

CYTOTOXIC EFFORTS AND ANTI DIABETIC ACTIVITY OF PEEL MEDIATED SELENIUM NANOPARTICLES USING *SELENICEREUS UNDATUS***Pranav Palanivel C¹, Dr. Abirami Arthanari^{2*} and Dr. Rajesh Kumar³**¹Undergraduate, Department of Forensic Odontology, ²Senior Lecturer, Department of Forensic Odontology and³Professor, Department of Pharmacology

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ABSTRACT**AIM**

The aim of the study is to evaluate Cytotoxic efforts and anti diabetic activity of Peel mediated selenium nanoparticles using *Selenicereus undatus*

INTRODUCTION

Ability of the substance or process to cause cells damage or lead them to death is called cytotoxic effect. Cytotoxic compounds are widely used to create programmed cell death. High blood sugar levels are a hallmark of diabetes mellitus, a metabolic illness brought on either by insufficient insulin production or by the body's ineffective response to insulin. Pancreatic beta cells may be protected by dragon fruit extracts, which could help maintain insulin secretion and synthesis. Despite the fact that the nutritional value of dragon fruit makes it a potentially healthy addition to a balanced diet, it should not take the place of prescription diabetes drugs or medical care.

MATERIALS AND METHOD

selenicereus udantus peels are used to make crude extract. Using the peel extract as a mediator, make selenium nanoparticles. check the manufactured selenium nanoparticles' antioxidant capacity. to quantify the nanoparticles' ability to scavenge free radicals. Analyze the likely mechanisms underlying their antioxidant effect. to advance our understanding of the antioxidant properties of selenium nanoparticles mediated by *Selenicereus undatus* peel.

RESULT

Positive results are obtained from cytotoxic assay and using alpha amylase assay and beta glucosidase assay

CONCLUSION

The favourable results from the current study proves that *Selenicereus undatus* peel derived selenium nanoparticles exhibit anti diabetic activity and cytotoxic effect.

Keywords: Selenium nanoparticles,,Anti diabetic activity,Cytotoxic effect,*Selenicereus undatus*, peel mediated.

INTRODUCTION

Ability of the substance or process to cause cells damage or lead them to death is called cytotoxic effect. Cytotoxic compounds are widely used to create programmed cell death. The pharmaceutical industry frequently uses cytotoxicity assays to check the cytotoxicity of pharmaceutical libraries. (1) To develop a therapeutic that specifically targets rapidly dividing cancer cells, for example, researchers can either search for cytotoxic compounds or check "hits" from initial high-throughput drug screens for unfavourable cytotoxic effects before investing in their development as a pharmaceutical. (2) Cancer cell death or growth inhibition is the goal of cytotoxic medicines, including those used in chemotherapy. Nature also contains other cytotoxic chemicals, such as some snakes' venom. Even your body produces cytotoxic cells, which are important components of your immune system. High blood sugar levels are a hallmark of diabetes mellitus, a metabolic illness brought on either by insufficient insulin production or by the body's ineffective response to insulin. In order to control blood sugar levels in diabetics, anti-diabetic medications are primarily employed. If you choose a more natural approach, you can use them as an alternative to other medications or in conjunction with them. (3)

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A tropical fruit-bearing cactus native to Central America is called *Selenicereus undatus*, sometimes called Dragon Fruit or Pitaya. It is a member of the Cactaceae family and is well-known for its unusual look, vibrant hues and sweet, renewing fragrance. Due to the fruit's delicious flavour, nutritive value, and aesthetic appeal, its popularity has increased on a global scale. Dragon Fruit is an excellent source of important nutrients.⁽⁴⁾ It contains a lot of fibre, vitamins, and minerals while containing little calories. Vitamin C, antioxidant The nutritional value of dragon fruit offers a number of potential health advantages. The immune system is bolstered by vitamin C, free radicals are combated by antioxidants, and digestion is aided by fibre. In addition, the fruit's minimal calories and high dietary fiber content make it a good choice for anyone trying to control their weight and maintain a balanced diet. s, B vitamins, and minerals which involve iron and calcium are particularly rich in the fruit.⁽⁵⁾

