EXCLUSIVE BENEFITS OF BGR-34

- Potential DPP-4 inhibitor with cardioprotective action
- Scientifically proven, optimized formulation
- Enriched with 34 vital Phytoconstituents, derivatives
- Regulates glucose homeostasis
- Converts proinsulin to insulin
- Reduces level of glycosylated Hb
- Exerts Anti-oxidant Action

BGR-34 contributes to the maintenance of normal blood glucose metabolism and restores quality of life.

Also reduces the chances of long-term complications.

**Active Ingredients**

- Daruharidra: Improves health and functioning of pancreas, restores stamina.
- Vijaysar: Rich in flavonoids, strengthens the skin and helps maintain normal blood glucose level.
- Giloy: A powerful herb to improve immunity, makes immune system resistant to infections.
- Methika: One of the best sources of micro-nutrients, nourishes & tones the vital organs.
- Majeeth: Promotes wound healing activity, helps protect from topical oxidative damage.

**Dosage:**
- Tablets: 2 tablets twice a day, half an hour before meals or as directed by Physician.
- Granules: ½ teaspoonful twice a day, half an hour before meals, or as directed by Physician.

BGR-34 contributes to the maintenance of normal blood glucose metabolism and restores quality of life. Also reduces the chances of long-term complications.

**CSIR Council of Scientific & Industrial Research**

Brings Revolution, with a BREAKTHROUGH PHYTORESEARCH of the Decade

JOINTLY DEVELOPED BY THE SCIENTISTS OF CSIR- NBRI & CSIR- CIMAP

NATIONAL BOTANICAL RESEARCH INSTITUTE (LUCKNOW)
CENTRAL INSTITUTE OF MEDICINAL & AROMATIC PLANTS, (LUCKNOW)

RESEARCH TECHNOLOGY TRANSFERRED TO AIMIL

AIMIL PHARMACEUTICALS (INDIA) LTD.
Rajkot, Gujarat, India, 360002
Email: info@aimilpharmaceuticals.com
Website: www.aimilpharmaceuticals.com

BGR-34 Blood Glucose Regulator to manage the lives of suffering diabetics.

For the use of Rural Medical Practitioners & Hospitals Only.
A scientifically validated herbal formulation

BGR-34™

jointly developed by the Scientists of CSIR-National Botanical Research Institute, Lucknow & CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow

for the management of diabetes.
The product was launched by the Honourable Vice President of India, Mr. M. Hamid Ansari on 22nd February 2014 at Vigyan Bhawan, New Delhi and the research technology has been transferred to Aimil Pharmaceuticals (India) Ltd. for the benefit of diabetic sufferers.

Launching Ceremony at Vigyan Bhawan, New Delhi.
Hon’ble vice president of India
Mr. M. Hamid Ansari with
Dr. C. S. Nautiyal, Director, CSIR-NBRI.

FOREWORD

There has been a quest to develop a promising, safe, non-toxic drug regimen to help effectively maintain normal blood glucose levels and reduce the chances of long term complications due to persistent high blood glucose level. It has been highly commendable on the part of scientists at CSIR-NBRI and CSIR-CIMAP to have in depth research studies to evolve scientifically the most desirable formulation that has been validated experimentally to address the disorder with a difference and that too in completely patient friendly manner. Not only that, the product also imparts the much needed good quality life in the patients.

The knowhow for the product has been transferred to Aimil Pharmaceuticals, an organization well known for its innovative quality products for various therapeutic groups in herbal/ayurvedic sector with a strong marketing network spread throughout the country. We wish Aimil Pharmaceuticals all the success in their noble endeavor of serving mankind by making the benefits of the marvelous research available to the fast increasing number of the patients all throughout the country.

