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ROLE OF CAMEL MILK IN THE MANAGEMENT OF DIABETES MELLITUS (MADHUMEHA) W.S.R. OF TYPE 1 DIABETES: REVIEW ARTICLE

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ABSTRACT :

Diabetes mellitus (DM) is a disease characterized by a high level of blood sugar (i.e., glucose) that results from the failure of the body to produce sufficient insulin (type 1 diabetes). In *Ayurved*, it can be correlated with "*Madhumeha*"."*Madhumeha*" caused by vitiation of *vata dosha* .In a country with the hightest incidence of diabetes in the world, a potential preventative treatment has been found in an unlikely place: camels.*Ayurveda* has referred medicinal value of camel milk under the classification of "*Dugdha varga*"(Milk classification).camel milk has a high vitamin and mineral content and immunoglobulin content. Camel milk contains high concentration of insulin i.e. 52 U/L to 59 U/L. The efficacy of camel milk consumption as an adjunct to routine diabetic management in maintaining long-term glycaemia control in type I diabetes was assessed during a 52 week randomized study. Throughout the duration of study, 12 randomly assigned patients underwent routine diabetic management(diet ,exercise ,parental insulin supplementation) and 12 randomly assigned patients additionally undertook daily consumption of raw camel milk (500ml/day).. In addition to that, one patient of the group is completely cured from DM after 8 months of consumption of camel milk, and gets rid of using insulin totally. In the contrary, there was no significant change in c-peptide or anti- insulin antibodies. This study demonstrated that, camel milk, as an adjunct to insulin therapy, was safe and efficacious in improving long-term glycaemic control, and helps in the reduction of insulin requirement in type 1 diabetic patients.

Keywords : type 1 diabetes, camel milk , *Madhumeha*

INTRODUCTION: Diabetes mellitus has gained gigantic disgrace in recent times as it is fast becoming the world's largest silent killer. Today the Diabetes mellitus is really becomes the burning problem of the world. The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030. The prevalence of diabetes is higher in men than women, but there are more women with diabetes than men. The urban population in developing countries is projected to double between 2000 and 2030. The most important demographic change to diabetes prevalence across the world appears to be the increase in the proportion of people

>65 years of age[1]. In *Ayurveda(In charak samhita)* Prameha described along with its signs, symptoms, aetiopathogenesis and its 20 types[2], *Madhumeha* is one of the type among these 20. *Madhumeha* can be correlated with Diabetes mellituson the basis of similarities in the signs and symptoms. *Madhumeha* caused by vitiation *of vata-dosha*[3] has many clinical similarities to the modern day Diabetes mellitus. Sedentary life style and stressful mental conditions nowadays have called for many distressing diseases, foremost amongst them being Diabetes Mellitus – a perfect example for a lifestyle disorder. The modern lifestyle trends over a few decades are heavily inclined towards a comfortable life style, with decreasing opportunities for physical exertion, prominence of processed foods in daily diet, irregular sleeping patterns, and a predominantly sedentary life, has led to the emergence of various lifestyle disorders like obesity, diabetes mellitus, hypertension, cardiac diseases etc. Diabetes increases the risk of long-term complications. These typically develop after many years (10-20 years), but may be the first symptom in those who have otherwise not been diagnosed before that time. The major long-term complications of diabetes are diabetic retinopathy, nephropathy, neuropathy, cardiovascular disorders etc. Diabetes mellitus is a chronic disease which cannot be cured except in very specific situations.

In Rural area,*Ustridugdha* (She Camel Milk) used in *madhumeha* traditionally from many years. According to NRCC Bikaner camel milk contents Insulin level up to 40 micro unit per liter that's why the camel milk has a very effective role in treatment of *madhumeha.*

Chemical Composition of Camel Milk: The chemical composition and nutritional quality of camel milk was studied. Result showed - 11.7 % - total solids, 3.0% protein, 3.6% fat, 0.8% ash, 4.4% lactose, o.13 % acidity & a PH of 6.5.The levels of Na, K, Zn, Fe, Cu, Mn, Niacin & Vitamin C were higher & thiamin, Riboflavin, Folacin, Vitamin B12, Pantothenic acid, Vitamin A, Lysine & Tryptophan were relatively lower than those of cow milk. Gas liquid chromatography analysis of milk fat showed a moler % of 26.7 for palmitic, 25.5 oleic, 11.4 myristic & 11.0 palmitoleic. Camel milk contains high concentration of insulin i.e. 52 U/L to 59 U/LIn vitro protein digestibility & calculated protein efficiency ratio values were 81.4% & 2.69, respectively based on 90.0% & 2.50 for ANRC casein.[4]

***Ayurvedic View : UstriDugdha*:** Ayurveda has referred medicinal value of camel milk under the classification of "*DugdhaVarga*"(milk classification).