Carotenoids, polyphenols, and vitamin C are just a few of the antioxidants found in dragon fruit. These antioxidants are essential for combating dangerous radicals that are free, which can cause cell damage and cause a number of illnesses, including cancer. On cancer cells, dragon fruit may have antiproliferative attributes.⁽⁶⁾ Breast cancer, liver cancer, and colorectal cancer cells were among the cancer cell lines that experienced these effects are seen. Due to its low glycemic index, dragon fruit only slightly and slowly elevates blood sugar levels after ingestion. People with diabetes can benefit from this characteristic since it lessens the likelihood of sudden rises in blood sugar. Dietary fibre, which helps decrease the uptake of carbohydrates and assist in controlling blood sugar levels, is present in dragon fruit in good amounts. Pancreatic beta cells may be protected by dragon fruit extracts, which could help maintain insulin secretion and synthesis. Despite the fact that the nutritional value of dragon fruit makes it a potentially healthy addition to a balanced diet, it should not take the place of prescription diabetes drugs or medical care.^(5,7) Overall aim of the study is to evaluate Cytotoxic effect and anti diabetic activity of Peel mediated selenium nanoparticles using *Selenicereus undatus*

MATERIALS AND METHOD

The current study was done at the Forensic odontology department in saveetha dental college for 3 months.



Figure1: Dried dragon fruit peel extract weighs about 5 grams.



Figure 2: Mixed with 100 ml of distilled water



Figure3: Heated at 60c for 20 minutes.

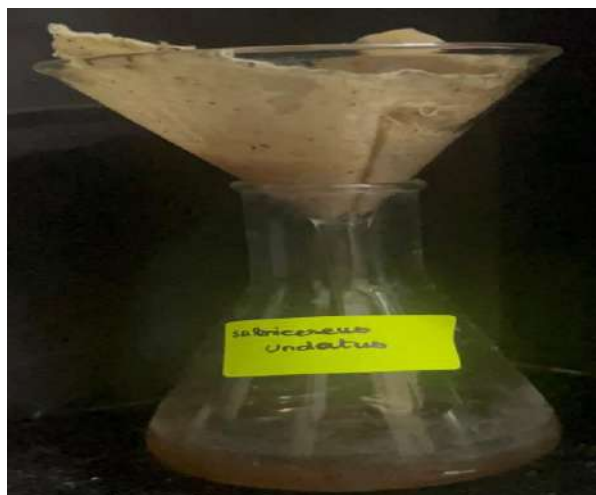


Figure 4: Filtered solution



Figure 5: Heated again at 100c for 30 minutes

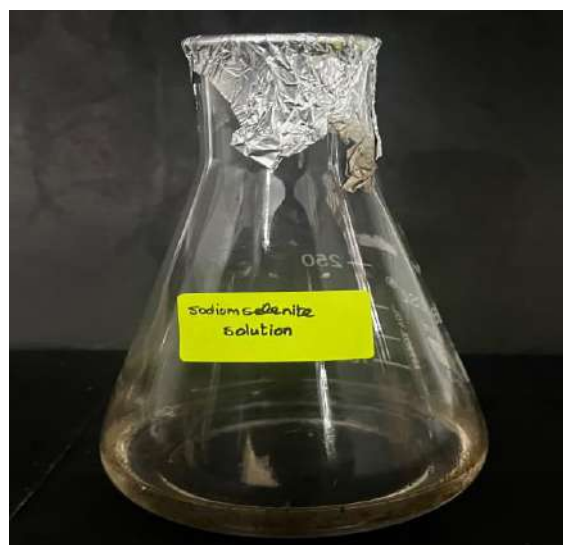


Figure 6: Crude extract

Alpha Amylase Activity

Complex carbohydrates like starch are broken down into simpler sugar molecules like maltose by the enzyme alpha-amylase. Salivary amylase starts breaking down starches into more straightforward sugars in the mouth, where the process starts. Pancreatic amylase facilitates the small intestine's continued breakdown of carbohydrates. Alpha-amylase is a key enzyme in the digestion of carbohydrates, altering postprandial blood sugar levels and affecting how glycemic meals react. Alpha-amylase activity and diabetes have a link that needs to be understood in order to effectively manage diabetes and maintain ideal blood glucose control.

