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Hypoglycaemic animal activity studies of Cucurbita maxima Seed extracts with streptozotocin formulation

Ravi Pratap Pulla[1]*, Shubhadip Nandi[2], Kush Biswas[2], Anushree Mistry[2], Subhoneel Dolui[2]

[1]*Dept. of Pharmaceutical Chemistry/ Pharmaceutical Analysis, Jawaharlal Nehru Technological University, Hyderabad, Telangana, India*
[2]*Dept. of Pharmaceutical Sciences and Research, M.R. College of Pharmaceutical Sciences and Research, Ashok Nagar, West Bengal, India*

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ABSTRACT

Background: The Cucurbita maxima which generally known as pumpkin, belongs to the family Cucurbitaceae. The Cucurbitaceae plants are known as cucurbits. They are developed in tropical and subtropical zones. Cucurbit species include pumpkins, squashes, gourds and melons. Streptozotocin was found from soil bacterium (Streptomyces achromogenes) which is a compound in nature having antibacterial properties. This is a glucosamine nitrosourea containing compound and furthermore goes about as alkylating specialist that causes DNA harm and shows poisonous nature to the islet β-cells.
Materials and Methods: Carbonium particles are the degradable type of Streptozotocin (STZ) and alkalyting purine and pyrimidine bases are adducted structure the DNA. Glibenclamide hinders of the K+ particles channels which prompts depolarization of β-cells and discharged insulin. Streptozotocin makes pancreas enlarge and finally causes degeneration in Langerhans islet β-cells and prompts trial diabetes.
Results: It additionally changes typical digestion in diabetic rodents (rats) in correlation with ordinary rodents. The current exploration manages the different sorts of concentrates like petrol ether separates, ethyl acetic acid derivation concentrates, and alcoholic concentrates of seeds of Cucurbita maxima (Cucurbitaceae) on Streptozotocin prompted diabetic rodents.
Conclusion: The petrol ether separates, ethyl acetic acid derivation and alcoholic concentrate were viewed as diminished the blood glucose level to 163.55 ± 4.23 mg/dL, 91.50 ± 1.93 mg/dL and 189.91 ± 1.89 mg/dL on 36 hour of the review ($p<0.05$). The ethyl acetic acid derivation removal was viewed as best in diminishing the fasting glucose level of rodents.

1. Introduction

Over beyond couple of many years, a typical propensity of people groups has been created towards home grown preparations due to an immense remedial potential for the treatment of numerous illnesses without related secondary effects as opposed to engineered (synthetic) drugs. The current review demonstrates the counter diabetic action of various seed concentrates of the plant Cucurbita maxima (Cucurbitacea). The Cucurbitaceae family has numerous species which are utilized as human food sources. This family approaches a colossal social occasion with around 130 genera and 800 species. The Cucurbitaceae plants are known as cucurbits. They are developed in tropical and subtropical districts. Cucurbit species incorporate pumpkins, squashes, gourds and melons. The

* *Corresponding author*.
E-mail address: ravipratap.pulla35489@paruluniversity.ac.in (R. P. Pulla).

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five tamed types of pumpkin are Cucurbita pepo, Cucurbita argyrosperma, Cucurbita ficifoli, Cucurbita mamima, and Cucurbita moschata.[1]

Pumpkin seeds show a decent helpful movement by being utilized as a protected diuretic and de-worming specialists and the seed oil likewise shows a vital job as acting nervine tonic.[2] Pumpkin seed oil has areas of strength for a property, and has been utilized to treat in various medical issues, for example, forestalling of the development of prostate and furthermore by lessening the size of the prostate, likewise supportive for diminishing the tension of urethra and bladder and furthermore help to further develop bladder consistence, easing of diabetes by advancing hypoglycaemic action, and bringing down degree of gastric, bosom, lung, and colorectal cancer.[3,4] Other various exercises shown by the plant are as per the following cell reinforcement activity,[5] anticarcinogenic activity,[6] hypolipidamic activity,[7] antihelmentic activity,[8] hostile to hypertensive and cardioprotective,[9] immunomodulatory activity.[10–15]

Pumpkin seed mainly contains Oleic and Linoleic acid (41.4% and 37.0%, respectively). Pumpkin seed oil were Δ7, 22, 25-stigmastatrienol, Δ7, 25-stigmastadienol, and spinasterol; with regard to the alcoholic fraction, triterpinoids compounds were more abundant than aliphatic compounds (63.2% vs. 36.8%). The seeds contained 41.59% oil and 25.4% protein. Moisture, crude fibre, total ash, and carbohydrate contents were 5.2%, 5.34%, 2.49%, and 25.19%, respectively. Gas chromatographic analysis of the pumpkin seed oil showed that the Linoleic (39.84%), Oleic (38.42%), Palmitic (10.68%) and Stearic (8.67%) acids were the major fatty acids. Compared with other vegetable oils, the present study revealed that Pumpkin seed oil can be a valuable source of edible oil. The anti-oxidative effects of Pumpkin seed protein isolate on rats kept on a low-protein diet for 5 days. The rats were subjected to Acetaminophen intoxication and then given Pumpkin protein isolate. The rats were killed at 24, 48 and 72 hours after their respective treatments.

