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# EVALUATION OF ANTIDIABETIC ACTIVITY OF HYDROALCOHOLIC LEAVES EXTRACT OF *RUMEX ALPINES* PLANT

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**ABSTRACT**

The present study was designed to evaluate the antidiabetic potential of the hydroalcoholic extract of *Rumex alpines* leaves using *in vivo* approaches. For *in vivo* studies, blood glucose level was monitored at different intervals after administration of varying doses of the extract for its anti-hyperglycemic effect in normoglycemic and diabetic wistar rats. Hydroalcoholic leaves extract of *Rumex alpines* was screened for antidiabetic activity and given to the 'Alloxan monohydrate'-induced diabetic rats at a concentration of 250 mg/kg and 500 mg/kg of body weight in different groups of 6 diabetic rats each orally once a day for 15 days. Glibenclamide is given to another group to support the result at a dose of (600µg/kg p.o.) of body weight orally once a day for 15 days. The plant extract showed significant antihyperglycemic effect in normoglycemic and diabetic wistar rats. The results demonstrate that hydroalcoholic leaves extract of *Rumex alpines* possess antidiabetic property.

**Keyword:** *Rumex alpines* leaves extract, Glibenclamide, 'Alloxan monohydrate'

## 1. INTRODUCTION

This results primarily in increasing blood glucose levels. If this variance and imbalanced condition does not revert back to normal and staying for a prolonged period of time, it develops hyperglycemia and in the long run, leads to a syndrome called diabetes mellitus. "Diabetes derived from the Greek word "Diab" was first used in 230 BCE it means to pass through, heavy thirst and frequent urination; "mellitus" is the Latin word for "sweetened with honey which indicates the presence of sugar in the urine. Famous Egyptologist Georg Ebers in 1874 explains, among various other diseases and their remedies, the reference to diabetes mellitus.

Physicians in India developed first clinical test for diabetes during the same period of time. They observed that urine from people with suffering from diabetic diseases attracted various insect like ants and flies. They describe these diseases condition "madhumeha" or "honey urine". Physicians from India studied that may be due to ketosis patients with "madhumeha" suffered from extreme thirst and foul smelling breath. Sushruta and Charaka, two renowned Indian physicians, were the first to describe the differentiation between the two various types of diabetes mellitus. Insulin discovered by Frederick Banting and Charles Best was the final benchmark in identifying the substance whose deficiency had been postulated to be responsible for the development of diabetes.

## 2. MATERIALS AND METHOD

### 2.1 Collection of plant material

Plant of *Rumex alpines* was collected from Vindhya Herbal Nursery Bhopal.

### 2.2 Storage

Drying of fresh plant parts were carried out in sun but under the shade. Dried Leaves of *Rumex alpines* were preserved in plastic bags and closed tightly and powdered as per the requirements.

### 2.3 Extraction procedure

Leaves of *Rumex alpinus* were shade dried at room temperature. The shade dried plant material was coarsely powdered and subjected to extraction with petroleum ether by maceration. The extraction was continued till the defatting of the material had taken place. 90 gm of dried powdered Leaves of *Rumex alpinus*has been extracted with hydroalcoholic solvent (ethanol:water: 80:20) using maceration process for 48 hrs, filtered and dried using vacuum evaporator at $40^0$C. The percentage yield of each extract was calculated by using following formula:

$$\text{Percentage yield} = \frac{\text{Weight of Extract}}{\text{Weight of powder drug Taken}} \times 100$$

### 2.4 Phytochemical Screening

The *Rumex alpinus* extract acquire was subjected to the precursory phytochemical analysis following standard methods by Khandelwal and Kokate. The extract was screened to identify the presence/Absence of various active principles of alkaloids, glycosides, phenols, flavonoids, Amino acid, Cabohydrates, Terpenoids, Saponins, Steroids.

### 2.5 Total Phenolic content estimation

The total phenolic content of the extract was determined by the modified Folin-Ciocalteu method.

### 2.6 Total flavonoids content estimation

Determination of total flavonoids content was based on aluminium chloride method.

