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Effect of *Glycyrhizza glabra* and *Solanum anguivi root* extract on insulin levels in Wistar albino rats

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Abstract:

The old Indian clinical framework suggests home grown treatments for various sicknesses, including diabetes mellitus. In many pathophysiological states, plants have been successfully tested in recent years. n present study we performed an in-silico work using VisANT 4.07 for the interactome analysis of proteins involved in the sleep cycle. After silico work, we performed in vivo work to analyze the alterations in metabolic and immunologic parameters on oral administration of the extract to rats. Group I was the normal (Negative) control; Group II was administered 10mg/kg of extract (positive control) and Groups III was administered body weight of aqueous extracts of Glycyrhizza glabra and Solanum anguivi respectively. In Group 1 Negative control result is satisfactory, in group III, there was a significant decrease in serum glucose, α-amylase and increase in insulin. The calculation of HOMA index and QUICKI showed an inverse trend i.e. decreased HOMA and increased QUICKI, showing increase in insulin efficiency and there is no insulin resistance. This indicates that the Glycyrhizza glabra and Solanum anguivi plant have antidiabetic, antilipemic and antioxidant property.

Keyword: Diabetes mellitus, Glycyrrhizza glabra and Solanum anguivi.

1. Introduction:

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One of the most well-known and pervasive illnesses is diabetes mellitus. This illness serves several purposes and has complex underlying causes and consequences. It continues to be a significant contributor to the rising rates of both juvenile and adult obesity as well as cardiovascular disease. Over the next ten years, diabetes is anticipated to become much more common [1]. Although there are many effective drugs for treating diabetes, some of them come with unwanted side effects, the most serious of which is an increased risk of hypoglycemia. Numerous research were undertaken to determine the active components, the method of action, and the safety of several plants traditionally used to treat diabetes. Herbal extracts have been shown to have hypoglycemic effects for type II diabetes in both human and animal studies [2, 3]. Glycyrhizza glabra (Licorice) and Solanum anguivi are commonly known as mulethi and brihati respectively. Solanum anguivi, a member of the Solanaceae family, is a plant species native to Africa that thrives in humid climates. It has been known to possess medicinal and antioxidant properties from long time [4]. Glycyrhizza glabra belong to the family Fabaceae, with a sub cosmopolitan distribution in Asia, Australia, Europe, and the Americas. It has been known for curing liver diseases and for its hypolipaemic and antidiabetic action [5,6,7]. It is used as cold beverage, and in preparing pharmaceutical products such as haematinic pills [8]. In Europe and the East, the roots are used medicinally. Triterpene saponins such glycyrrhizin and glycyrrhetic corrosive are liable for the plant's circulatory strain managing, hostile to ulcer, calming, against diuretic, against epileptic, hostile to hypersensitive, and cancer prevention agent exercises [9]. The use of herbal remedies to treat and prevent illness is rapidly expanding. However, a thorough understanding of these treatments is still challenging [10] owing to their high complexity in chemical components and methods of action. Licorice (*Glycyrhizza*) and *Solanum* have been identified as an unsafe herb to be used in therapy [11]. Continuous use of Glycyrhizza and Solanum extract can induce sleep and have hypnotic like activity [12]. However, the exact mechanism whether by immunomodulation or by metabolic alterations it changes the sleep cycle is still unknown.

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2. Methods and Materials:

2.1 Chemicals:

Everything saves the 2-thiobarbituric corrosive came from Sigma-Aldrich Pvt. Ltd. in the US; we got it from Hey Media Research centers, Pvt. Ltd. in Mumbai. Range diagnostics Pvt. Ltd., Surat, India provided the glucose, lipid profile, and - amylase action gauge packs. *Glycyrhizza glabra* and *Solanum anguivi are them.*

2.2 Extractions Preparation:

2.2.1 Plant root Collection & Identification:

The roots of *Glycyrhizza glabra* and *Solanum anguivi* were purchased from local ayuredic store, Udupi.

