



## COMPARITIVE EFFECT OF SYZGIUMCUMINI AND GYMNEMASYLVESTRE

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### ABSTRACT

Diabetes mellitus can be identified by chronic hyperglycemia and impaired carbohydrates, proteins metabolism and lipids due to complete or partial inadequate of insulin secretion and/or insulin action. In general, there are two varieties of diabetes, namely, (i) type 1 diabetes mellitus, T1DM - insulin-dependent diabetes mellitus and (ii) type 2 diabetes mellitus, T2DM - non-insulin-dependent diabetes mellitus. Type 2 diabetes is observed to be the general form of diabetes mellitus, which exists in 90% to 95% of all diabetic patients. For the last few decades, the demand for herbal medicines is being increased due to its biological values, higher safety margin and lesser costs than the synthetic drugs. In the present study, for type 2 diabetes, the gene responsible for the insulin resistance gene from the genomic information resource database was identified. The gene is further analysed and docked with the four herbal components and checked its minimum energy value for further studies. This will be the combination of drug and using Nano medicine which will be the target drug delivery towards the target gene which stimulates the activity of the insulin resistant gene. Since its targets towards the gene, it will be considered as the gene therapy and new combinatorial medicine, here Bioinformatics, combinatorial chemistry, pharmacology, Nano medicine play a vital role in treatment of diabetes.

**KEYWORDS:** chronic hyperglycemia and impaired carbohydrates.

### INTRODUCTION

Diabetes is a disorder of carbohydrate, fat & protein metabolism caused due to insufficient production of insulin or due to its inhibitory action. Natural products such as plant extracts and Phytochemicals are attracting more and more attention for their potentials in the treatment of diabetes. A number of Plant extracts and natural biomolecules that have been tested for their antidiabetic properties using both in -vivo and in -vitro approaches were reviewed here. Among the various organs, the leaves have been used predominantly in the treatment of diabetes. The families of plants with the most potent hypoglycemic effects include Liliaceae, Leguminosae, Lamiaceae etc. The most commonly studied species are Mamordicacharantia, Trigonellafoenumgraecum, Ficusbenghalensis and Gymnemasylvestre. In the Oral glucose tolerance test, Streptozotocin & Alloxan induced diabetic mouse or rat models were most commonly used for the screening of antidiabetic drugs. In this review, biocompounds like terpenoids, alkaloids, phenolic compounds such as flavanoid p have shown antidiabetic potential through the insulin mimetic activity. Among the reviewed compounds, flavonoids majorly exhibit the Antidiabetic activity. It acts by preventing  $\beta$ -cell apoptosis and promotes  $\beta$ -cell proliferation and insulin secretion. The Indian traditional herbal drugs Gymnemasylvestre,

Syzgiumcumini, Phyllanthusamarus, Aloe vera, Momordicacharantia, Trigonellafoenumgraecum, Emblicaofficinalis, Azadirachtaindica are more frequently used in the formulations for diabetes. Figure 1 presents the schematic lay out or flow of sign and symptoms due to uncontrolled hyperglycemia in diabetes mellitus.