### 2.7 *In -Vivo* Anti diabetic activity

Wistar rats (150–200 g) were group housed (n= 6) under a standard 12 h light/dark cycle and controlled conditions of temperature and humidity (25±2 °C). Separate group (n=6) of rats was used for each set of experiments. Toxicity studies were carried out in accordance with OECD guidelines, acute oral toxicity study of

hydroalcoholic extract of *Rumex alpinus*. The hydroalcoholic extract of *Rumex alpines* (250,500 mg/kg/day) was administered orally for 4 days of six groups of rats (n=6) and the animals were kept under examination for mortality as well as any behavioral changes.

After fasting, diabetes was induced by a single intraperitoneal injection of 120 mg/kg body weight of 'Alloxan monohydrate' in distilled water. The animals were allowed to drink 5% glucose solution overnight to overcome the drug-induced hypoglycaemia. These animals were tested for diabetes after 15 days and animals with blood glucose (fasting) were selected for experimentation.

**Group I:** Rats served as normal-control and received the vehicle (0.5 ml distilled water/day/rat)

**Group II:** Rats served as diabetic-control and received the vehicle (0.5 ml distilled water/day/rat)

**Group III:** Rats (diabetic) were administered of hydroalcoholic extract of *Rumex alpines* (250 mg/kg p.o.) for 15 days

**Group IV:** Rats (diabetic) were administered of hydroalcoholic extract of *Rumex alpines* (500 mg/kg p.o.) for 15 days

**Group V:** Rats (diabetic) were administered Glibenclamide (600µg/kg p.o.) for 15 days

## 3. RESULTS AND DISCUSSION

### 3.1 Result of Percentage Yield

The yield of extracts obtained from hydroalcoholic solution as solvents are depicted in the table 3.1.

**Table .1: % Yield of Leaves of *Rumex alpinus***

| S. No. | Solvents | % Yield |
|---|---|---|
| 1. | Hydroalcoholic | 8.25 |

### 3.2 Result of Phytochemical screening of extracts

The outcomes of the results of Hydroalcoholic extract of *Rumex alpinus* Leaves are discussed separately in the table 3.2.

**Table 3.2: Phytochemical screening of extract of Leaves of *Rumex alpinus***

| S. No. | Constituents | Hydroalcoholic extract |
|---|---|---|
| **1.** | **Alkaloids** | |
| | Mayer's Test | -ve |
| | Wagner's Test | -ve |
| | Dragendroff's test | -ve |

| | | |
|---|---|---|
| | Hager's test | -ve |
| **2.** | **Glycosides** | |
| | Modified Borntrager's Test | -ve |
| | Legal's test | +ve |
| **3.** | **Flavonoids** | |
| | Lead acetate | +ve |
| | Alkaline test | +ve |
| **4.** | **Phenolics** | |
| | Ferric Chloride Test | +ve |
| **5.** | **Proteins and Amino acids** | |
| | Xanthoproteic test | +ve |
| | Ninhydrin Test | +ve |
| **6.** | **Carbohydrates** | |
| | Molisch's Test | +ve |
| | Benedict's Test | -ve |
| | Fehling's test | -ve |
| **7.** | **Saponins** | |
| | Froth Test | +ve |
| | Foam test | +ve |
| **8.** | **Diterpins** | |
| | Copper acetate test | -ve |

**3.3 Results of estimation of total Phenolic and Total flavonoid content of Leavesof *Rumex alpinus***

**Table 3.3: Total Phenolic and Total flavonoid content of Leavesof *Rumex alpinus***

| S. No. | Extract | Total Phenol (mg/100mg) | Total flavonoid (mg/100mg) |
|---|---|---|---|
| **1.** | Hydroalcoholic *extract* | 0.62 | 0.431 |

### 3.4 Results of *in vivo* anti diabetic activity

**Table 3.4: Effect of hydroalcoholic extract of *Rumex alpinus* treatment on blood glucose (mg/dl) in normal and diabetic rats**

