



Available online freely at [www.isisn.org](http://www.isisn.org)

# Bioscience Research

Print ISSN: 1811-9506 Online ISSN: 2218-3973

Journal by Innovative Scientific Information & Services Network



RESEARCH ARTICLE

BIOSCIENCE RESEARCH, 2020 17(4): 2711-2715.

OPEN ACCESS

## Anti-diabetic Activity of *Daphne mucronata* Royle in Induced Diabetic Rabbits

Muhammad Romman<sup>1\*</sup>, Rainaz Parvez<sup>2,3</sup>, Hina Ghani<sup>1</sup>, Samin Jan<sup>4</sup>, Muhammad Shuaib<sup>5</sup>, Saraj Bahadur<sup>6</sup>, Kamran Shah<sup>7</sup>, Hammad Ahmad Jan<sup>8</sup>, Faiz ul Haq<sup>9</sup>, Atif Ali Khan Khalil<sup>10</sup>, Syed Sardar Sikandar Hayat<sup>4</sup>, Wali Khan<sup>11</sup>, Bashir ahmad<sup>11</sup>, Rizwana Bilqees<sup>1</sup>, Murad Ali<sup>12</sup>, Shariat ullah<sup>13</sup>, Ali Hazrat<sup>13</sup>, Nisar uddin<sup>14</sup>, Noor Muhammad<sup>15</sup>, Muhammad Adnan<sup>16</sup>, Muhammad Ikram<sup>14</sup>, Zakir ullah<sup>17</sup>, Ihtesham Ul Haq<sup>18</sup>, Akhtar Rasool<sup>19</sup>, Saqibullah<sup>8</sup>, Muhammad Ishaq<sup>20</sup>, Sareer Ahmad<sup>4</sup>, Riaz Ahmad<sup>21</sup> and Muhammad Ibrahim<sup>22</sup>

<sup>1</sup>Pharmacognosy Lab, Department of Botany, University of Chitral, **Pakistan**

<sup>2</sup>Department of Botany, Government Girls Degree College Dargai, District Malakand, **Pakistan**

<sup>3</sup>Department of Botany, Abdul Wali Khan University Mardan, **Pakistan**

<sup>4</sup>Department of Botany, Islamia College Peshawar, **Pakistan**

<sup>5</sup>School of Ecology and Environmental Science, Yunnan University, Kunming, Yunnan, **China**

<sup>6</sup>Institute of Tropical Agriculture and Forestry, Hainan University Haikou, **China**

<sup>7</sup>College of Horticulture, Northwest Agriculture and Forestry University, Shaanxi, **China**

<sup>8</sup>Department of Chemical and Life Sciences, Qurtuba University of Science and Information Technology, **Pakistan**

<sup>9</sup>Department of Microbiology, University of Health Sciences Lahore, **Pakistan**

<sup>10</sup>Department of Biological Sciences, National University of Medical Sciences, Rawalpindi, **Pakistan**

<sup>11</sup>Department of Zoology, University of Malakand, **Pakistan**

<sup>12</sup>Institute of Biotechnology and Genetic Engineering, The University of Agriculture Peshawar, **Pakistan**

<sup>13</sup>Department of Botany, University of Malakand, **Pakistan**

<sup>14</sup>Department of Botany, Hazara University, **Pakistan**

<sup>15</sup>Department of Pomology, The College of Horticulture Hebei Agricultural University Baoding, Hebei **China**

<sup>16</sup>Department of Agriculture, University of Swabi, **Pakistan**

<sup>17</sup>Plant Biochemistry and Molecular Lab, Quaid i Azam University Islamabad, **Pakistan**

<sup>18</sup>Department of Applied Life Science Gyeongsang National University Jinju-si, Gyeongnam, **South Korea**

<sup>19</sup>Centre for Biotechnology and Microbiology, University of Swat, **Pakistan**

<sup>20</sup>Department of Botany, Bacha Khan University Charsadda, KP, **Pakistan**

<sup>21</sup>Department of Applied Life Science Gyeongsang National University Jinju-si, Gyeongnam, **South Korea**

<sup>22</sup>Department of Botany, Government Post Graduate College Dargai, Malakand, **Pakistan**

\*Correspondence: [dr.romman.uom@gmail.com](mailto:dr.romman.uom@gmail.com) Received 13-09-2020, Revised: 11-10-2020, Accepted: 25-10-2020 e-Published: 10-11-2020