Date: 05.11.2014

(C.S. Nautiyal)
Acts as DPP-4 inhibitor to effectively manage Diabetes

Inhibition of DPP-4 provides improved glucose tolerance, increases insulin secretion in response to oral glucose and decreases blood glucose level effectively. - *Berberis aristata* (Daruharidra)

Modulates Insulin release, exerts insulinogenic effect

Increases the c AMP content of the β-islets, which helps in repair and revival of β-cells of pancreas, increases insulin release & converts proinsulin to insulin. - *Pterocarpus marsupium* (Vijaysaar)

Manages glucose absorption & uptake

Supplements bioactive constituents like galactomannan, reduces post prandial glucose level because of its property to delay intestinal absorption of glucose and benefits in blood glucose management - *Trigonella foenum-graecum* (Methi)

Strengthens β-cell functional Capacity

*Protects β-cells from damage, promotes reparative regeneration of cells, thus increases insulin production by improving the functional capacity of β-cells* - *Gymnema sylvestre* (Gudmar)

Exerts Cardioprotective Action

*Boosts body defence system & anti-oxidant mechanism to protect the cardiovascular system by supplementing essential phyto-constituents* - *Tinospora cordifolia* (Giloe)

Nourishes & Strengthens vital organs

Regulates blood glucose through mitigating oxidative stress, promoting insulin secretion. It helps to restore anti-oxidant enzymes like SOD, catalase, glutathione peroxidase etc. to nourish & protect the vital organs - *Rubia cordifolia* (Majeeth).

**What is special about BGR-34?**

BGR-34 is a novel, natural DPP-4 inhibitor and unlike other DPP-4 inhibitors in market, BGR-34 exerts cardioprotective action. It also exerts powerful anti-oxidant action, helps prevent development of triopathic complications. An optimized concentration of synergistically acting extracts makes BGR-34 highly efficacious in management of Diabetes.
Research product of MINISTRY OF SCIENCE & TECHNOLOGY

**BGR-34**

Granules / Tablets

C.S.I.R.

Effectively controls diabetes by inhibiting DPP-4 (GLP-1 & GIP)

**Berberine** (*Berberis aristata*)

- Acts as DPP-4 inhibitor
- Blocks DPP4 enzymes activity
- Increases GLP-1 level (A Gut hormone)
- Provides Protection from oxidative damage
- Retards glucose absorption
- Decreases glucose production by liver (Decreases gluconeogenesis)
- Increases Glucose uptake & Storage by muscles
- Reduces feeling of hunger (Increases satiety)
- Increases insulin secretion
- Enhances Insulin sensitivity
- Controls Blood Sugar Level
- Increases insulin secretion and improves oral glucose tolerance

Berberine from *Berberis aristata* (Daruharidra) has been shown to antagonize the hyperglycaemic action of glucose and the gluconeogenic action of alanine in experimental subjects and on hepatocyte cell lines. It seems to decrease insulin resistance by raising insulin sensitivity. The **DPP IV inhibitory activity** could explain the anti-diabetic activity of berberine including the decrease of fasting blood glucose level, the increase in insulin secretion and the improvement in oral glucose tolerance tests (OGTT) was observed in experimental subjects. (Journal of Enzyme Inhibition and Medicinal Chemistry, 24(5): 1061-1066, 2009)

In a study *Berberis aristata* (Daruharidra) extract showed high DPP-IV inhibitory potential. The reason to observe high inhibitory activity of Diprotin A, the standard DPP-4 inhibitor, was due to its tripeptide specificity and purity. Berberine significantly reduced fasting blood glucose, HbA1c and triglycerides in type 2 diabetic patients. It lowered blood glucose levels through increasing insulin receptor expression. Berberine is preferred over metformin for hyperglycaemic patients with liver diseases. ([Natural Products, 4; 158-163, 2011])

Berberine from *Berberis aristata* (Daruharidra) has been shown to have a significant beneficial effect on diabetes mellitus type-2, and may be as effective as metformin (500 mg /day). Berberine acts through several mechanisms, including insulin mimicking action, improving insulin action by activating AMPK, reducing insulin resistance through protein kinase C-dependent up-regulation of insulin receptor expression inducing glycolysis, and on incretins by promoting GLP-1 secretion and modulating its release, by inhibiting DPP-4.