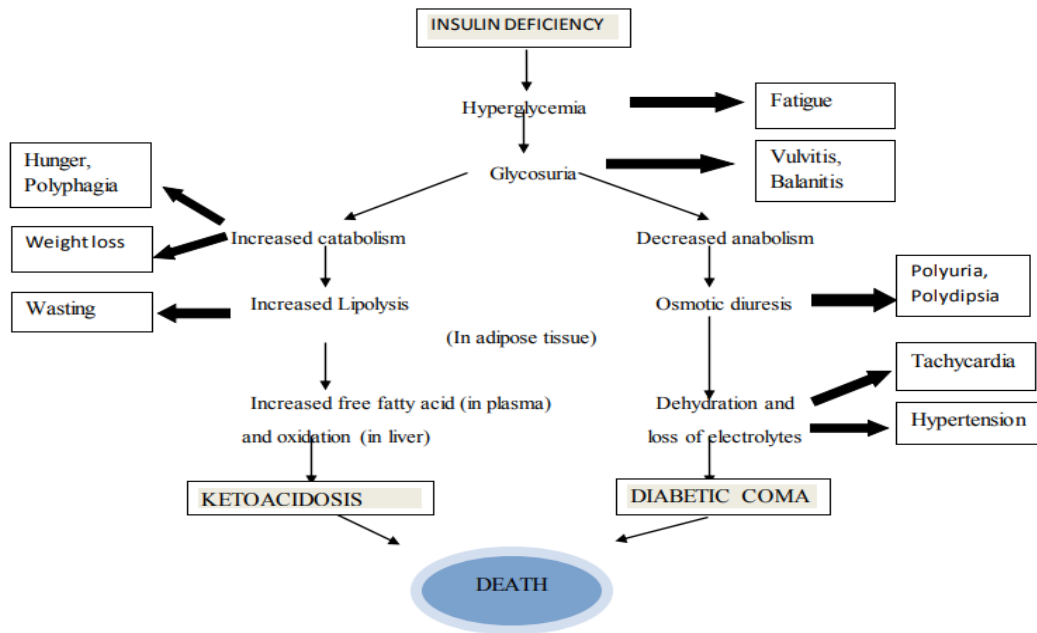


Fig. 1: Sign and symptoms due to uncontrolled hyperglycemia in diabetes mellitus.

Figure 2 shows summary of the influencing factors and mechanism of T2DM. The factors include (A) Life styles

(B) Susceptibility loci (C) Gut metagenome association (D) Vitamin and (E) the mechanism of T2DM.

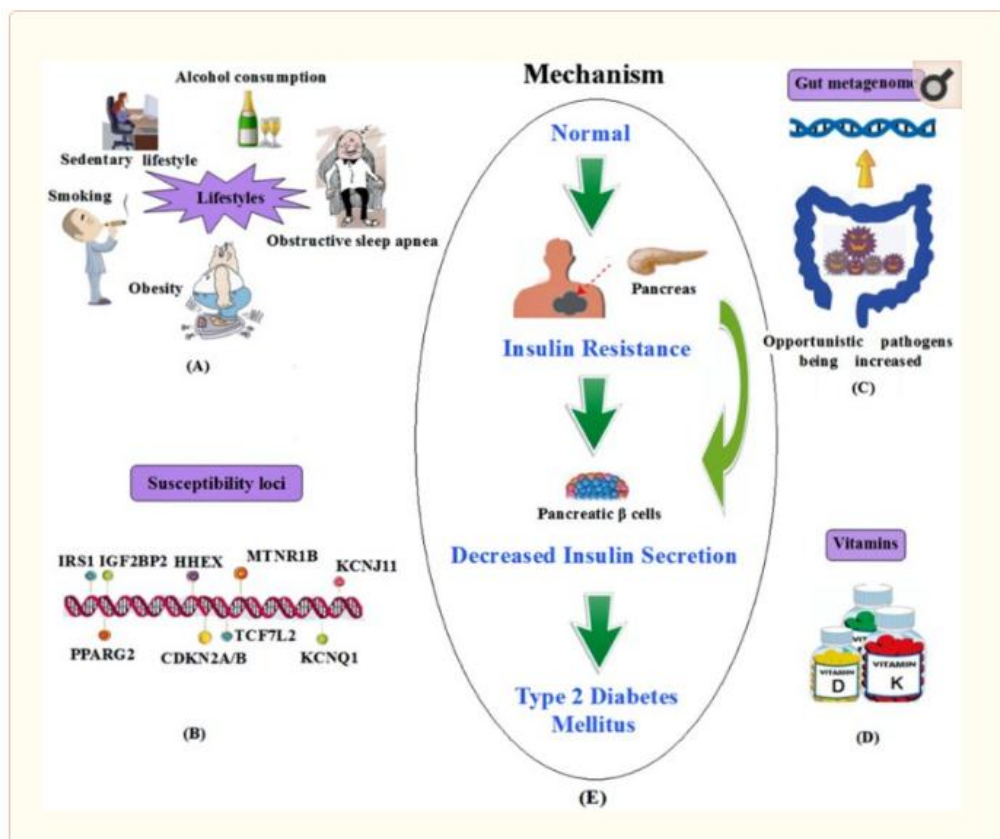


Figure 2: A summary of the influencing factors and mechanism of T2DM.

**Gymnema sylvestre**

Type 2 diabetes primarily occurs as a result of obesity and not enough exercise. Some people are more genetically at risk than others. Type 2 diabetes

makes up about 90% of cases of diabetes, with the other 10% due primarily to diabetes mellitus type 1 and gestational diabetes. In diabetes mellitus type 1 there is an absolute lack of insulin due to breakdown

of islet cells in the pancreas. Diagnosis of diabetes is by blood tests such as fasting plasma glucose, oral glucose tolerance test, or A1C.

