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**DETERMINATION OF DRUG COMPOUND IN VINDOLININE - A  
PLANT SPECIES PRESENT IN THE PLANT CATHARANTHUS ROSEUS  
FOR TYPE2 DIABETES.**

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# ~~Anti-diabetic against type 2 diabetes (Tjong et al., 2010)~~

## DETERMINATION OF DRUG COMPOUND IN VINDOLININE - A PLANT SPECIES PRESENT IN THE PLANT CATHARANTHUS ROSEUS FOR TYPE2 DIABETES.

### Introduction

Catharanthus roseus, was also known as 'Nithyakalyani', bright eyes, Cape periwinkle, graveyard plant, Madagascar periwinkle, pink periwinkle, rose periwinkle and white periwinkle. It is a flowering plant. The leaf and flower of the plant have good medicinal properties. The leaf and flowers was used to treat diseases like diabetes, cancer, leukemia in children and sore throat. The natural product present in the plant can be used as an **anti-cancer** drug. In 1950 the Canadian research team found that the chemical compound present in the plant can be used to treat cancer. This plant species was mainly seen in the Indian Ocean island of **Madagascar**. **Madagascar** is **located** in the east coast of Southern Africa. Catharanthus plant belongs to tropical and sub-tropical areas. In many countries they use this plant to treat diabetes and believe that periwinkle plant can lower the blood sugar level.



periwinkle plant leaf and flower (rose colour)

Figure 1 MADAGASCAR PERIWINKLE PLANT.



**Figure2:Taxonomic description**

## ABSTRACT

Madagascar periwinkle has got a lot of medicinal properties. Madagascar periwinkle belonging to the genus catharanthus is found all over the world and a very common one in India. It is called as 'Sadabahar' plant in Hindi and 'Nithyakalyani' in Tamil. It is called 'Nithyakalyani' because it flowers daily, round the year and there are two varieties that are common in India. One of them produces white flowers and the other produces beautiful dark pink flowers. It is also a very common garden plant that you will find in most nurseries. Isn't it amazing that this simple yet beautiful plant is saving millions of lives every year? It is used for treating type 2 diabetes. For generations, it has been used in traditional medicine for treating various diseases and especially it is very popular for its use in treating diabetics. These studies were undertaken to find the medicinal uses of periwinkle plant in treating diabetes and found that these plants can lower blood sugar level. It is also tested in a patient suffering from diabetes (my mom) for last four months and positive results were found. The tests were done after consulting with a doctor under proper medical guidance. Vindoline is the compound present in this plant which has the good protein tyrosine phosphatase (the sequence was retrieved from NCBI-National Centre for Biotechnology Information database). Using Protein data bank the protein structure was predicted. Using ChEMBL tool three drug compounds (Razuprotafib, Ertiprotafib, and Levodopa tyrosine phosphatase 1b) for

tyrosine protein was found. From the above three drug compounds, I have tried to establish that levodopa tyrosine drug compound can be used to treat type2 diabetes mellitus.

Through these studies it is confirmed that Madagascar periwinkle can lower the blood sugar level and tyrosine protein is good for human and can be used to treat diabetes.

### KEYWORDS

Tyrosine phosphatase protein, Type2 diabetes, vindolicine, vindolinine, vindolidine, plant alkaloids, levodopa

### DIABETES MELLITUS

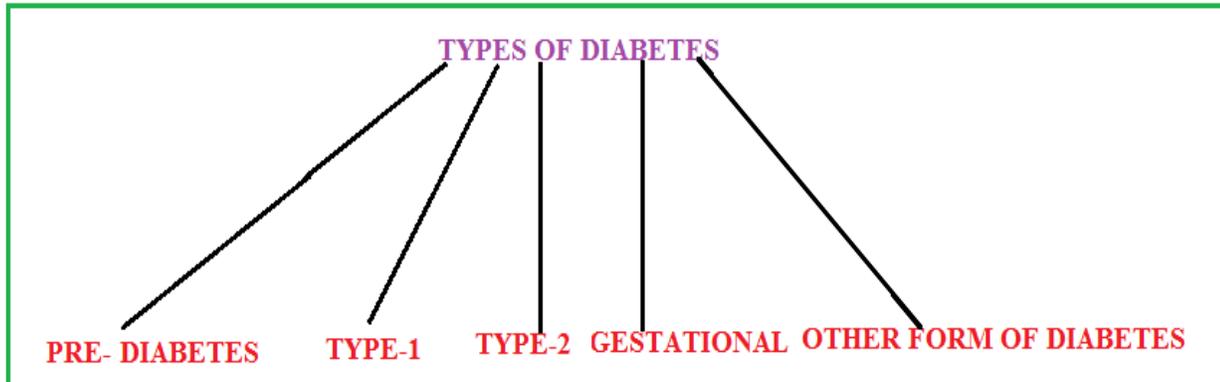
The term diabetes mellitus has latin origin which means ‘go through’. Diabetes mellitus is the disease which increases blood glucose level. Frequent urination is one of the main problem, it is because of large amount of urine produced by the kidney. Insulin is the hormone which plays major role in the disease. In normal person insulin moves sugar from the blood into your cells to be stored or used for energy. In a diabetic patient the body either doesn't make enough insulin or it can not use the insulin effectively which it makes. The disease can be treated effectively when found earlier. If left untreated it will lead to many complications such as kidney damage, nerve related issues, stroke and even heart failure in some cases.

- dry skin
- weight loss.
- Extreme hunger.
- vision changes. .
- numbness in the hands or feet.
- Feeling very tired
- Excessive thirst.
- Frequent urination.

s

### Complications arising due to Diabetes

## TYPES OF DIABETES



### PREDIABETES

Pre-diabetes is when the blood sugar is higher than it should be but not high enough. It is easy to diagnose. In United States one third of the people have this disease, but many people don't know that they have these disease.

Pre-diabetes can lead to type 2 diabetes mellitus and heart disease. Daily Exercising and losing extra pounds, even a little of body weight, can lower the risk of getting this disease.

### Type 1 Diabetes

Type 1 (insulin-dependent diabetes.) It often begins in childhood.

Type 1 is an autoimmune condition in which the body attacks pancreas with antibodies. The organ is damaged and doesn't produce insulin. Diabetes is not a hereditary one per se but genes play an important role in some cases. People with type 1 also have a higher risk of heart disease and stroke. Type 1 diabetes also leads to various other complications such as eye problem (Diabetic retinopathy, neuropathy and kidney related diseases).

### Treatment:

Type 1 diabetes involves injecting insulin into the fatty tissue just under your skin. You might use:

- Syringe
- Insulin pens, prefilled cartridges

- The high-pressure air to send a spray of insulin through your skin(jet injectors)
- Pumps that send insulin through a tube to a catheter under the skin of your belly

The blood test estimates your blood sugar level and checked continuous for three months from that test it is easy to identify type of diabetes.

Type 1 diabetes regular checkup is must which includes,

- Frequent testing of your blood sugar levels
- meal planning
- Exercising
- Regular medication.

## **Type 2 Diabetes**

The type2 diabetes is also called as Non-insulin-dependent or adult-onset diabetes. This type has become more common in children and teens because of overweight or obese condition. About 90% of people with diabetes fall in type 2category. In type2 diabetes pancreas usually creates some insulin. But it is not enough for the body.

Type 2 diabetes is mild when compared to type 1 but still it may causesome major health complications. The tiny blood vessels present in kidney get affected which leads to kidney failure in many people and in some cases neuropathy and eye sight problems arise.Type 2 also increases the risk of getting heart attack and stroke.

More than 20% of the people who are obese or overweight are in high risk of getting type 2 diabetes. Obesity causes insulin resistance, so the pancreas has to work harder to make more insulin.

## **Treatment**

Type2 diabetes involves keeping a healthy weight, eating right, and exercising. Some people need medication.

## **Gestational Diabetes**

During the time of Pregnancy in some cases the body develops some form of insulin resistance. If it becomes diabetes, then it is calledas Gestational Diabeteswhich could be spotted only during the middle or later stages of pregnancy.A woman's blood sugars travel through her placenta to the baby, hence it's important to control gestational diabetes to protect the baby's growth and development.

Gestational diabetes in 2% to 10% of pregnant women it goes away after birth. But up to 10% of women who have gestational diabetes get type 2, weeks or even years later.(www.webmd.com)

Gestational diabetes is more of a risk to the baby. A baby might have unusual weight gain before birth, trouble breathing at birth, or a higher risk of obesity and diabetes later in life. The mother might need a cesarean section because of overweight baby, she might also have her heart, kidney, nerves, and eyes affected adversely due to this type of diabetes.

### **Treatment**

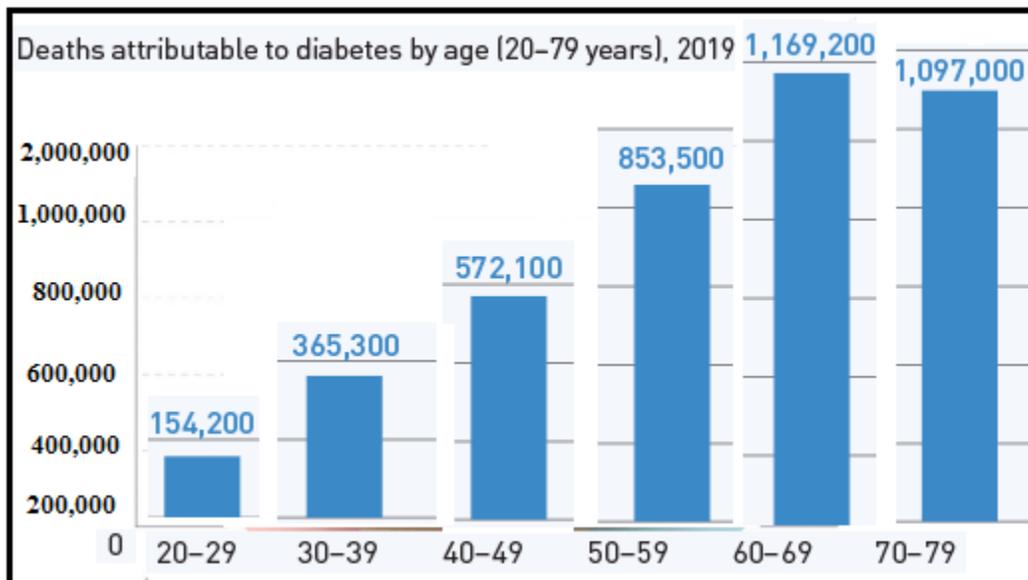
- Meal planning
- Avoiding oily and fat foods
- Daily exercise
- Weight management
- If needed, taking insulin to control the blood sugar levels.