(Natural Medicine Journal 2(10), 5-6, 2010)

**Improves Insulin action by activating AMPK**

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Repairs & Revives β-cells, Enhances Insulin Release

A study conducted with Pterostilbene, a constituent derived from Pterocarpus marsupium (Vijaysar) showed hypoglycemic activity in experimental subjects because of presence of tannates in the extract. Marsupin, pterosupin and liquiritigenin obtained from vijaysar showed antihyperlipidemic activity. (-)Epicatechin, its active principle, has been found to be insulinogenic, enhancing insulin release by converting proinsulin to insulin. Like insulin, (-) epicatechin stimulates oxygen uptake in fat cells and tissue slices of various organs, increases glycogen content of experimental subjects diaphragm in a dose-dependent manner.

Vijaysar (Pterocarpus marsupium)

A rich source of (-)epicatechin

Flavonoid fraction from Pterocarpus marsupium (Vijaysar) exerts pancreatic β cell regranulation

(-) Epicatechin, an active principle in the extract of Pterocarpus marsupium (Vijaysar) increases the cAMP content of the β-islets which is associated with the increased insulin release, conversion of proinsulin to insulin and cathepsin B activity. The response of the β-islets to the (-)epicatechin stimulation is more pronounced in immature (one month old) than in mature (12 month old) experimental subjects.

A multicentric trial was carried out to compare the blood glucose lowering effect of Vijaysar with pharmacological agent of sulphonyl urea group (Tolbutamide). A total of 365 newly diagnosed or untreated patients with type 2 diabetes mellitus whose fasting blood glucose was > 12.8 mmol/l were randomized to receive either the trial drug or the standard pharmacological agent for duration of 36 weeks with 4 weekly clinic attendance for review and collection of drug. There were 172 patients in vijaysar treated group and 177 patients in the tolbutamide group. 86% in vijaysar and 94% in tolbutamide group maintained glycaemic control. Thus, it is concluded that vijaysar is effective in blood glucose lowering effect with its hypoglycaemic effect being comparable to that of tolbutamide in treatment of patients with type 2 diabetes and it is free from any significant side effects.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Drug Group</th>
<th>Baseline</th>
<th>At 36 weeks</th>
<th>Mean fall (95% C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vijaysar (n=172)</td>
<td>10.5</td>
<td>8.9</td>
<td>1.6*</td>
</tr>
<tr>
<td></td>
<td>Tolbutamide (n=177)</td>
<td>10.5</td>
<td>8.7</td>
<td>1.8*</td>
</tr>
</tbody>
</table>

* P<0.001    C.I : Confidence interval

Blood Glucose (mmol/l)

- Fasting
  - Vijaysar (n=172) | 9.4, 7.0, 5.6
  - Tolbutamide (n=177) | 9.4, 6.7, 5.4

- Postprandial
  - Vijaysar (n=172) | 13.9, 9.6, 5.2
  - Tolbutamide (n=177) | 13.8, 9.4, 5.4

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BGR-34

Research product of MINISTRY OF SCIENCE & TECHNOLOGY

C.S.I.R.

Converting Pro-insulin to insulin

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Vijaysar (Pterocarpus marsupium)

A rich source of (-)epicatechin

Repairs & Revives β-cells of islets of Pancreas

Increases glucose mediated insulin secretion

Increases glucose utilisation in tissues

Helps Control Diabetes Mellitus
Trigonella foenum-graecum (Methi) was studied to establish the inhibitory activity against α-amylase and α-glucosidase enzyme activity. The percentage inhibition by each extract is shown in Figure 1. Aqueous extract at 250 μg/ml showed prominent α-amylase inhibitory potential. The percentage of inhibition ranged from 43.95% to 9.23% in case of aqueous extract. The α-glucosidase inhibitory activity of extract of T. foenum-graecum is shown in Figure 2. Aqueous extract showed percent α-glucosidase inhibition in dose dependent manner. Inhibition in enzyme activity ranged from 33.64% to 7.32% in case of aqueous extract. Therefore, methi based α-amylase and α-glucosidase inhibitors are likely to be useful in regulating blood-glucose level. Inhibition of these enzymes delays the digestion of carbohydrates, causing reduction in the rate of glucose absorption. 

