CSIR SCIENTISTS AWARDED BY
TECHNOLOGY AWARD-2016
for Innovative Ayurvedic Drug
for Diabetes BGR-34
Tablets
Appreciated by the Hon’ble Prime Minister of India

BGR-34
Tablets

JOINTLY DEVELOPED BY THE SCIENTISTS OF
CSIR- NBRI NATIONAL BOTANICAL RESEARCH INSTITUTE (LUCKNOW)
& CSIR- CIMAP CENTRAL INSTITUTE OF MEDICINAL & AROMATIC PLANTS, (LUCKNOW)

Over 20 LAKH Patients Benefitted

First Time in India an Ayurvedic brand -BGR-34 features in top 20 list of Best Launches in last 2 years amongst more than 6000 allopathic brands.

AIOCD Survey Apr.2017

RANKED No. 1 IN INDIA in Ayurvedic/Herbal Anti-diabetic market by
imshealth

RESEARCH TECHNOLOGY TRANSFERRED TO AIMIL
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 22 Feb. 2014 at Vigyan Bhawan, New Delhi and the research technology has been transferred to Aimal 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 Aimal 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 Aimal Pharmaceuticals all the success in their noble endeavor of serving the 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)
BGR-34 Tablets

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 cAMP 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).
BGR-34™ Tablets

Research product of MINISTRY OF SCIENCE & TECHNOLOGY

Helps in Effective management of diabetes by inhibiting DPP-4 (GLP-1 & GIP)

Berberine (Berberis aristata) acts as a DPP-4 inhibitor and blocks DPP4 enzymes activity. It increases GLP-1 level (A Gut hormone) which delays glucose absorption and provides protection from oxidative damage.

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.

Improves Insulin action by activating AMPK

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(19), 5-6, 2010)

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(3): 1061-1066, 2009)

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(Natural Products, 4; 158-163, 2011)

Figure-1: DPP-4 inhibitory activity of Diprotin A, the standard DPP-4 inhibitor

Figure-2: DPP-4 inhibitory activity of Berberis aristata ext.
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 Tablets)

Converting Pro-insulin to insulin

(-)-Epicatechin, an active principle in the extract of Pterocarpus marsupium (Vijaysar) increases the cAMP content of the β-islets which is associated with 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 Pterocarpus marsupium (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 Pterocarpus marsupium (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.

(Debomalyo Grootland, 34, 1, 2005)

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

<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>Fasting</td>
<td>Vajravar</td>
<td>10.5</td>
<td>8.9</td>
<td>1.6*</td>
</tr>
<tr>
<td></td>
<td>(n=50)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tolbutamide (n=45)</td>
<td>10.5</td>
<td>8.7</td>
<td>1.8*</td>
</tr>
</tbody>
</table>
Research product of MINISTRY OF SCIENCE & TECHNOLOGY

BGR-34™

BGR-34 Tablets

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 extract combinations, BGR-34 was found to have most optimum composition with best of anti-hyperglycaemic activity.

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

CLINICAL STUDY OF BGR-34

Establishing its efficacy and safety in patients with TYPE-II Diabetes

A randomised, double blind, placebo controlled clinical study was conducted in patients with mild to moderately severe type 2 diabetes mellitus at Aggarwal Hospital, New Delhi (India) with BGR-34/placebo taken as adjuvant along with the prescribed anti-diabetic drugs if any. The duration of study was 4 months.

Inclusion Criteria:
- Age: 25 to 60 years
- Patients with type 2 Diabetes mellitus
- Fasting blood glucose >126 mg/dL
- Absence of any other significant disease or clinically significant medical history on physical examination during screening in the view of the investigator.
- Subjects willing to provide written informed consent to participate in the study.

Exclusion Criteria:
- Patients on Insulin
- Patients with acute infections or chronic debilitating diseases, tuberculosis, malignancy, HIV infection etc.
- Any life threatening serious disorder of the liver, kidneys, heart, lungs or other organs
- Pregnancy and lactation
- Patients diagnosed with severe end organ damage
- Unwillingness to give written informed consent for participation in the study.

Demographic profile of patients according to treatment group

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 3 (mean ± SD)</th>
<th>Placebo (mean ± SD)</th>
<th>p value *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>47.9 ± 6.7</td>
<td>49.7 ± 5.9</td>
<td>0.318</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>67.04 ± 8.6</td>
<td>70.1 ± 6.9</td>
<td>0.1444</td>
</tr>
<tr>
<td>Males (%)</td>
<td>16 (57.1)</td>
<td>14 (50.0)</td>
<td>0.592#</td>
</tr>
<tr>
<td>Females (%)</td>
<td>12 (42.9)</td>
<td>14 (50.0)</td>
<td></td>
</tr>
</tbody>
</table>

The difference in age, body weight, number of patients in the drug and placebo groups was not found to be significant.