### **Other Forms of Diabetes**

1% to 5% of people have other forms of diabetes and this might be due to pancreas problem, surgeries, medications and infections. In these cases regular blood checkup and maintaining sugar level is more important.

### **DIABETES RATE IN INDIA**

In India. Over 30 million have been diagnosed with diabetes. Kerala has the largest number of diabetes patients followed by Tamil Nadu and Punjab, Often known as the diabetes capital of the world.(Dec 8, 2017). The CPR (Crude prevalence rate) in the urban areas of India is thought to be 9 per cent. In rural areas, the prevalence is approximately 3 per cent of the total population. According to the International Journal of Diabetes in Developing Countries India has been witnessing an alarming rise in incidence of diabetes. In patients with diabetes, the absence or insufficient production of insulin causes hyperglycemia. There are estimated 72.96 million cases of diabetes in adult population of India. The prevalence in urban areas ranges between 10.9% and 14.2% and prevalence in rural India was 3.0-7.8% among population aged 20 years and above with a much higher prevalence among individuals aged over 50 years (INDIAB Study).



### PLANT ALKALOIDS

Plant alkaloids are found mainly in flowering plants. More than 4000 plant alkaloids have been found from 3000 different plant species. The alkaloids are naturally occurring compounds which have nitrogen atom. The chemicals which are made by plants in large number will have nitrogen in them. Alkaloids are plant stimulants which plays main role in growth, reproduction and metabolism of plant.

### USES OF PERIWINKLE

The periwinkle plant was used in different forms in many countries to treat many diseases. Periwinkle plant is a gift to mankind.

PERIWINKLE PLANT USES	
INDIA	Juice is used as application for bee and wasp sting
PHILIPPINES	used to treat diseases like menorrhagia, diabetes, dysentery, sore throat, cough.
MADAGASCAR	Tooth ache and vomiting. (roots are used)
WEST INDIES AND NIGERIA	The leaf and flower of the plant was used to treat diabetes
CUBA AND JAMAICA	Eye treatment in infants
MALAYSIA	Decoction of flower was used to treat diabetes
HAWAI	Used to stop bleeding (crushed plant extract)
AMERICA	Chest ailments and sore throat
AFRICA	Tea made from the plant was used to treat diabetes

### Table 1:uses of periwinkle plant

Chinese and European herbalists are using this medicine since medieval time. In china people used to make matcha powder from the leaf extract and use the powder for tea preparation this tea can lower the blood sugar level.

### IRREGULAR MENSTRUATION

The leaf and flower from the plant are boiled with 1cup and reduce it to half cup and drink this water regularly during menstrual cycle. Heavy menstrual flow will be controlled and this also reduces the stomach pain. The scanty flow during periods will also be regularized. This method was effectively practiced in Karnataka.

### ANTI-CANCER DRUG

Sarah O'Connor and her team from John Innes center found the last missing gene in the genome of the Catharanthus plant. It took nearly 15 years for them to find the gene which is very useful in building the chemical compound Vinblastine. It takes approximately 500kg of dried leaves to produce 1g of Vinblastine. (**Science daily.com (may 3<sup>rd</sup> 2018)**). The Vinblastine compound which they found was used as an anti-cancer drug in the treatment of cancer.

### ANTI DIABETIC PROPERTY:

The aqueous plant extract was found to lower the blood glucose about to 20%(below the previous level) in diabetic rats. The same when combined to that of the dichloromethane and methanol extracts it lowered the blood glucose level to 49-58%. The effect has appeared due to the result of the increased glucose utilization in the liver. All the four alkaloids vindoline, vindolicine and vindolinine were isolated and identified from the dichloromethane extract of catharanthus leaves which induced relatively high glucose uptake in pancreatic  $\beta$ -Tc6 or myoblast c2c12 cells, with vindolicine showing the highest activity. In addition, compounds **Vindolidine, vindolicine** and **vindolinine** demonstrated the good protein **tyrosine phosphatase 1B (PTP-1B)** inhibition activity, implying their therapeutic potential against type 2 diabetes (**Tiong et al, 2013**).

### CHEMICAL COMPOUNDS IN PERIWINKLE (DIABETES)

The **vindolinine, vindolicine, vindolidine** are the three chemical compounds that have good protein **tyrosine phosphatase**. The Tyrosine protein has the potential to cure type 2 diabetes. The compounds are extracted from the periwinkle leaves using dichloromethane.

The compounds which are identified from the plant source were injected into the pancreas of rat and it was observed that it gradually reduced the blood glucose level. The vindolinine compound shows very good result in lowering the glucose level when compared to other two compounds (vindolidine and vindolicine). (www.researchgate.net)

## VINDOLININE

**Vindolinine** formula:  $C_{21}H_{24}N_2O_2$ , Vindolinine was isolated from several plant species. It is a plant metabolite and monoterpene indole alkaloid.

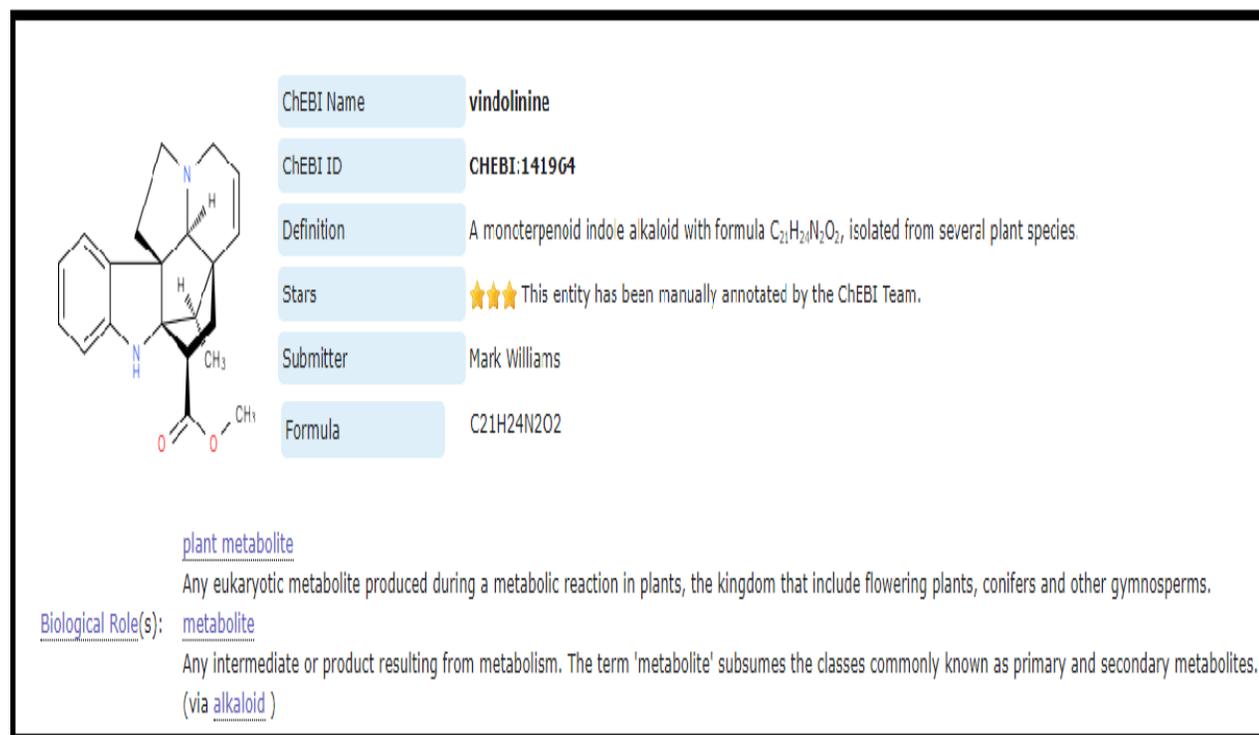
PubChem CID: 24148538

Molecular Formula:  $C_{21}H_{24}N_2O_2$

Synonyms: Vindolinine 5980-02-9 Vindolinin(-)

Molecular Weight: 336.4 g/mol.

figure 3 represents the chemical structure of the vindolinine compound



**Figure 3: Vindolinine**

## ROLE OF TYROSINE PHOSPHATASE PROTEIN IN DIABETES

Type2 is the insulin-dependent diabetes mellitus (NIDDM).The major factor of the disease is obesity and 75% of obese individuals will develop type 2 diabetes.(www.sciencedaily.com) It is necessary to develop some new therapies for these disease. The tyrosine phosphatase PTP-1B has been shown to be a negative regulator of the insulin signaling pathway, suggesting that inhibitors of this enzyme. It is beneficial in the treatment of type 2 diabetes.Figure4 and Figure5 shows the chemical and crystal structure of protein retrieved from PDB and Uniprot database.