Type 2 diabetes is partly preventable by staying a normal weight, exercising regularly, and eating properly. Treatment involves exercise and dietary changes. If blood sugar levels are not adequately lowered, the medication metformin is typically recommended. Many people may eventually also require insulin injections. In those on insulin, routinely checking blood sugar levels is advised, however this may not be needed in those taking pills. Bariatric surgery often improves diabetes in those who are obese.

- The researchers believe that insulin resistance, the hallmark of type 2 diabetes (unlike type 1 diabetes where it is the insulin-producing cells that are destroyed), is the result of B cells and other immune cells attacking the body's own tissues.

This discovery is nothing new to some natural medicine researchers. Treatments that do the things necessary to build the immune system have been curing type 2 diabetes for years.

- The classic symptoms of diabetes are polyuria (frequent urination), polydipsia (increased thirst), polyphagia (increased hunger), and weight loss. Other symptoms that are commonly present at diagnosis include a history of blurred vision, itchiness, peripheral neuropathy, recurrent vaginal infections, and fatigue. Many people, however, have no symptoms during the first few years and are diagnosed on routine testing.<sup>[7]</sup> People with type 2 diabetes mellitus may rarely present with hyperosmolar hyperglycemic state (a condition of very high blood sugar associated with a decreased level of consciousness and low blood pressure).
- Lifestyle factors are important to the development of type 2 diabetes, including obesity and being overweight (defined by a body mass index of greater than 25), lack of physical activity, poor diet, stress, and urbanization. Excess body fat is associated with 30% of cases in those of Chinese and Japanese descent, 60–80% of cases in those of European and African descent, and 100% of cases in Pima Indians and Pacific Islanders.<sup>[7]</sup> Among those who are not obese, a high waist–hip ratio is often present.<sup>[7]</sup> Smoking appears to increase the risk of type 2 diabetes mellitus.
- Dietary factors also influence the risk of developing type 2 diabetes. Consumption of sugar-sweetened drinks in excess is associated with an increased risk. The type of fats in the diet are important, with saturated fats and trans fatty acids increasing the risk, and polyunsaturated and monounsaturated fat decreasing the risk. Eating a lot of white rice appears to play a role in increasing risk.<sup>[1]</sup> A lack of exercise is believed to cause 7% of

cases.<sup>[2]</sup> Persistent organic pollutants may play a role.

- There are a number of rare cases of diabetes that arise due to an abnormality in a single gene (known as monogenic forms of diabetes or "other specific types of diabetes") These include maturity onset diabetes of the young (MODY), Donohue syndrome, and Rabson-Mendenhall syndrome, among others. Maturity onset diabetes of the young constitute 1–5% of all cases of diabetes in young people.

### **Syzygiumcumini**

Tea, extracts, solutions, and other preparations from plants with a putative antihyperglycemic effect have a worldwide utilization in the treatment of diabetes (1). Among them, the tea prepared from leaves of jambolan [*Syzygiumjambos* (L.) Alst or *Syzygiumcumini* (L.) Skeels] is largely used in our city and elsewhere. We demonstrated that the tea and extracts from different parts of the plant had no effect in normal rats, rats with streptozotocin-induced diabetes, and normal volunteers. An antihyperglycemic effect in patients with diabetes, however, could not be ruled out, since its mechanism of action could depend on specific abnormalities of diabetes in humans.

- In this double-blind, double-dummy clinical trial, we randomized patients with type 2 diabetes to receive a tea prepared from leaves of *Syzygiumcumini* (two grams per liter of water, taken as water substitute) plus placebo tablets, placebo tea (prepared with dried leaves of *Imperatabrazilensis* Trinius) plus glyburide tablets (5 mg twice a day), or placebo tea plus placebo tablets.



### **Gymnemasylvestre**

*Gymnema* is a woody climbing shrub native to India and Africa. The leaves are used to make medicine. *Gymnema* has a long history of use in India's Ayurvedic medicine. The Hindi name, gurmar, means "destroyer of sugar." Today, *Gymnema* is used for diabetes, metabolic

syndrome, weight loss, and cough. It is also used for malaria and as a snake bite antidote, digestive stimulant, laxative, appetite suppressant, and diuretic.



