HyphaeneThebaica* (*Doum*) and *NelumboNucifera* (*Lotus seeds*) on blood lipids and hypertension. Lipid profile will be evaluated by estimation of Cholesterol count , Triglycerides , High and low density lipoprotein while hypertension will be evaluated by measuring Aginotensin converting enzyme (ACE) in serum and tissue extraction. Herbal medicine is the new good treatment for many chronic diseases to get ride from side effects of anti-cholestremic and anti-hypertension drugs.

Key words: *Hyperlipidemia, Hypertension, Aginotensin converting enzyme (ACE), HyphaeneThebaica, Nelumbo Nucifera*

Introduction

Plants have proven to be useful source of natural multifunctional molecules. Flavonoids along with a number of natural molecules have been reported to exhibit multi-functionality trait. The structural pattern of flavonoids influences the enzymatic activity of glucosidases and lipases. This can be useful for production and evolution of new drugs for many diseases caused by hyperlipidemia. The incorporation of medicine into food can add a new aspect to the existing drug market. The fate of accepting natural molecules as a remedy can be decided over acquiring the support of conducting large clinical studies checking the critical factors of toxicity as well as bioavailability. The researches have provided insights into the anti-potential of multifunctional natural molecules and elaborated some of the natural molecules

in terms of bio-distribution and safety¹. Herbal medicine still tops the list when it comes to the primary health care of about 65-80% of the globe's population. This is mainly observed in developing countries, due to improved cultural acceptability and showing more compatibility with human body and lesser side effects². The drugs currently available have shown to bring about a number of side effects. Hyperlipidemia is illustrated by high serum lipids profile in circulated blood. It has been established that the greatest risk factors causing to commonness and severity of stroke, coronary heart diseases, hyperlipidemia and atherosclerosis are the primary cause of fatality. WHO reported that the high blood cholesterol contributes to approximately 56% of patients of cardiovascular diseases and about 4.4 million deaths every year³.

High blood pressure is rightly termed as a “silent killer” as it comes up with no warning signs or symptoms whatsoever. Hypertension stands as the most common reason of premature death worldwide. An estimated amount of around one billion people are suffering from hypertension and two-thirds of them are found in developing countries. There is association between hyperlipidemia and hypertension as it is prevalent in hypertension⁴. Diabetes mellitus is one of common chronic metabolic disease spread all over the world cause intolerance deal with glucose due to absence of or deficiency of insulin⁵.

HyphaeneThebaica and NelumboNucifera:

Both are herbal medicine Plants which are the choice of drugs which represented the most potential field of alternative medicine. Many peoples depend on traditional system of medicine to maintain their physical and psychological health. Both are herbal medicine plants which are the choice of drugs that represent the most potential field of alternative medicine. Many peoples depend on traditional system of medicine to maintain their physical and psychological health⁵.

NelumboNucifera is a part of the family of Nelumbonaceae, which has various local names (Bean of India, Indian Lotus, scared lotus and Chinese water lily)⁶. HyphaeneThebaica is an African palm tree. It grows in riparian areas and along the coast of east, central and West Africa. It is sweet and called “Doom Fruit”⁷.

Chemical composition and pharmacological effects of the both medical plants:

The phytochemical constituents of these medical plants reflect their medical importance. NelumboNucifera phytochemical composition were flavonoids, alkaloids, steroids, glycosides, terpenoids and tannins. The proximate constituents were calcium, iron, crude protein, ash, crude fibers, crude fats and vitamin C⁸.

The epidemiological studies have shown that phytochemical components possess rich antioxidant

properties and have been reported to exert multiple biological effects including antimicrobial, anti-inflammatory activities, free radical scavenger, pain reliever, tranquilizer and metal chelators. They are effective in reducing cardio-cerebrovascular diseases, cancer mortality, hypercholesterolemia and antibiotic properties⁹. The process of thin-layer chromatography identified that the doom fruit contains significant amounts of flavonoids, coumarins, hydroxyl cinnamates, saponins, and essential oils¹⁰.

H. Thebaica aids effectively in the treatment of bilharzias and hypertension. It also acts as a hematinic agent. The water extract of doom fruits possess the capability of lowering hyperlipidemia in nephrotic syndrome and also eliminates the risk of glomerulosclerosis and atherosclerosis. An option which is natural, safe and nontoxic, H. Thebaica fruit can emerge out as a potent alternative to be used for hypolipidemic drugs. Moreover, it is also quite capable to be used as a hypocholesterolemic agent, hematinic and hypolipidemic suspensions¹¹.

Treatment properties of HyphaeneThebaicaand NelumboNucifera

Hyperlipidemia was defined as the low density lipoprotein (LDL), complete cholesterol, levels of the triglyceride, or the level of the lipoprotein more than the 90th percentile as per the comparative value to the expected sample population or as per the level of HDL which is supposed to be less over the 10th percentile once it is compared with the common and most general population¹².