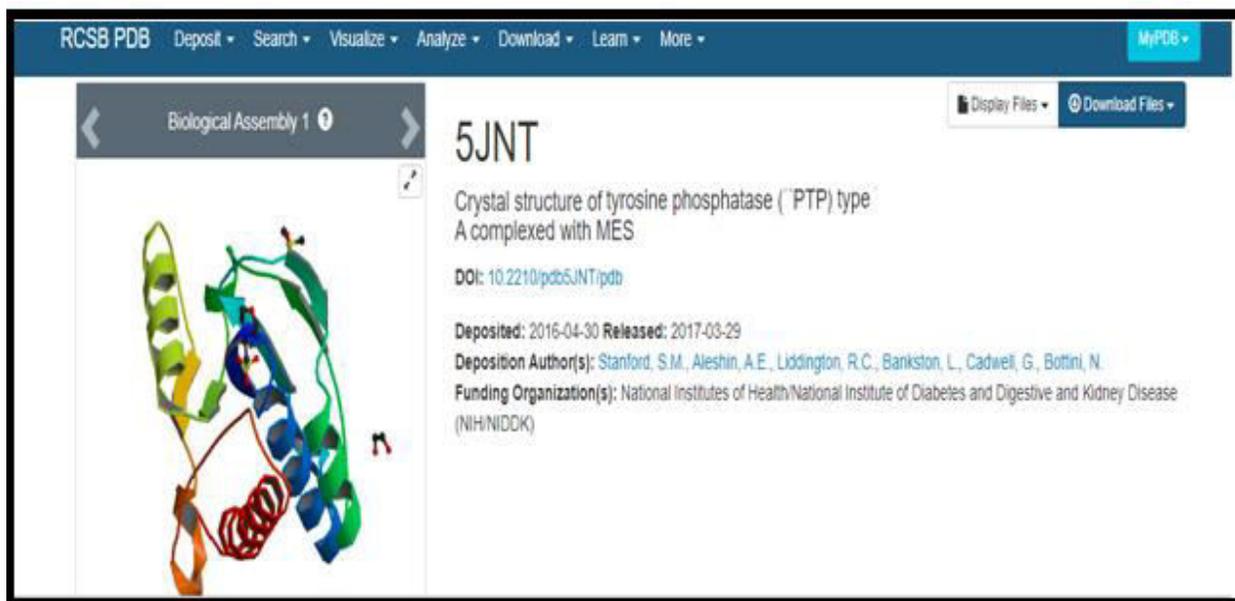


Figure4:crystal structure of protein

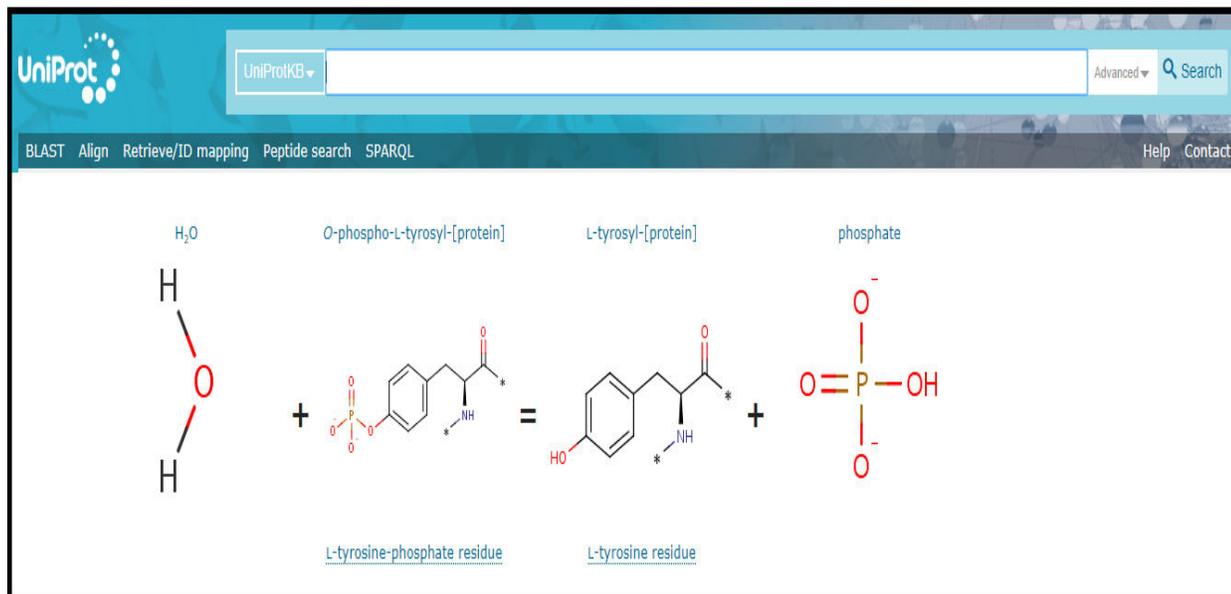
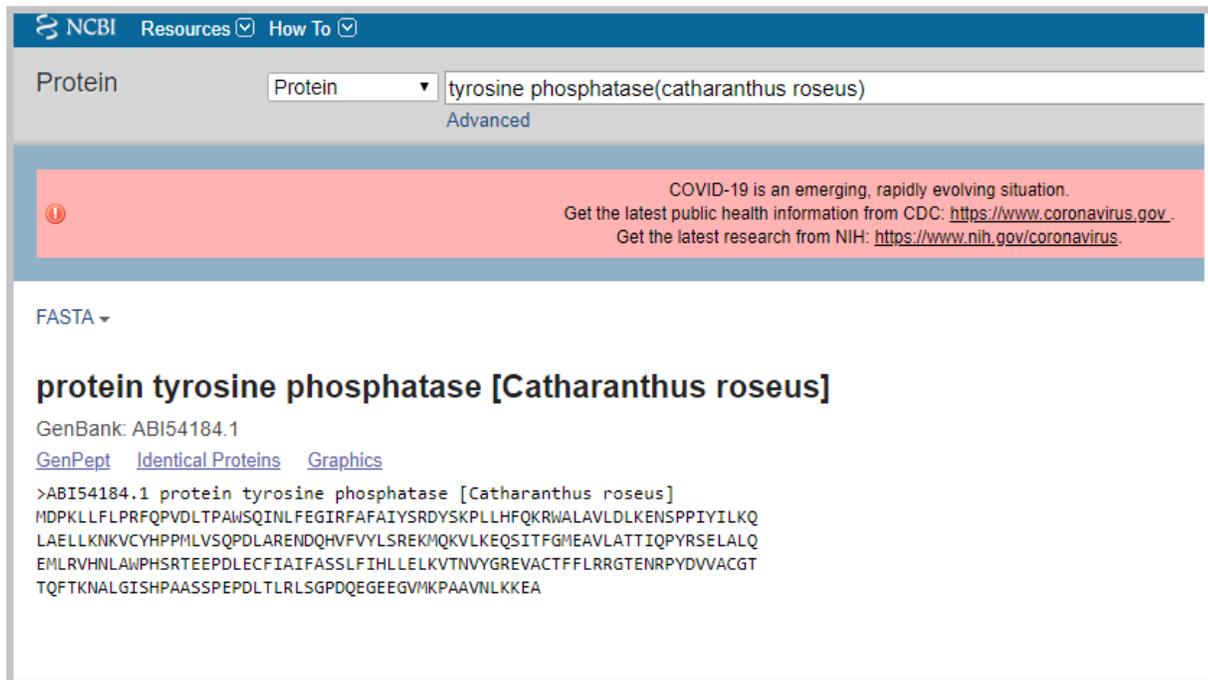


Figure5:Tyrosine chemical structure



The screenshot shows the NCBI protein database entry for tyrosine phosphatase from *Catharanthus roseus*. The search criteria are "Protein" and "tyrosine phosphatase(catharanthus roseus)". A warning banner for COVID-19 is visible. The FASTA sequence is as follows:

```

>ABI54184.1 protein tyrosine phosphatase [Catharanthus roseus]
MDPKLLFLPRFQVVDLTPAWSQINLFEGRFAFAIYSRDYSKPLLFHQKRWALAVLDLKENSPPIYILKQ
LAELLLKNKVCYHPPMLVSPDLARENDQHVYVLSREKMQKVLKEQSIITFGMEAVLATTIQPYRSELALQ
EMLRVHNLAWPHSRTEEPDLECFIAIFASSLFIHLLELKVTNVYGREVACTFFLRRGTENRPYDVVACGT
TQFTKNALGISHPAASSPEPDLTLRLSGPDQEGEGVMKPAAVNLKKEA
  
```

Figure6:Tyrosine phosphatase protein sequence

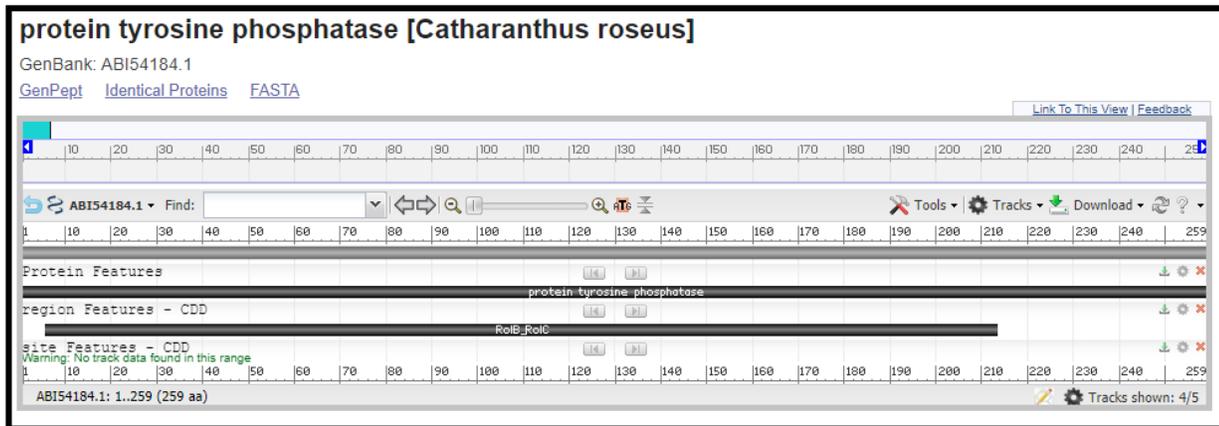
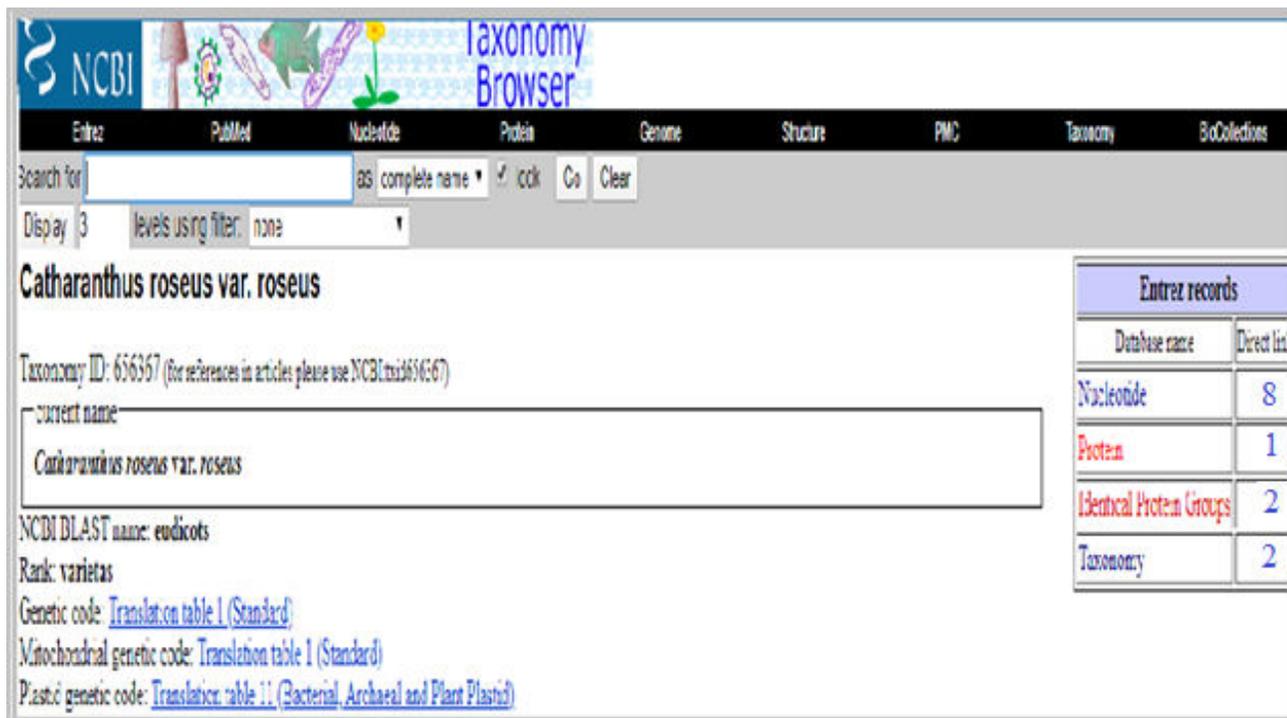


