

# Treatment of Type II Diabetes using Combinational Herbal Compounds

R.Priya, K.Vijayalashmi, T.Jayalakshmi

**Abstract:** Diabetes is the common disorder found in case of metabolic dysfunction leads to high blood glucose level in our body. Type two polygenic diseases are that the most typical type of polygenic disease. If we have type 2 diabetes our body does not use insulin properly. This is called insulin resistance. At first, our pancreas makes extra insulin to make up for it. But, over time it's not able to carry on and cannot create enough internal secretion to stay your blood sugar at traditional levels. 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 Bioinformatics, combinatorial chemistry, pharmacology, Nano medicine play a vital role in treatment of diabetes.

Type II diabetes is the high risk of day to day life, so considering these facts the gene responsible for diabetes is identified and diagnosis of DNA is done used molecular techniques and mutated treatment.

In this gene is identified for further project, suitable drug targets is identified and targeted towards the type II diabetes.

**Keywords:** Type 2 Diabetes, Insulin Secretions, Target drug deliver

## I. INTRODUCTION

People with kind two polygenic disorders will still build endocrine, however their cells have some extent of endocrine resistance. Long-term complications from high glucose embody cardiovascular disease, strokes, diabetic retinopathy which might lead to aneity, renal disorder, and poor blood flow within the limbs which can lead to amputations[1],[ 3],[5]

### A. Causes of Type II Diabetes:

As per the medicinal news the scientist says Type 2 diabetes to be an invulnerable issue whereby the resistant framework assaults the body's own cells[2 ],[ 4],[6]. Type 2

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diabetes is being renamed as an invulnerable framework disease rather than just a metabolic issue, said a maker of another examination circulated in Nature prescription in the week,, the discoveries of which may prompt new diabetes medications that objective the safe framework as opposed to attempting to control glucose.

The scientists accept that hypoglycemic operator obstruction, the sign of sort 2 diabetes (dissimilar to type 1 diabetes where it is the insulin-delivering cells that are pulverized), is the aftereffect of B cells and other invulnerable cells assaulting the body's own tissues[7],[ 9],[11].

This discovery is nothing unaccustomed some natural medication researchers. Treatments that do the items necessary to make the system are hardening sort a pair of polygenic disease for years. The symptoms of diabetes are polyuria, polydipsia, and polyphagia and weight loss. Many folks, however, have no symptoms during the first few years and are diagnosed on routine testing. People with sort a pair of diabetes could seldom gift with hyperosmolar hyperglycaemic state.

## II MATERIALS AND METHODS

### Identification of the target gene in type II diabetes.

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. [provided by RefSeq, Nov 2009]-NCBI.

### A. Selection of herbal drug compounds.

The Four herbal ligands were selected using PUBCHEM database in which the compound which is responsible for reducing the blood glucose are identified by the literature survey and studied the mechanism of action for each compound were taken for drug designing[26],[28],[30]. The selected herbal compounds are *Curcuma longa*, *Syzygium cumini*, *Gymnema sylvestre*, *Trigonella foenum graecum*

### B. Study of gene and its analysis.

Gene analysis is done using GENEVIEWER tool which results in Gene location and the sequence id and number of sequence present in the target gene.

#### 1. Drug designing.

Drug Designing is done using CHEMSKETCH tool to draw and join the four compounds.

#### 2. Molecular docking.

Molecular docking analysis is done using AUTODOCK 4.

III RESULTS AND DISCUSSION

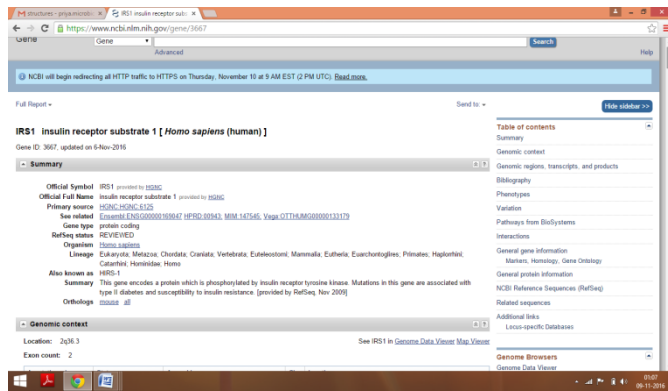


Fig:1 Target gene IRS1 is found using NCBI database.