This research work was executed to determine antidiabetic activity of *Daphne mucronata*. The *D. mucronata* have significant function in keeping up individuals' wellbeing. The methanolic concentrate of *D. mucronata* was evaluated in rabbits which were induced diabetic with alloxan monohydrate. The concentrates were given orally by 8 hours. The extract was given at 125mg, 225 mg and 325mg/kg per body weight individually while alloxane was given at 12 mg/kg. At like clockwork blood test was gathered, serum isolated and the level of glucose was dictated by pack strategy. The outcome proposes that the treatment of 325 mg/kg body weight essentially ( $p < 0.05$ ) diminished the level of blood glucose at 143 mg/dl in the trial gathering. Along these lines, it is reasoned that the *D. mucronata* have noteworthy

role in diabetic control.

**Keywords:** Diabetic mellitus, *D. mucronata* alloxan monohydrate, glucose

## INTRODUCTION

*D. mucronata* Royle belong to the family Thymelaeaceae popularly known as kheweshk. As an herbal diseases medicine, the plant *D. mucronata* is traditionally utilized for the behavior and cure of various infections for example cancer. The *Daphne* genus consists of about 100 species. The leaves of the plant contain toxic properties that are not potent and forceful towards goats and the bark of the plant can be used to heal and make well bone diseases and also used for the washing of hair (Ashraf et al. 2018). The leaves of the *D. mucronata* are poisonous. Fruits of these plant eatable in addition to consumed and is exploited by way of pigment and colorant for the leathery skin (Takashi et al. 2006). *Daphne mucronata* is a common shrub by the side of river banks from 800 to 3000 m; in Trans-Indus, Hazara, Kaghan, Poonch, Chitral etc (Ali and Al-snafi, 2017). *D. mucronata* is also used for the treatment and cure of ulcer, rheumatism as a purgative abortifacient and against toothache. The powdered of bark or leaves are mixed in enough quantity of mustard oil to organize a past which is applied on swollen parts to relieve and reduce pain and swelling. In the some areas of Pakistan *D. mucronata* leaves decoction, in efficient arthritis and flue like situation and also apply topically on muscle swelling (Rasool et al. 2010). Its cooked and ripe leaves and decoction were in employment and functioning for curing and remedial for women infertility, gynecological infection, menstruation disorders and constipation. For the antimicrobial movement of hydro alcoholic, aqueous also alcoholic removes of the greeneries and stem of the plant *D. mucronata* on the growth of oral bacteria *D. mucronata* has been evaluated. The antimicrobial special effects of the *D. mucronata* extracts were evaluated by means of the disk of agar dispersal technique then the lowest inhibitory meditation. And the outcome indicated on the type of extract that the antimicrobial action depended. The alcoholic extract of *D. mucronata* has the maximum antibacterial activity and the highest effect on *Streptococcus mutans*. Of the plant aqueous extract have no effect on bacterial growth (Da Silva et al. 2019).

## MATERIALS AND METHODS

### Selection of plant:

The material of the plant *Daphne mucronata* was obtain from the mountainous and rocky areas of Khyber Pakhtunkhwa.

### Collection of plant:

The plant *Daphne mucronata* are collected from Golan valley Tehsil and District Chitral from where they are collected.

### Drying of Plant:

For 21 days for drying of the plants were preserved on the side in shade. And the materials of the plant was out in the open to sun light to keep away from fungal attack time to time.

### Grinding of Plant:

To get coarse powder the shadow-dehydrated complete plants be situated exposed to humilation. The dried parts of plants were grinded with grinder.

### Selection of Animals:

As an experimental animal Rabbits (*Oryctolagus cuniculus*) were selected.

### Grouping of animals:

The duration of the many days of rearing the rabbits in a Bio Park, were randomly selected 20 number of rabbits. Depending upon their weight they rabbits were divided into 5 groups. The same weighted rabbits were kept in same groups and each group have 3 number of rabbits.

**Chemical used:** The chemical which are used during the experiment were;

Methanol, Alloxane monohydrate, Glucophage, Glucose kit.

### Induction of Diabetes mellitus:

In rabbits Alloxane was used intended for the Diabetes mellitus induction (Romman et al., 2015).

### Organization of Extract

A Group was retained as untreated group.

