"Impact of okra seed [*Abelmoschus eslulentus (L.) moench*] in lowering the blood sugar and cholesterol level"

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SUPERVISOR
Prof. Sunita Mishra
Dean School For Home Science

SUBMITTED BY
Poorva Dubey
Enrolment no 805/13

DEPARTMENT OF HUMAN DEVELOPMENT AND FAMILY STUDIES
SCHOOL FOR HOME SCIENCE
BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY
VIDYA VIHAR LUCKNOW (U.P.) INDIA

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Summary

Diabetes mellitus is a dynamic metabolic infection and it has influenced significant level of populace all through the world. Epidemiologic information demonstrated that 2.8% of the total populace was diabetic in the year 2000 and it might advance to 4.4% of the total populace by 2030. It influences all age group population. In India, measurable investigation uncovered that the quantity of diabetics will increase to 57 million in the time of 2025 in contrasted with 15 million diabetics in 1995. The pathogenesis of both type of diabetes are different, but hyperglycemia and its associated complications are common in both conditions. In diabetes, elevated levels of lipid profile are commonly reported that increases the cardiovascular complications. as of now, diabetes is overseen or controlled by utilizing medicines and non-pharmacologic strategies, for example, changing of life style doing exercise. it is also the biggest truth that the medicine are having there side effect and it motivate academic network to scan for new medications from every single conceivable source, including customary pharmaceuticals, which may be less harmful then it contrasted with the accessible medication treatment. Moreover, because of diabetic many other complication arise due to it pathophysiology. By and by, currently the researchers are focusing on developing alternative medicine for diabetes with traditional plant and herbs which are utilized as potential alternative source to treat diabetes with its numerous pharmacologic activities.Several phytoconstituents having antidiabetic action were disconnected and examined from numerous therapeutic plants, yet at the same time researchers proceed with their examination on restorative plants to convey great antidiabetic lead or medications to the medicinal services network.

Abelmoschus esculentus (L.)Moench., scintific name of okra, referred to in numerous English-talking nations as lady's fingers or gumbo is a blooming plant in the mallow family. the main source of the nutrient in okra are its seed an pods. It is a vital vegetable and generally found from Africa to Asia, Southern Europe and America. In Asia, okra is ordinarily used as conventional drug as a dietary sourse in the treatment of gastric disturbances. The plant has an extensive variety of medicin and has been utilized to control different disease and illness.

okra can possibly keep up the blood glucose level by enhancing the rate at which sugar is ingested from the intestinal tract .It is a good vegetable for those having weakness, exhausted ,

and depressed and it is also effective in ulcers, lung irritation, sore throat and additionally irritable bowel . Okra is useful for asthma patients and it additionally standardizes glucose and cholesterol levels.

Past examinations revealed that okra polysaccharide has anti complementary and hypoglycemic action in typical mice. Likewise, okra polysaccharide brings down cholesterol level in blood and may avoid the chance of cancer by its capacity to tie bile acids. In light of the above logical information, the present researc work is to check the effectivity of okra in bringing down of blood glucose and cholesterol levels by experimentally .In this way, the present examination was meant to explore antidiabetic and antihyperlipidemic potential of *Abelmoschusesculentus* (L) Moench. seed powders in streptozotocin and high fat induced diabetic rats.