FIG:2 OMIM entry of the target gene .

HERBAL COMPOUNDS:

| S. N O | Name of the compound | Structures |
|--------|----------------------|------------|
| 1      | Curcuma longa        |            |
| 2.     | Gymnema sylvestre    |            |
| 3      | Syzygium cumini      |            |

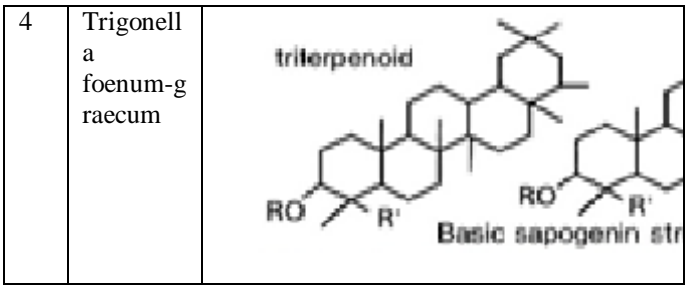


Fig 3: Ligand of the four herbal plants.

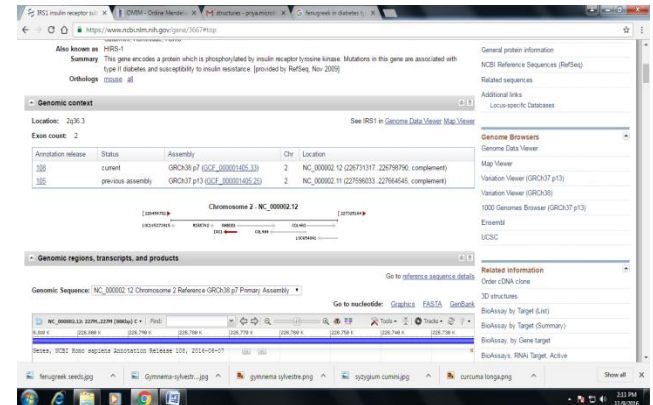


Fig: 4 gene location identification.

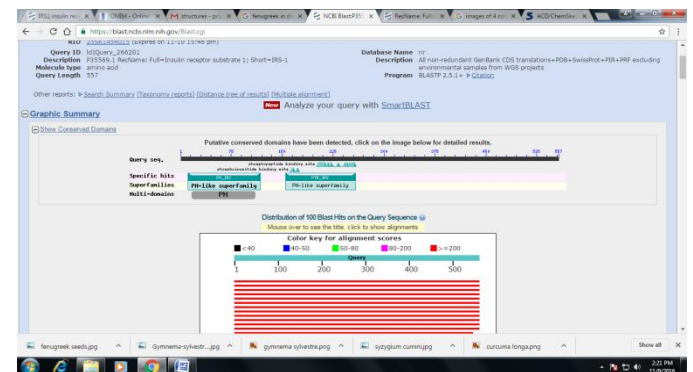


Fig 5: BLAST p result indicates the most similarity search for the target gene.

IV 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[37],[39],[41]. 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 Bioinformatics, combinatorial chemistry, pharmacology, Nano medicine play a vital role in treatment of diabetes.