2.2.2 Plant root extract preparation:

Samples were washed, dried and crushed to powder. Fifty gm sample were soaked in 1:1 ratio of water and 90% ethanol (to obtain extract) for 02 days at room temperature with occasional shaking. The combination was screened by filter paper. The ethanol solution was evaporated in a water bath at temperatures between 30 and 40 degrees Celsius until a thick paste was produced. Water extract solution was freeze dried at (-15 to -20 ^{o}C) under vacuum, the yield was hydroscopic powder. A known amount of powder is suspended in distilled water and 0.5 ml of this was orally administered to group II animals, while the animals orally administered with the solvent (water) served as control.

2.3 Animals used in experiments:

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Institutional Moral Board for Taking care of and Support for Exploratory Creatures, College; Focal Contamination Control Board for Investigations on Creature ; Service of Climate and Woods, Administration of India; endorsed the analysis convention.

Male and female Wistar albino rats (Ratus narvegicus) weighed between 120 and 200 grammes each and were kept in polypropylene cages of 43 by 27 by 25 centimetres (165.85 square centimetres in total) to ensure their health. Each enclosure contained seven creatures and was kept at a consistent temperature of (23 20C) with a light/dim pattern of (14h light: 10h dark).

2.4 Planning an Experiment:

Rats were randomly divided into two groups.

Group 1 was the normal control,

Group 2 was administered 10mg/kg of extract (positive control) and

Groups 3 was administered per-kg body weight of aqueous extracts of Glycyrhizza glabra and Solanum anguivi respectively.

2.5 Methods in the Laboratory:

2.5.1 Serum and tissue preparation*:*

Different biochemical and hormonal parameters were estimated by isolating serum from the blood of each animal. Liver, pancreas, and lung tissues were quickly taken out after exsanguinations, cleaned of blood clusters, gauged, and handled for protein and hepatic gluco-administrative catalyst estimation. Lung, pancreas, liver, and adipose tissue sections were protected in 10% PBS-cradled formalin for histopathological analysis.

2.6. Analysing the data statistically:

The end for deciding factual importance was set at P 0.05. The information were broke down involving the preliminary adaptation of Crystal 5 programming for windows (GraphPad, San

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Diego, CA) and introduced as means S.E.M. from an ANOVA (non parametric) and a posthoc Neuman keuls different correlation test.

3. Discussion and Results

Group 1 Negative control result is satisfactory, **Group II** Positive control results is satisfactory with administered 10mg/kg of extract (positive control) and Serum glucose, -amylase, and insulin levels all changed biochemically as a result of the diabetes in **Group III**. The calculation of HOMA index and QUICKI showed an inverse trend i.e., decreased HOMA and increased QUICKI, showing increase in insulin efficiency and there is no insulin resistance.

Implies standard blunder of the mean ± S.E.M. (n=7 for glucose, insulin, alpha-amylase, and leptin; a, P<0.001; b, P<0.01 and c, P<0.05 contrasted with their relating control values. Please see Table 01.A low level of leptin in group II indicates less inhibition of insulin i.e. increased level of insulin Diminished homeostasis model appraisal of insulin obstruction (HOMA-IR) and upgraded Quantitative Insulin awareness Really look at Record (QUICKI) values showed the extensive drop in blood glucose fixation and improvement in insulin responsiveness.

HOMA IR:

nequals7, each vertical bar ±SEM (mean SEM); ***, P<.001; **, P<.01; *, P<.05 represent significance level of group II compared to the control values.

QUICKI: **N**equals7, each vertical bar ±SEM (mean SEM); ***, P<.001; **, P<.01; *, P<.05 represent significance level of group II compared to the control values

Table No. 01 Effect of *Glycyrhizza glabra* and *Solanum anguivi* extract on normoglycemic animals on the parameters in Wistar albino rats.

