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PHARMACOLOGICAL EVALUATION OF THE HYPOGLYCEMIC ACTIVITY OF THE "ANTIDIABETOL" PHYTOCOMPOSITION IN EXPERIMENTAL MODELS OF DIABETES MELLITUS

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Abstract: The study presents statistically substantiated results of a preclinical pharmacological evaluation of the "Antidiabetol" phytocomposition developed from local medicinal plants. Hypoglycemic efficacy was assessed in alimentary and adrenaline-induced hyperglycemia models, along with toxicological safety parameters. The phytocomposition demonstrated a statistically significant reduction in blood glucose levels ($p < 0.05–0.01$) without cumulative, allergic, embryotoxic, or cardiovascular adverse effects. These findings support the potential clinical relevance of "Antidiabetol" for the management of type 2 diabetes mellitus.

Keywords: type 2 diabetes mellitus, phytotherapy, Antidiabetol, hypoglycemic activity, preclinical study, statistics.

1. Introduction

Type 2 diabetes mellitus (T2DM) is characterized by chronic hyperglycemia accompanied by insulin resistance and progressive metabolic dysfunction. According to epidemiological data, T2DM accounts for up to 85–90% of all diabetes cases worldwide. Despite the availability of various synthetic hypoglycemic agents, their long-term use is frequently limited by adverse reactions and decreased tolerability.

In this context, phytotherapeutic agents with multi-target metabolic effects and improved safety profiles represent a promising alternative. The "Antidiabetol" phytocomposition was developed using medicinal plants native to Uzbekistan, aiming to achieve effective glycemic control with minimal toxicity.

2. Materials and Methods

2.1. Experimental design

A controlled preclinical experimental study was conducted using laboratory animals randomly divided into control and experimental groups (n = 6–8 per group).

2.2. Experimental models

- **Alimentary hyperglycemia:** induced by oral glucose loading.
- **Adrenaline-induced hyperglycemia:** induced by subcutaneous adrenaline

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administration.

2.3. Statistical analysis

Results were expressed as **mean ± standard error (M ± SEM)**. Statistical significance was evaluated using Student's *t*-test. Differences were considered significant at **$p < 0.05$** and **$p < 0.01$**.

3. Results

3.1. Hypoglycemic activity

Administration of "Antidiabetol" resulted in a statistically significant decrease in blood glucose levels compared with the control groups in both experimental models.

Table 1. Effect of "Antidiabetol" on blood glucose levels in alimentary hyperglycemia

Group	Blood glucose (mmol/L)	Change vs. control (%)	Statistical significance
Control	8.9 ± 0.4	—	—
Antidiabetol	6.2 ± 0.3	−30.3%	$p < 0.01$

Interpretation: The phytocomposition reduced glycemia by approximately **30%**, indicating a pronounced antihyperglycemic effect.

Table 2. Effect of "Antidiabetol" in adrenaline-induced hyperglycemia

Group	Blood glucose (mmol/L)	Change vs. control (%)	Statistical significance
Control	10.1 ± 0.5	—	—
Antidiabetol	6.7 ± 0.4	−33.7%	$p < 0.01$

Interpretation: A stronger hypoglycemic response was observed under hormonally mediated hyperglycemia, suggesting involvement in counter-regulatory metabolic pathways.

3.2. Toxicological safety

Table 3. Acute and cumulative toxicity parameters

Parameter	Observation	Statistical note
Mortality	0%	$p > 0.05$
Behavioral changes	Not observed	—
Body weight dynamics	±2–3%	$p > 0.05$

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Parameter	Observation	Statistical note
Cumulative toxicity	Not detected	—

Table 4. Allergic and reproductive safety assessment

Indicator	Result	Statistical significance
Allergic reactions	Absent	$p > 0.05$
Embryotoxicity	Not detected	$p > 0.05$
Teratogenicity	Not detected	$p > 0.05$

Table 5. Cardiovascular system parameters

Parameter	Control	Antidiabetol	p-value
Heart rate (beats/min)	362 ± 12	355 ± 10	$p > 0.05$
Systolic BP (mmHg)	118 ± 4	116 ± 3	$p > 0.05$
Diastolic BP (mmHg)	78 ± 3	77 ± 3	$p > 0.05$

Interpretation: No statistically significant cardiovascular effects were observed.

4. Discussion

Statistical analysis confirms that the hypoglycemic effect of "Antidiabetol" is not incidental but represents a stable pharmacological response with high statistical reliability ($p < 0.01$). The 30–34% reduction in blood glucose levels is comparable to effects reported for several polyherbal antidiabetic formulations in preclinical studies.

Importantly, the absence of statistically significant adverse effects ($p > 0.05$) across toxicity, allergy, reproductive safety, and cardiovascular parameters highlights the favorable therapeutic index of the phytocomposition. This profile is particularly valuable for chronic conditions requiring long-term treatment.

5. Conclusion

The "Antidiabetol" phytocomposition demonstrates statistically significant hypoglycemic activity (up to 34%, $p < 0.01$) combined with a high level of toxicological safety ($p > 0.05$ for all adverse parameters). These results substantiate its potential as a safe and effective phytotherapeutic agent for the management of type 2 diabetes mellitus and justify further clinical investigation.

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