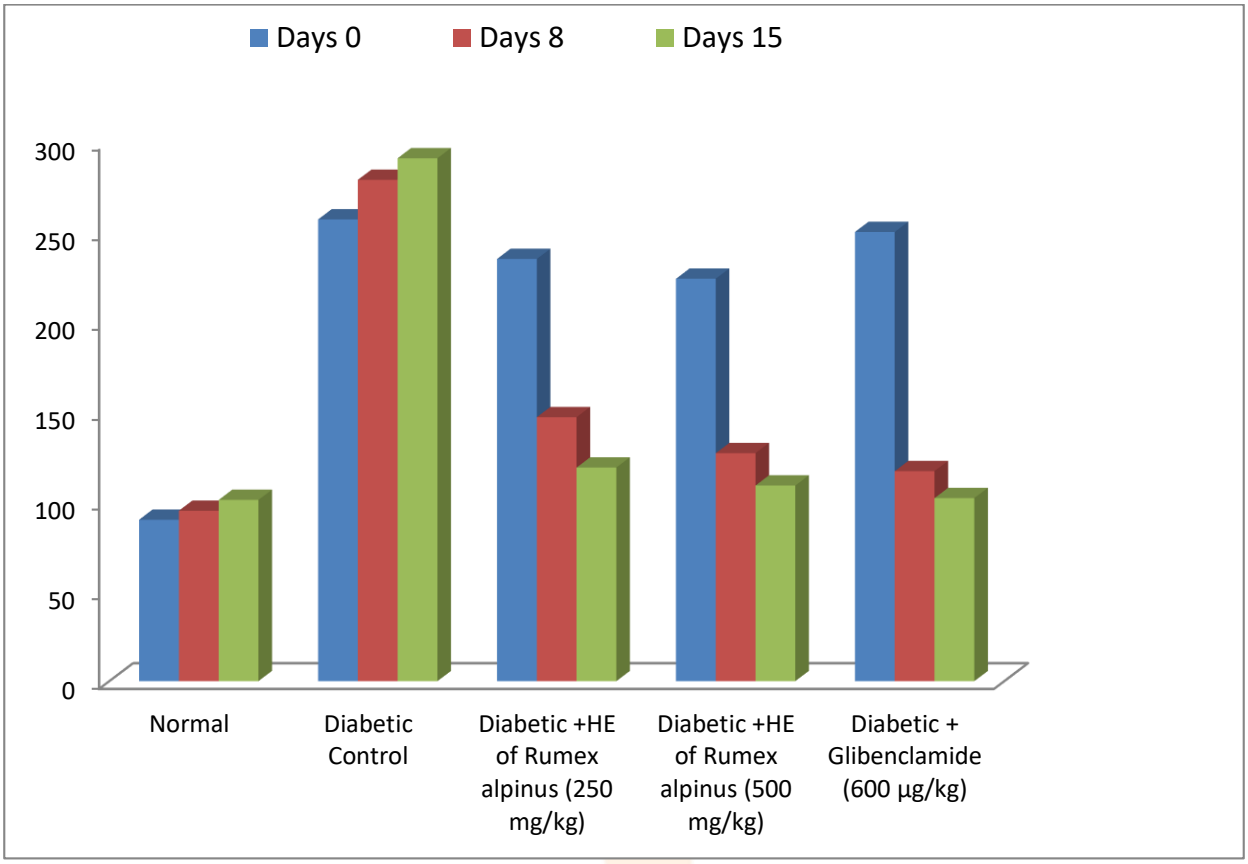


**Figure 3.1: Effect of hydroalcoholic extract of *Rumex alpinus* treatment on blood glucose (mg/dl) in normal and diabetic rats**