Parameter	Group II (ctrl)	Group III (0.5 ml)
Glucose (mg / dl)	125.37 ± 1.162	92.53 ± 0.948[a]
Insulin (uU/ ml)	40.95 ± 1.92	49.59 ± 4.13[b]

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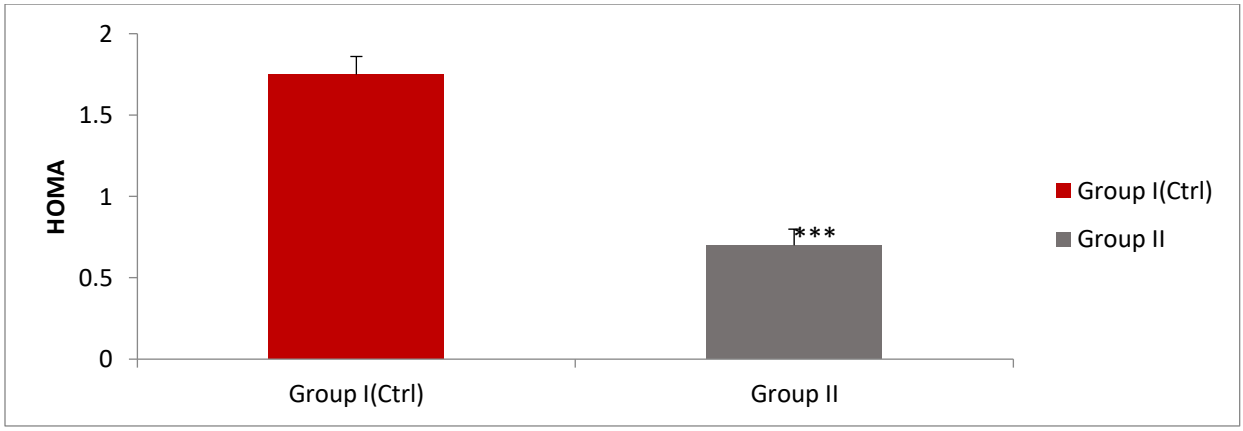
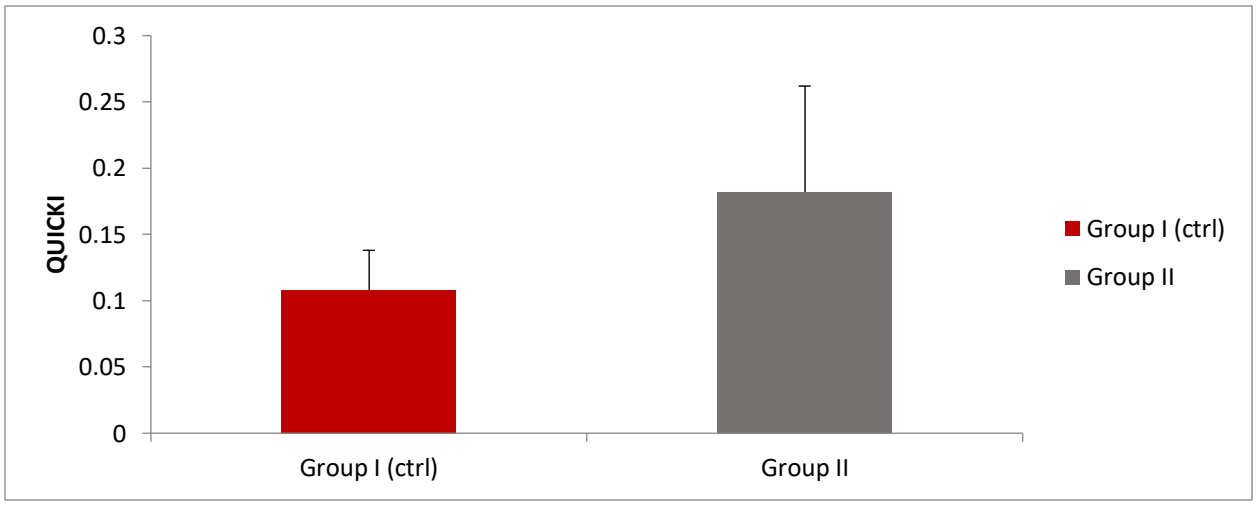
α-amylase (IU/ dl)	102.08 ± 1.75	98.19 ± 1.18[c]
Leptin (pg/ml)	88.62 ± 3.28	132.03 ± 3.48 [a]
HOMA IR	1.75 ± .110	0.7 ± .099 [a]
QUICKI	.108 ± .030	.182 ± .080 [b]