Figure7:Identical gene

In figure7 Four identical protein sequences were identified for tyrosine phosphatase using BLAST database in that two of the protein were hypothetical protein and other two belongs to Human tyrosine phosphate protein which have the identity of 92.1%.this shows that tyrosine phosphate is a good protein.



Figure8 protein sequence(identical protein)



The screenshot shows the NCBI Taxonomy Browser interface. The search bar contains "as complete name" and the search results are for "Catharanthus roseus var. roseus". The current name is "Catharanthus roseus var. roseus". The NCBI DFAST name is "eudicots". The rank is "varietas". The genetic code is "Translation table 1 (Standard)". The mitochondrial genetic code is "Translation table 1 (Standard)". The plastid genetic code is "Translation table 11 (Bacterial, Archaeal and Plant Plastid)".

Entrez records	
Database name	Direct link
Nucleotide	8
Protein	1
Identical Protein Groups	2
Taxonomy	2

**Figure9 Protein records**

In figure8 and figure9 sequence identity were found for two identical protein and protein records with taxonomy was found using NCBI database.



### Figure10 Identity of protein

Figure10 and Figure11 shows the identity of two proteins which was predicted using BLAST database. It is also to be noted that the protein with tyrosine (homo sapiens) shows 100 percent of identity when compared to other protein. Using this the drug compound can be found for the tyrosine phosphatase protein. The identity of protein refers to a quantitative measurement of the similarity between two sequences of DNA and Amino acid. The proteins which are highly related have a higher **percent identity** and the distantly related protein have low percent identity.

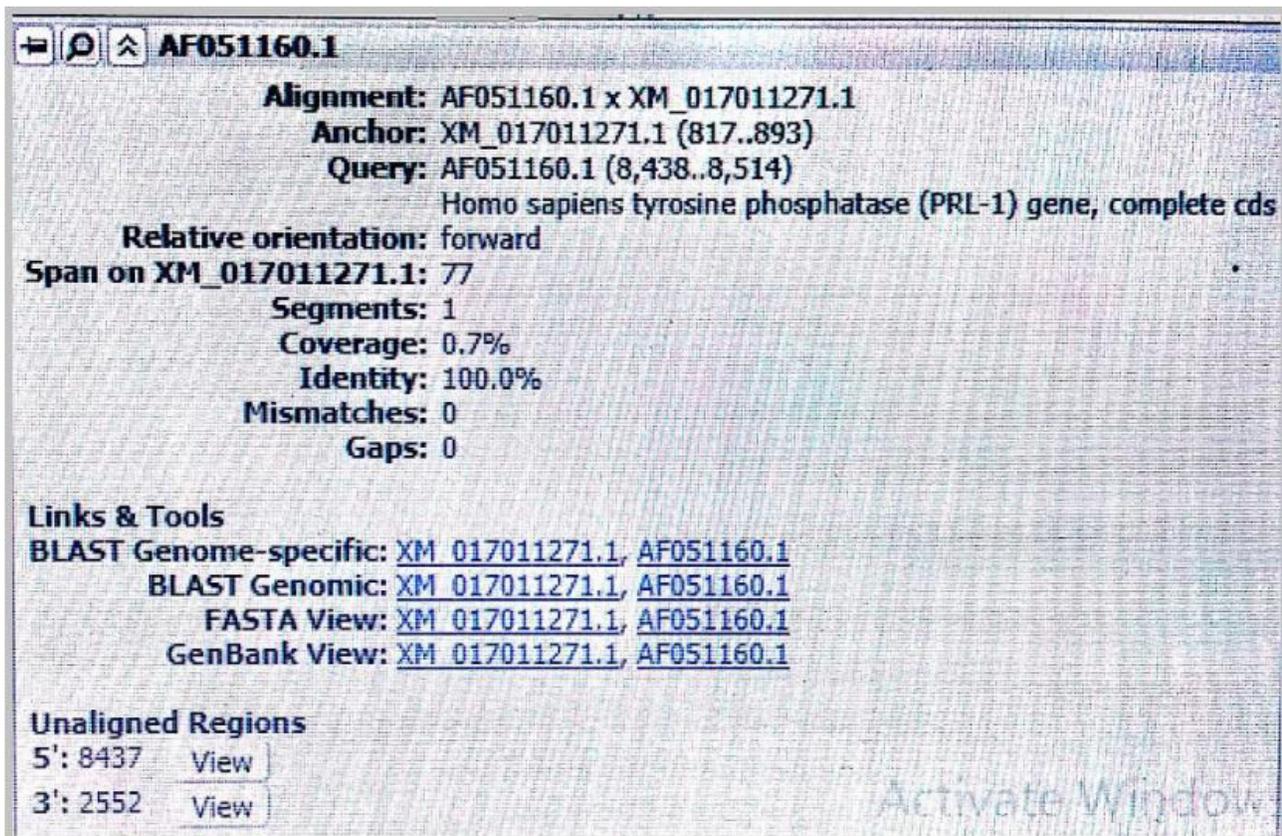
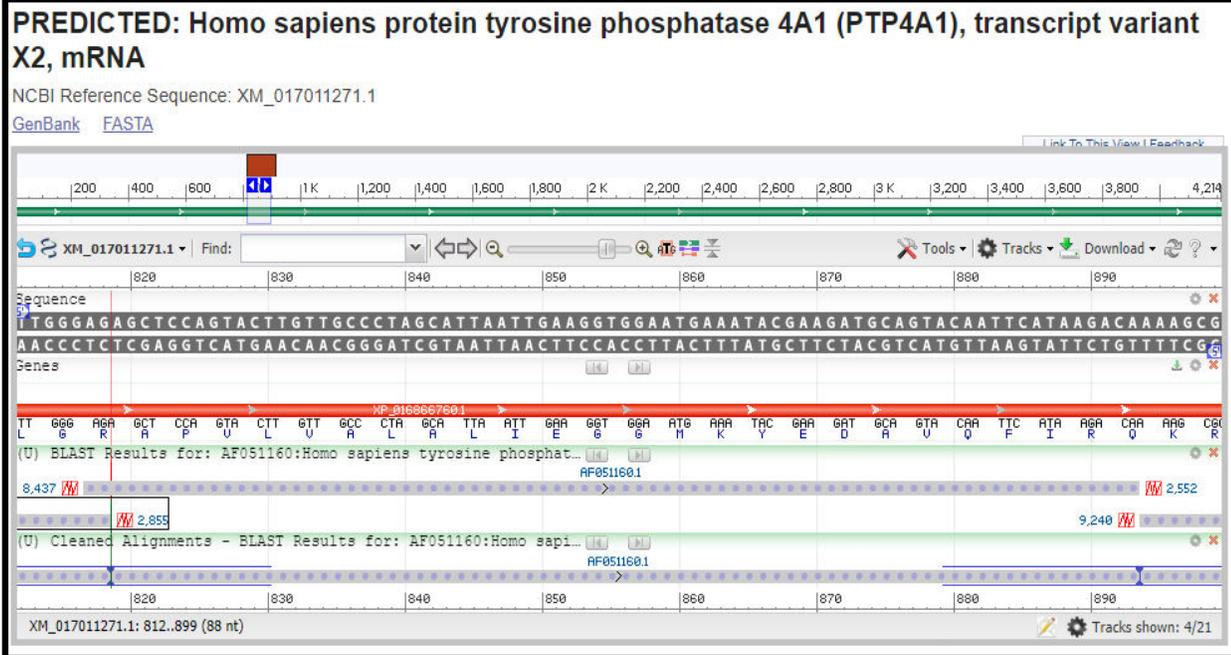
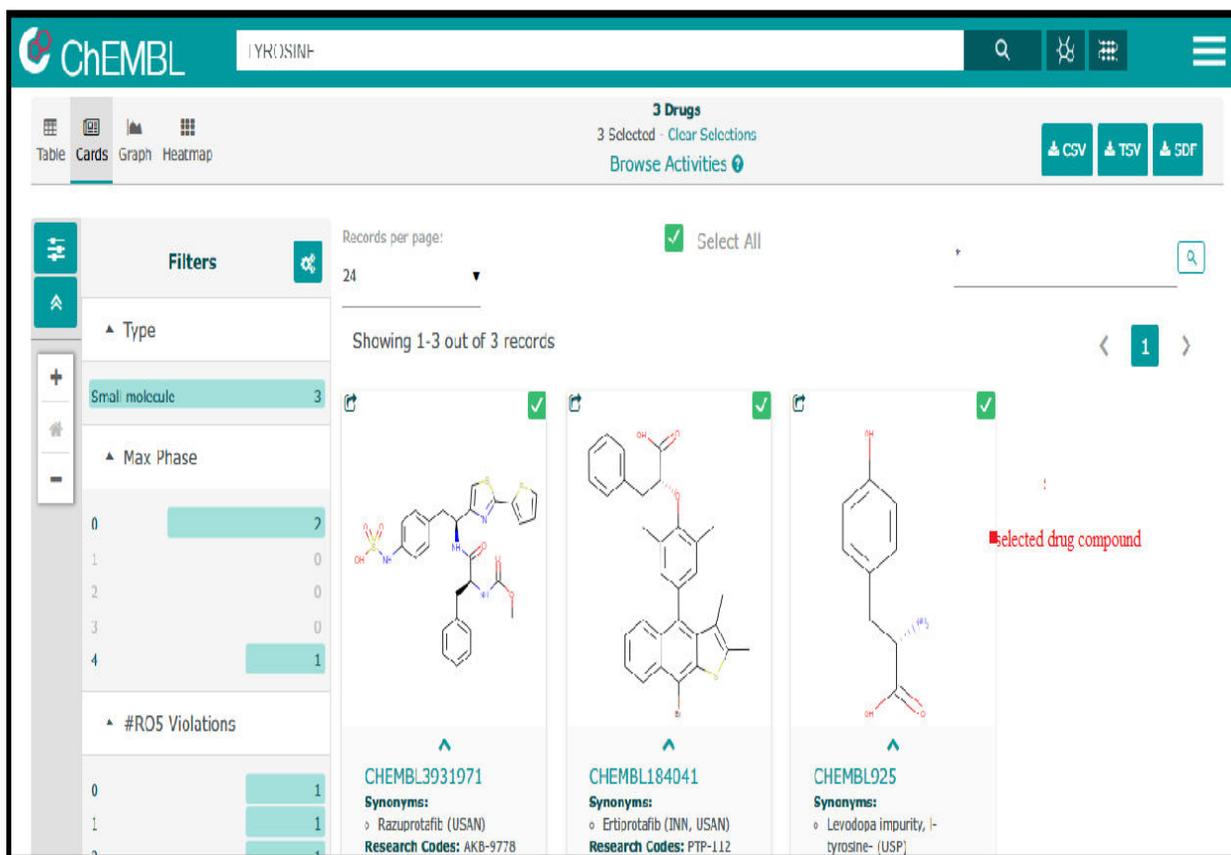