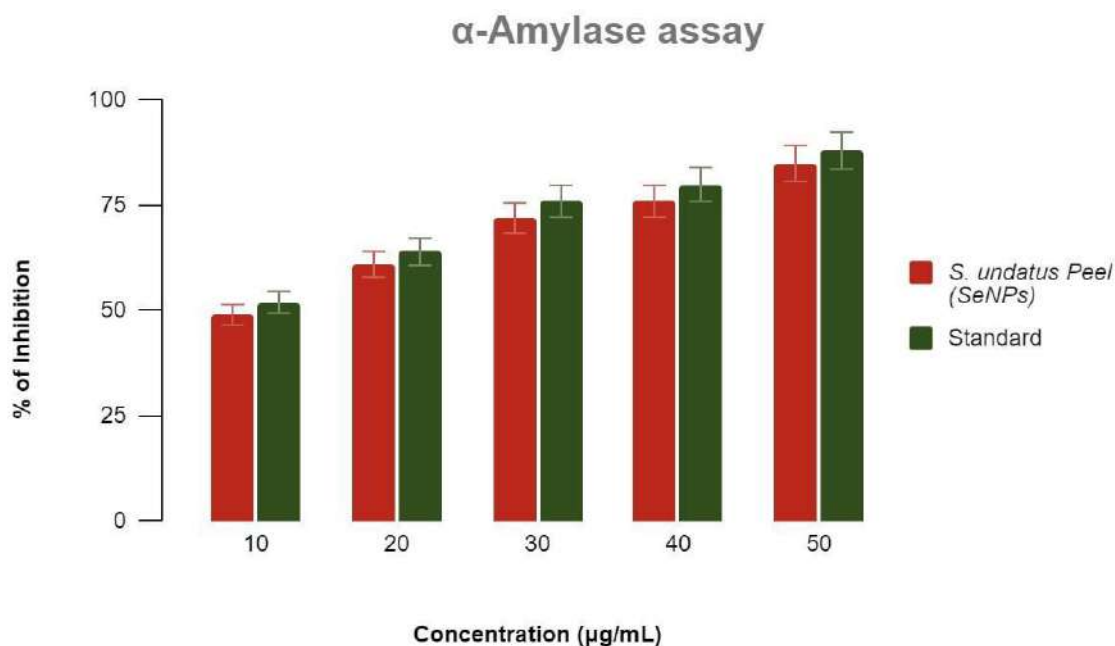
Beta Glucosidase Activity

The activity of this enzyme in biological materials like blood or tissues is measured by the -glucosidase assay. It involves the enzymatic hydrolysis of a certain substrate, and the enzyme activity is gauged by how quickly products are formed. Different glucoside molecules are broken down by -glucosidase's hydrolysis of -glycosidic bonds. The analysis of -glucosidase activity can reveal details on how specific compounds are broken down within the body. Different glucoside molecules are broken down by -glucosidase's hydrolysis of -glycosidic bonds. The analysis of -glucosidase activity can reveal details on how specific compounds are broken down within the body.