REFERENCES

- Sharmila S., Jeyanthi Rebecca L., Das M.P., Production of Biodiesel from Chaetomorpha antennina and Gracilaria corticata, Journal of Chemical and Pharmaceutical Research, V-4, I-11, PP-4870-4874, Y-2012
- Aarthi C., Ramesh Babu P.B., Anti-cancer activity of Phyllanthus reticulatus on colon cancer cell line, International Journal of Civil Engineering and Technology, V-8, I-1, PP-943-947, Y-2017
- Sharmila S., Jeyanthi Rebecca L., Das M.P., Saduzzaman M., Isolation and partial purification of protease from plant leaves, Journal of Chemical and Pharmaceutical Research, V-4, I-8, PP-3808-3812, Y-2012
- Jayalakshmi T., Krishnamoorthy P., Ramesh Babu P.B., Vidhya B., Production, purification and Biochemical characterization of alkaline Fibrinolytic enzyme from Bacillus subtilis strain-GBRC1, Journal of Chemical and Pharmaceutical Research, V-4, I-12, PP-5027-5031, Y-2012
- Jeyanthi Rebecca L., Susithra G., Sharmila S., Das M.P., Isolation and screening of chitinase producing Serratia marcescens from soil, Journal of Chemical and Pharmaceutical Research, V-5, I-2, PP-192-195, Y-2013
- Aarthi C., Ramesh Babu P.B., Antimicrobial and antioxidant activity of phyllanthus niruri, International Journal of Pharmacy and Technology, V-8, I-2, PP-14701-14707, Y-2016
- Anbuselvi S., Jeyanthi Rebecca L., Sathish Kumar M., Senthilvelan T., GC-MS study of phytochemicals in black gram using two different organic manures, Journal of Chemical and Pharmaceutical Research, V-4, I-2, PP-1246-1250, Y-2012
- Soniya priyadharishni A.K., Ramesh Babu P.B., Data mining strategies for identification of HNF4A MODY gene using gene prioritize tool, Journal of Chemical and Pharmaceutical Research, V-6, I-3, PP-1126-1133, Y-2014
- Sharmila S., Jeyanthi Rebecca L., Naveen Chandran P., Kowsalya E., Dutta H., Ray S., Kripanand N.R., Extraction of biofuel from seaweed and analyse its engine performance, International Journal of Pharmacy and Technology, V-7, I-2, PP-8870-8875, Y-2015
- Sharmila S., Jeyanthi Rebecca L., Saduzzaman M., Biodegradation of domestic effluent using different solvent extracts of Murraya koenigii, Journal of Chemical and Pharmaceutical Research, V-5, I-2, PP-279-282, Y-2013
- Jeyanthi Rebecca L., Sharmila S., Das M.P., Seshiah C., Extraction and purification of carotenoids from vegetables, Journal of Chemical and Pharmaceutical Research, V-6, I-4, PP-594-598, Y-2014
- Krishnamoorthy P., Praveen Kumar P.K., Ramesh Babu P.B., Community based evaluation of phenylthiocarbamide (PTC) sensitivity and Dermatoglyphics as a genetic marker in Tamilnadu, India, International Journal of Pharmacy and Technology, V-5, I-3, PP-5705-5712, Y-2013
- Sharmila S., Jeyanthi Rebecca L., GC-MS Analysis of esters of fatty acid present in biodiesel produced from Cladophora vagabunda, Journal of Chemical and Pharmaceutical Research, V-4, I-11, PP-4883-4887, Y-2012
- Sinha S., Rajasulochana P., Ramesh Babu P.B., Krishnamoorthy P., Comparative modelling of shikimate kinase (M Tb) and molecular docking studies of its known inhibitors, Research Journal of Pharmaceutical, Biological and Chemical