Figure 11 Identity of protein with percentage

## FINDING DRUG COMPOUNDS AND INDICATION:

ChEMBL is a database to find bio active drug for small molecules using proteins. This database is also used in the prediction of modern drugs for all type of disease. Ongoing research and clinical data for the predicted drug compound was also found using these database. Figure 11 shows three drug compounds Razuprotafib, Ertiprotafib, and Levodopa tyrosine phosphatase 1b are the three drug compounds which show similarity in binding with tyrosine phosphatase protein. Figure 12 and 13 levodopa tyrosine phosphatase drug compound was selected. From the selected drug compound it is found that levodopa when combined with tyrosine protein can be used to treat diabetes as shown in the figure 14. Figure 15 represents the drug record indication and totally six records were found in that using levodopa+tyrosine compounds and this combination can be used to treat many diseases and many clinical trials are in progress for the same. Figure 16 clearly shows that this compound can also be taken in oral form.



The screenshot displays the ChEMBL database search results for 'TYROSINE'. The interface includes a search bar, navigation tabs (Table, Cards, Graph, Heatmap), and a filter sidebar. The main content area shows three drug records, each with a chemical structure and associated identifiers. The third record, CHEMBL925, is highlighted with a red box and labeled 'selected drug compound'.

Chemical ID	Synonyms	Research Codes
CHEMBL3931971	Razuprotafib (USAN)	AK8-9778
CHEMBL184041	Ertiprotafib (INN, USAN)	PTP-112
CHEMBL925	Levodopa impurity, l-tyrosine- (USP)	

Figure 11: Drug compounds for tyrosine phosphatase protein

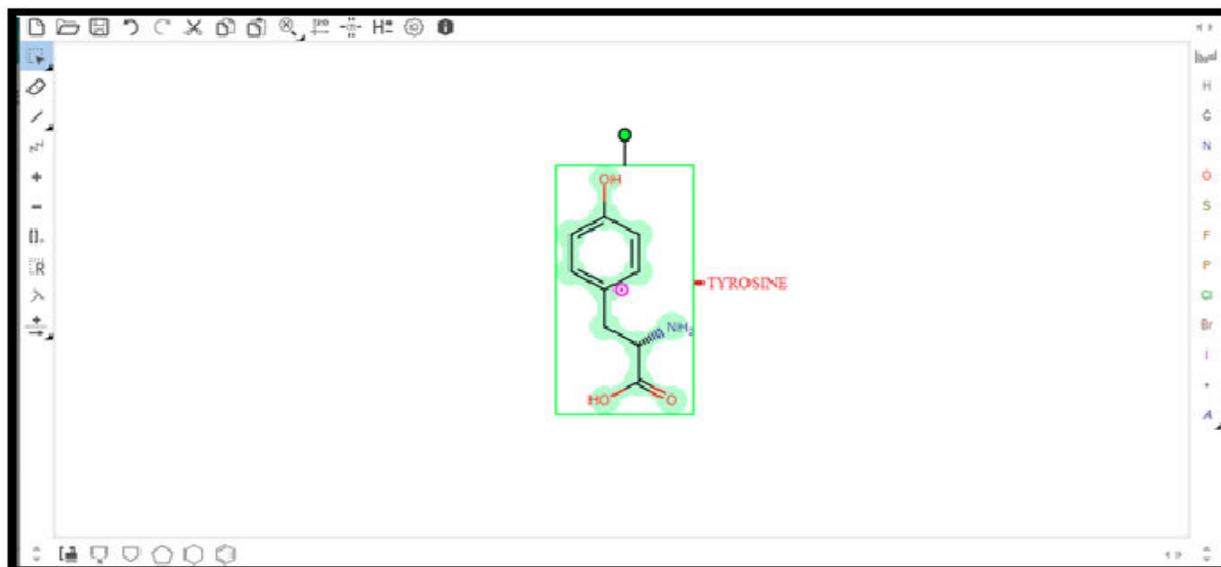
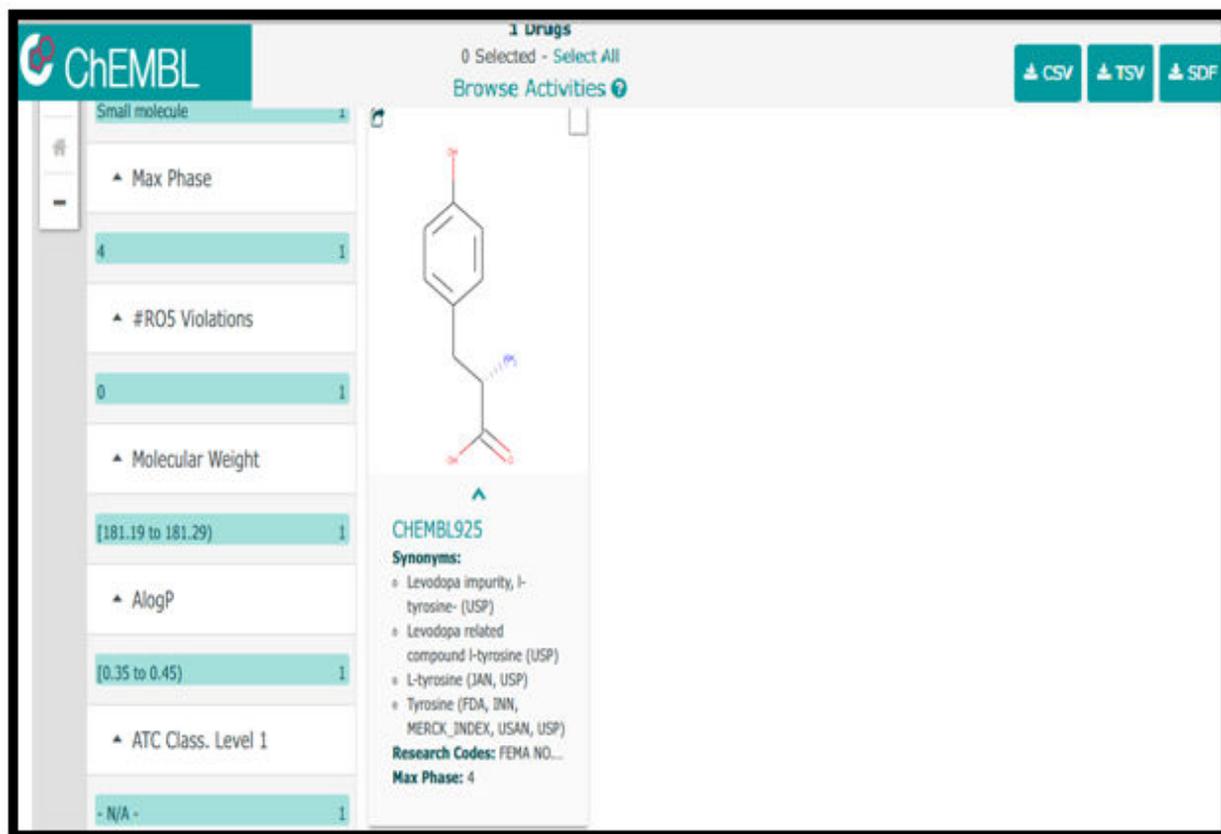