Figure 1: Inhibitory activity of Trigonella foenum-graecum extract against α-amylase

![Inhibitory activity of Trigonella foenum-graecum extract against α-amylase](image1)

Figure 2: Inhibitory activity of Trigonella foenum-graecum extract against α-glucosidase

![Inhibitory activity of Trigonella foenum-graecum extract against α-glucosidase](image2)

**Inhibits activity of α-amylase & α-glucosidase**

Trigonella foenum-graecum (Methi) seeds contain 55% of soluble fibre, this gel forming fibre absorbs water as it passes through the gut and swells up, binding with the food. It delays gastric emptying, slows down carbohydrate absorption and delays glucose transport. Fenugreek seeds contain many amino acids but the most abundant amino acid is 4-hydroxyisoleucine. This amino acid stimulates pancreas to release insulin. Fenugreek seeds are rich source of polysaccharide galactomannan and other bioactive constituents which have been shown to lower blood sugar and prevent diabetes induced cataract. It also lowers cholesterol and triglycerides.

![Reduces intestinal absorption of glucose](image3)

**Reduces intestinal absorption of glucose**

Trigonella foenum-graecum (Methi) seeds contain 45% to 60% carbohydrate (galactomannan), 6% to 10% lipid (polyunsaturated fatty acids), and 20% to 30% protein (4-hydroxyisoleucine) being one of the major amino acids. Galactomannan, a polysaccharide polymer that dissolves in water because of the presence of galactose side chain, has been reported to reduce postprandial blood glucose response because of its viscous property and has the potential to reduce intestinal absorption of low concentrations of glucose and benefit in blood glucose management.

![Stimulates insulin release from β-cells](image4)

**Stimulates insulin release from β-cells**

Trigonella foenum-graecum (Methi) has been observed to cause glucose-induced insulin release in vitro and in vivo. 4-hydroxyisoleucine, a novel amino acid from fenugreek seeds, increases glucose stimulated insulin release from isolated β-cell islets. The extracts, powder and gum of Trigonella foenum-graecum helps to improve insulin sensitivity presumably due to presence of fibres, which slows down the metabolism of carbohydrates, resulting in reduced insulin levels and lower blood glucose.

![Effect of Methi on Plasma Glucose](image5)
Strengthens β- cells functional capacity

Gymnemic acid is the main active constituent of *Gymnema sylvestre* possessing beneficial effects in controlling blood glucose level by strengthening β-cells.

Regeneration of β-cells is possible with the treatment of *Gymnema sylvestre* (Gudmar) extract mainly from acinar cells. The acinar cells are proposed as precursors of ductal cells in focal regions, which can differentiate into β-cells. The Histopathological results showed the congestion with sever decrease in number of β-islets of langerhans and β-cells in streptozotocin treated diabetics (Fig-2). But in treated diabetic subjects it shows decrease in congestion with mild decrease in islets and increase in normal β-cells (Fig-3). This clearly indicates that there is a reversal of the endocrine damage in *Gymnema sylvestre* extract treated experimental subjects.

*Gymnema sylvestre* (Gudmar)

- Promotes regenerative regeneration of islet cells.
- Increases secretion of glucose-mediated insulin.
- Causes delay of glucose absorption from intestine.
- Increases the utilization of glucose as it increases the activities of enzymes responsible for utilization of glucose by insulin-dependent pathways.
- Increases in phosphorylation activity, decreases in gluconeogenic enzymes and Sorbitol dehydrogenase.

 Dioscorea douglasii (Dourak) (Der Pharmacia Lettre 2010, 2(1), 275-284)

Mitigates oxidative stress, promotes insulin secretion

In diabetes mellitus, high glucose levels inactivate antioxidant enzymes SOD, CAT, GPs etc. By glycating these proteins, hyperglycaemia induces oxidative stress which in turn causes lipid peroxidation. Decreased enzyme activity and increased lipid peroxidation, protein carbonylation in diabetic experimental subjects was restored as an effect of *Berberis aristata* (Daruharidra) root extract, attenuating antioxidant status in diabetic liver. Daruharidra extract *restored reduced glutathione content* in diabetic liver which plays an important role in the prevention of diabetic complications.