**Table 3.5: Effect of hydroalcoholic extract of *Rumex alpinus* treatment on biochemical parameters in normal and diabetic rats**

| Group | Treatment | TC (mg/dL) | TG (mg/dL) | Total protein(g/dl) |
|---|---|---|---|---|
| I | Normal | 90.00 ± 3.00 | 85.50 ± 3.00 | 9.00 ± 1.50 |
| II | Diabetic Control | 192.0 ± 5.00 | 128.0 ± 6.00 | 5.60 ± 1.50 |
| III | Diabetic + hydroalcoholic extract of *Rumex alpinus* (250 mg/kg) | 115.8 ± 5.55** | 90.40 ± 6.00* | 7.800 ± 2.50** |
| IV | Diabetic + hydroalcoholic extract of *Rumex alpinus* (500 mg/kg) | 106.5 ± 5.50** | 85.60 ± 6.00* | 8.30 ± 2.50** |

| | | | | |
|---|---|---|---|---|
| V | Diabetic + Glibenclamide (600µg/kg) | 103.1 ± 5.50** | 81.80 ± 6.00* | 8.11± 2.50** |

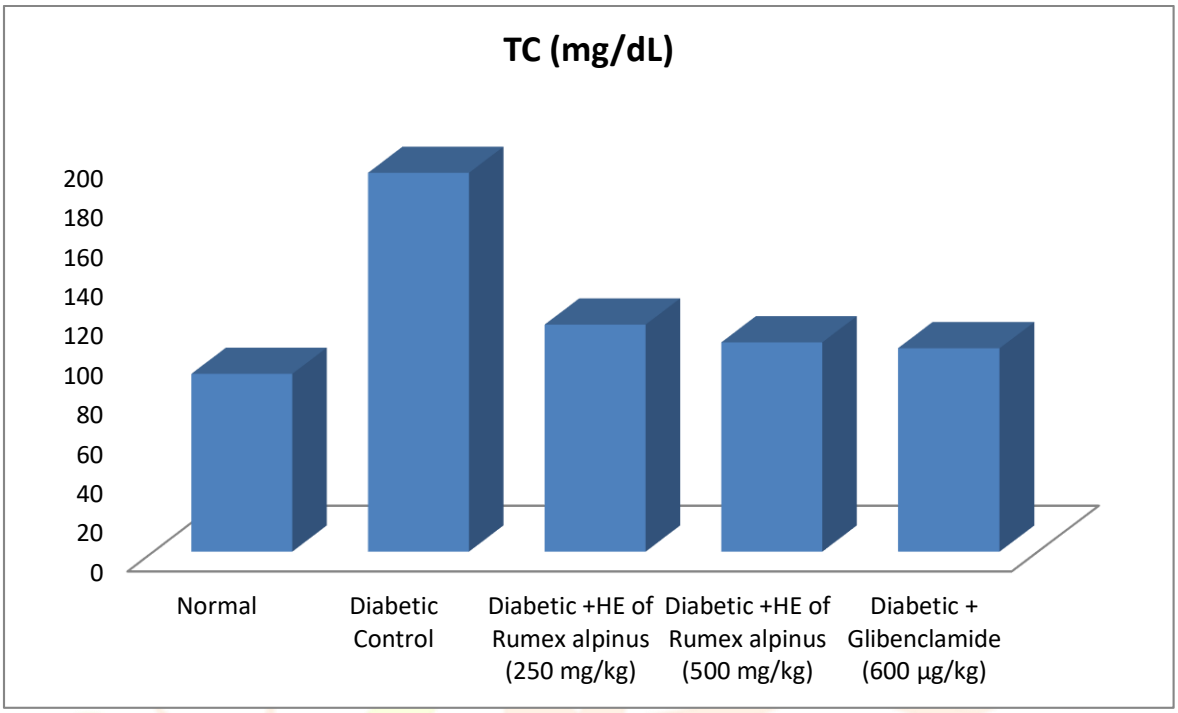


**Figure 3.2: Effect of hydroalcoholic extract of *Rumex alpinus* treatment on total cholesterol in normal and diabetic rats**