B Group was given with Glibenclamide at the portion pace of 12 mg/kg body weight.

C Group was given with plant concentrate of *D. mucronata* at dose of 125 mg/kg body weight.

D Group was given with *D. mucronata* extract at dose of 225 mg/kg body weight.

E Group was given with *D. mucronata* extract at dose of 325 mg/kg body weight.

### Blood Sample Collection

From the peripheral veins at the rear of ear, blood was acquired in Zero hours, Two hours, four hours, six hours and eight hours all the while and Double Beam UV Spectrophotometer was used for testing purpose.

### RESULTS

Glibenclamide was given to group B for normal 8 hrs at the break of zero hrs, 2 hrs, 4hrs, 6 hrs and 8 hrs. At the remainder of the cycle of

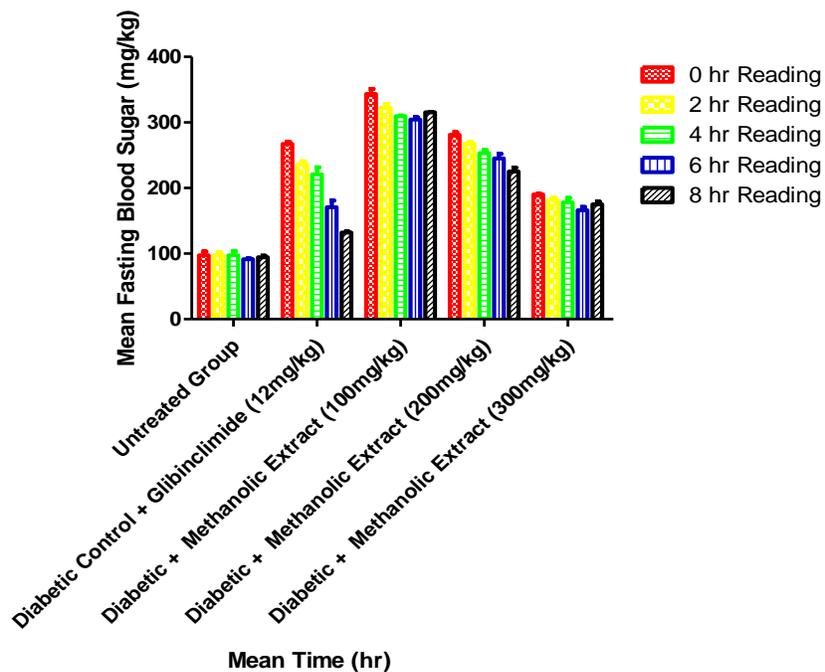
treatment, the glucose level of 185 mg/dl was reported at the end in group B.

C group was retained on *Daphne mucronata* plant's concentrate at dose of 125 mg/dl for consistent 8 hrs at the break of zero hrs, 2hrs, 4hrs, 6hrs and 8 hrs. At the remainder of the cycle of treatment, 315 mg/dl of glucose level was reported.

D group was given with plant concentrate of *Daphne mucronata* at measurements of 225 mg/kg for constant 8 hrs at the interval of zero hrs, 2 hrs, 4hrs, 6 hrs and 8 hrs. At the remainder of the cycle of treatment, 233 mg/dl of glucose level was reported.

**Table 1: Blood glucose level (mg/kg) in alloxan induced diabetic rabbits.**

	0 hr Reading	2 hr Reading	4 hr Reading	6 hr Reading	8 hr Reading
Untreated Group	89.66	96.33	95.33	92	95
Diabetic Control + Glibenclimide (12 mg/kg)	288	288.33	265	207.33	185.66
Diabetic + Methanolic Extract (125 mg/kg)	378	342.66	312.66	305.33	315
Diabetic + Methanolic Extract (225mg/kg)	303.33	292	266.66	255	233.33
Diabetic + Methanolic Extract (325 mg/kg)	198.66	190.33	181	179.66	143



**Figure 1: Blood glucose level of Rabbits**

E group was given with plant remove at the portion pace of 325 mg/kg for ordinary 8 hrs. It was given at the time frame hrs, 2 hrs, 4 hrs, 6 hrs and 8 hrs. At the remainder of the cycle of treatment, 143 mg/dl of glucose level was reported.

