Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 23s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Study Of Biological Activity And Safety Of Phytocomposition Of Antidiabetol

Fayzieva Z.T.[2], Ibragimov O.M.[2], Islomova S. [2], Azimova B.J[*1]

[1]Tashkent Pharmaceutical Institute, Tashkent, Uzbekistan.

[2]Siab College of Public Health named after Avicenna, Samarkand, Uzbekistan.

[3]Search Foundation, Rajajinagar, Bengaluru, Karnataka, India.

ORCID:

Z. T. Fayziyeva - https://orcid.org/0000-0001-6716-9183

O. M. Ibragimov - https://orcid.org/0009-0004-3996-6344

S. Islomova - https://orcid.org/0009-0002-4840-7566

Azimova B. J. - https://orcid.org/0000-0002-0132-1741

***Corresponding Author:**

Dr. Azimova Bahtigul Jovli Qizi

Associate Professor, Department of Inorganic, Physical and Colloidal Chemistry, Tashkent Pharmaceutical Institute, 100015, 45 Aybek Street, Tashkent, Uzbekistan

Email ID: baxt-gulim@rocketmail.com

Cite this paper as: Fayzieva Z.T., Ibragimov O.M., Islomova S., Azimova B.J, (2025) Study Of Biological Activity And Safety Of Phytocomposition Of Antidiabetol. *Journal of Neonatal Surgery*, 14 (23s), 780-786.

ABSTRACT

Objective: Modern lifestyles often lead to an imbalance between energy intake and expenditure, contributing to obesity, which is a major risk factor for type II diabetes. The consumption of unhealthy foods, high in refined sugars and unhealthy fats, leads to insulin resistance, where the body's cells do not respond effectively to insulin.

Methods: The acute toxicity, allergenic, diuresis, immune system, hypoglycemic effect, course of experimental alloxan diabetes of the Antidiabetol capsule. In diabetes, the influence of Antidiabetol on the immune system and on diuresis plays a significant role. The study of the impact of Antidiabetol on the immune system was conducted using the Jerne and Nordin method, while the effect on diuresis was studied using the method of V.V. Gatsura.

Results: This resistance is a precursor to type II diabetes. Additionally, chronic stress can impact hormone levels and metabolism, further exacerbating the risk of developing diabetes. Stress often leads to poor dietary choices and reduced physical activity, creating a cycle that contributes to weight gain and insulin resistance. Harmful habits, such as smoking and excessive alcohol consumption, also play a role in the development of diabetes. These behaviors can damage the body's systems and contribute to metabolic dysfunction.

Conclusion: The study is concluded to investigate the safety and hypoglycemic activity of the “Antidiabetol” capsule.

Keywords: *Diabetes mellitus, Phytocomposition, Antidiabetol, Hypoglycemic effect, Antidiabetic effect.*

1. INTRODUCTION

The problem of combating diabetes becomes increasingly relevant for modern medicine each year, due to the rising incidence worldwide. Characteristics of living conditions and lifestyle in the 21st century, associated with hypokinesia; consumption of products high in carbohydrates, salt, fats, synthetic additives; frequent stressful situations caused by the acceleration of life's pace; harmful habits and many other factors underlie the increase in body weight, the development of metabolic syndrome, and type II diabetes [1-5]. Today, diabetes is one of the most common non-infectious diseases in humans after cardiovascular and oncological pathologies, leading to disability and, often, fatal outcomes. According to WHO documents, the disease in most people can be diagnosed several years after its onset, often after complications have arisen. According to the International Diabetes Federation (2023), by 2040, one in ten adults will have type 2 diabetes. Today, the spread of diabetes has become so threatening that this disease can be called the non-infectious epidemic of the 20th century. According to WHO data, every 10 seconds one person with diabetes dies in the world, which means more than 3.5 million patients

annually, more than from AIDS and hepatitis [6-10]. Based on the above, the search and implementation of new herbal medicinal products without side effects for the treatment of diabetes is extremely relevant. It is known from the literature that herbal medicines in many cases do not cause allergic and other side effects, and they can be used for a long period of time [11,12].

Professor H.J. Kambarov created a new phyto-composition with antidiabetic action from a mixture of dry extracts of medicinal plants (chicory root, mulberry leaves, stevia leaves, licorice root and sage). Based on the phyto-composition, "Antidiabetol" capsules have been developed [13].

2. MATERIALS AND METHODS

Materials are purchased and picked from the authenticated, reliable and reported sources (Table No 1 and Table No. 2). Methods are adopted and developed as per references and more suitable for the Antidiabetol development and evaluation.