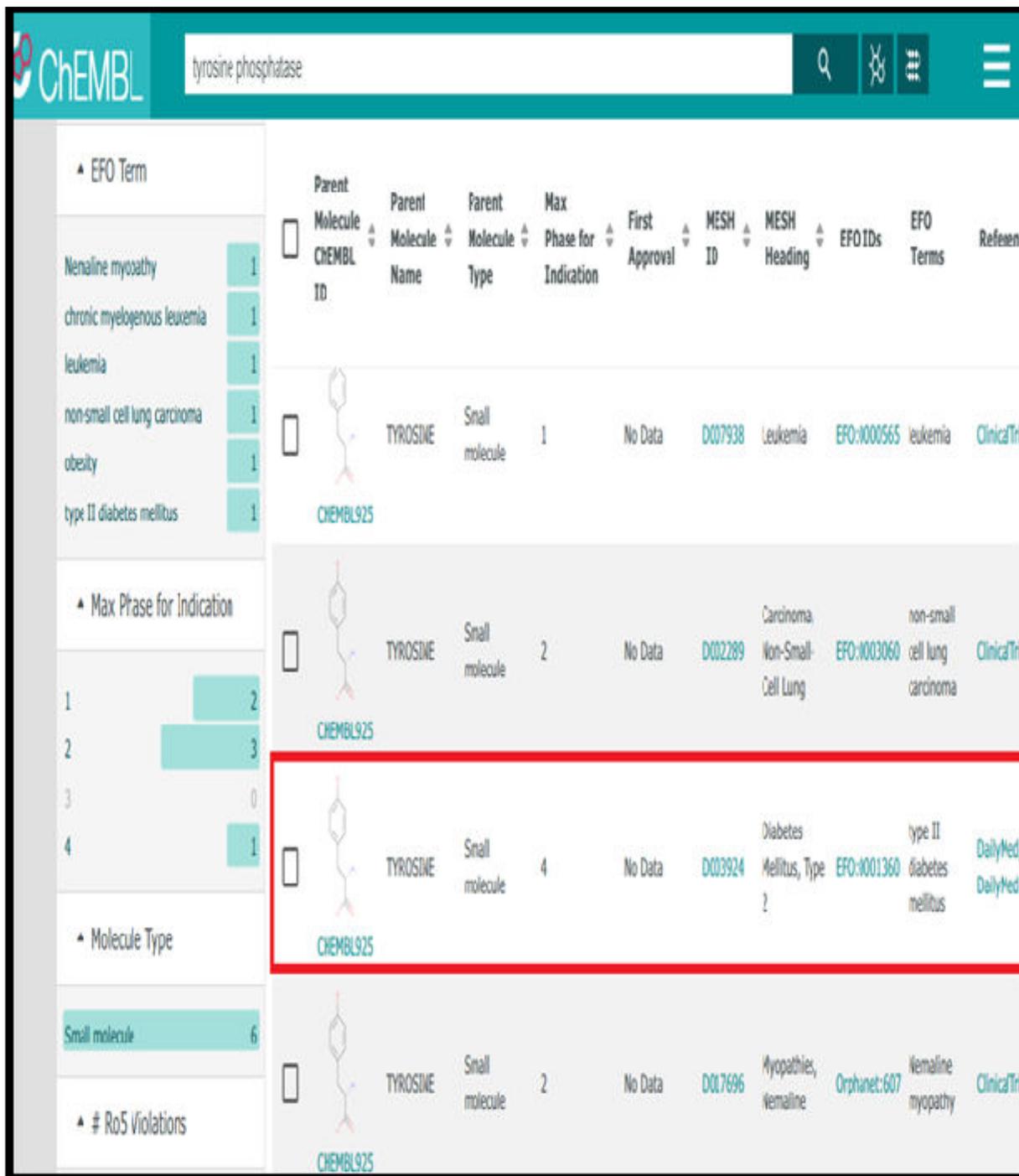
Figure12 levodopa Tyrosine phosphate



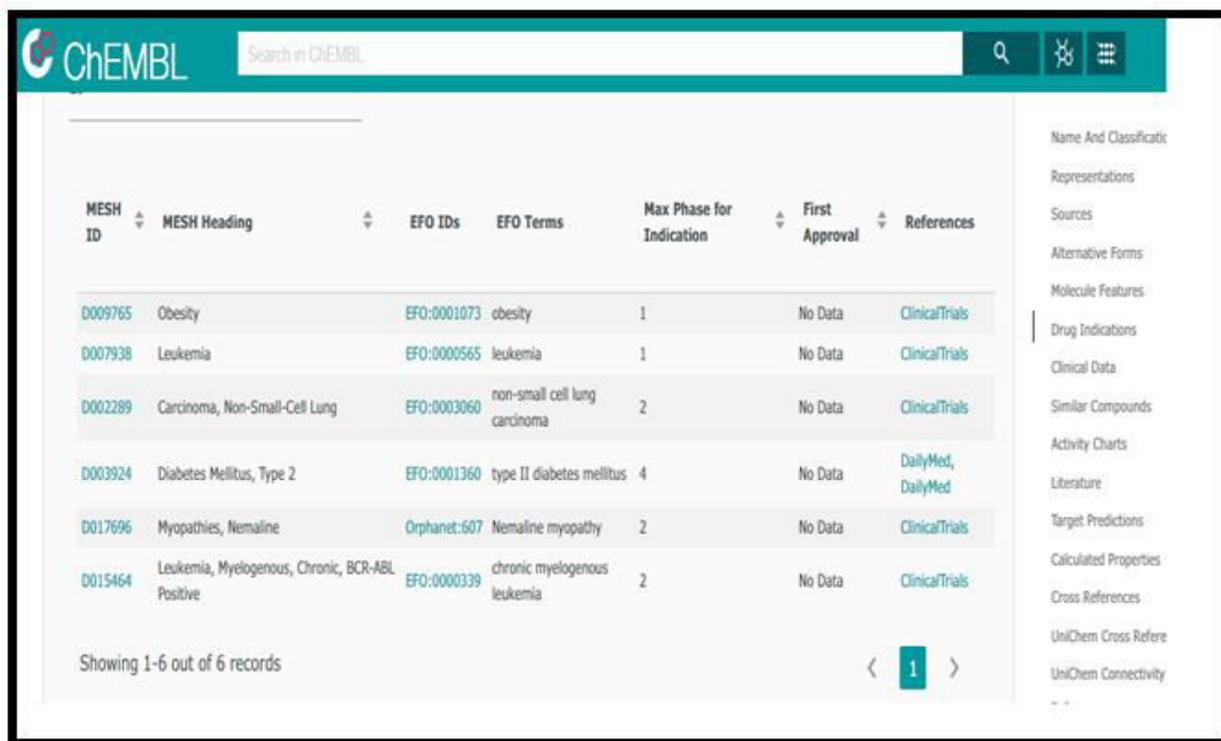
A screenshot of the ChEMBL (European Molecular Biology Laboratory) interface. The top bar shows "1 Drugs" and "0 Selected - Select All". The left sidebar contains filters for "Small molecule", "Max Phase", "#ROS Violations", "Molecular Weight", "AlogP", and "ATC Class. Level 1". The main panel displays the chemical structure of CHEMBL925, which is L-tyrosine. Below the structure, the following information is provided:

- CHEMBL925**
- Synonyms:**
  - Levodopa impurity, l-tyrosine- (USP)
  - Levodopa related compound l-tyrosine (USP)
  - L-tyrosine (JAN, USP)
  - Tyrosine (FDA, INN, MERCK\_INDEX, USAN, USP)
- Research Codes:** FEMA NO...
- Max Phase:** 4

**Figure13 Tyrosine drug compound**



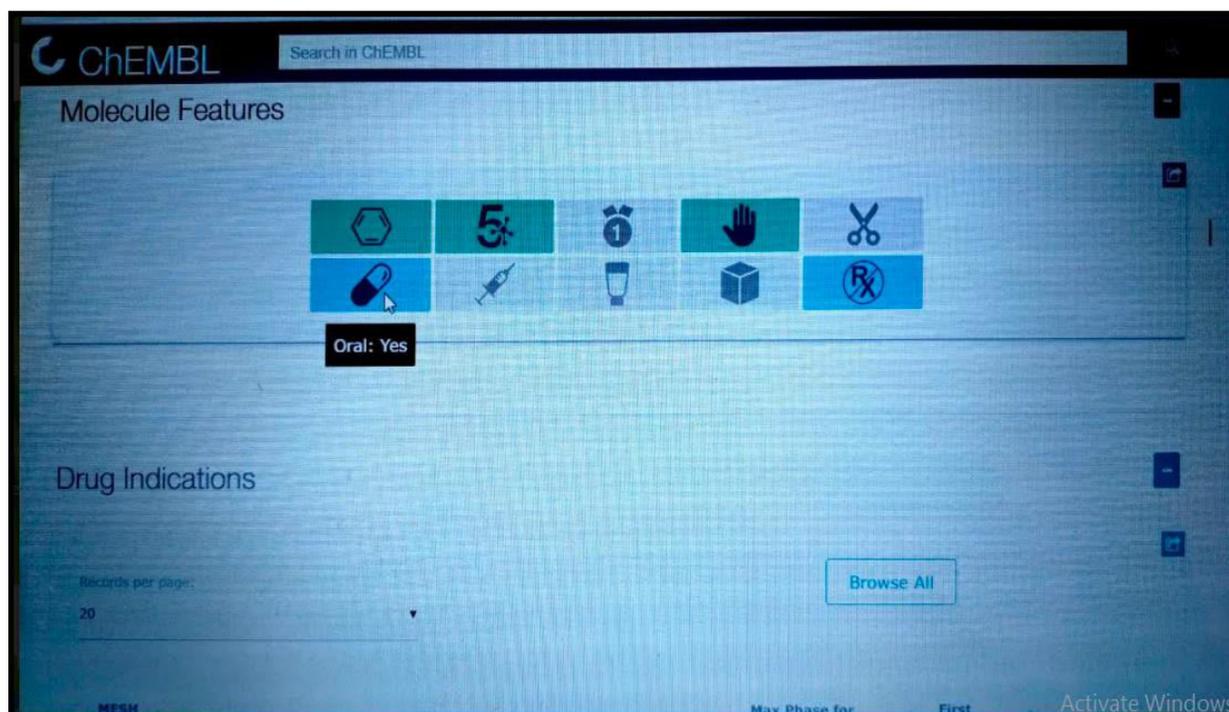
**Figure14 Tyrosine protein and Diabetes**



MESH ID	MESH Heading	EFO IDs	EFO Terms	Max Phase for Indication	First Approval	References
D009765	Obesity	EFO:0001073	obesity	1	No Data	<a href="#">ClinicalTrials</a>
D007938	Leukemia	EFO:0000565	leukemia	1	No Data	<a href="#">ClinicalTrials</a>
D002289	Carcinoma, Non-Small-Cell Lung	EFO:0003060	non-small cell lung carcinoma	2	No Data	<a href="#">ClinicalTrials</a>
D003924	Diabetes Mellitus, Type 2	EFO:0001360	type II diabetes mellitus	4	No Data	<a href="#">DailyMed</a> , <a href="#">DailyMed</a>
D017696	Myopathies, NemaLine	Orphanet:607	NemaLine myopathy	2	No Data	<a href="#">ClinicalTrials</a>
D015464	Leukemia, Myelogenous, Chronic, BCR-ABL Positive	EFO:0000339	chronic myelogenous leukemia	2	No Data	<a href="#">ClinicalTrials</a>

Showing 1-6 out of 6 records

**Figure15 Drug compound record for tyrosine protein**



**Molecule Features**

Oral: Yes

**Drug Indications**

Records per page: 20

[Browse All](#)

**Figure 16 Drug features**

## **TRADITIONAL METHOD TO TREAT DIABETES USING CATHARANTHUS PLANT**

### **EXTRACTION OF PROTEIN FROM THE PLANT**

The frozen tissue was placed in a mortar containing sea sand and liquid nitrogen. Grind the tissue to a powder with the mortar and pestle. 10 ml **extraction** buffer was added, which contains with 140  $\mu$ l 40 mM PMSF. The sample was grinded for 2 min or to a homogenate and then transfer into a sterilized 50 ml centrifuge tube.