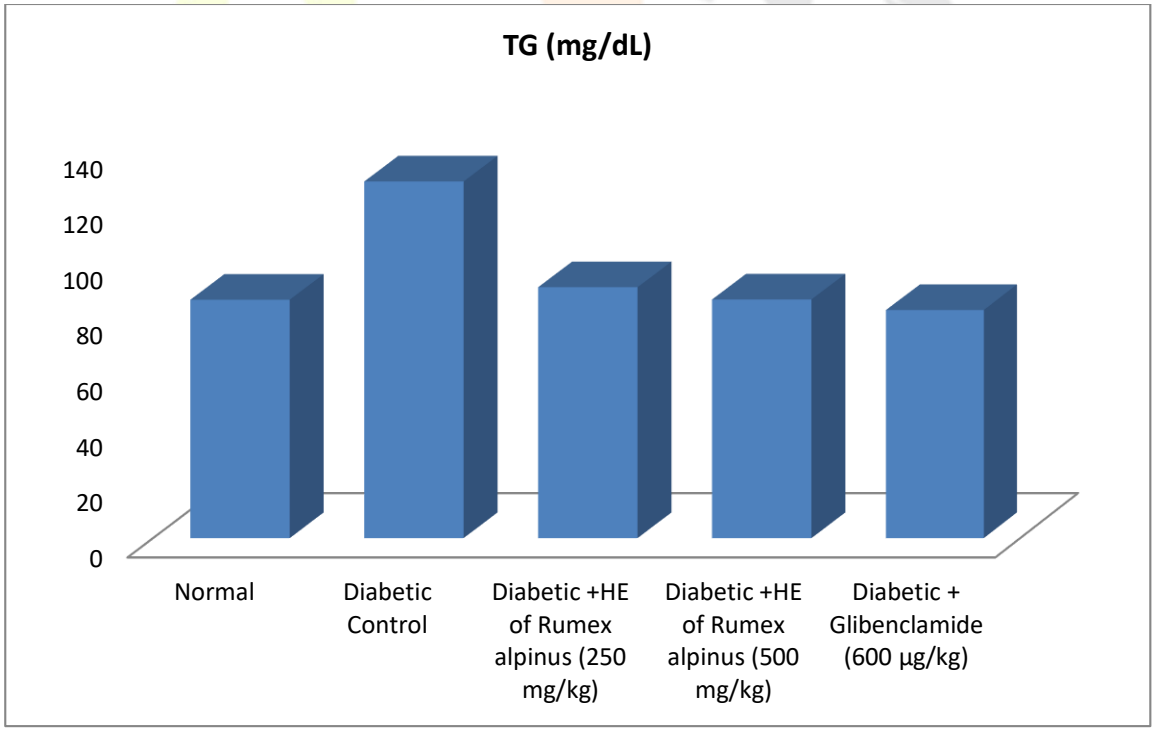


**Figure 3.3: Effect of hydroalcoholic extract of *Rumex alpinus* treatment on triglyceride in normal and diabetic rats**