Graph No.01: HOMA IR Index



Graph No.02: QUICKI Index

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4. Conclusion:

Using the data from this study, we draw the conclusion that Glycyrrhizza glabra and Solanum anguivi root extract significantly raise insulin levels in Wistar albino rats. As a substitute, this herb can be used well to manage diabetes in pancreatic activities.

5. Reference:

1. National Diabetes, 1998. Fact sheet: Diabetes Statistics and Background Data at the National Level. Centre for Disease Control and Prevention, Atlanta, Georgia.
2. Kheighley, U.K., 1999. Association for British Herbal Medicine. British Herbal Pharmacopoeia.
3. O.O. Elekofehinti, I.G. Adanlawo, A. Fakoya, J.A. Saliu, S.A. Sodehinde. Effects of Saponin from Solanum anguini Lam Fruit on Heart and Kidney Superoxide Dismutase, Catalase and Malondialdehyde in Rat. Current Research Journal of Biological Sciences. 2012; 4(4):530-533.
4. Elekofehinti O. O, Kade I. J. Aqueous extract of Solanum anguini Lam. fruits (African Egg Plant) inhibit Fe2+ and SNP induced lipid peroxidation in Rat's brain – In Vitro. Der Pharmacia Lettre, 2012; 4 (5):1352-1359.
5. Thyagarajan SP, Jayaram S, Gopalakrishnan V, Hari R, Jeyakumar P, Sripathi MS. Herbal medicines for liver diseases in India. J Gastroenterol Hepatol. 2002; 17 Suppl 3:S370-6.
6. MS. Sitohy MZ, el-Massry RA, El-Saadany SS, Labib SM. Metabolic effects of licorice roots (Glycyrrhiza glabra) on lipid distribution pattern, liver and renal functions of albino rats. Nahrung. 1991; 35(8):799-806.
7. Swanston-Flatt SK, Day C, Bailey CJ, Flatt PR. Traditional plant treatments for diabetes: Studies in normal and streptozotocin diabetic mice. Diabetologia. 1990; 33(8):462-4.

E-ISSN No: 2456-6713

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8. Fenwickie G, Lutomski J, and Nieman C. Liquorice, Glycrrhiza glabra L.composition, uses and analysis. Food Chem. 1990; 38(2):119-143.
9. Global medicinal plants. Ross IA., editor. It was published by Humana Press Inc. in Totowa, NJ in 2001.
10. Yonghua Wang, Ling Yang, and Hui Liu round out the top 10. Licorice as a Model for Systems Approaches and Polypharmacology in Herbal Medicine-Based Drug Discovery. In Press (2013 edition) of the Journal of Ethnopharmacology.
11. TB Klepser and ME Klepser. Herbal remedies that might be harmful or helpful. Publication information: Am J Health Syst Pharm. 1999;56(2):125-38.
12. Licorice (Glycyrrhiza glabra) ethanol extract and its primary flavonoid ingredient glabrol have hypnotic effects and a GABAergic mechanism, according to the research of Suengmok Cho, Ji-Hae Park, Ae Nim Pae, Daesook Han, Dongsoo Kim, and Nam-Chul Cho, among others. 2012;11:3493-3501 Bioorganic & Medicinal Chemistry.