## DISCUSSION

In the bright of the outcomes, our revision point toward that the methanolic extract of *Daphne mucronata* make sure virtuous anti-diabetic movement. In Alloxan diabetic rabbits, as results to perpetual demolition of pancreatic  $\beta$  cells the intensities of glucose in blood are raised. Furthermore, in Alloxane diabetics rabbits the levels of serum insulin are decreased as results to the devastation of pancreatic  $\beta$  cells. The growth in the levels of insulin serum of the diabetic rabbits as experiential shows in the current work that several renewals of pancreatic  $\beta$  cells through the usage of Composite procedure have happened (Shiheng et al., 2017). Deliberately and gradually this redevelopment of pancreatic  $\beta$  cells has happened and then remained maximum period subsequently of three (3) days. In the minority of beta cells are still surviving and stimulated by extract components, releasing insulin. The extracts of *Daphne mucronata* exhibited in alloxan-treated rabbits a considerable decrease of serum glucose level. In this study the impairment of pancreas diabetic control in alloxan-cured rabbits and redevelopment of  $\beta$  cells through Glibinclidide remained detected. As results to upturn in the mobilization and conscription of open fatty acids as of the nonessential fat maintenance yard from which the abnormal high meditation of serum lipids in the diabetic matter is main (Yaoa et al., 2017; Tabinda et al., 2020). Trouble in the utility of renal therefore that the level of blood urea is raised caused by Diabetes. And the groups which are extract- canned demonstrated decrease in the level of serum urea that indicates that quotation could bring to bear its achieve on renal function and utility. Diabetes causes reduced levels of uric acid and one of the chief anti-oxidant which are existing in the body is uric-acid. The extract of *D. mucronata* reflects the anti-diabetic potential as it decreases the diabetic pressure and increase the level of uric acid. Diabetes paves the way for weight loss during the loss of Proteolysis, lipolysis and acute fluid. The weight expand in *D. mecronata* extract treated groups reflects the modification of body metabolism. Therefore the exceeding argument revelry that entire

methanolic extract of the plant by the side of extraordinary dosage (325mg/ kg) is additional operative besides the indications comparable therapeutic and healthful consequence as customary and that is usually glibenclamide (Bilqees et al. 2020). This might be situated as results to the opportunity that particular  $\beta$ -cell stay at a standstill persisting to performance upon by means of *Daphne mucronata* quotation to make use of its insulin discharging consequence. This result's make known that the *D. mucronata* methanolic extract exhibits the antidiabetic activity in a dosage dependent method. The capability expose a gorgeous botanic convention of anti-diabetic indication managements between they Q'eqchii'. The research revision of extremely categorized vegetation discovered their commotion in AGE embarrassment associated through SIV (Ferrier et al., 2018; Karamolah et al., 2017). The capability of the plant *Melia azedarach* which is belong to Family Meliaceae, *Zanthoxylum alatum* which is belong to Family Rutaceae, and *Tanacetum nubigenum* which is belong to Family Asteraceae this plants extract have the ability to significantly decrease the blood glucose level similarly shown the same result were our own plant *Daphne mucronat* (Khan et al., 2018; Romman et al., 2020).

## CONCLUSION

It has been concluded that *D. mucronata* has the potential of reducing blood glucose in the rabbits having diabetes.

## CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

## ACKNOWLEDGEMENT

Pharmacognosy Lab, Department of Botany, University of Chitral, KP, Pakistan is conceding for support.

## AUTHOR CONTRIBUTIONS

MR, RP, HG designed and performed the experiments and also wrote the manuscript. MR, HG, performed animal treatments and data analysis. SU designed experiments and SJ, MS, SB, KS, HAJ, FH, AAKK, SSSH, WK, BA, RB, MA, SU, AH, NU, NM, MA, MI, ZU, IUH, AR, SU, MI, SA, RA, MI reviewed the manuscript. All authors read and approved the final version

---

Copyrights: © 2020@ author (s).