Gymnema contains substances that decrease the absorption of sugar from the intestine. Gymnema may

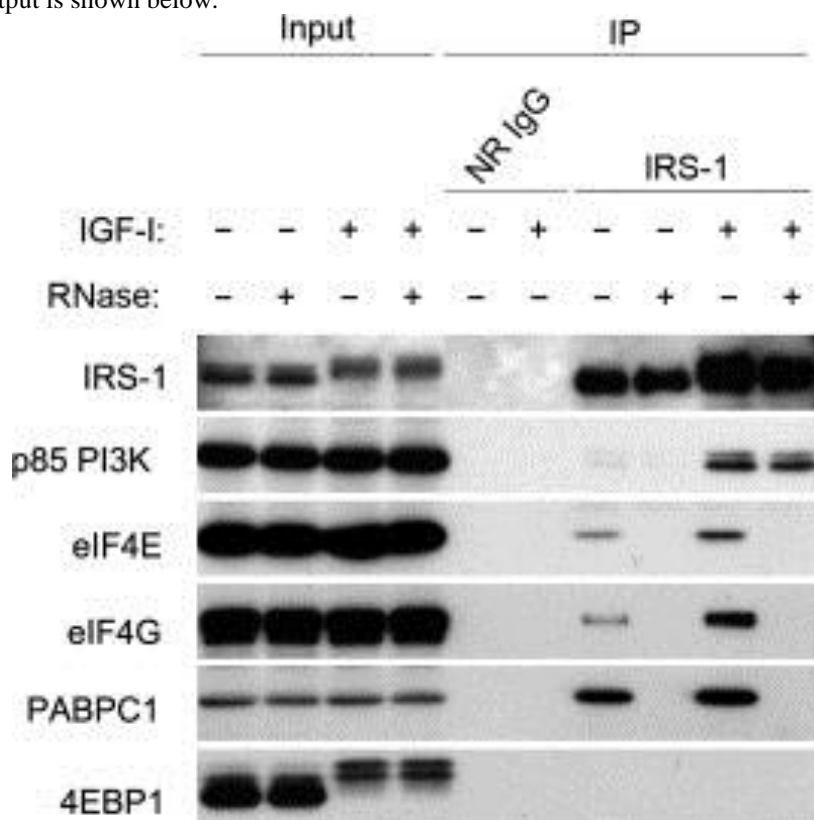
also increase the amount of insulin in the body and increase the growth of cells in the pancreas, which is the place in the body where insulin is made.