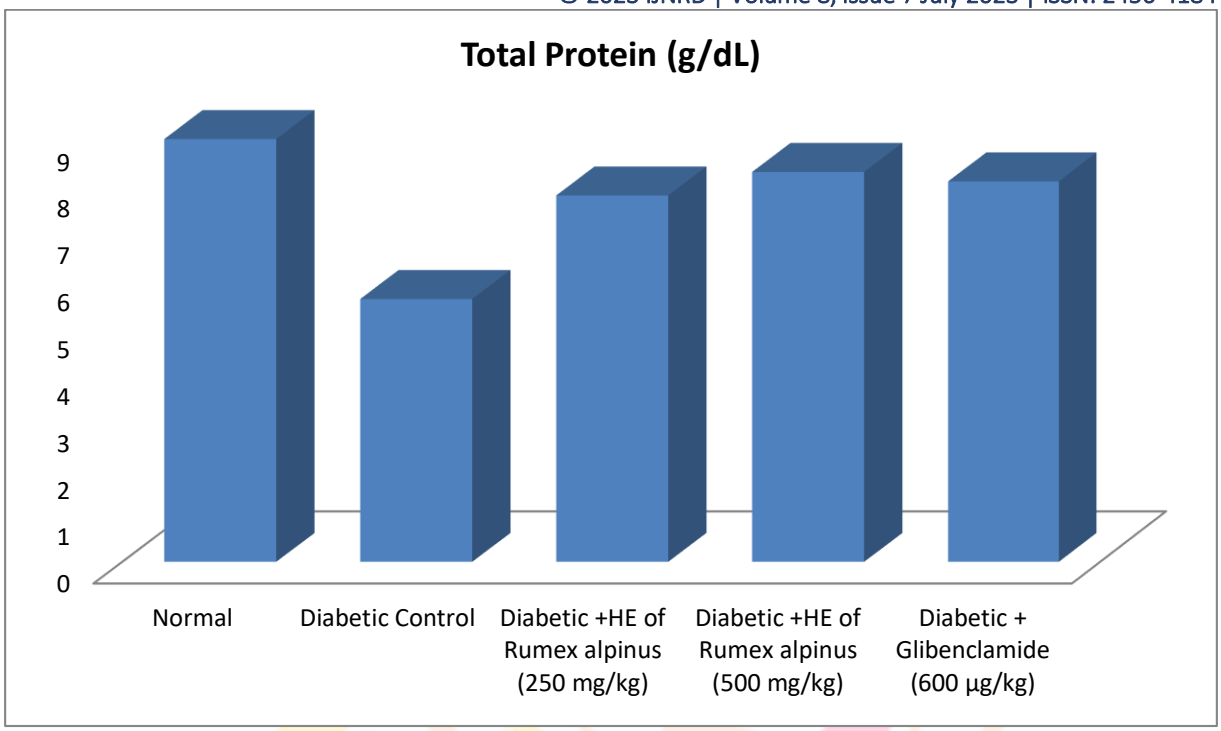


**Figure 3.4: Effect of hydroalcoholic extract of *Rumex alpinus* treatment on total protein in normal and diabetic rats**

**Table 3.6: Effects of hydroalcoholic extract of *Rumex alpinus* on body weight**

| Group | Treatment | Initial weight (g) | Final weight (g) |
|---|---|---|---|
| I | Normal | 158.00 ± 8.00 | 185.10 ± 8.00 |
| II | Diabetic Control | 164.00 ± 8.00 | 155.00 ±9.00 |
| III | Diabetic + hydroalcoholic extract of *Rumex alpinus* (250 mg/kg) | 166.00 ± 8.00 | 173.30 ± 9.00 |
| IV | Diabetic + hydroalcoholic extract of *Rumex alpinus* (500 mg/kg) | 171.00 ± 8.00 | 186.50 ± 8.00 |
| V | Diabetic + Glibenclamide (600µg/kg) | 177.00 ± 8.00 | 197.10 ± 9.00 |

Values are expressed as mean ± SD of six samples from each group. (Two-way ANOVA test).