Table 1: Organoleptic indicators of the dietary supplement Antidiabetol (TI 26140431-001-2019).

Sl. No	Organoleptic indicators	Characteristic
01	Dosage form	Capsule
02	Appearance	Hard gelatin capsules
03	Color	Any capsule color is permissible
04	Smell	Faint, distinctive, characteristic of the components used

Table 2: Composition of the dietary supplement Antidiabetol (500 mg) (Technical Specifications 26140431-001-2019)

Sl. No.	Composition	Containing
01	Mulberry leaves (Morus)	250 mg
02	Stevia leaves (Stevia rebaudiana)	95 mg
03	Licorice root (Radix Glycyrrhizae Glabrae)	50 mg
04	Sage leaves (Salvia officinalis)	50 mg
05	Common chicory root (Cichorium intybus)	50 mg
06	Calcium stearate	5 mg

3. RESULTS AND DISCUSSIONS

Study of harmlessness of the Antidiabetol capsule

In diabetes, the influence of Antidiabetol on the immune system and on diuresis plays a significant role. The study of the impact of Antidiabetol on the immune system was conducted using the Jerne and Nordin method, while the effect on diuresis was studied using the method of V.V. Gatsura. The hypoglycemic effect was determined on 28 rats weighing 170-195 g, of both sexes. In doing so, efforts were made to determine the optimal hypoglycemic effects. Alimentary hyperglycemia was induced by intraperitoneal administration of a hypertonic glucose solution at a dose of 45 g/kg [14].

Acute toxicity was studied in mice of both sexes with a single oral administration ranging from 500 mg/kg to 2000 mg/kg. The condition of the animals was monitored for 14 days after the administration of the Antidiabetol capsule [15]. The study of the local irritant effect of the Antidiabetol capsule was conducted using a commonly accepted method. The first series of experiments was carried out on 6 rabbits weighing 23-33 kg and on 10 guinea pigs weighing 350-410 g of both sexes, according to the methodological recommendations of the FK MZ RUz (2000).

The cumulative effect of Antidiabetol was studied with multiple administrations in laboratory rats. The dosing of the animals was carried out in increasing doses, starting from 250 mg/kg with a twofold increase every five days over a period of four weeks.

The allergic properties of Antidiabetol were studied using the method described in the book by A.D. Ado. Antidiabetol was administered orally 30 minutes before the glucose injection at doses of 75, 100, and 125 mg/kg. The comparative influence of different doses of Antidiabetol on the quantitative indicators of blood glucose levels was determined using the universal semi-automatic biochemical analyzer "Mindray BA-88A" at 60, 90, and 120 minutes after glucose administration.

In another series of experiments, the effect of Antidiabetol on the course of alloxan diabetes was studied. The model of alloxan diabetes was induced using the method described in the works of O.V. Remizova, T.L. Kuraeva (2003). For comparison of the hypoglycemic effect of Antidiabetol, the well-known drug Glukeyr (India) was used. The experiments were conducted on 18 sexually mature laboratory rats weighing 176-200 g, of both sexes. Control animals were administered alloxan at a dose of 170 mg/kg. The test animals were given alloxan, and after 2 days, treatment with Antidiabetol in capsule form was initiated. The test substance was administered orally at a dose of 100 mg/kg once a day for 21 days.

Study of the acute toxicity of the Antidiabetol capsule.

When administering Antidiabetol capsules in doses of 500-1000 mg/kg, there was no significant impact on animal behavior. During testing at doses of 1500-2000 mg/kg, there was a slight increase in breathing rate immediately after administration, which returned to baseline within 30-60 minutes. When Antidiabetol was administered at a dose of 2000 mg/kg, the animals exhibited noticeable lethargy and relaxation of skeletal muscle tone.

It should be noted that the animals responded well to external stimuli. No animal deaths were observed during the observation period. Due to the absence of animal mortality, it was not possible to determine the LD50. The test animals were selectively decapitated under ether anesthesia, and a macroscopic examination of the gastrointestinal mucosa and the condition of the parenchymal organs was conducted. It was noted that Antidiabetol in the studied doses does not have a significant impact on the mucosa of the oral cavity and gastrointestinal tract.

Consequently, the studied Antidiabetol capsules proved to be low-toxic when administered orally as a single dose.

To study the local irritating effect, Antidiabetol in the form of a 0.5-2% solution was applied preliminarily to shaved areas located on the sides, one of which was scarified with a scalpel, while the other remained intact.

The studied skin areas were covered with soft gauze, and the skin reaction was recorded after 30 minutes and again 72 hours after the experiment.