 Dioscorea douglasii (Dourak) (IJPAES, 3(3), 42-49, 2013)

*Berberis aristata* (Daruharidra)

- Regulate glucose homeostasis
- Decreases gluconeogenesis
- Increases glucokinase & G-6PD activity
- Decreases G-6P activity
- Protects from oxidative stress

 Dioscorea douglasii (Dourak) (Der Pharmacia Lettre 2010, 2(1), 275-284)

*Rubia cordifolia* (Gilo) regulates the blood glucose through mitigating oxidative stress, promoting insulin secretion and also by inhibiting gluconeogenesis and glycoysis, thereby regulating blood glucose. The *isoquinoline alkaloid* rich fraction from stem exerts insulin mimicking and insulin releasing effect *in-vitro* and *in-vivo*. Aq. extract has been reported to regulate blood glucose levels, enhance insulin secretion and suppress oxidative stress markers. The aq. extract has also been reported to decrease the levels of Glycosylated haemoglobin and other reactive substances.


**Table 1.**

<table>
<thead>
<tr>
<th>Groups</th>
<th>SEPT</th>
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<th>Hb</th>
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<tbody>
<tr>
<td>Group NC (0)</td>
<td>31.82±5.18</td>
<td>27.51±2.16</td>
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<tr>
<td>Group BGR-34 (1)</td>
<td>30.30±4.79</td>
<td>28.55±6.12</td>
<td>14.1±3.26</td>
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<tr>
<td>Group NE (2)</td>
<td>45.78±2.76</td>
<td>61.56±3.61</td>
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<tr>
<td>Group NC (3)</td>
<td>48.78±4.29</td>
<td>59.89±2.89</td>
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<tr>
<td>Group BGR-34 (4)</td>
<td>50.34±6.89</td>
<td>45.45±3.01</td>
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Values are given as mean ±SD for five determinations in each group.
NC: Normal control; ND: Normal rats administered Rubia cordifolia; DG: Diabetic control; DE: Diabetic experimental rats administered Rubia cordifolia, DG: Diabetic rats administered glibenclamide

The steptozocin induced diabetics had a damage over pancreatic acinar region as can be seen by reduced pancreatic amylose and lipases and these decreases are corrected by Gurmar therapy.

**Fig. 1.** Pancreatic section from normal experimental subject. The islet of langherans shows well defined granulated dark beta cells.

**Fig. 2.** Diabetic experimental subject pancreas, showing imperfections. The islet is atrophied and hydropic changes are seen.

**Fig. 3.** Islet from a diabetic experimental subject, after *Gymnema sylvestre* therapy. The beta cells appear dark, well developed and granulated.

Alpha amylase and glucosidase are the digestive enzymes. Their inhibitors are considered to be effective for the treatment of diabetes, obesity and hyperlipidaemia. In alpha amylase assay the positive control acarbose showed I50 of 47.98±1.2 and extract of *Rubia cordifolia* (Majeeth) showed an I50 95.34±1.6. Maximum percent inhibition of *R. cordifolia* extract and Positive control acarbose was found to be 50% and 69% at a concentration of 98.33±1.54 μg and 96.67±2.89 μg respectively.


Rubia cordifolia, DG: Diabetic rats administered glibenclamide

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Granules / Tablets
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Formulation optimization study

BGR-34 formulation Optimization for best Anti-hyperglycaemic activity

Primary screening of anti-diabetic potential of the herbal combinations in different proportions was undertaken by conducting Oral Glucose Tolerance Test (OGTT) as per the selected parameters. The treatment groups were dosed orally at 2000mg/kg body weight, 30 min. before giving glucose solution. Group 1 of experimental subjects was treated as normal control, and given only glucose solution orally. Group 2 referred as positive control, was treated with Metformin at 250 mg/kg body weight. Group 3-9 were given different combinations of herbs. The blood glucose level at intervals of 15, 30, 60 and 90 min were recorded after giving glucose solution successively. Based on the glucose metabolism kinetics of combinations, BGR-34 was found to have most optimum composition with best of anti-hyperglycemic activity.

BGR-34 maintained the glucose levels significantly when compared to control.

CLINICAL STUDY

A double blind placebo controlled clinical trial of BGR-34 in patients with mild to moderate diabetes mellitus was carried out with prior approval from the ethical committee at Aggarwal Hospital, New Delhi. 100 patients from the OPD at Aggarwal Hospital were screened, out of which 48 patients were selected after applying inclusion and exclusion criteria. The clinical trial was conducted for period of 16 weeks.