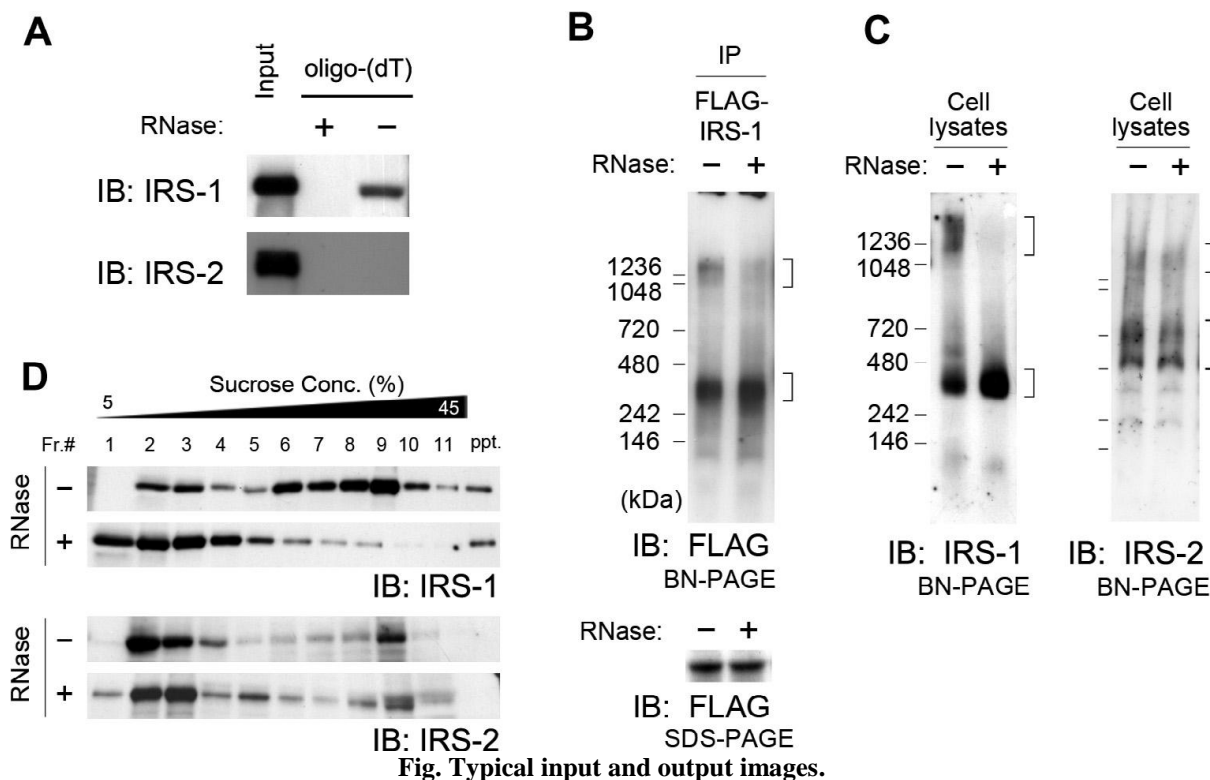
**MATERIALS AND METHODS**

- Identification of the target gene in type II diabetes.:
  - IRS 1
  - Gene: This gene encodes a protein which is phosphorylated by insulin receptor tyrosine kinase. Mutations in this gene are associated with type II diabetes and susceptibility to insulin resistance.
- Selection of herbal drug compounds.
- Study of gene and its analysis.
- Drug designing.
- Molecular docking.
- Evaluation of compounds.

**RESULTS AND DISCUSSION**

Typical input and output is shown below.





**Herbal Compounds**

S.NO	Name of the compound	Structures
1	Curcuma longa	
2.	Gymnemasylvestre	
3	Syzygiumcumini	
4	Trigonellafoenum-graecum	

Fig. 3: Ligand of the four herbal plants.

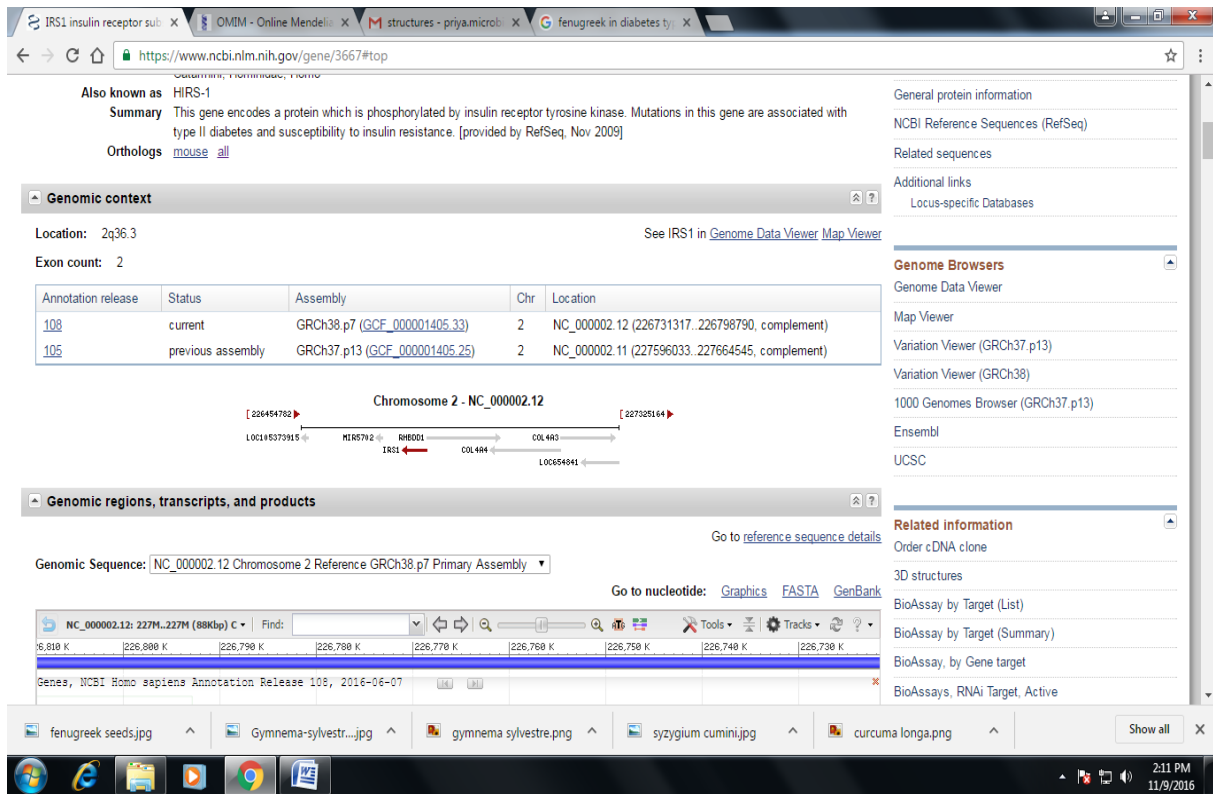


Fig. 4: Gene location identification.