As a result, it was found that Antidiabetol at the specified dose does not have an irritating effect on the skin.

In the second series of experiments, the local irritating effect of the capsule was studied on six guinea pigs weighing 340-495 g of both sexes, using the Draize method. An aqueous solution of the capsule was administered in 1-2 drops under the upper eyelid of the guinea pig, while 2 drops of distilled water were administered to the other eye. The instillation was performed with the animal positioned head down.

The experiments showed that Antidiabetol at the specified concentrations does not cause any reactions from the conjunctiva after 15 minutes, and after 24-48 hours. The condition of the conjunctiva of the right eye was indistinguishable from that of the left eye, where water was administered. Consequently, Antidiabetol capsules do not have an irritating effect on the skin and mucous membranes.

Study of the allergenic action of the Antidiabetol capsule.

Experiments were conducted on 18 rats weighing 160-186 g of both sexes. Anaphylactic shock was induced using the method of A.A. Ado. Sensitization in rats was induced by three subcutaneous injections every other day of 0.5-1 mg/kg of chicken egg protein, diluted in saline solution at a 1:5 ratio, with simultaneous administration of 0.1 ml of vaseline oil. Then, on the 21st day of sensitization, the animals were intraperitoneally injected with 1 ml/kg of native chicken egg protein. In the control group of animals, where distilled water was administered in the corresponding volume, signs of anaphylaxis were noted: the frequency of respiratory movements increased and became shallow, skeletal muscle tone relaxed, there was a disturbance in movement coordination, and the animals became restless.

Against the background of the Antidiabetol capsule at a dose of 100 mg/kg, the aforementioned changes in the animals were noticeably reduced and occurred less pronouncedly than in the control group. Consequently, Antidiabetol capsules do not have an allergenic effect.

Experiments were conducted on 18 rats weighing 160-186 g of both sexes. Antidiabetol capsules were administered orally for the first 5 days at a dose of 250 mg/kg, the next 5 days at 500 mg/kg, the following 5 days at 1000 mg/kg, and during the fourth five-day period at 2000 mg/kg. The control group received distilled water in a corresponding volume. The condition of the animals was monitored visually, paying attention to their general state, appetite, and response to external stimuli.

It was found that there were no significant differences in body weight between the experimental and control groups. The mucous membranes and fur of all animals were unchanged. All animals had a satisfactory appetite, willingly consumed food and water, and the breathing of all groups of animals was the same. No diarrhea was observed in any of the animals.

Upon dissection of the animals on the 20th day of the experiment, a normal morphological picture of organs and systems was observed. No macroscopic changes in the organs were detected in any of the animals. Consequently, Antidiabetol does not have a cumulative effect.

The influence of the Antidiabetol capsule on diuresis

The effect of Antidiabetol on diuresis was studied in 18 rats, both male and female, with body weights ranging from 150 to 185 grams. For this purpose, diuresis without water loading was first measured in each rat over 6 days, after which control experiments with water loading were conducted. For this, each animal was orally administered 4 ml of distilled water per 100 g of body weight.

Then, the animals were placed in special chambers for 24 hours, and the initial amount of urine produced was measured, both in the control and in the experiment. Throughout the experiment, the animals were kept on a specific vivarium diet. After this, the animals were divided into 3 groups of 6 each:

The first group was the control group, which received distilled water in the corresponding volume. The second and third groups were the experimental groups, which received Antidiabetol at doses of 75 and 100 mg/kg of body weight, respectively, against a background of water loading.

The results of the studies showed that Antidiabetol capsules in the studied doses significantly increase the amount of urine excreted per day. Thus, Antidiabetol at a dose of 75 mg/kg increases the amount of daily urine by 10%, and at a dose of 100 mg/kg by 15.5% compared to the control. The obtained data are presented in Table №3.

Table 3: The effect of Antidiabetol on diuresis (M+m; n=6; P<0.05)

Sl. No	Introduced substances	Dose mg/kg	Volume of urine excreted in mL		Diuretic effect
			Absolutely	In %	
1	Distilled water	1 mL	6,4±0,58	100	-
2	Antidiabetol	75	7,05±0,51*	110	10
3	Antidiabetol	100	7,39±0,66*	115,5	15,5

Note: * Reliable data at P<0.05

Based on the above, it can be concluded that Antidiabetol at the studied doses significantly increases the amount of daily urine.

The effect of Antidiabetol on the immune system in mice.