The confine displayed around 80 % revolutionary rummaging movement, chelating action of roughly 64 % on Fe^{2+} particles and a restraint of roughly 10 % of xanthine oxidase. CCl_4-instigated liver injury was lightened by Pumpkin protein disengage as confirmed from the superior cancer prevention agent level and brought down degrees of lipid peroxidation. With the coming of studies from different literary works overview, one from Rehab Abd-El Salam Mostafa et al.,[16] have revealed Pumpkin seeds contain Omega six unsaturated fats which shows the cancer prevention agent, mitigating, hypolipidemic impact. In another examination article, N.S.Gill et al.,[17] have detailed the investigation of detachment, portrayal, hostile to ulcer action of the terpenoids separated from the seeds.

The seed removed was exposed to segment chromatography for the disconnection of the compound. The separated compound showed the most extreme cancer prevention agent action. On par one more examination, by Makni et al.,[18] assessed the impact of the flakes and pumpkin seed blend consumption in rodents taken care of with a 1 % cholesterol diet. In seed fed rodents they took care of gathering importance expansion in poly and immersed greasy was noticed. Considering the above writing there could have been no legitimate strategy from enlistment of prompted development for the rodent thus to adjust to the circumstances the writers have prevailed in the examination action for the improvement of a hypoglycaemic action.

From the above content, the authors recognized another invigorated technique for hypoglycaemic action which is showing additional promising outcomes. This exploration data sources will be a striking edge for any new figured out dose structures in the neighbouring future. The most widely recognized problem of the current situation is diabetes mellitus which is predominantly an endocrine issue that is portrayed by hyperglycaemia. The current examination manages hypoglycaemic investigation of different sorts of concentrates of seed of Cucurbita Maxima on diabetic rodents. All conventions of trials are endorsed by the IAEC (Institutional Creature Moral Advisory group) and are administered by the accompanying rules of the CPSEA.

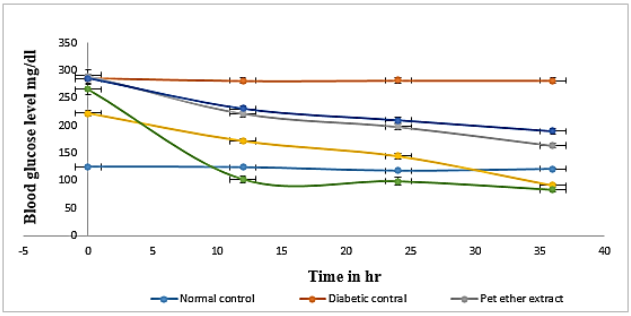

Figure 1: In vivo study of blood glucose level by using different seed extracts in compare to standard drug Glibenclamide (GBC)

2. Materials and Methods

The seeds have been gathered from the nearby market of Durgapur, Paschim Bardhhaman, West Bengal, India and has been verified by B.S.I., Shibpur, Howrah, West Bengal, India. All the synthetic/chemical use in this research is of analytical grade.

2.1. Preparation of extracts

Extraction was finished by maceration process where solvents were utilized non-polar to polar consecutively. N-Hexane, Petroleum Ether, Ethyl Acetic Acid derivation,

Table 1: Effect of Cucurbita maximaon blood glucose level in STZ-induced diabetic rats.

Group No	1 hour	12 hour	24 hour	36 hour
Normal Control	125 ± 3.20	124.3 ± 4.80	118.3 ± 5.40	121.3 ± 4.40
Diabetic Control (STZ 55 mg/dL)	285.500±7.833 mg/dL	281.500±5.196 mg/dL	282.00±5.638 mg/dL	281.800 ± 5.107 mg/dL
Test-1 Group Pet. Ether Extract (50 mg/kg)	291.00 ± 9.829 mg/dL	222.00 ± 6.822 mg/dL	198.00 ± 4.621 mg/dL	163.55 ± 4.239 mg/dL
Test 2 Group Ethyl Acetate Extract (200 mg/kg)	222.60 ± 4.902 mg/dL	172.10±4.506 mg/dL	144.60 ± 4.525 mg/dL	91.50 ± 1.936 mg/dL
Test-3 Group Alcoholic Extract	285.3±3.753 mg/dL	230.5±2.354 mg/dL	209.7 ± 1.835 mg/dL	189.9±1.896 mg/dL
Test-4 Group Glibenclamide (10 mg/kg)	266.10 ± 9.378 mg/dL	102.50±6.897 mg/dL	99.10 ± 6.462 mg/dL	83.50 ± 4.321 mg/dL

Each value is expressed in Mean ± SEM, where n=6. Test drug contrasted with diabetic control in such case P<0.05 when contrasted with diabetic rodents.