Chapter 1 dealt with the introduction part it includes the brief information about definition of diabetes mellitus ,Worldwide Epidemiology of Diabetes Mellitus, Indian Epidemiology of Diabetes Mellitus, Classification of Diabetes Mellitus under three class one is type one diabetes mellitus second is type 2 diabetes mellitus and under the third section all other Specific Diabetes Type are included , Pathogenesis of type 2 diabetes, Definition of Cholesterol Level, Epidemiology of Cholesterol Level, Pathophysiology of Hyperlipidemia, Diagnosis of Hyperlipidemia, Management of both diseases: Management of Hyperlipidemia, Management of Diabetes, Current management of type 2 diabetes, Genus Abelmoschus, Botany and Taxonomy of Okra Plant, Geographical distribution and ecology of Okro Plant, Nutritional potential of Okro Plant, Okra Seed as Potential Edible Oil and Flour Source, Non Medicinal Uses and Ethnopharmacology Okra Plant, Pharmacological Studies Okra Plant, Analgesic Effects of Okra Plant, Anti-Inflammatory Effects of Okra Plant, Larvicidal Effects of Okra Plant, Antiviral Effects of Okra Plant, Effect on Nervous System of Okra Plant, Okra Plant as Protective Effects on Osteoporosis, Okra Plant in Wound Healing, Okra Plant Effects on the Gastro Intestinal Tract, Antioxidant and Anticancer and Antimicrobial Activities of Okra Plant, Hepatoprotective Activity of Okra Plant, Immunomodulatory Effects of Okra Plant, Okra Seed as Anti-Diabetic and Anti-Hyperlipidemic and Related Disease Prevention, Need for Study.

Objective of the study

- To study the nutritional profile of okra seed.
- To develop the diabetic rat models by inducing streptozotocin(Stz).
- To develop the hypercholesterolemic rat models through administration of high fat diet.
- To administer the okra seed among the diabetic and hypercholesterolemic model rats.
- To assess the efficacy of okra seed in the reduction of blood sugar level.
- To assess the efficacy of okra seed in reduction of blood cholesterol.

Chapter 2 dealt with Review of Literature of the study, Botanical Features of Okra, Morpho-Agronomic Characterization of Okra, Distribution and ecological aspects of A. esculentus plant (Worldwide and in India), Genetic Diversity of Okra, Nutritive and phytochemical profiling of different parts of okra (A. esculentus), Seed as potential edibile oil and flour source, Mucilage and its potential, Diabetics and Okra seed relation, Hyperlipidemic and Okra seed relation, Studies on rat model, Studies on the efficacy of Okra Seed in the reduction of blood sugar level, Studies on the efficacy of Okra Seed in the reduction of blood cholesterol level

Chapter 3 dealt with material and method proposed in the synopsis a study on " **to checking the efficacy of okra seed in reducing the blood sugar and cholesterol among rats**"The present investigation was directed in Lucknow at BBAU and in Banaras city at Banaras Hindu University at Department of Zoology, Uttar Pradesh. This examination was directed on total 92 male albino rats, body weight of the rats at the starting of the study period was between 180 gm-200 gm of. the experiment was done for checking the adequacy of okra seed in decreasing the glucose and cholesterol among rats in the course of the investigation time. Okra seed and was bought from Local market of Lucknow City. Male albino rats were collected from the near by provider from the region of Varanasi. Rats were haphazardly separated into two principle group, Group A (diabetic rat group) and Group B (Hypercholesterolemic rat group). In assemble group A 46 rats were taken and in Group B 46 rats were taken. Rats of group A were filled in as Streptozotocin (Stz) {Hyperglycemic} Group and rats of Group B were filled in as

Hypercholesterolemic Group. Other components of the chapter were study, period, and selection of research methodology, collection of the data and analysis of the data.

Chapter 4 dealt with result and discussion of the study. Statistical Analysis was done through frequency, percentage, ANOVA test, and regression test.

5.1 Testing of hypothesis of the study

H01: There exists no association weight gain in different studied group.

It was observed that there was no statistically significant association among studied group and weight gain, hence null hypothesis was accepted and simultaneously proven.

H02: There exists no association between blood glucose levels in different follow-up weight in control group.

It was observed that there was no statistically significant association among studied group and blood glucose, hence null hypothesis was accepted and simultaneously proven.

H03: There exists no association between blood glucose in STZ induced rat groups at different time periods.

It was observed that there was statistically significant association among studied group and blood glucose in STZ induced rat group at different time period, hence alternative hypothesis was accepted and simultaneously proven.

H04: There exists no association between creatinine level and studied groups.

It was observed that there was statistically significant association between creatinine levels and and studied groups, hence alternative hypothesis was accepted and simultaneously proven.