Experiments were conducted on 20 white mice, weighing 20-22 g of both sexes. For this purpose, the mice were immunized intraperitoneally once with sheep erythrocytes (SE) at a dose of 2x10^7, and four days later, the number of antibody-producing cells (APCs) in the spleens was determined using the direct method of local hemolysis by Jere and Nordin. The number of APCs was calculated per organ weight and per 10^6 spleen cells. Additionally, the total number of nucleated cells in the spleen (NCS) was counted.

In another phase of the study, the number of erythrocytes and leukocytes in the peripheral blood of immunized mice was determined. Antidiabetol was administered orally at a dose of 100 mg/kg one day after immunization with SE. The results of the study on the effect of Antidiabetol on the level of APCs are presented in Table No. 4. These series of studies were conducted at the Institute of Immunology of the Academy of Sciences of Uzbekistan.

Table 4: The effect of Antidiabetol on the immune response to sheep erythrocytes

Sl. No	Groups	Injectable substance	Quantity of YASKS 106	IS	Amount of AOC on			
					the entire spleen	IS	106 spleen cells	IS
1	Control	1 ml of distilled	125,5±8,2	-	2010+190,5	-	16,5±2,1	-

		water						
2	Experimental	Antidiabetol 100 mg/kg	205± 1,5*	1,63	5750+506,5*	2,86	28,5±1,7*	1,73

"Note: * - Reliable data in relation to the control at P<0.05. IC - Index of relation to control."

As can be seen from this table, in the spleens of mice in the control group, an average of 2010 ± 190.5 AOCs are formed. In animals that received Antidiabetol capsules, the immune response to EB increases by 2.86 times, and the number of AOCs amounts to 5750 ± 560.5. Consequently, Antidiabetol capsules have a sufficiently pronounced immunostimulating effect.

When calculating AOC per 1 million spleen cells, it was established that in the control group their number equals 16.5 ± 2.1. Under the influence of Antidiabetol, the number of AOCs per 1 million splenocytes significantly increases by 1.7 times and amounts to 28.5 ± 1.7. As can be seen from Table No. 4, the total number of cells in the control group is 125.5 ± 8.2 x 10^6. With the introduction of Antidiabetol, the total number of cells in the spleen significantly increases by 1.6 times and amounts to 205.0 ± 14.5 x 10^6. The obtained data indicate that Antidiabetol has the ability to increase the total number of antibody-producing cells in the spleens of immunized mice.

Study of the hypoglycemic effect of the Antidiabetol capsule.

Experiments conducted under conditions of alimentary hyperglycemia showed that the most pronounced hypoglycemic effect of Antidiabetol is observed 90 minutes after glucose administration (Table 5).

Table 5: The effect of the Antidiabetol capsule on blood sugar levels in alimentary hyperglycemia.

Sl. No	Administrated drugs	Doses mg/kg	Blood glucose level in intact animals mmol/L	Blood glucose level 90 minutes after glucose administration		Hypoglycemic activity %
				Abs	%	
1	Control	1.5 mL	4,60±0,75	7,25±0,56	100	
2	Antidiabetol capsules	75		5,47±0,86	75,5	24,5
3	Antidiabetol capsules	100		4,69±0,61	64,8	35,2
4	Antidiabetol capsules	125		4,59±0,80	63,3	36,7

Note: * - Reliable data relative to the control at P<0.05.

As can be seen from this table, the hypoglycemic effect of the Antidiabetol capsule at a dose of 75 mg/kg was 24.5% relative to the control. With an increase in the dose to 100 and 125 mg/kg, the Antidiabetol capsules reduce the blood glucose level by 35.2% and 36.7%, respectively.

Consequently, Antidiabetol capsules have a pronounced hypoglycemic effect in hyperglycemia, caused by hypertonic glucose solution.

Study of the effect of Antidiabetol on the course of experimental alloxan diabetes

From the literature, it is known that during the development of alimentary hyperglycemia, there is no damage to the insulin-secreting apparatus of the pancreas. Therefore, the level of insulin in peripheral blood remains within the physiological norm. In alloxan diabetes, there is atrophy of the insulinocytes of the Langerhans islets. Alloxan, by activating free-radical processes in the β-cells of the Langerhans islets of the pancreas, causes necrosis and damage to the pancreatic insulin apparatus. At the same time, the level of insulin in the peripheral blood sharply decreases, disrupting the operation of the glucose transport systems of peripheral tissues, and the influx of energy substrates into them. As a result, metabolism in the cells changes, and alloxan diabetes develops, increasing the blood sugar content. Approximately 45 hours after the administration of alloxan, marked hyperglycemia develops due to the death of the β-cells of the Langerhans islets of the pancreas, and within 2-3 days, persistent diabetes occurs. The results showed that on the third day after alloxan administration, there was a significant increase in blood glucose levels compared to intact animals. Seven days after the oral administration of a dissolved capsule at a dose of 100 mg/kg, the amount of glucose in the blood did not significantly differ from the control group. On the fifteenth

day of treatment with the Antidiabetol capsule, a reduction in blood glucose levels was observed relative to the control by 18.4%. With prolonged, 21-day treatment, it was found that Antidiabetol at the studied doses reduces blood glucose levels by 33.6% (Table 6).