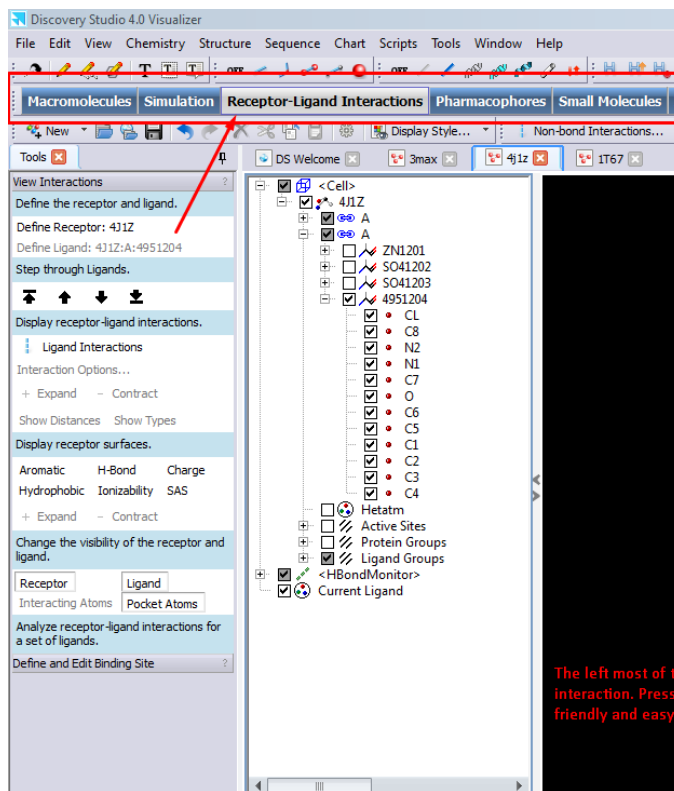


FIG 6: MOLECULAR DOCKING Using AUTO DOCK Software.

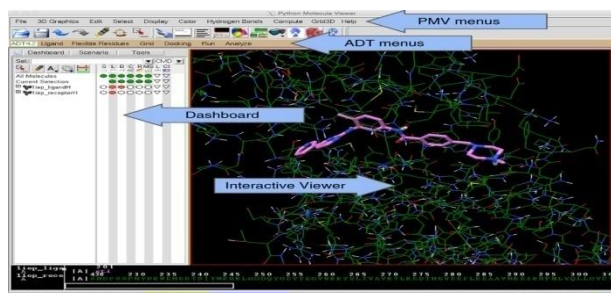


Fig: 7 Docked ligand pink colour indicates the designed Drug and the green colour indicates the structure of the protein (IRS 1 gene)

The RMSD values of all 14 phytochemical molecules were tabulated below.

| S.NO | MIN. BINDING ENERGY | RUN       | MOLECULE                |
|------|---------------------|-----------|-------------------------|
| 1.   | -8.76               | 2         | Heliotrine              |
| 2.   | -8.93               | 4         | Helindicine             |
| 3.   | <b>-9.19</b>        | <b>10</b> | <b>Lycoposamine</b>     |
| 4.   | -7.56               | 2         | Indicine                |
| 5.   | <b>-10.17</b>       | 4         | <b>Indicine N-oxide</b> |
| 6.   | -8.56               | 9         | Heleurine               |
| 7.   | <b>-9.14</b>        | 7         | <b>supinine</b>         |
| 8.   | -5.74               | 6         | Supinidine              |
| 9.   | -5.87               | 9         | Lindelofidine           |
| 10.  | -5.86               | 8         | Trachelanthamidine      |
| 11.  | -5.86               | 3         | Retronecine             |
| 12.  | -3.67               | 9         | Putrescine              |
| 13.  | -5.16               | 8         | Spermidine              |
| 14.  | -6.61               | 7         | Spermine                |

Fig 8: Minimum energy values are listed for the compounds the minimum energy value is showed for the best binding energy between the new drug compound and the diabetes protein, the red colour highlighted compounds shows the best binding energy value for the target gene.