56 patients (30 male and 26 females) with type 2 diabetes mellitus completed the study. There were 28 patients in the BGR-34 group (drug arm) and 28 patients in the placebo group (placebo arm). The mean age of patients for BGR-34 and placebo group were 47.9±6.7 years and 49.7±5.9 years respectively. Average body weight in BGR-34 group was 67.04±8.6 kg and in placebo group it was 70.1±6.9 kg.

**p<0.01, ***p<0.001 Vehicle vs treatment- Metformin at 250mg/kg bd wt. of combination treatments at 500mg/kg body wt. administered 30 min prior to Glucose at 2000mg/kg
Study shows Encouraging Effect on Fasting and PP Blood Glucose

Effect of BGR-34 and Placebo on Fasting Blood Glucose (FBG) mg/dl at baseline and after completion of study

<table>
<thead>
<tr>
<th>Variables</th>
<th>Drug Group (mean ± SD)</th>
<th>Placebo (mean ± SD)</th>
<th>Difference (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>196.0 ± 32.7</td>
<td>187.2 ± 43.3</td>
<td>8.8 (11.7 to 23.1)</td>
<td>0.3909</td>
</tr>
<tr>
<td>Post intervention</td>
<td>129.3 ± 33.3</td>
<td>162.9 ± 41.59</td>
<td>-33.5 (33 to -13.7)</td>
<td>0.0016</td>
</tr>
<tr>
<td>Change (reduction)</td>
<td>66.7 ± 23.2</td>
<td>24.4 ± 14.3</td>
<td>42.3 (31.9 to 52.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>%Change (reduction)</td>
<td>34.5 ± 10.7</td>
<td>13.2 ± 7.7</td>
<td>21.2 (6.1 to 25.2)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Biochemical results of all patients were analyzed before and after completion of the study. Blood sugar fasting showed significant reduction (p=0.0016) from 196.0 ± 32.7 mg/dl to 129.3 ± 33.3 mg/dl in the BGR-34 treated group as compared to placebo group where fasting blood sugar reduced from 187.2 ± 43.3 mg/dl to 162.9 ± 41.6 mg/dl. The percent reduction in the BGR-34 treated group was highly significant (p<0.001) as compared to the placebo group.

Fig 1: Comparison between means (± SD) of Fasting Blood Glucose (FBG) mg/dl, values in drug and placebo arms before and after the treatment.

Study shows significant reduction in Glycosylated Haemoglobin (HbA1c)

EffecT on BGR-34 and Placebo on Post Prandial Blood Glucose (PPBG) mg/dl at baseline and after completion of the study

<table>
<thead>
<tr>
<th>Variables</th>
<th>Drug Group (mean ± SD)</th>
<th>Placebo (mean ± SD)</th>
<th>Difference (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>278.8 ± 53.7</td>
<td>294±58.3</td>
<td>-15.1 (-42.9 to 12.8)</td>
<td>0.2482</td>
</tr>
<tr>
<td>Post intervention</td>
<td>215.8 ± 45.3</td>
<td>262 ± 52.9</td>
<td>-46.5 (-81.1 to -11.9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Change (reduction)</td>
<td>64.5 ± 16.9</td>
<td>62 ± 18.4</td>
<td>2.5 (17.2 to 4.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>%Change (reduction)</td>
<td>30.5 ± 10.6</td>
<td>10.9 ± 5.9</td>
<td>19.6 (14.3 to 24.9)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Post prandial blood glucose (PPBG) showed significant reduction (p=0.001) from 278.8 ± 53.7 to 215.8 ± 45.3 in BGR-34 treated group as compared to placebo group where PPBG reduced from 294±58.3 to 262 ± 52.9 mg/dl. Percentage reduction in BGR-34 treated group was highly significant with (p<0.001) as compared to the placebo group.

Fig 2: Comparison between means (± SD) of Post Prandial Blood Glucose (PPBG) mg/dl, values in drug and placebo arms before and after the treatment.

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 wellbeing due to better control of hyperglycemia. The various mechanism through which the drug showed these results may be attributed to i) delays in absorption of glucose from GIT, ii) inhibition of Advanced Glycation end products (AGEs) accumulation and iii) enhancing insulin release and conversion of pro-insulin to insulin. It is further suggested that BGR-34 should be further extensively used as a monotherapy/adjunctive therapy for the regulation/management/control of blood glucose level.

BGR-34 showed very promising results with respect to glycemic parameters in patients with type 2 Diabetes mellitus.
BGR-34 Tablets

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

Active Ingredients:

- Daruharidra: Improves health & functioning of pancreas, naturally.
- Majeeth: Powerful anti-oxidant activity. Helps protect vital organs from oxidative damage.
- Vijaysar: Rich in flavonoids, strengthens the cells and help maintain normal blood glucose level.
- Gudmar: Maintains post-prandial blood glucose level by delaying glucose absorption.
- Giloy: A unique herb to improve immunity. Helps improve resistance to infections.

Indications:
- Type II Diabetes Mellitus
- Impaired Glucose Tolerance
- As adjunct to OHG’s & Insulin

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