Table 6: Effect of Antidiabetol capsule on blood glucose in alloxan diabetes (Mm; n=6)

Sl. No	days of treatment	Blood glucose level in the intact group mmol/L	Blood glucose level in the control group mmol/L	Blood glucose level in the experimental group mmol/L	%
1	3	5,6±0,65	26,0±1,37	24,5±2,34	6
2	7		21,5±1,75	20,0±3,54	7
3	15		19,6±1,58	16,0±2,58	18,4
4	21		12,5±1,46	8,3±1,16	33,6

Note: * - Reliable data compared to control at P<0.05" in English.

Consequently, the Antidiabetol capsule has a pronounced hypoglycemic effect in alloxan-induced hyperglycemia. Based on the above, Antidiabetol in capsule form can be recommended as a dietary supplement for the treatment of type 2 diabetes.

4. CONCLUSION

Based on the above, Antidiabetol capsules can be recommended as a dietary supplement for the treatment of type 2 diabetes mellitus.

REFERENCES

[1] Asfandiaryova, N.S. Mortality in type 2 diabetes. Diabetes Mellitus. 2015;18(4):12-21.

[2] Dedov, I.I., Shestakova, M.V. Algorithms for specialized medical care for patients with diabetes mellitus. Diabetes Mellitus. 2017; 20(IS):1-112.

[3] Dedov, I.I., Shestakova, M.V. Algoritmy spetsializirovannoy meditsinskoy pomoshchi bol'nim sakharnym diabetom [Algorithms for specialized medical care for patients with diabetes]. Diabetes Mellitus. 2017;20(IS):1-112.

[4] Marchetti P, Bugliani M, Boggi U, Masini M, Marselli L. The pancreatic β cells in human type 2 diabetes. Adv Exp Med Biol. 2012;771:288-309.

[5] Meier JJ, Bonadonna RC. Role of reduced β-cell mass versus impaired β-cell function in the pathogenesis of type 2 diabetes. Diabetes Care. 2013;36 (Supplement 2): S113-S119.

[6] Saisho Y. β-cell dysfunction: Its critical role in prevention and management of type 2 diabetes. World Journal of Diabetes. 2015;6(1):109.

[7] Shah AD, Langenberg C, Rapsomaniki E, Denaxas S, Pujades-Rodriguez M, Gale CP, et al. Type 2 diabetes and incidence of cardiovascular diseases: a cohort study in 19 million people. Lancet Diabetes Endocrinol. 2015;3(2):105-13.

[8] Shi Y, Vanhoutte PM. Macro- and microvascular endothelial dysfunction in diabetes. Journal of Diabetes. 2017;9:434-49.

[9] Vergès B. Pathophysiology of diabetic dyslipidaemia: where are we? Diabetologia. 2015;58(5):886-99.

[10] Wright EM, Loo DD, Hirayama BA. Biology of human sodium glucose transporters. Physiological Reviews. 2011;91(2):733-94.

[11] Mukesh R, Namita P. Medicinal Plants with Antidiabetic Potential-A Review. American-Eurasian J Agric Environ Sci. 2013; 13(1): 81-94.

[12] Osadebe PO, Odoh EU, Uzor PF. The search for new hypoglycemic agents from plant. Afr J Pharm Pharmacol. 2014; 8(11): 292-303.

[13] Kambarov, Kh.Dz. Development of technology for cardiovascular and sedative drugs based on local medicinal plant raw materials: Author's abstract of dissertation for the degree of Doctor of Pharmaceutical Sciences: 15.00.01. Tashkent Pharmaceutical Institute. Tashkent; 2016; 50 p.

[14] Faizieva, Z.T. Pharmacology of biologically active substances isolated from Stevia rebaudiana B., Rhodiola semenovii A., and Helianthus tuberosus L.: Dissertation abstract for the degree of Doctor of Medical Sciences: 14.00.25. Tashkent Pharmaceutical Institute. Tashkent; 2011; 31 p.

[15] Feruza Saydaliyeva , Ziyoda Fayzieva, Natalya Shiltsova. Pharmako-toxicological actions of liquid extract “Hemostat”. World Bulletin of Public Healht. 2022; 8:120-125.