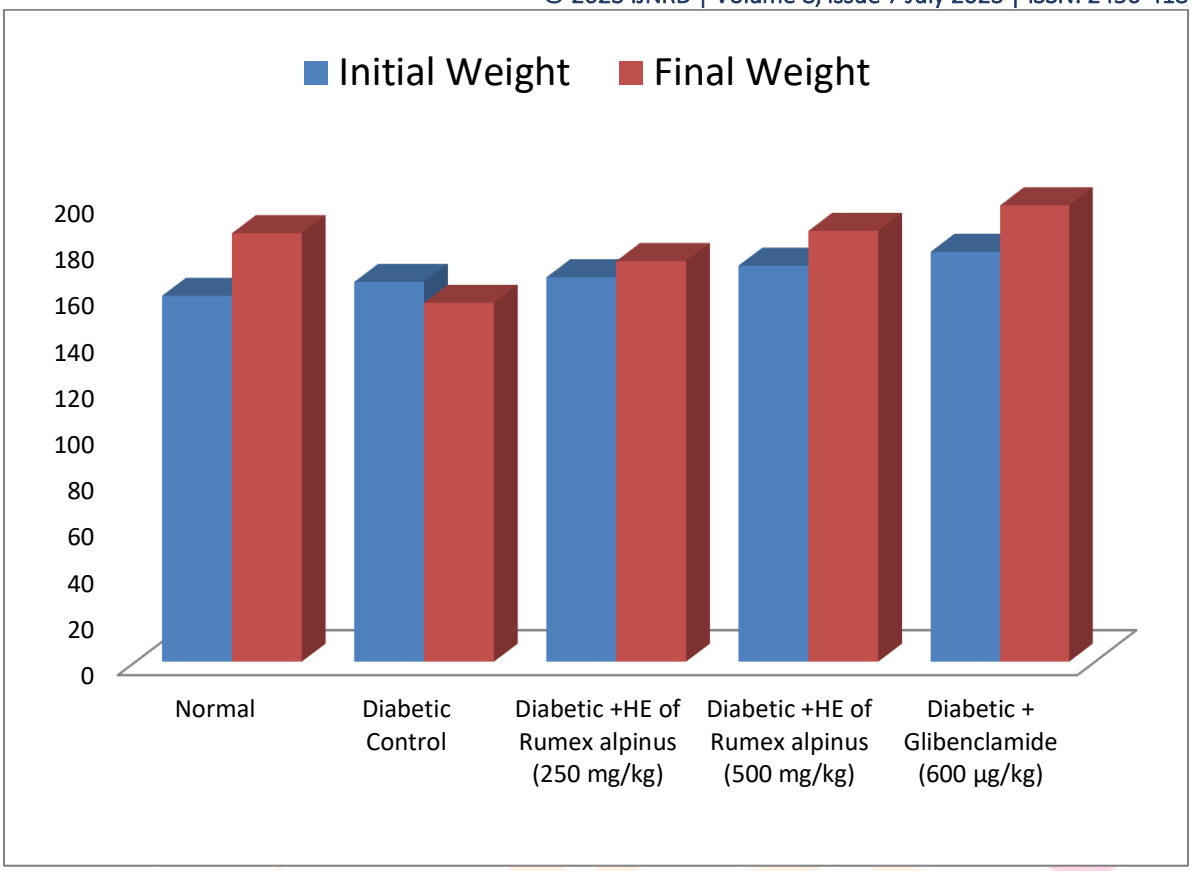


**Figure 3.5: Effects of hydroalcoholic extract of *Rumex alpinus* on body weight**

## CONCLUSION

Hydroalcoholic extract of *Rumex alpines* exhibited significant anti-hyperglycemic activities in alloxan-induced hyperglycemic rats without significant change in body weight; they can also improve the condition of Diabetic mellitus as indicated by parameters like body weight & lipid profile. The renewal of cells in diabetes has been studied in several animal models. The total cell mass reflects the balance between the renewal and loss of these cells. It was also suggested that regeneration of islet ß cells following destruction by alloxan may be the primary cause of the recovery of alloxan-injected guinea pigs from the effects of the drug. Hydroalcoholic extract of *Rumex alpines* has been shown to act by cell regeneration. In our studies, the damage of pancreas in alloxan-treated diabetic control rats and regeneration of cells by glibenclamide was observed. It is found that of hydroalcoholic extract of *Rumex alpinus*at high dose (500 mg/kg) is more effective than whole plant extract at low dose (250 mg/kg) after 15 days of treatment. Hence the above discussion revels that of hydroalcoholic extract of *Rumex alpines* at high dose (500 mg/kg) is more effective and shows similar curative effect as standard that is glibenclamide (600 µg/kg). This could be due to the possibility that some-cells are still surviving to act upon by hydroalcoholic extract of *Rumex alpines* to exert its insulin releasing effect.

From the above discussion it conclude that Hydroalcoholic extract of *Rumex alpines* at high dose (500 mg/kg) exhibited significant antihyperglycemic activity than whole plant extract at low dose (250 mg/kg) in alloxan-induced diabetic rats. These extracts also showed improvement in parameters like body weight and lipid profile

as well as regeneration of cells of pancreas and so might be of value in diabetes treatment. Further investigation is in necessary to determine the exact phytoconstituents (s) responsible for antidiabetic effect.

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