

An Affordable Alternative? Investigating the use of Camel's milk as an Adjunctive Therapy for Insulin-Dependent Diabetes Mellitus

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Abstract

Globally, there are approximately 415 million people suffering from diabetes. A significant portion of these individuals require insulin for primary treatment. As the prevalence of diabetes increases, especially in developing countries, there is need for less expensive therapies. As insulin is one of the most expensive liquids in the world, decreasing its demand in impoverished areas is crucial for lowering the levels of morbidity and mortality. The purpose of this structured review was to assess the correlation between drinking camel's milk and decreased need for exogenous insulin for diabetes management. From our review of the University of Ottawa's online library database, 5 relevant studies were found. These studies showed a significant correlation between the intake of camel's milk and the reduction in need of exogenous insulin. From the gathered research, the derived conclusion is that camel's milk as an adjunctive therapy for insulin-dependent diabetes significantly reduces the required volume of insulin and is a possible method of reducing management costs for diabetics.

Background

In Rajasthan, India, it was found that a camel herding community called the Raikas, had a near zero prevalence of diabetes mellitus despite the heavy presence of the HLA alleles, predisposing genes for type 1 diabetes (1). After comparing the incidence rates of type 1 diabetes in the Raikas with those of neighbouring communities, researchers hypothesized that differences in lifestyle were responsible for disparity in prevalence of type 1 diabetes between the groups. Due to similar geographic location of all communities involved, other environmental factors needed to be examined. The discovery that 82.5% of Raikas consumed camel's milk at least 5 times a week compared to 25.9% of non-Raikas launched the investigation into the preventative effects of camel's milk regarding the development of diabetes.

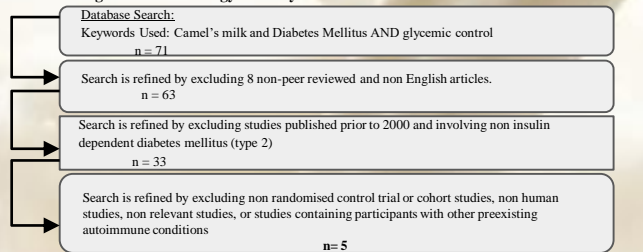
Research Question:

Does the consumption of camel's milk in insulin-dependent diabetics reduce required amount of insulin for treatment?

Methods

Figure 1. (pictured above) depicts the methodology used to select articles for this structured review. Using the University of Ottawa's library database, articles were selected using the keywords Camel's milk and diabetes mellitus, and glycemic control. Articles were limited to those that were peer-reviewed, written in the English language, and published after 2000. In this review, relevant articles containing only human experimentation were included where the studies were either randomized control trials or cohort studies using subjects without other preexisting autoimmune conditions

Figure 1. Methodology of Study Selection



Results

Table 1. Summary of Articles Used for Review

Author(s)	Sample	Study Design	Results	Conclusion
R.P. Agrawal et al., 2004	24 patients with type 1 diabetes	52-week randomized controlled study. Group 1 received usual care, group 2 received 500 ml camel milk in addition to usual care.	No significant changes for group 1. For group 2, significant increase in fasting blood sugar (119 ± 19 to 95.42 ± 15.70 p < 0.003) and in HbA1c (7.6 ± 3.35 to 6 ± 0.96, p < 0.001). Significant reduction in mean insulin doses (32 ± 12 to 17.83 ± 12.40, p < 0.005).	There was significant reduction in insulin doses to obtain glycemic control at the end of 1 year in patients taking camel milk.
R.P. Jain, S. Shah, A. Chopra & V. Agarwal	24 patients with type 1 diabetes	2-year randomized clinical, parallel design study. Group I (n=12) received usual care and Group II (n=12) received 500 ml camel milk in addition to the usual care.	In camel milk group, there was decrease in mean blood glucose (118.58±19-93.16±17.06 mg/dl), hemoglobin A1c levels (7.51±1.39-5.44±0.81%) and insulin doses (32.50±9.99-17.50±12.09 U/day, P<0.05).	Camel milk can improve long-term glycemic control, with a significant reduction in the doses of insulin in type 1 diabetics.
R. Mohammed et al., 2009	54 type 1 diabetic patients	16-week randomized study. Two groups of 27 patients: one received usual management, the other received 500 mL of camel milk daily with standard management. Control group of 10 healthy subjects was also assessed.	Statistically significant increases occurred in improvement in fasting blood sugar levels (227.2 ± or -] 17.7 vs. 99.9 [± or -] 16.2 mg/dL, P < 0.01), HbA1c levels (9.59 [± or -] 2.05%] vs. 7.16 [± or -] 1.84%], P < .001) and C-peptide levels (0.28 [± or -] 0.6 vs. 2.30 [± or -] 0.51 pmol/mL, P < .007).	These findings suggest that camel's milk has an advantageous effect on type 1 diabetes.
P.P. Agrawal et al., 2003	24 patients with type 1 diabetes	3-month randomized prospective controlled study of two groups. Group 1 (N=12) received usual care and group 2 (N=12) received 500 ml camel milk in addition to usual care for 3 months.	There was significant improvement in fasting blood sugar (9.54 ± 2.1 to 9.08 ± 1.77; p < 0.002) and HbA1c levels (115.66 ± 7.17 to 100 ± 16.2; p < 0.002) and significant reduction in insulin requirement (mean doses of insulin 41.16 ± 10.32 to 30 ± 12.6; p < 0.002) in group 2.	The data of this study shows a significant hypoglycemic effect of camel milk when given as an adjunct therapy.
R.P. Agrawal et al., 2005	24 patients with type 1 diabetes	52-week randomized study. 12 patients underwent routine diabetic management and 12 patients additionally undertook daily consumption of camel milk (500ml/day)	Significant change in both in HbA1c (7.1 ± 3.86 to 5.9 ± 0.96, p<0.001), in group 2. There was also significant reduction in the mean doses of insulin (32±12 vs 17.83 ± 12.40, p<0.005) in group 2.	Significant reduction in insulin doses and significant improvement in HbA1c level in group 2.

Results

Results from all five studies suggest a inverse relationship between the consumption of camel's milk and the amount of exogenous insulin required for management of type 1 diabetes. Each of the studies determined this by comparing the HbA1c levels of diabetic patients before the camel milk intervention and after. All the studies showed a statistically significant decline in HbA1c in patients consuming the milk. In addition, each study compared the mean doses of insulin that each group required. The groups that had regularly consumed camel's milk also required a reduced amount of insulin. In addition, one of the studies showed remarkable increase in c peptide levels in the camel's milk group. This implies that residual beta cell function was increased by the intervention

Conclusion and Discussion

Implications

The use of camel milk as an adjunctive therapy could lead to reduced management costs for type 1 diabetics. In addition, since camel milk may improve beta cell function, this could lead to recovery of beta cells in type 1 diabetics. The recovery of beta cells could lead to some insulin production in type 1 diabetics.

Limits

The exact mechanism is unknown. Only used one database. This may have caused a selection bias in the study. The results in the University of Ottawa database may have been chosen because they rejected the null hypothesis.

Only used studies in English. This may have created language bias. Also, studies were only selected post 2000. Could have excluded relevant studies

Strengths

All the studies used the same measurements to determine the effectiveness of the intervention. This created homogeneity. All the studies were randomized controlled trials.

All the studies found a statistically significant α value in their results.

Conclusion

According to articles collected, the consumption of camel's milk is an effective adjunctive therapy for reducing the volume of insulin needed to manage diabetics. However, more research needs to be done to uncover the true mechanism as to why camel's milk works and also the market potential of camel's milk in North America needs to be further evaluated.

References

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