48 patients (30 male and 18 females) with type 2 diabetes mellitus were evaluated in the study. There were 24 patients in the BGR-34 group (drug arm) and 24 patients in the placebo group (placebo arm). The mean ages of patients for BGR-34 and placebo group were 46.29±9.2 and 48.40±8.6 years respectively. Average weight in BGR-34 group was 64.6±8.2 kg and in placebo group it was 66.2±9.4 kg.

Biochemical results of all patients were analyzed after completion of the study. Statistical analysis was carried out to calculate effect of BGR-34 on fasting blood glucose and post prandial blood glucose. Highly significant results were observed in 15 (62.5%) patients in the drug arm. Blood sugar fasting showed significant reduction in BGR-34 treated group as compared to placebo group.

Glycosylated haemoglobin decreased from 7.89±0.12 to 7.01±0.18 which was found to be the significant decline in the BGR-34 group. On the other hand in the placebo group, contrary to this there was no decline in the glycosylated haemoglobin level, instead of that an increase was reported from 7.90±0.14 to 8.01±0.22 during the 16 week study period. Favorable response in lipid profile was seen in the patient on BGR-34.

Conclusion:

BGR-34 showed very promising results with respect to glycemic parameters in patients with type 2 diabetes mellitus. There was a significant improvement in the feeling of well being due to better control of hyperglycemia. The various mechanisms through which the drug showed these results may be attributed to delay in absorption of glucose from GIT, Inhibition of Advanced glycation end products (AGEs) accumulation, enhancing insulin release and conversion of pro insulin to insulin. It is further suggested that BGR-34 should be further extensively used as a mono therapy/adjunctive therapy for the regulation /control of blood glucose level.

Glycosylated haemoglobin values in drug and placebo arms before and after the treatment

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The treatment groups were dosed orally at 2000 mg/kg body weight, 30 min. before giving glucose solution. Group 1 of experimental subjects was treated as normal control, and given only glucose solution orally. Group 2 referred as positive control, was treated with Metformin at 250 mg/kg body weight. Group 3-9 were given different combinations of herbs. The blood glucose level at intervals of 15, 30, 60 and 90 min were recorded after giving glucose solution successively. Based on the glucose metabolism kinetics of combinations, BGR-34 was found to have most optimum composition with best of anti-hyperglycemic activity.

BGR-34 maintained the glucose levels significantly when compared to control.

Glycosylated haemoglobin decreased from 7.89±0.12 to 7.01±0.18 which was found to be the significant decline in the BGR-34 group. On the other hand in the placebo group, contrary to this there was no decline in the glycosylated haemoglobin level, instead of that an increase was reported from 7.90±0.14 to 8.01±0.22 during the 16 week study period. Favorable response in lipid profile was seen in the patient on BGR-34.

Conclusion:

BGR-34 showed very promising results with respect to glycemic parameters in patients with type 2 diabetes mellitus. There was a significant improvement in the feeling of well being due to better control of hyperglycemia. The various mechanisms through which the drug showed these results may be attributed to delay in absorption of glucose from GIT, Inhibition of Advanced glycation end products (AGEs) accumulation, enhancing insulin release and conversion of pro insulin to insulin. It is further suggested that BGR-34 should be further extensively used as a mono therapy/adjunctive therapy for the regulation /control of blood glucose level.