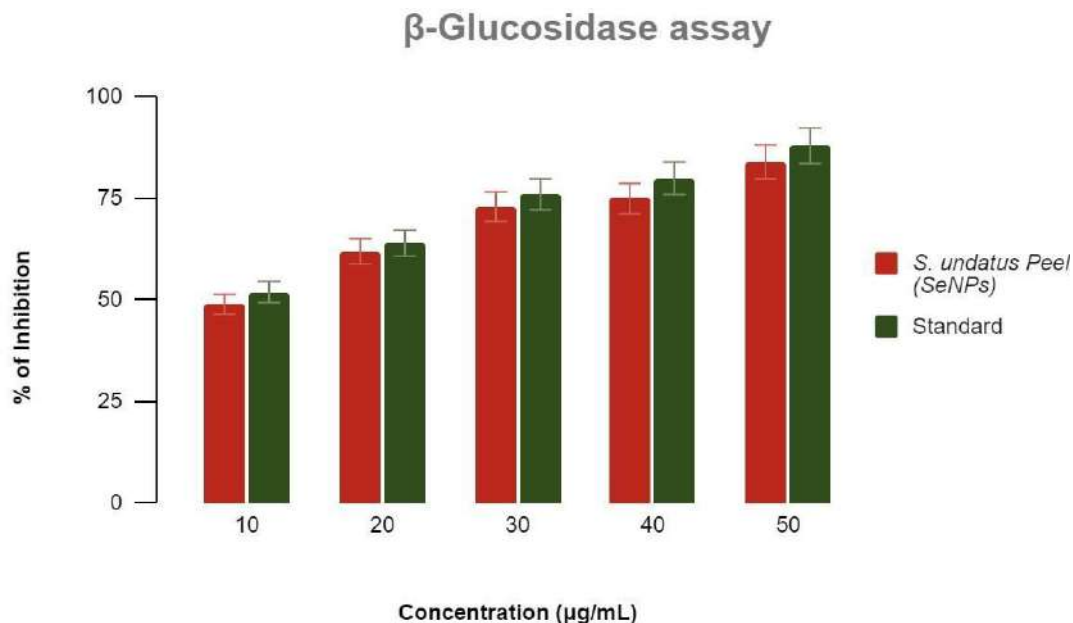
Cytotoxic Effect Using Live Naupilli

In comparison to employing cell lines derived from animals or people, using nauplii is less frequently used in cytotoxicity investigations. Nauplii from specific crustacean species have, however, occasionally been employed as model animals to evaluate the toxicity of pesticides or other environmental pollutants. Since nauplii are essential components of both marine and freshwater food webs, these studies are typically carried out to determine the possible effects of these compounds on aquatic ecosystems. The "Artemia nauplii bioassay" or "brine shrimp lethality assay," which uses brine shrimp nauplii, involves exposing the nauplii to various concentrations of the test drug and tracking their survival over time. The concentration that results in a certain percentage of death (often 50%) in nauplii is known as the median lethal concentration (LC50) if the chemical is cytotoxic. As a result, nauplii tests are frequently employed as a first step in the screening process to find chemicals that may need to be investigated further using more sophisticated cell-based models or animal research.

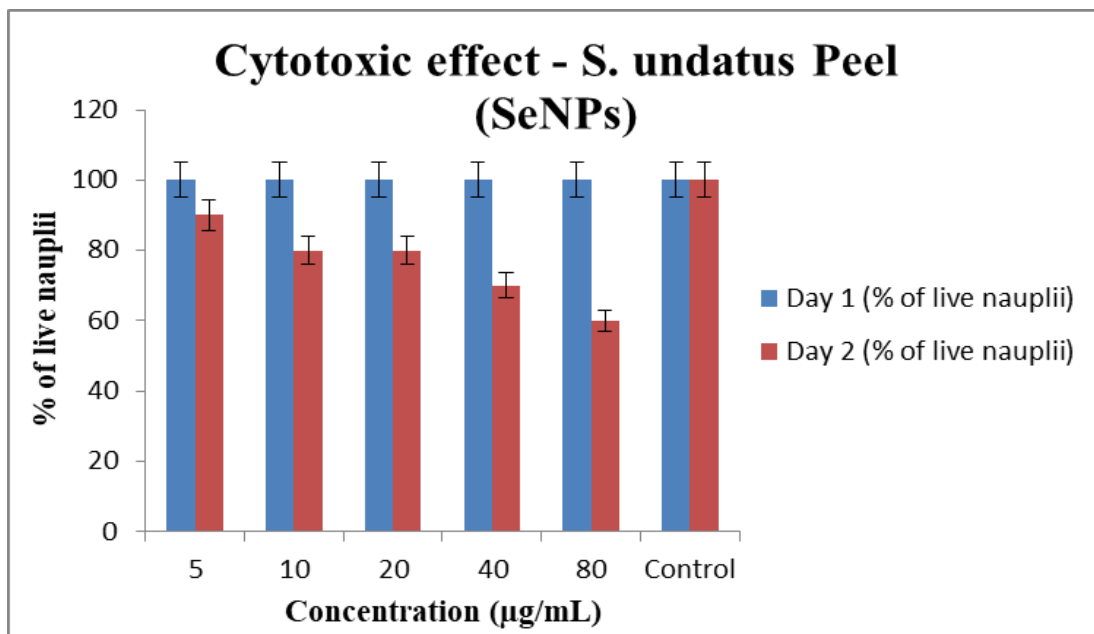
RESULT



Graph 1: Alpha amylase activity



Graph 2: Beta glucosidase assay



Graph 3: Cytotoxic effect: SENPs

In our current study we include 3 graphs . In which the first 2 graphs include alpha amylase activity and beta glucosidase activity elaborates anti diabetic activity of *Selenicereus undatus*. Graph 3 elaborates the cytotoxic effect of peel mediated selenium nanoparticles using *Selenicereus undatus*. In all 3 graphs *Selenicereus undatus* shows slight lesser value than standard values which clearly indicates that peel mediated selenium nanoparticles using *Selenicereus undatus* exhibit anti diabetic activity and cytotoxic effect.