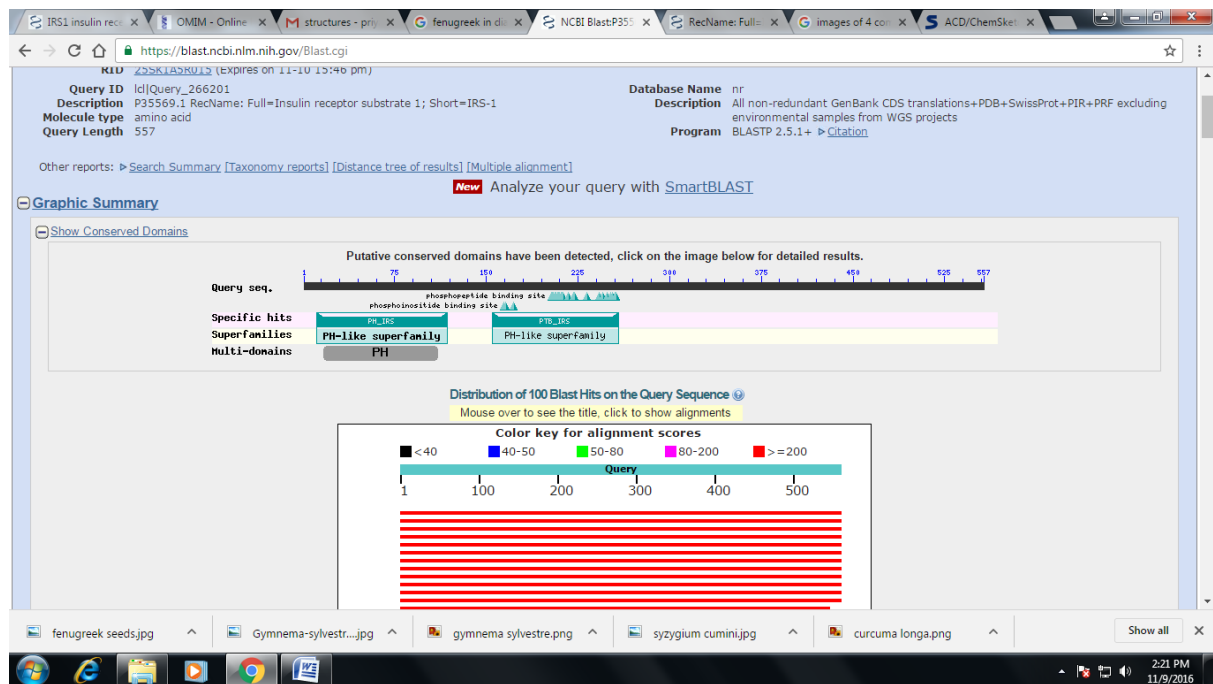


Fig. 5: BLAST p result.