H05: There exists no association between SGOT (IU/L) levels and studied group of diabetic rat.

It was observed that there was no statistically significant association between SGOT (IU/L)levels and studied groups, hence alternative hypothesis was accepted and simultaneously proven

H06: There exists no association between SGPT (IU/L) levels and studied group of diabetic rat.

It was observed that there was no statistically significant association between SGPT (IU/L)levels and studied groups, hence alternative hypothesis was accepted and simultaneously proven.

H07: There exists no association between body weight and studied groups for hypercholesterolemic rats.

It was observed that there was statistically significant association between body weight and different groups in different time interval of hypercholesterolemic rats hence alternative hypothesis was accepted and simultaneously proven.

H08: There exists no association between HDL-Cholesterol and studied groups for hypercholesrimic rat.

It was observed that there was statistically significant association between HDLC and different groups in different time interval of hypercholesterolemic rats hence alternative hypothesis was accepted and simultaneously proven.

H09:There exists no association between LDL-C and studied groups for hypercholesrimic rat.

It was observed that there was statistically significant association between HDLC and different groups in different time interval of hypercholesterolemic rats hence alternative hypothesis was accepted and simultaneously proven.

H10:There exists no association between SGOT and studied groups for hypercholesrimic rat.

It was observed that there was no statistically significant association between SGOTand different groups in different time interval of hypercholesterolemic rats hence null hypothesis was accepted and simultaneously proven.

H11:There exists no association between SGPT and studied groups for hypercholesrimic rat.

It was observed that there was no statistically significant association between SGPTand different groups in different time interval of hypercholesterolemic rats hence null hypothesis was accepted and simultaneously proven.

H12: Okra seed is not efficient in the reduction of blood sugar level in inducing streptozotocin rat models.

It was observed that Okra seed is efficient in the reduction of blood sugar level in inducing streptozotocin rat models hence null hypothesis was accepted and simultaneously proven.

H13: Okra seed is not efficient in reduction of blood cholesterol level in high fat diet rat models.

It was observed that Okra seed is efficient in reduction of blood cholesterol level in high fat diet rat models hence null hypothesis was accepted and simultaneously proven.

6.1Major findings of the research:

- In present study (Table no 4.1 indicated) the nutritional content of where Energy (29 kcal), Protein (2.20 g), Total Lipid (0.05 g), Carbohydrate (7.03 g), Total dietary fibre (3.9 g), Vitamin C (19.9 mg) on composition of okra pods per 100 g edible portion.

- The body weight gain to STZ induced diabetic rats was ranged from 180 to 200 mg/dl in different groups.

- It have been observed that STZ induced diabetes rat show loss in body weight. Due to absolute or relative deficiency of insulin and decreased production of ATP and protein synthesis decreases in all tissues.

- The blood glucose level was monitored for after 48 hours . Fasting blood glucose of rats treated with stz was observe to be move significantly higher than those of normal control rats.

- In traditional medicine, we observed okra seeds to have ability in managing increased blood glucose concentration.

- In comparison of blood glucose in STZ induced rat groups at different time periods. At 1st day after intervention mean blood glucose in STZ induced rat ranged from 100.0±4.0g (Control group) to 207.7±15.3 (STZ Control). It seems higher blood glucose in positive control group.

- At 42th Day after intervention blood glucose ranged 99.5±4.4g (Control group) to 232.3±12.6g (STZ Control). Minimum blood glucose level was found in control group.

- In our study, administration of AESP (250 mg/kg and 500 mg/kg) decreased elevated blood glucose levels significantly ($P < 0.001$) from 14^{th} day to 48^{th} day as compared to STZ control group rats.

- The AESP at a dose 500 mg/kg showed significantly ($P < 0.001$) more blood glucose reduction than its 250 mg/kg dose.