---

This is an open access article distributed under the terms of the [Creative Commons Attribution License \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and source are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

## REFERENCES

- Al-Snafi AE, 2019. Chemical constituents and pharmacological effects of *Lepidium sativum*-a review. *Inter J Curr Pharma Res* 10. <https://doi.org/10.22159/ijcpr.2019v11i6.36338>
- Ashraf I, Zubair M, Rizwan K, Rasool N, Jamil M, Khan SA, Tareen R B, Ahmad VU, Mahmood A, Riaz M, Zia-UI-Haq M, Jaafar HZ, 2018. Chemical composition, antioxidant and antimicrobial potential of essential oils from different parts of *Daphne mucronata* Royle. *Chem Cent J* 12. <https://doi.org/10.1186/s13065-018-0495-1>
- Bilqees R, Muhammad R, Muhammad S, Samin J, Rainaz P, Muhammad A, Muhammad I, Sadia I, 2020. Cardiac function profiling and antidiabetic effect of *Vigna radiata* in Alloxan monohydrate induced diabetic rabbits. *Pure App Biol* 9: 390-395. <https://doi.org/10.19045/bspab.2020.90043>
- Da Silva IC, Kaluđerović GN, De Oliveira PF, Guimarães DO, Quresma CH, Porzel A, Muzitano MF, Wessjohann LA, Leal IC, 2019. Apoptosis caused by Triterpenes and phytosterols and antioxidant activity of an enriched flavonoid extract from *passiflora mucronata*. *Anti-Cancer Ag Medic Chem* 18: 1405-1416. <https://doi.org/10.2174/1871520618666180315090949>
- Ferrier J, Saleem A, Carter Ramirez A, Liu R, Chen E, Pesek T, Cal V, Balick M, Arnason JT, 2018. Traditional medicines used by Q'eqchi' Maya to treat diabetic symptoms and their antiglycation potential. *J Ethnopharmacol* 5; 224:504-511. doi: 10.1016/j.jep.2018.06.031.
- Karamolah KS, Mousavi F, Mahmoudi H, 2017. Antimicrobial inhibitory activity of aqueous, hydroalcoholic and alcoholic extracts of leaves and stem of *Daphne mucronata* on growth of oral bacteria. *GMS Hyg Infect Control*. 12. doi: 10.3205/dgkh000301
- Khan MF, Rawat AK, Khatoon S, Hussain MK, Mishra A, Negi DS. 2018. *In vitro* and *in vivo* antidiabetic effect of extracts of *Melia azedarach*, *Zanthoxylum alatum*, and *Tanacetum nubigenum*. *Integr Med Res*. 7:176-183. doi: 10.1016/j.imr.2018.03.004.
- Khodadadian Z, Hassanpour-Ezatti M, Mousavi SZ, Asgarpanah J, 2016. Analgesic and anti-inflammatory potential of aerial parts of the *Daphne mucronata* Royle extract in mice: Opioid-independent action. *Asi Pac J Trop Biomed* 6: 198-201. <https://doi.org/10.1016/j.apjtb.2015.12.004>
- Rasool MA, Khan R, Malik A, Bibi N, Kazmi SU, 2010. Structural determination of daphnecin, a new coumarinolignan from *Daphne mucronata*. *J Asi Nat Prod Res* 12: 324-327. <https://doi.org/10.1080/10286021003610144>
- Romman M, Samin J, Muhammad H, Izhar A, Sher W, 2015. In vitro Antioxidant activity of stem and leaves extracts of *Hedera nepalensis* K. Koch. *Inter J Biosci* 7: 19-24. <https://doi.org/10.12692/ijb/7.2.19-24>
- Romman M, Rainaz P, Wali K, Muhammad S, Shariat U, Shah Z., ... Murad A. 2020. Hypoglycemic activity and ALP lowering role of *Hedera nepalensis* K. Koch Leaves in Alloxane monohydrate induced Diabetic rabbits. *Bioscience Research*. 17: 2264-2268.
- Shiheng T, Bibi S, Siddique UR, 2017. Hypoglycemic and Hypocholesterolemic study of *Monotheca boxifolia* Falc. in induced diabetic rabbits. *Uni Chitral J Bot*: 144-151. <https://doi.org/10.33195/uochjb-v1i1412017>
- Tabinda N, Sayed WAS, Ali H, Gul R, Abdul K, Ikram I , ... Afshan B. 2020. Phytochemical, antioxidant and antibacterial screening of *Artemisia Absinthium* from Dir Lower Pakistan. *Bioscience Research*, 17: 2233-2241.
- Yaoa M, Siddique UR, Sardar N, 2017. Study of blood glucose and SGPT lowering effect of *Eucalyptus Lanceolata* Linn. in induced diabetic rabbits. *Uni Chitral J Bot*: 152-158. <https://doi.org/10.33195/uochjb-v1i1422017>