- Sciences, V-4, I-3, PP-715-720, Y-2013
- 15) Jeyanthi Rebecca L., Dhanalakshmi V., Sharmila S., Effect of the extract of *Ulva* sp on pathogenic microorganisms, *Journal of Chemical and Pharmaceutical Research*, V-4, I-11, PP-4875-4878, Y-2012
  - 16) Sharmila S., Jeyanthi Rebecca J., A comparative study on the degradation of leather industry effluent by Marine algae, *International Journal of Pharmaceutical Sciences Review and Research*, V-25, I-2, PP-46-50, Y-2014
  - 17) Ramesh Babu P.B., Krishnamoorthy P., Gayathri G., Identification of drug target site on citrate synthase of food pathogen - *Campylobacter jejuni*, *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, V-4, I-1, PP-618-623, Y-2013
  - 18) Sharmila S., Rebecca Jeyanthi L., Saduzzaman M., Biodegradation of tannery effluent using *Prosopis juliflora*, *International Journal of ChemTech Research*, V-5, I-5, PP-2186-2192, Y-2013
  - 19) Kumar S., Das M.P., Jeyanthi Rebecca L., Sharmila S., Isolation and identification of LDPE degrading fungi from municipal solid waste, *Journal of Chemical and Pharmaceutical Research*, V-5, I-3, PP-78-81, Y-2013
  - 20) Das M.P., Jeyanthi Rebecca L., Sharmila S., Anu, Banerjee A., Kumar D., Identification and optimization of cultural conditions for chitinase production by *Bacillus amyloliquefaciens* SM3, *Journal of Chemical and Pharmaceutical Research*, V-4, I-11, PP-4816-4821, Y-2012
  - 21) Ramesh Babu P.B., Krishnamoorthy P., Rekha R., Development of comprehensive online database model for genes responsible for asthma, *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, V-4, I-1, PP-865-871, Y-2013
  - 22) Devi M., Jeyanthi Rebecca L., Sumathy S., Bactericidal activity of the lactic acid bacteria *Lactobacillus delbreuckii*, *Journal of Chemical and Pharmaceutical Research*, V-5, I-2, PP-176-180, Y-2013
  - 23) Ramesh Babu P.B., Miller T.L., Chidekel A., Shaffer T.H., Clara cell protein mediates secretion of proteins, IL-8 and IL-6 in human airway epithelial cell line Calu-3 exposed to hyperoxia, *Journal of Chemical and Pharmaceutical Research*, V-4, I-6, PP-3164-3170, Y-2012
  - 24) Bhuvanewari B., Hari R., Vasuki R., Suguna, Antioxidant and antihepatotoxic activities of ethanolic extract of *Solanum torvum*, *Asian Journal of Pharmaceutical and Clinical Research*, V-5, I-SUPPL. 3, PP-147-150, Y-2012
  - 25) Abraham Samuel F., Mohan V., Jeyanthi Rebecca L., Physicochemical and heavy metal analysis of sugar mill effluent, *Journal of Chemical and Pharmaceutical Research*, V-6, I-4, PP-585-587, Y-2014
  - 26) Narayani P.C., Anbu J., Vasuki R., Hari R., In vitro and in vivo anti-arthritis activity of combined ethanolic extracts of *Calotropis gigantea* and *Cardiospermum halicacabum* in Wistar rats, *Journal of Natural Remedies*, V-14, I-1, PP-58-66, Y-2014
  - 27) Paul Das M., Jeyanthi Rebecca L., Sharmila S., Anu, Banerjee A., Kumar D., Identification and optimization of cultural conditions for chitinase production by *Bacillus amyloliquefaciens* SM3, *Journal of Chemical and Pharmaceutical Research*, V-4, I-12, PP-4969-4974, Y-2012
  - 28) Vasuki R., Hari R., Pandian S., Arumugam G., Hepatoprotective action of ethanolic extracts of *eclipta alba* and *piper longum* linn and their combination on CCL 4 induced hepatotoxicity in rats, *International Journal of Pharmacy and Pharmaceutical Sciences*, V-4, I-SUPPL.1, PP-455-459, Y-2012
  - 29) Saduzaman M., Sharmila S., Jeyanthi Rebecca L., Efficacy of leaf extract of *Moringa oleifera* in treating domestic effluent, *Journal of Chemical and Pharmaceutical Research*, V-5, I-2, PP-139-143, Y-2013