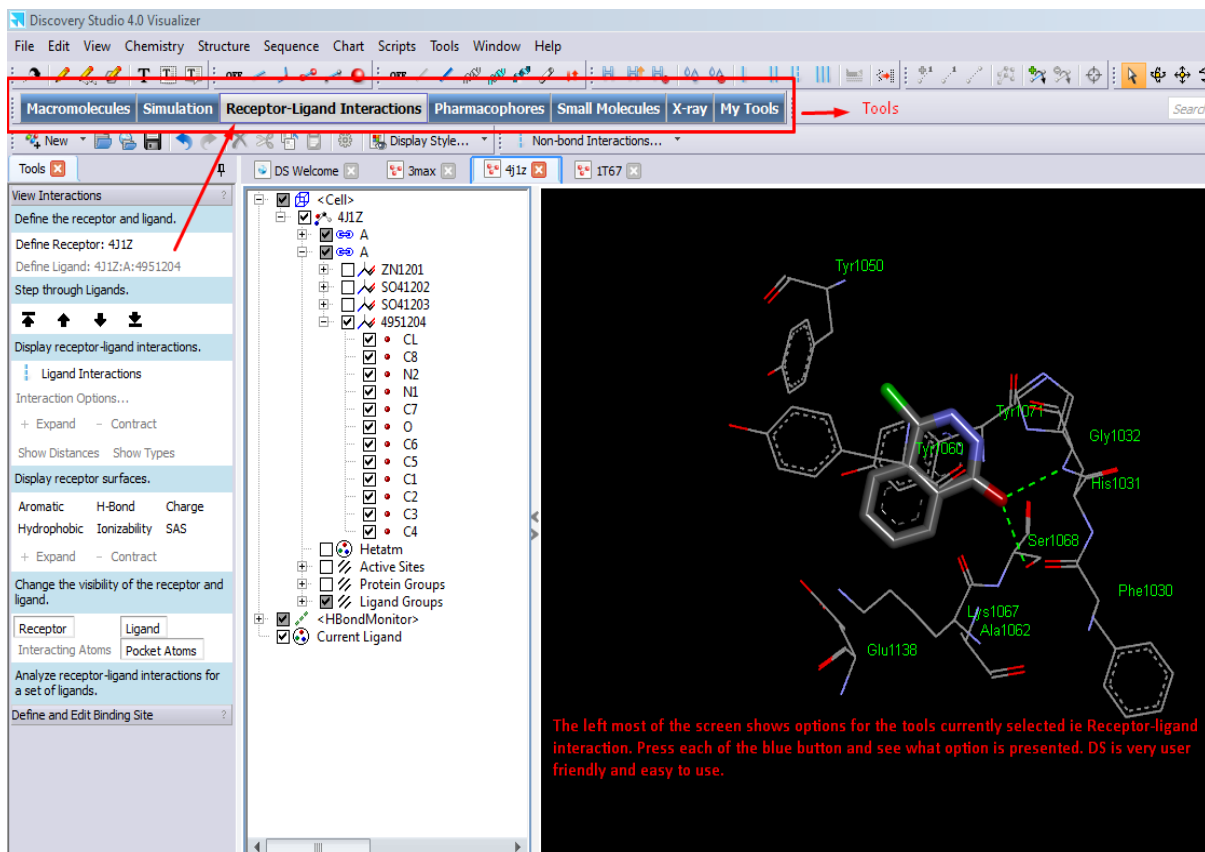
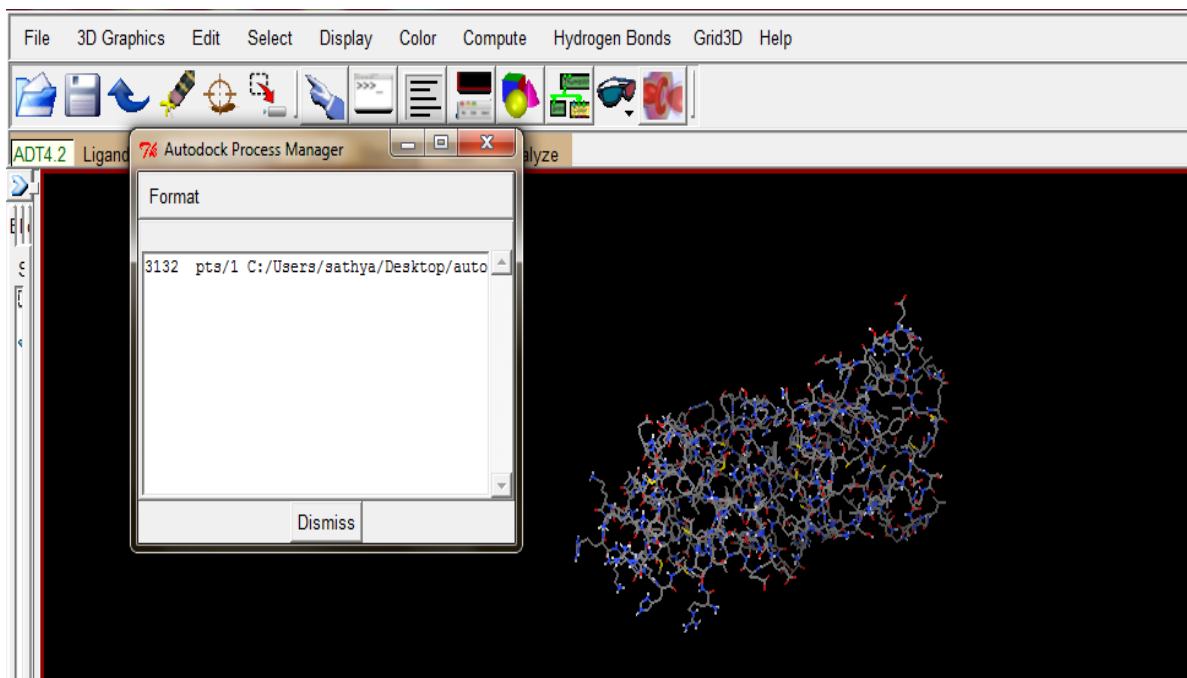


Fig. 6: Drug Designing Compound.