DISCUSSION

A cytotoxicity MTT assay was conducted, and net growth inhibition was calculated in comparison to a negative control growth, to determine the cytotoxic activity of supercritical carbon dioxide extracts of pitaya (*H. polyrhizus*

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and *H. undatus*) peel against cancer cell lines PC3 (human prostate cancer cell line), Bcap-37 (human breast cancer cell line), and MGC-803 (human gastric cancer cell line).(8) A positive control was utilized, adriamycin (ADM).Against PC3, Bcap-37, and MGC-803 cells, the two extracts displayed an extensive spectrum of cytotoxic actions.Even in our test every group were controlled and dragon fruit shows cytotoxic effect.(9)

Three antioxidants (myricetin, rutoside, and quercetin) and three phenolic acids (caffeic, gallic, and protocatechuic acids) were discovered. The methanol extracts were the only ones to contain flavonoids. The P1, P3, P6, and P5 samples contained myricetin. Rutoside was found in all samples, with P1 having the greatest concentration and P4 having the lowest.The edible section of the pitaya fruit, which has been peeled for the research, was the main focus. The findings suggest that pitaya fruits, which have a wide range of qualities, have the potential to be useful fruits.(10) It may be a valuable addition to a daily diet with chemopreventive importance and good safety due to its beneficial plant chemicals ,high antioxidant characteristics, and selective cytotoxic activity, aimed mostly against digestive system cancer cells.In our findings we able to know that dragon fruit has ability to control cancer cell line.(11)

At various doses, the anti-diabetic effect of dragon fruit extracts ranged from 1.033 to 32.436 percent. At various concentrations, the antilipase activity of dragon fruit extracts ranged from 6.125 to 46.938 percent. As the concentration rose, the dragon fruit extract's useful qualities also rose.Pitaya is a promising natural remedy that has the potential to act as an antioxidant, antidiabetic, and antilipase agent. (12)To get a better understanding of the fruit's pharmacological capabilities, more research must be done on the identification, purification, and quantification of the bioactive components found in pitaya, as well as on the fruit's mode of action.(13,14) Therefore, additional research on this fruit would offer more details on the advantages of eating dragon fruit.As seen dragon fruit has promising effects in controlling diabetes . Future research may establish every useful medicinal properties of dragon fruit.(15)

CONCLUSION

In order to explore the potential medicinal applications of *Selenicereus undatus* (Dragon fruit) peel-mediated selenium nanoparticles, the study "Cytotoxic Effects and Anti-diabetic Activity of Peel-Mediated Selenium Nanoparticles using *Selenicereus undatus*" has produced encouraging results. The study showed that these nanoparticles had anti-diabetic and cytotoxic effects.In terms of cytotoxicity, the study probably examined how the produced selenium nanoparticles affected different cell lines, indicating their capacity to cause cell death or damage in particular cancer cell types.This component of the study probably examined how well these nanoparticles managed or prevented diabetes.Overall, the work offers insightful information regarding the possible biomedical uses of selenium nanoparticles produced by *Selenicereus undatus* peel. To clarify the underlying mechanisms and confirm their effectiveness and safety in treating cancer and managing diabetes, more research and clinical investigations are required. A promising field of research in nanomedicine is the creation of natural-based nanoparticles from fruit peels, such as *Selenicereus undatus*, which presents novel therapeutic options for a number of disorders.

CONFLICT OF INTEREST

There is no conflict of interest

ETHICAL CLEARANCE

Since it's an in vitro study ethical clearance is not required.

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(SHANKAR TILES BUILDING) 4/150-A, Thirupathi Nagar,

Sivakasi to S.N.Puram Main Road,

Sivakasi – 626 123

AMOUNT

Twenty Five thousand (25000)

AUTHOR CONTRIBUTION

All authors are equally contributed

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