

Research Article

The effect of dried camel milk on blood parameters in the diabetic casesTaherah Mohammadabadi¹ , Rajesh Jain² ¹ Professor, Faculty of Animal Science and Food Technology, Agricultural Sciences and Natural Resources University, Iran² Consultant Diabetes, Jain hospital, Kanpur, India*Submitted: 1 April 2025; Accepted: 10 April 2025; Published: 29 April 2024*^{1*}Corresponding author: Prof Dr Taherah Mohammadabadi, Faculty of Animal Science and Food Technology, Agricultural Sciences and Natural Resources University, Iran. Email: t.mohammadabadi.t@gmail.com**Abstract**

Traditionally in Africa, Asia, and the Middle East, camel milk is consumed regularly for diabetes, and a lower incidence of diabetes happens by drinking camel milk. Since fresh camel milk is not available for all people globally, therefore, the aim of this study was to evaluate the antidiabetic effects of camel milk powder in diabetic patient. About 15 gram/day camel milk powder used in 6 type 1 diabetic cases who injected insulin; for 3 months in two groups. The results showed a significant decrease in fasting blood glucose in patient fed camel milk powder. Blood sugar reduced from 113 to 98 mg /dL and LDL also decreased significantly from 95 to 73 mg/dL. The results showed that the average dose of required insulin before consuming camel's milk powder was 42 ± 5 u/day that gradually decreased to 30 ± 6 u/day, three months after taking camel milk powder. After 3 months, consuming 15 g camel milk powder, two times daily, decreased fasting blood glucose, required insulin dose, total cholesterol and LDL. Thus, camel milk powder may exhibit antidiabetic activity in diabetic patient and improve cardiovascular disorders and other complications.

Keywords: camel milk, diabetes, blood glucose, health**Introduction**

Recently, more studies concentrated on functional foods and natural healings for diabetes. Camel milk has a great concentration of lactoferrin, immunoglobulin, lysozyme, and insulin-like protein (Alavi et al., 2017). It's proved that camel milk has insulin-like peptides that do not degrade in the stomach and absorbed from the intestine. Fresh camel milk has immune-stimulatory properties on the beta-cells of pancreas, enhanced secretion of insulin, and decreased insulin resistance in the diabetic subjects (Aqiba et al., 2019). It contains small-size immunoglobulins which strengthen the immune system (Mohammadabadi, 2020). Camel milk reduced fasting glucose in diabetic rats, type 1 diabetes, and T2DM. Insulin requirement in type 1 diabetic patients decreased due to insulin-like protein in camel milk. Diabetic patients face cardiovascular challenges and other complications. Camel milk has protective effects on lipid profile and inflammatory cytokines in these patients (Ayyash et al., 2018). A lower incidence of diabetes happens by drinking camel milk. Insulin requirement in type 1 diabetic patients decreased due to insulin-like protein in camel milk (Aqiba et al., 2019). Camel milk has protective effects on lipid profile and inflammatory cytokines in these patients.

Daily using of fresh camel milk may provide *approximately* 60% of the required insulin doses in the patients

(Shori, 2015). Thus, camel milk controls long-term glycemic safely that significantly decreases the needed insulin doses in type 1 and 2 diabetic patients (Aqiba et al., 2019). Since fresh camel milk is not available for all people globally, thus this study was conducted to evaluate the antidiabetic effects of camel milk powder in diabetic patient.

Methods

In this trial, 6 type 1 diabetic cases who were on insulin for last few years were selected and divided into 2 group. About 500 mL camel milk or 15-gram camel milk powder /day used and started with 100 mL camel milk for 3 months, two times daily. Patients were not on medications, dietary regimens or exercises at least one month before the trial.

Patients had the following conditions: no smoking, insulin injections, no any health complications such as cardiovascular, liver, or kidney diseases and any gastrointestinal issues and allergy to camel milk were not reported.

Blood samples from the this groups were taken and analyzed before start of intervention and after 3 months at the end of trial for the biochemical parameters such as fasting blood glucose and LDL cholesterol. Statistical analysis was done using SPSS software. Values within each group and between the two groups were analyzed using the paired student's test.