The initial steps of **protein extraction** often involve crude mechanical disruption such as cutting, smashing, or shearing tissue into smaller pieces. If intracellular **proteins** are the target, then detergents can be used to help break apart the phospholipid cellular membrane (cell lysis). ([www.phys.org](http://www.phys.org))

### **ISOLATION OF PROTEIN**

#### **Ultra Centrifugation**

**Centrifugation** is the process where a mixture is separated through spinning. A **centrifuge** is a laboratory device that is used for the separation of fluids, gas or liquid, based on density. Separation is achieved by spinning a vessel containing material at high speed; the centrifugal force pushes heavier materials to the outside of the vessel.

### **CHROMATOGRAPHY TECHNIQUES**

Chromatography is one of the most common technique used for purifying and analyzing proteins. In Centrifugation process the protein gets separated based on their rate of sedimentation, which is influenced by their mass and shape. Chromatography can be used to separate protein in solution or denaturing conditions by using porous gels. The technique is also called as size exclusion chromatography. The principle is that smaller molecules have to traverse a larger volume in a porous matrix. Using

chromatography techniques it is possible to isolate tyrosine phosphate protein present in the Catharanthus plant.

## **PERIWINKLE PLANT TO TREAT DIABETES:**

Madagascar periwinkle has the medicinal characteristic to lower the blood sugar. It will also lower the blood sugar level drastically in people with diabetes who are using this plant along with anti-diabetes medications. In Philippines and China, the plant is boiled for several minutes and consumed daily to help manage insulin level in the body and minimize high blood pressure. Madagascar periwinkle contains an alkaloid, **Reserpine**, which is well known for its ability to lower the levels of blood pressure. An excess level of blood pressure is dangerous to heart. By maintaining the levels of blood pressure, it protects the heart from various fatal conditions including stroke. (www.hindawi.com)

## **MATERIALS AND METHODS**

### **DECOCTION**

The leaf juice or water decoction of the plant is used as a folk medicine for the treatment of diabetes all over the world. In the present investigation, the juice from the leaf and flower lowered the sugar level in the rat. (clinical test).

### **TEA**

- To make periwinkle tea you need 2 teaspoon of dried herbs (which is a mixture of leaf, flower, stem, root etc.)
- Pour boiling water into the cup and let it steep for about 10-15 minutes and once it is done, strain to remove the herbs and your cup of periwinkle tea is ready.
- You can add honey or fruit juice to your cup if the taste is too bitter for you.
- You must drink periwinkle tea in the morning before breakfast or it may upset your stomach. (www.webmd.com)

### **SYRUP PREPARATION**

Plant extract (leaves + flowers) + unfiltered honey + Herbal infusion

(Herbal infusion is a method in which dried herbs 1 to 2 teaspoons + Fresh herbs 2 to 4 spoons are placed in a cup of hot water and strained).

The goal is to reduce the liquid content and thicken the mixture until it's a syrup.

When the syrup is cooled add tinctures

A Syrup can be preserved more safely for shelf life if we add plant essential oils

1 drop of essential oil-----1 ounce of syrup.

### **CATHARANTHUS POWDER**

Periwinkle is used for treating certain kind of cancers successfully and even leukemia in children. It has been used in traditional medicine for thousands of years for treating various diseases and especially it is very famous for its use in treating diabetics. Dried leaves and flowers are made in powder form and used to treat diabetes. Many leading online shopping sites like Amazon.com and Alibaba.com sell this Catharanthus powder (Nithyakalyani powder) which is used to treat many diseases. (Mark Peplo webmd.com)

#### **Periwinkle as nutritional supplement**

This nutritional supplement is very appreciated by elderly people. It is also interesting for athletes because it allows during the effort to oxygenate the body and provide food faster to the muscles.

1 to 2 capsules per day, one in the morning and one in the evening 30 minutes before meals.

For a cure (3 to 6 months): 3 capsules, one in the morning, one at midday and one in the evening 30 minutes a day before meals. Periwinkle plant tablet is used as a nutritional supplement in many international countries.

### **Catharanthus rosea (SADABAHAR) IN AYURVEDA**

According to Ayurvedic expert Dr. Ashutosh Gautam, "Sadabahar flowers and leaves are used to control blood sugar levels. One can have herbal tea made from flowers and leaves in the morning or you can also chew some three to four leaves to get effective results" (Ashutoshgautam). (www.wef.org.in)

#### **Health Benefits of Sadabahar for Diabetes**

Sadabahar has long been used in Ayurveda and Chinese medicines and is said to be a time-tested herbal treatment for managing conditions like diabetes, malaria, sore throats and leukaemia. Vincarosea contains two active compounds, the alkaloids and the tannins. It is

believed that the plant has more than 100 alkaloids, of which vincristine and vinblastine are most notable for their medicinal benefits.

### How To Use Sadabahar For Diabetes?

1. The fresh leaves of Sadabahar can be dried, powdered and stored in an air-tight container. Consume one teaspoon of this dried leaf powder with a cupful of fresh fruit juice or water daily. The powder may taste bitter.
2. Take not more than three to four leaves of the plant and chew them to manage blood sugar levels through the day.
3. Take the pink coloured flowers of the Sadabahar plant and boil them in a cupful of water. Strain the water and drink it every morning on an empty stomach.(Arogyayoga school.com)

### CLINICAL TRIAL(Using leaf and flower)

#### PERIWINKLE PLANT TESTED IN TYPE2 DIABETIC PATIENT:

The test was done in the patient for the past two months and there was significant change in the blood sugar and pressure level. The patient name is Mary Stella (my mom) for the past two years she was suffering from Type 2 diabetes. In the beginning she took allopathic medicine and the glucose level got controlled but she used to look so tired and she got side effects because of high dose medicines and insulin. So we decided to take Siddha medicine and we consulted a Siddha doctor (One of the Best hospitals in India.) Along with the Siddha medicine she used to drink periwinkle tea daily morning in an empty stomach. The blood sugar level also got reduced and she feels so much better now. I have attached some of the photos of periwinkle tea preparation by my mom. My grandmother and my relatives also drink this tea made from periwinkle flower and leaves and got good results.

#### DATA ANALYSIS AND INTERPRETATION

Totally 5 people who have type1 and type 2 diabetes were selected and they are tested over the period of 5 months by giving this tea with their other regular medication

MONTH	PATIENT NAME	AGE
Janauary	Marystella	55
Feburary	Bala murugan	60
March	manoharan	50
April	Nadachi	75
May	Chandra	45

Totally 5 subjects were taken up for the trial.I have selected the people who regularly drink this tea by the advice of the doctor and observed very good results.Their medical history was also analyzed.

#### SUBJECT 1

(Height in Feets and Inches, Weight in Kilograms)

NAME: MARY STELLA(TYPE2)

AGE: 55

OCCUPATION:HOUSE WIFE

HEREDITARY DISEASE:YES

HEIGHT: 5.1

WEIGHT:50

BLOOD PRESSURE:120/80

BLOOD SUGAR:260 WITH MEDICATION

BLOOD SUGAR AFTER MEDICATION+TEA -200

There was a change in blood sugar level after having the tea regularly for 5 months.She used to do exercise regularly(walking.)

**SUBJECT 2****NAME: BALAMURUGAN(TYPE1)****AGE: 60****OCCUPATION:CAR DRIVER****HEREDITARY DISEASE:NO****HEIGHT:6.0****WEIGHT:50****BLOOD PRESSURE:120/80****BLOOD SUGAR:250WITH MEDICATION****BLOOD SUGAR AFTER MEDICATION+TEA -250**

There was no change in his blood sugar level after having the tea regularly for 5 months.(No exercise,No proper diet).

**SUBJECT 3****NAME: MANOHARAN(TYPE2)****AGE: 50****OCCUPATION:PLUMBER****HEREDITARY DISEASE:YES****HEIGHT: 5.4****WEIGHT:55****BLOOD PRESSURE:120/80****BLOOD SUGAR:220 WITH MEDICATION****BLOOD SUGAR AFTER MEDICATION+TEA -170**

There was a positive change in his blood sugar level after having the tea regularly for 5 months.He used to have a good diet and exercise too along with this.

**SUBJECT4****NAME: NADACHI(TYPE2)****AGE: 75****OCCUPATION:HOUSE WIFE****HEREDITARY DISEASE:YES**

HEIGHT: 4.5

WEIGHT:50

BLOOD PRESSURE:140/80

BLOOD SUGAR:300 WITH MEDICATION

BLOOD SUGAR AFTER MEDICATION+TEA -300

There was no change in her blood sugar level after having the tea regularly for 5 months.(No proper diet but she used do exercise regularly(walking))

#### SUBJECT5

NAME: CHANDRA (TYPE2)