Methanol and Water had been utilized separately. The rough material was kept in an isolating funnel. 200 ml of the previously mentioned solvents were utilized to make each fraction. The crude material was kept in solvents for 24-36 hours. After the specific time the residue unrefined material was gathered by the opened stopcock of isolating funnel though supernatant was independent on a mission to get dried separate by rotary film evaporator. Petroleum ether which detaches the oil from rough material and the slick substance was discrete from the unrefined material after maceration which is gathered by rotary film evaporator at 800°C temperature of water bath and 30°C temperature of vacuum.

2.2. Acute oral toxicity study

Mice were contaminated with 5, 50, 300 and 2000 mg/kg body wt./rodent/day dosages to take any Cucurbita maxima to see any poisonous/toxic impacts or to change conduct. As per the OECD Rule 423, LD_{50} 2000mg/kg seed extract was found. In this way, the Cucurbita maxima seed extricate has been shown to be non-harmful. $1/10^{th}$ of the most maximum safe portion for seed test poisoning is found within. Therefore, the first 200 mg/kg body weight of the natural is not entirely settled for additional treatment of the concentrate.

2.3. Study of anti-diabetic activities

Antidiabetic investigations of test plant seed removal were examined by introducing six distinct gatherings of mice and six animals in each gathering (n=6). Mice were regulated intra-peritoneal course of diabetic, Streptozotocin (50 mg/kg), dissolved in 0.1M citrate buffer support and kept up with at pH 4.5 by gathering blood samples from the tail vein utilizing capillary tubes. The measured glucose levels were taken at 1, 12, 24, 36 hours. Blood glucose levels in excess of 200 mg/dL were available in the rodents treated with diabetes utilized for the research study.

3. Results and Discussions

3.1. Fasting blood glucose level

There was altogether ($p< 0.05$) raised blood glucose level in STZ-prompted diabetic rodents when contrasted with ordinary benchmark group. Organization of Cucurbita maxima separate in diabetic rodents fundamentally ($p< 0.05$) diminished the blood glucose level towards typical when contrasted with the diabetic control group (Table I).

The total six groups were taken against diabetic concentrate as Normal control, Diabetic control group, Test-1, Test-2, Test - 3 and Test-4. Each group contained six rodents. The diabetic inducer specialist Streptozocin ingested each group of animals to make them diabetic. The standard anti- diabetic medication GBC was ingested for Test - 4 groups and results were taken on 1, 12, 24, 36 hours. The Diabetic control group was likewise treated by diabetic inducer Streptozocin and kept undisturbed for 36 hours. The Petroleum ether extract was viewed as it is decreasing the fasting blood glucose level to 291.00 ± 9.829 mg/dL, 222.00 ± 6.822 mg/dL, 198.00 ± 4.621 mg/dL and 163.00 ± 4.239 mg/dL on 1, 12, 24 and 36 hours.

The Ethyl acetic acid derivation separate was viewed as decreasing the fasting blood glucose level to 222.60 ± 4.902 mg/dL, 172.10±4.506 mg/dL, 144.60 ± 4.525 mg/dL and 91.50 ± 1.936mg/dL on 1, 12, 24 and 36 hours. The alcoholic concentrate was viewed as decreasing the fasting blood glucose level to 285.3±3.753 mg/DL, 230.5±2.354 mg/dL, 209.7 ± 1.835 mg/dL and 189.90±1.896 mg/dL on 1, 12, 24 and 36 hours. The oral anti - diabetic medication GBC decreased the fasting blood glucose level to 266.10 ± 9.378 mg/dL, 102.50±6.897 mg/dL, 99.10 ± 6.462 mg/dL and 83.50 ± 4.321 mg/dL on 1, 12, 24 and 36 hours. The ethyl acetic acid (Acetate) derivation concentrate of seed of Cucurbita maxima (Cucurbitacea) was viewed as best in contrast with Petroleum ether and alcoholic concentrate. Consequently, bringing down fasting glucose level ethyl acetic acid (acetate) derivation was observed to be extremely near the consequences results of medication Glibenclamide.

4. Conclusion

In the current research study, the different sorts of seed extricates were equipped for bringing down the fasting blood glucose level in rats in contrast with standard medication Glibenclamide. The Ethyl acetic acid (acetate) derivation was viewed as the best in diminishing the blood glucose level among them and it will be a decent elective herbal medication in the future that it is additionally switched over completely too any measurement of dosage forms.

5. Source of Funding

None.

6. Conflict of Interest

None.

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Author biography

Ravi Pratap Pulla, Professor and Principal https://orcid.org/0000-0003-3028-4473

Shubhadip Nandi, Associate Peofessor

Kush Biswas, Associate Professor

Anushree Mistry, Associate Professor

Subhoneel Dolui, Associate Professor

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