- It was observed that there was statistically significant association between creatinine levels and studied groups. ($p<0.05$)

- The comparison of SGOT levels mean difference ranged -6.2 to 2.6 mg/dl in different groups. Mean difference SGOT levels was minimum in okra does group (low) to okra does group (high) (-6.2±2.13 mg/dl) followed by control to okra dose group (high) (-5.2±1.69mg/dl) and maximum in STZ to okra does group (low) (2.6±0.629 mg/dl). The difference among groups was found to be not significant. ($p>0.05$) except Okra does group (low)okra does group (high)group ($p<0.05$) in the table no.4.19.

- Comparison of SGPT levels mean difference ranged 0.3 to 4.4 mg/dl in different groups. The difference among groups was found to be not significant ($p>0.05$) except one i.e Control to Okra does group (high) which found statistically significant. ($p<0.05$)

- Mean body weight of hyper cholesterol experiment rats were minimum in control group (166.9±11.65mg/dl) followed by okra does group (high) (208.0±6.03), okra does group (low) (232.9±5.78mg/dl) and obese control group (262.6±8.1mg/dl). On evaluating the data statistically, this difference among groups was found to be significant. ($p<0.001$)

- The body weight mean difference & statistical relation between hyper cholesterol groups. We observed significant difference in control group to obese control group (-95.7±4.4mg/dl) followed by control group to Okra does group (low) (-66.0±4.52), control group to Okra does group (high) (-41.1±3.9mg/dl), Okra does group (low) to okra does group (high)(24.9±2.05mg/dl), obese control to okra does group (low)(29.7±2.05mg/dl) and obese control to Okra does group (high)group (54.6±2.42mg/dl).

- Hypercholestrolimic group rats significantly ($P < 0.001$) elevated the Total Cholesterol level and LDL and decreased the HDL levels compared with normal control rats
- In the present study, administration of AESP at 250 and 500 mg/kg doses to the hypercolestrimic rats showed significant ($P < 0.001$, $P < 0.05$) reduction in Total Cholestrol and LDL than diabetic control rats.
- The HDL level was increased significantly ($P < 0.001$) after the treatment of both the dose of AESP in hypercholestrimic rats compared with negative control rats.
- It was observed that there was statistically significant association between HDL-C and different groups in different time interval of hypercholesterolemic rats
- It was observed that there was no statistically significant association between SGOT and different groups in different time interval of hypercholesterolemic rats .
- It was observed that there was no statistically significant association between SGPT and different groups in different time interval of hypercholesterolemic rats.
- It was observed that Okra seed is efficient in the reduction of blood sugar level in inducing streptozotocin rat models
- It was observed that Okra seed is efficient in reduction of blood cholesterol level in high fat diet rat models.

6.2 Conclusion

There is considerable evidence from experimental studies that okra seed has potential hyporglycemic and hypolipidemic activity in STZ induced diabetic rats and high fat induced hyperlipidimic rat. Our results confirm that supplementation of okra seed (*A. esculentus*) significantly controlled the hyperlipidemic and hyporglycemic condition including the body weight reduction. The Supplementation of okra seed showed lower level of SGPT, SGOT and reduce blood glucose level as well as blood lipid level in rats.. Results also indicate that okra seed is effective for LDL reduction and increased the HDL level. Hence it can be utilized as a substitute for medicine in treating diabetes and cardiovascular disorders,.Finally, this study indicate that the seed of okra under the conditions of this experiment represent an alternative low cost treatment for obesity, hyperlipidemia and diabetic .However further research work is to be carried out to come to final conclusion.

6.3Recommendation for further studies

Since STZ has been accounted for to instigate diverse sorts of diabetes mellitus in animal, delineating a predefined glucose level in test conventions assessing drugs utilized in diabetes is profoundly prescribed. Care must be taken when testing the impacts of different antidiabetic treatment on STZ diabetic induce animals because of the impact of STZ on changing the normal glucose homeostasis. other factors for example , liver glycogen, incretins, and amylin levels that likewise contribute in keeping up typical glucose homeostasis or influencing insulin reaction ought to be additionally investigatedduring experimental STZ diabetes induction. Sample size should be more to predict more accurate result.