Results and Discussion

The results showed a significant decrease in fasting blood glucose in patient fed camel milk powder. Blood sugar reduced from 113 to 98 mg /dL and LDL also decreased significantly from 95 to 73 mg/dL. The results showed that the average dose of required insulin before consuming camel's milk powder was 42 ± 5 u/day that gradually decreased to 30 ± 6 u/day, three months after taking camel milk powder.

Table 1- The effect of camel milk powder on blood metabolites in the diabetic cases

Parameters	Group 1	Group 2	P-value
Fasting blood glucose mg/dl	113 \pm 1.2	98 \pm 0.8	0.001
LDL mg/dl	95 \pm 2	73 \pm 2.4	0.002
dose of required insulin u/day	42 \pm 5	30 \pm 6	0.02

In another study, 25 type 2 diabetic patients were assigned into two sections. They used 10 g camel and cow milk powder two times daily for 4 weeks, after breakfast and dinner. A significant decrease in fasting blood glucose of cases observed by using dried camel milk and nonsignificant decrease in 2-hr postprandial blood glucose. After 4 weeks, total cholesterol decreased in the cases fed camel milk powder, but there was not significant impact on LDL-C/HDL-C and the total triglyceride, before and after the using of camel milk powder (Zheng et al., 2021).

In one trial, T2DM patients used 500 mL raw camel milk equally two times/day for three months. Consumption of camel milk has a markedly effect on reducing blood glucose. Furthermore, camel milk treatment may reduce the dose of used oral antidiabetic drugs and diabetic complications such as elevated cholesterol and TG levels reduced. Camel milk could be useful for glycemic control in T2DM patients (Sboui et al 2022).

The researchers found that consuming 500 mL camel milk daily reduced glucose and required insulin dose by 30 to 35 %, but it does not affect the concentration of blood lipids (Al-Haj and Al Kanhal, 2010). Consumption of camel's milk could increase serum insulin levels in type 2 diabetic patients, but fasting blood sugar, blood lipid, and blood pressure changes were insignificant in camel's and cow's milk (Ejtahed et al., 2015).

Twenty-one patients with type 1 diabetes consumed 500 mL of camel milk daily for six months in one experiment. Lipid factors such as LDL, triglycerides and the required insulin dose were reduced. However, the required insulin amount before treatment with camel milk was 41.6 u/day and after treatment with camel milk reached 28.32 u/day (Agrawal et al., 2009). After two years, a significant reduction in insulin requirements (46.15%) occurred in type 1 patients consuming camel milk. In the diabetic group, insulin levels decreased significantly at 0, 60, and 120 min after camel milk supplementation, suggesting that camel milk plays a crucial role in controlling insulin resistance (Agrawal et al., 2011).

Two groups of 15 people with type 1 diabetes aged 18 to 19 years and between 2 and 15 years old with diabetes consumed 500 mL camel milk in the morning and evening for a year under similar conditions. The results showed that the required insulin dose was reduced by 46%, from 75 to 42 u/day. Fasting blood sugar decreased by 67% from 286 to 95 mg / dL (Abdalla and Abdalla, 2018). However, regular consumption of camel milk significantly reduced blood sugar and long effect insulin dose in type 2 diabetes patients (Fallah et al., 2017).

After 16 weeks, fasting blood sugar and daily insulin requirements decreased. In addition, a combination of camel

milk and insulin reduced postprandial blood glucose levels in type 1 diabetic patients by 52% compared with camel milk alone or insulin alone (Mohammad et al., 2009; Al-Numair 2010).

After three months, triglyceride and cholesterol levels decreased by 9% and LDL by 7% in type 1 diabetic patients who received insulin injections (control group). Reverse reductions of threefold for triglycerides and twofold for cholesterol and LDL were reported in diabetic patients treated with camel's milk. Also, a significant decrease in triglyceride, cholesterol (approximately 45%), and LDL (about 30%) was shown in the diabetic patients treated with insulin and camel milk together compared with the control group (El-Sayed et al., 2011).

Conclusion

After 3 months, consuming 15 g camel milk powder, two times daily, decreased fasting blood glucose, required insulin dose and LDL. Thus, camel milk powder exhibited antidiabetic activity in diabetic patient and improved cardiovascular system. The evidences show that camel milk is safe without any side effects and for diabetic cases for long-term hypoglycemic effects. It appears that more scientific studies are needed to confirm the efficacy of heated camel milk and camel milk powder as a superfood on diabetes.

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Conflict of Interest Statement



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