AGE: 45

OCCUPATION:ELECTRICIAN

HEREDITARY DISEASE:YES

HEIGHT: 5.3

WEIGHT:50

BLOOD PRESSURE:120/80

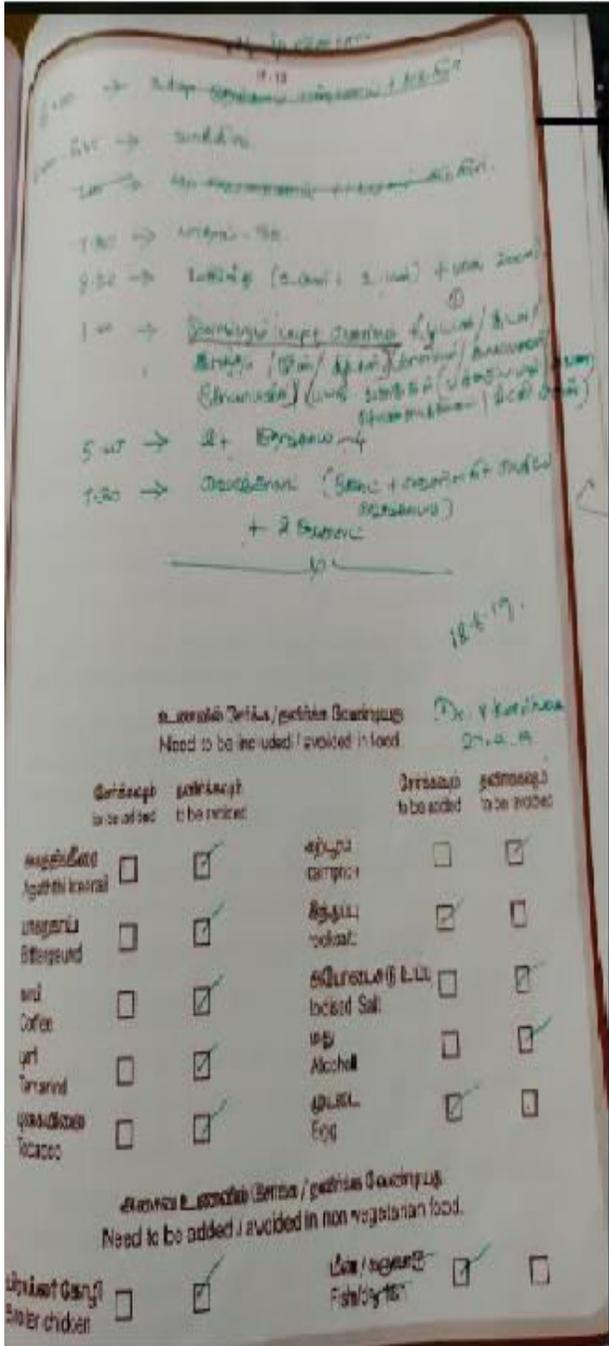
BLOOD SUGAR:160 WITH MEDICATION

BLOOD SUGAR AFTER MEDICATION+TEA -140

There was a change in his blood sugar level after having the tea regularly for 5 months with proper diet and regular exercise.

From the above results it is proved that the plant is a benevolent one and we can use the plant as a medicine. But it should be taken along with medication. In the above subjects we can see that subject2 and 4 does not show any change in their sugar level and it may be because of improper diet and irregular exercise.

**PATIENTS DIET CHART:**



**DIET CHART**

MORNING - 20 BADAM(Soaked overnight)

MILK - 1 GLASS

BREAK FAST: OATS

LUNCH: 1 BOWL VEGETABLE COOKED  
1 BOWL CEREAL  
1 EGG, CURD, SPINACH

EVENING: 2 SUGAR FREE BISCUIT  
TEA WITHOUT SUGAR

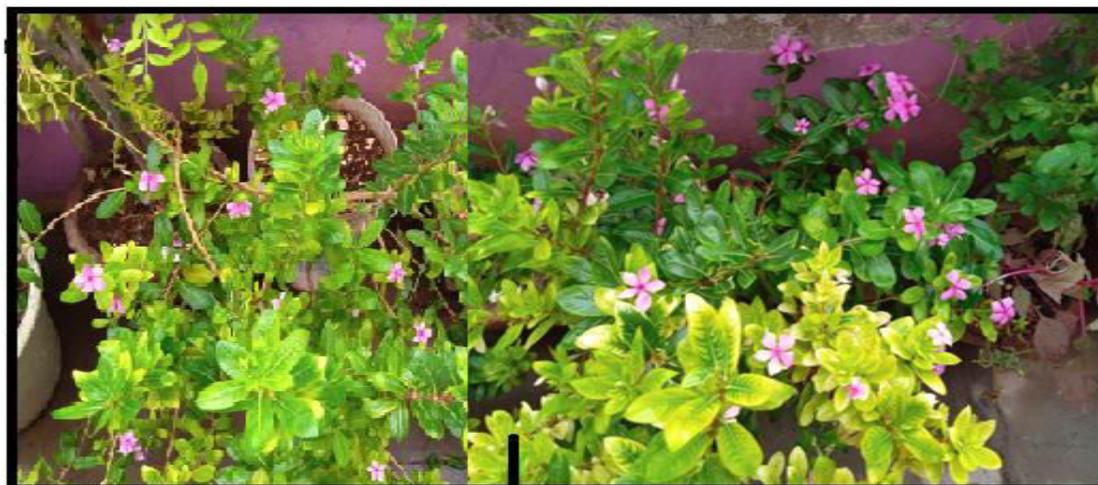
WALKING FOR 30 MINUTES.

DINNER BEFORE 8PM: SANDWICH IN WHEAT  
BREAD(1 CARROT, 1 ONION, 2 CUCUMBER, 1 EGG).

WEEKLY TWICE COUNTRY CHICKEN AND FISH.

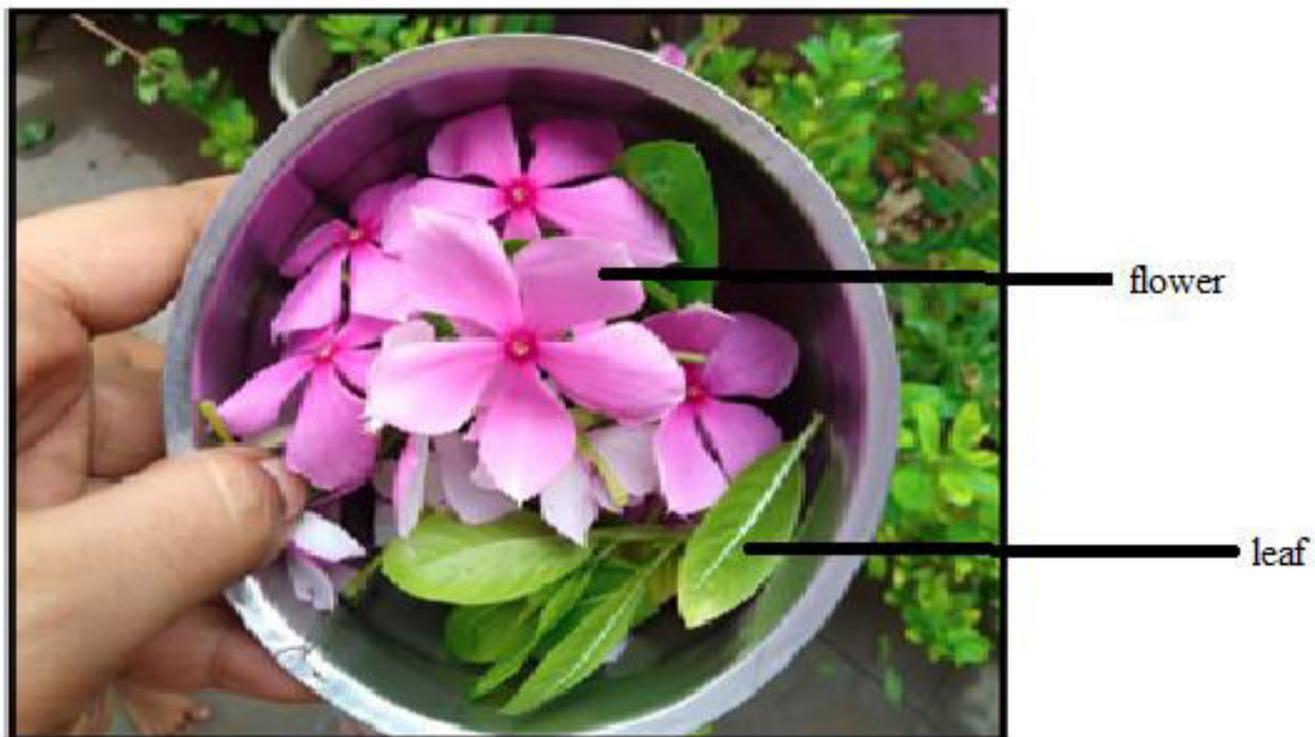
FOODS TO AVOID-  
COFFEE, LEMON, TAMARIND

## PREPARATION PROCEDURE:



periwinkle plant leaf and  
flower(rose colour)

**Figure17 periwinkle flower,leaf**





Wash In Tap Water

**Figure18washed in tap water**



The Flower Was Boiled and The colour of the flower changes from pink to white(Add 2 glass of water and reduce it to 1 glass)



**Figure19 Boiling the plant extract**

**MEDICATION +PROPER DIET+EXERCISE+DAILY MORNING EMPTY STOMACH(1 GLASS OF PERIWINKLE TEA)----- VERY GOOD RESULTS AND A GREAT AYURVEDIC METHOD TO FIGHT DIABETES AND TO LIVE A HEALTHY LONG LIFE.**

#### **SCOPE AND LIMITATIONS:**

There is a proverb which goes as follows “Too Much Of Anything Is Good For Nothing” so there is a limit to drink this tea (recommended only once in a day, prepared as per the procedure given earlier). So far there has been no report of any adverse reactions or allergy in people taking this drink but the odor of the medicinal preparation is not that much pleasant and people who are sensitive to smell may not like it.

#### **RESULTS AND DISCUSSION:**

The plant has been called a miracle in the prevention of childhood leukemia, diabetes, and cancer treatment.(science daily.com). It is our responsibility to protect this plant for the future of our children. Instead of using the chemical drugs causing side effects , it is better to use *Catharanthusroseus* extraction.*Catharanthusroseus* one of the most medicinally

valuable plant species of Apocynaceae family, which is used in traditional herbal medicine in the world, and the chemical extraction has a role in cancer and diabetes treatment. The plant also has along history of use in Ayurvedic medicine, traditional Chinese medicine, western medical science began researching this plant during the 20th century. From the above result it is confirmed that periwinkle can be used to treat diabetes but it should be taken with good medication, proper diet and exercise. Vindoline is the plant compound present in the leaf extract of the plant this compound have tyrosine phosphatase protein which is a good protein and it can be used to treat diabetes. The sequence, structure and identity for the protein was found using NCBI database and it is confirmed that tyrosine phosphatase is a good protein. Using chembl tool drug compound for tyrosine protein were found from these drug compound it is possible to produce new drug for type 2 diabetes.

## REFERENCE

1) [WWW.SCIENCEDAILY.COM](http://WWW.SCIENCEDAILY.COM)

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- ✚ Erickson L R *et al* (1983). Restriction patterns reveal origins of genomes in catharanthus plant, "*Journal for Medicinal plant and uses*" 65:201–206.
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