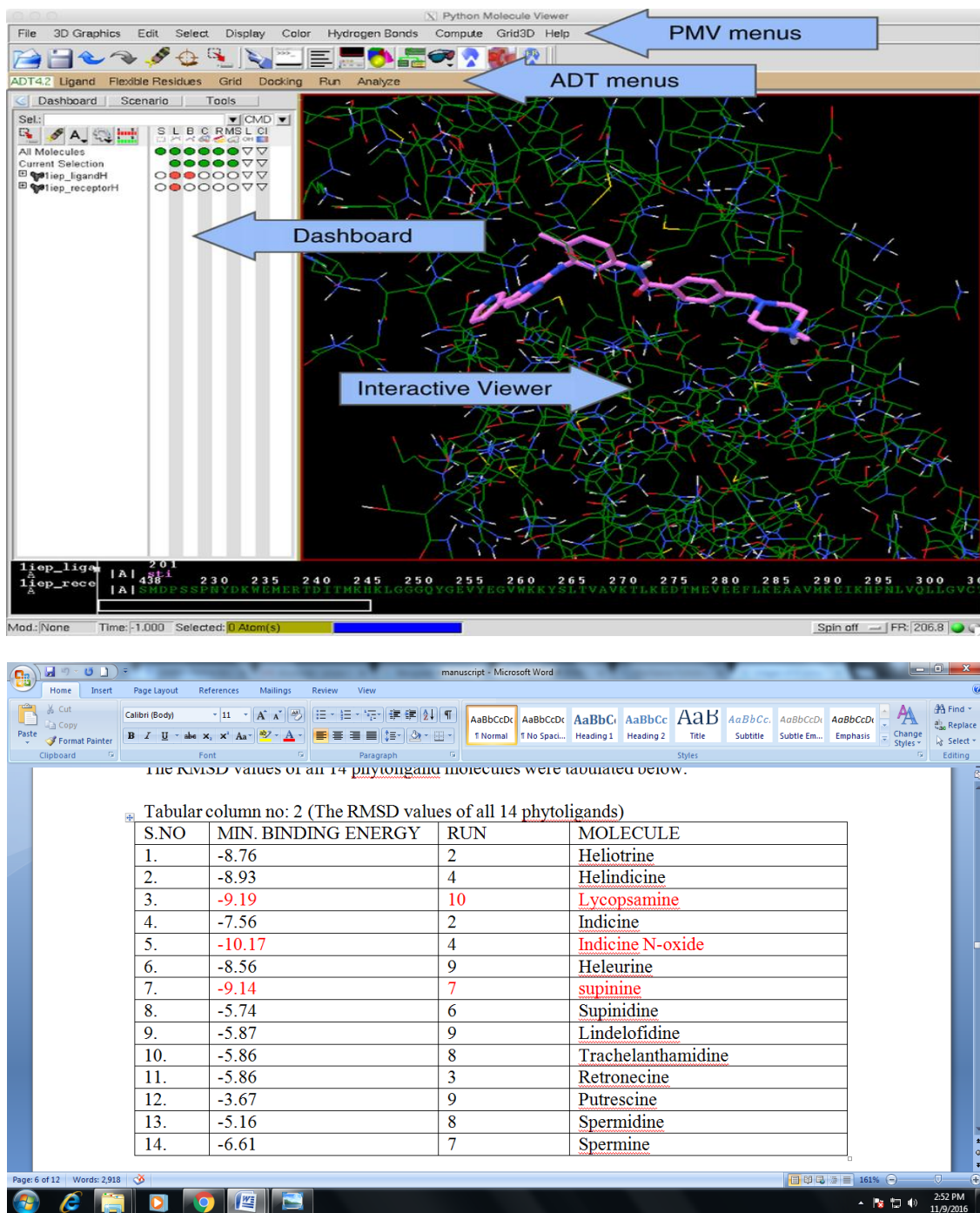


Fig. 7: Molecular Docking Results.

**CONCLUSION**

In order to cure Type II diabetes, we have identified the gene responsible for the insulin resistance gene from the genomic information resource database. The gene is further analysed and docked with the four herbal components and checked its minimum energy value for further studies. This will be the combination drug and using Nano medicine which will be the target drug delivery towards the target gene which stimulates the activity of the insulin resistant gene. Since its targets towards the gene it will be considered as the gene therapy and new combinatorial medicine, here

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