Hyperlipidemia, that plays a vital and more important part as in the promotion of the atherosclerosis inside the vessels of blood in the body, can be a major reason for affecting the heart as well, and this can lead towards the abrupt increase in ischemia injury and this can also weird the response to cardiac protective interventions which can be assumed to be a ischemic pre-as well as post-conditioning of the heart. In association with the unavailability of obvious coronary artery stenosis, it can also be responsible for the long-term hyperlipidemia,

which may be a reason for the accumulation of cardiac lipids and this can be made responsible for the affect cardiac function¹². Most of 50% of hypertensive patients have underlying cardiovascular (CVS) risk factors which are; diabetes, Lipids disorders (LDL and TGs), obesity, metabolic syndrome, unhealthy life, alcoholic intake. These risk factors cause increase in cerebrovascular and renal complications. Familial history of hypertension, hypercholesterolemia and diabetes play an important role in developing hypertension¹³.

Angiotensin-converting enzyme (ACE) provides the most important and main component of renin-angiotensin system (RAS), that is responsible for the management of the blood pressure with the help of which the volume of all the fluids will be maintained inside the body. The main conversion of the hormone angiotensin is done towards the active vasoconstrictor angiotensin II. Because of this reason we can say that ACE will be able to increase blood pressure with the constriction of the vessels of blood. ACE inhibitors are well known for their behavior in contrast towards the pharmaceutical drugs which is used for the treatment of cardiovascular diseases. The location for all of them are in the main capillary inside the lungs and thus they are available in the endothelial and kidney epithelial cells¹⁴. Angiotensin converting Enzyme (ACE) is regulated by the effect of Hyphaena as it leads to regulation of hypertension⁷.

Since long times, it is supposed to be believed that the plants which have medicinal properties are an important source for the substances needed for the therapeutic

effects. As per a general statistics we can predict that approximately 80% and more of the developing countries and their populations largely depends on the use of the elements available in the folk medicines for the problem resolution for heart related issues and cardio problems. There are many researches have been done to prove its efficacy and safety¹³.

NelumboNucifera as a medicinal plants contain phenolic , glycosides , alkaloids , flavonoids, saponins and tannins that all make NelumboNucifera extract has anti-hyperlipidemic effect that was proven by³. Nelumbo (Lotus) caused lowering in LDL, TGs, VLDL and cholesterol and increase in HDL, so it corrects the hyperlipidemic state either primary hyperlipidemia or induced from diabetes mellitus and so will help in lowering hypertension. The atherogenic index will markedly decrease when use plant extract³.

H. Thebaica(Doum) exhibited significant decrease in serum total cholesterol and non-HDL cholesterol in rats. The beneficial dietary hypotensive and hypolipidemic effects of Doum was also tested by some studies and they found that supplementation with the availability of the Doum may be one of the reasons for the reduction of the systolic blood pressure. The reduction in the diastolic blood pressure can also be a problem caused by Doum. However other problems like cholesterol and triglyceride and LDL are also expected to have a larger value as compared to the once who are not given proper treatment once while there is an increase in the HDL value¹⁵.

Table (1): The effect of HyphaenaThebaica on lipid Profile (Total Cholesterol-Triglycerides-LDL-HDL) and Aginotensin Converting Enzyme (ACE)

Author-Year-Country	Number of experimental Animals	Type of extract	Results
AlharbiNG,Sindi HA.(2020)(KSA)16	56 male rats	Water extract	Significance increase in HDL.(P<0.05)
Abdulazeez MA et al.,(2019)(Nigeria)7	25 rats	Flavonoid rich fraction of HT	Significant reduction in ACE (P<0.05)

Cont... Table (1): The effect of HyphaeneThebaica on lipid Profile (Total Cholesterol-Triglycerides-LDL-HDL) and Aginotensin Converting Enzyme (ACE)

Hassan MK et al.,(2018) (Egypt)17	32 male rats	Ethanollic extract	Significant reduction in cholesterol, TGs, LDL. (P<0.05)
BayadA.B, 2016(Egypt)18	18 male and female rats	Decoction	Significant decrease in lipids(cholesterol , TG, Total lipids) (P<0.05)
Elhaj A.E, Elbagir NM,(2016) (Sudan)19	40 male rats	Powder	Significant reduction in cholesterol, TGs, LDL. (P<0.05)
Al-Gendy A et al.,(2008) (Egypt)15	30 individual	Water extract	Significant reduction in systolic and diastolic Bl. Pressure and blood cholesterol(P< 0.001)
Zanna H et al., (2008)20	60 male rats	Aqueous	Significance decrease cholesterol in serum (P< 0.05)