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BGR-34 maintained the glucose levels significantly when compared to control.
The bio-chemical parameters in diabetic experimental subjects receiving BGR-34 as well, remain significantly different from the diabetic control with p<0.001 in Serum alkaline phosphatase (ALP) and serum creatinine and P<0.05 in Total cholesterol over the study period after induction of diabetes.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Bio-chemical Parameters</th>
<th>BGR-34 (normal control)</th>
<th>Vehicle</th>
<th>Metformin</th>
<th>BGR-34 (NBRMAP-DB-II)</th>
<th>Streptozotocin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ALP (IU/L)</td>
<td>84.02 ± 2.23</td>
<td>140.29 ± 4.71***</td>
<td>143.41 ± 2.12***</td>
<td>177.85 ± 3.54***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Serum Creatinine (mg/dl)</td>
<td>0.36 ± 0.02</td>
<td>0.29 ± 0.03</td>
<td>0.40 ± 0.03***</td>
<td>0.65 ± 0.03</td>
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<td>TC (mg/dl)</td>
<td>33.46 ± 2.80</td>
<td>39.59 ± 2.28*</td>
<td>37.18 ± 1.42*</td>
<td>51.15 ± 4.58*</td>
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<tr>
<td>Group 1</td>
<td>Blood Glucose (mg/dl)</td>
<td>96.6 ± 6.73</td>
<td>75.1 ± 2.75</td>
<td>90.6 ± 4.92</td>
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<td>Group 2</td>
<td>Blood Glucose (mg/dl)</td>
<td>172.3 ± 8.36***</td>
<td>80.16 ± 2.79***</td>
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<td>Group 3</td>
<td>Blood Glucose (mg/dl)</td>
<td>305.6 ± 17.34</td>
<td>71.5 ± 3.41***</td>
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<tr>
<td>Group 4</td>
<td>Blood Glucose (mg/dl)</td>
<td>398.6 ± 14.98</td>
<td>293.6 ± 8.31</td>
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The values are expressed as mean ±SEM. n = 6 experimental subjects per group. Significant difference of diabetic control from normal control on consecutive days: #P < 0.001. Significant difference of treated groups from diabetic control on the corresponding days: * P < 0.05, ** P < 0.01, *** P < 0.001

Effect of BGR-34 on Biochemical parameters

Study on Various Biochemical parameters of treated groups suggest the efficacy & safety of the formulation, BGR-34 in terms of Liver functions, Kidney functions and Lipid profile & General behaviour of Experimental subjects.

Anti-hyperglycemic activity Study

BGR-34 maintains glucose homeostasis in Diabetics

Anti-hyperglycemic potential of BGR-34 was studied in streptozotocin induced diabetic experimental subjects with fasting blood glucose (FBG) observed on 0.2nd, 10th & 21st day. BGR-34 was found to significantly maintain glucose homeostasis quite comparable to that with normal control (Vehicle group) and Metformin treated group and significantly different as compared to negative control streptozotocin only treated group with

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<th>Groups</th>
<th>Normal induction</th>
<th>10th day</th>
<th>21st day</th>
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<td>Group 1</td>
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Effect of BGR-34 on Blood glucose level in normal & STZ induced Diabetics

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DPPH radical scavenging activity

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A scientifically proven, optimized formulation with 34 vital phytoconstituent derivatives

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2. Berbamine
3. Palmatine
4. Dehydrocheilanthifoline - Insulin secretagogues
5. 8-oxo berberine - Regulates glucose homeostasis
6. Columbamine - Insulin secretagogues
7. Jatrorrhizine

8. Rubiadin - Potentiates insulin effect due to increased peripheral utilization of glucose.
9. Purpurin
10. Xanthopurin
11. Manjistin
12. Pseudopurin

13. 4 hydroxy isoleucine - Insulinotropic Activity
15. α-tocopherol - Reduces level of glycosylated haemoglobin.
16. Fenugreekine - Maintains blood glucose by slowing down metabolism
17. Scopoletin - Blood glucose regulator
18. Trigonelline

20. Marsupin - Insulinogenic
21. Pterosupin
22. Liquirtigenin
23. Epicatechin - Converts pro insulin to insulin.
24. Quercitin
25. Myrcetin - Blood glucose regulator
26. Isoliquirtigenin - Anti-hyperglycaemic

27. Palmatine - Insulin mimicking effect
28. Jatrorrhizine - Insulin releasing effect
29. Magnoflorine - Incretin mimicking action, delays absorption of glucose and interferes with ability of taste buds to differentiate between bitter and sweet.
31. Gurmarin - Incretin mimicking action, delays absorption of glucose and interferes with ability of taste buds to differentiate between bitter and sweet.
32. Gymnemagenin - Maintains blood glucose homeostasis and anti-oxidant action.
33. Dihydroxy gymnemic triacetate - Insulin secretagogues
34. Isoquinoline - Insulin secretagogues