  - 30) Senthil Kumar K., Vasuki R., Priya R., Green synthesis, pegylation of silver nano herbal complex and study of its anti-mutagenicity activity, *International Journal of Pharmacy and Technology*, V-8, I-2, PP-12130-12143, Y-2016
  - 31) Srivastava S., Seethalakshmi I., Jeyanthi Rebecca L., Antimicrobial and antioxidant properties of *cissus quadrangularis*, *Journal of Chemical and Pharmaceutical Research*, V-5, I-5, PP-131-134, Y-2013
  - 32) Giresshan M.G., Vasuki R., Krishnakumar T., High power production from elephant's urine, *International Journal of Pharmacy and Technology*, V-6, I-2, PP-6714-6718, Y-2014
  - 33) Jeyanthi Rebecca L., Dhanalakshmi V., Sharmila S., Das M.P., In vitro antimicrobial activity of *Gracilaria* SP and *Enteromorpha* SP, *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, V-4, I-1, PP-693-697, Y-2013
  - 34) Jeyanthi Rebecca L., Dhanalakshmi V., Thomas T., A comparison between the effects of three algal extracts against pathogenic bacteria, *Journal of Chemical and Pharmaceutical Research*, V-4, I-11, PP-4859-4863, Y-2012
  - 35) MohdHelmyAbdWahab, Amirul A. Talib, Herdawatie A. Kadir, Ayob Johari, A.Noraziah, Roslina M. Sidek, Ariffin A. "Smart cane: assistive cane for visually impaired people", *IJCSI*, Vol.8 Issue 4, July 2011.
  - 36) M. Bousbia-Salah, A. Larbi, and M. Bedda, "An approach for the measurement of distance travelled by blind and visually impaired people," in *Proc. 10th IEEE Inter*
  - 37) Brabyn, J. A. (1985). A review of mobility aids and means of assessment. In D. H. Warren & E. R. Strelow (Eds.), *Electronic Spatial Sensing For the Blind—Contributions From Perception, Rehabilitation, and Computer Vision* (pp. 13- 27). Boston, MA: MartinusNijhoff Publishers
  - 38) Heyes, "A polaroid ultrasonic travel aid for the blind," *Journal of Visual Impairment and Blindness*, vol. 76, pp. 199–201, 1982.
  - 39) ShrutiDambhare M.E 3rd SEM (ESC) G.H.R.C.E. Nagpur, Prof. A. SakhareM.Tech(ESC) G.H.R.C.E. Nagpur Smart stick for Blind: Obstacle Detection, Artificial vision and Real- time assistance via GPS.
  - 40) Michel Mouly and Marie-Bernadette Pautet: *GSM System for Mobile Communications* published by the authors 1992, ISBN 2-9507190-0-7 [4] Majid Al Shamsi, Mahmoud Al- Qutayri, and Jeedella, "Blind Assistant Navigation System" in *IEEE Transactions*, March 2011.
  - 41) A. R. Garcia, R. Fonseca. A. Duran. "Electronic long cane for locomotion improving on visual impaired people." *IEEE*, pp.58-61, 2011.
  - 42) G.Gayathri, M.Vishnupriya, R.Nandhini, Ms.M.Banupriya "SMART WALKING STICK FOR VISUALLY IMPAIRED" *International Journal Of Engineering And Computer Science* ISSN:2319-7242 Volume 3 Issue 3 March, 2014 Page No. 4057-4061.
  - 43) ArijitDatta "Advanced GPS & GSM Based Navigation System for Blinds" *International Journal for Research in Technological Studies* Vol. 1, Issue 6, May 2014 |ISSN (online):2348-1439.
  - 44) Amit Kumar, Rusha Patra, M. Manjunatha, J. Mukhopadhyay and A. K. Majumdar an electronic travel aid for navigation of visually impaired Communication Systems and Networks (COMSNETS), 2011 Third International conference on 4-8 jan 2011.
  - 45) Shamsi, M.A.; Al-Qutayri, M.; Jeedella, J.; Blind assistant navigation system *Biomedical Engineering (MECBME)*, 2011 1st Middle East Conference on 2124 Feb. 2011
  - 46) Michel Mouly and Marie-Bernadette Pautet: *GSM System for Mobile Communications*, published by the authors 1992, ISBN 2-9507190-0-7 [4] Majid AlShamsi, Mahmoud Al-Qutayri, and Jeedella, "Blind Assistant Navigation System" in *IEEE Transactions*, March 2011.

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