Table(2): The effect of NelumboNucifera on Lipid Profile and Aginotensin Converting Enzyme (ACE)

Author-Year-Country	Number of experimental Animals	Type of extract	Results
Alok B,(2017) (India)5	30 albino Wistar rats	Alcoholic extract	Significant hypocholesterolemic effect(P<0.05)
Keshav RP ,(2015)(Nepal)6	-	Water and alcoholic extract	Anti-dyslipidemia effect
Subasini U,(2014) (India)3	36 rats	Hydro-alcoholic flower extract	Significant decrease in lipid profile(P<0.001) and increase HDL(P<0.001)
Velusami VC etal.,(2013) (India)21	-	Ethanollic extract	Significant Antihyperlipidemic and increase HDL(P<0.05)
Vinodhini R,(2010) (Ethiopia)22		Flowers of NelumboNucifera	Significant reduction in cholesterol(P<0.001)

Discussion

Hyperlipidemia can be considered as one of the probable condition which can induce a large number of genetic and the acquired issues and disorders in the human body. We can also recall and redefine as the improved levels of the lipids inside the human body. A further value of the LDL i.e. Low Density Lipoprotein along with the increase of Cholesterol level, or it can be a probable reason for the improved triglyceride levels. The general ingredients of the lipids includes various types of cholesterol levels, or the values of lipoproteins, in association with the chylomicrons, VLDL, LDL, Apo lipoproteins. The Hyperlipidemia is also associated to the promotion of the atherosclerosis which is available in blood vessels. However it might also affect the heart which might lead to the improved ischemia injury¹². Most of hypertensive patients have to proceed by cardiovascular diseases, DM or dyslipidemia. Obesity, metabolic syndrome, alcoholic intake and smoking are risk factors cause increase in cerebrovascular and renal complications. Familial history of hypertension, hypercholesterolemia and diabetes play an important role¹³.

Angiotensin-converting enzyme (ACE) regulates the blood pressure as a central entity which is responsible for the regulation of the pressure in the blood vessel which is supposed to be regulating the management of the pressure. ACE tends to contract the blood vessels and this is responsible for the increase of the blood vessels. The decrease as well as increase of the blood pressure depends on the blood pressure of the human body. ACE inhibitors are very important and used in a large number of quantity as pharmaceutical drugs responsible for the treatment of the diseases relative to cardio issues¹⁴.

Therapeutic use of the Medicinal plants is done with a proper belief that they are a rich source of chemical substances which are needed for the human body and protective against developing side effects, but many researches have been done to prove its efficacy and safety¹⁴.

Due to its phytochemical constituents like phenolic, glycosides, alkaloids, flavonoids, saponins and tannins that all make *NelumboNucifera* extract and *HyphaeneThebaica* have anti-hyperlipidemic effect they caused lowering in LDL, TGs, VLDL and cholesterol and increase in HDL, so it corrects the hyperlipidemic state either primary hyperlipidemia or induced from DM and so will help in lowering hypertension. The atherogenic index will markedly decrease when use plant extract³and¹⁵.

From the results of previous studies shown in Table(1) it was proved that according to chemical composition of *Hyphaene* and its content of flavonoids, it has a good anti hyperlipidemic effect that proved by¹⁶ by using water extract on 56 male rats, it showed that *Hyphaene* had a significant effect on increasing HDL($P<0.05$).⁷, proved that flavonoid rich fraction of *Hyphaene* cause significant decrease in ACE when given to 32 rat ($P<0.05$).⁷. Also Hassan et al., showed that Ethanolic extract of *Hyphaene* caused decrease in serum levels of TG, cholesterol and LDL¹⁷. *NelumboNucifera* has many useful component like flavonoids, tannins and saponins that make it benefit in treatment hyperlipidemia and hypertension.⁵ proved that by alcoholic extract in the experiment on 30 male rats, there was significant hypocholesterolemic effect. ($P<0.05$)⁵. Also⁶ showed that by water and alcoholic extract, the plant had anti-dyslipidemic effect⁶. Also, ³ proved that hydroalcoholic flower extract decreased the lipid profile ($P<0.001$).

Conclusion

Extracts of *Hyphaene* and *Nelumbo* are hypo-lipidemic and so, anti-hypertensive due to its constituents of active substances that enables them to be used as therapeutic agents in treating hyperlipidemic hypertensive patients. We conclude that *Doum* and *Lotus* are lowering factors for serum cholesterol and other lipid profile and it lowers ACE, so control the hypertension will be done.

Ethical Clearance: The researchers were able to ask permission to conduct the study and were given permission to conduct the experiments.

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Conflict of Interest: There is no conflict of interest.

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