Properity of Camel milk(*In Ayurveda: Kayedev niganthu*)[5]

Ras-Ishat katu ,lavan ,madhu

Guna-vikasi,vishad,Guru ,Tikshna ,Rukhsan,

Karma:Vata-kaphar,Shula,Premeha ,Kustha ,Pandu

Ushtra ksheera (*milk of camel) is-(according to asthang hrudaya)*[6]

- *Ishat ruksha* - Slightly dry
- *Ushna* - Hot
- *Lavana* - Salty taste
- *Deepana - Increases digestion strength*
- *Laghu* - Easy to digest

- *Vatakaphaanah shastam* - Useful in *vata* and *kapha*
- *Krumi* - Relieves worm infestation
- *Shopha* - Anti inflammatory
- *Udara* -Useful in ascites
- *Arshas* – Haemorrhoids

Role of Camel Milk in Diabetes: There is a traditional belief in the Middle East that regular consumption of camel milk helps in the prevention and control of diabetes. Recently, it has been reported that camel milk can have such properties. Literature review suggests the following possibilities: i) Insulin in camel milk possesses special properties that makes absorption into circulation easier than insulin from other sources or cause resistance to proteolysis. ii) Camel insulin is encapsulated in nano particles (lipid vesicles) that make possible its passage through the stomach and entry into the circulation. iii) Some other elements of camel milk make it anti-diabetic. Sequence of camel insulin and its predicted digestion pattern do not suggest differentiability to overcome the mucosal barriers before been degraded and reaching the blood stream. However, we cannot exclude the possibility that insulin in camel milk is present in nano particles capable of transporting this hormone into the blood stream. Although, much more probable is that camel milk contains 'insulin- like' small molecule substances that mimic insulin interaction with its receptor. Such beneficial effects of camel milk might be due to presence of insulin in the milk or some other substance(s) able to modulate glucose level. It contains higher level of insulin than milk from other animals but to be effective it would have to be absorbed directly in the buccal cavity or completely Proteolytically protected during passage through stomach and absorbed in the intestine. Camel milk is unique in the sense that it does not respond to acidic agents like other animal milk, possesses different casein content and much larger lipid micelles. Camel milk contains high concentrations of lactoferrin, immunoglobulins, lysozyme and lactoperoxidase. These inflammation-inhibiting proteins may explain why, from way back, camel milk has been used to combat intestinal diseases. Camel milk also contains a protein with characteristics similar to insulin. This explains the results of epidemiological, animal experimental and clinical research which reveal that camel milk can help to prevent and treat diabetes.

Experimental Evidences of Therapeutic Effects of Camel Milk on IDDM(Type1 Diabetes): The efficacy of camel milk consumption as an adjunct to routine diabetic management in maintaining long-term glycaemia control in type I diabetes was assessed during a 52 week randomized study. Throughout the duration of study, 12 randomly assigned patients underwent routine diabetic management(diet ,exercise ,parental insulin supplementation) and 12 randomly assigned patients additionally undertook daily consumption of raw camel milk (500ml/day). Glycosylated haemoglobin (HbA1c) and BMI were measured at the initiation of the study and monitored at 3 monthly intervals. Additionally, plasma insulin, C-peptide and anti-insulin antibodies were measured at the beginning and end of the study. In the group receiving camel milk, there was a significant increase in MBI and a significant reduction

in HbA1c, mean blood glucose and necessary insulin dose compared to the values at the initiation of the study. In addition to that, one patient of the group is completely cured from DM after 8 months of consumption of camel milk, and gets rid of using insulin totally. In the contrary, there was no significant change in c-peptide or anti- insulin antibodies. This study demonstrated that, camel milk, as an adjunct to insulin therapy, was safe and efficacious in improving long-term glycaemic control, and helps in the reduction of insulin requirement in type 1 diabetic patients. Camel milk was well tolerated and its use was not associated with an increase in hypoglycemic events.(7)

The study conducted by India's Bikaner Diabetes Care Research Centre (2005), reported the beneficial effects of camel milk consumption on type-1 diabetes as it significantly reduced insulin doses required to maintain long-term glycemic, or blood sugar level under control. This study also demonstrated the insulin concentration in camel milk is higher as compared to cow milk.

The hypoglycemic effect of camel milk in comparison to cow and buffalo milks in stretozotocin-induced diabetic rats was carried out . The effects of camel, cow and buffalo milks on liver and kidney functions of the diabetic rats in comparison to a control group and groups fed with cow and buffalo milks were also investigated. The study revealed that, camel milk was most effective in hypoglycaemic control of the diabetic rats; it reduced hyperglycemia by 49.2%, while cow and buffalo milks reduced hyperglycemia by 11.6% and 11.1% respectively.(7)

CONCLUSION: In order to combat the global epidemic of diabetes and non communicable diseases (NCDs), it is imperative to create a baseline for monitoring trends and to assess the progress of countries in addressing the epidemic. 14 November 2016 was marked as the world Diabetes day. This year's theme "Eyes on Diabetes", was a reminder that diabetes is among the leading cause of various other major diseases. Camel, as per Quran ia a miracle of God. Its milk holds many medicinal properties.Camel milk has insulin like activity, regulatory and Immune Modulatory functions on β cells. Camel milk exhibits hypoglycemic effect when given as an adjunctive therapy, which might be due to presence of insulin/insulin like protein in it and possesses beneficial effect in the treatment of diabetic patients. The initial pilot studies have shown some exciting results in Camel milk as a treatment for Diabetes. A project is also being undertaken by DSRRAU, Jodhpur and NRCC, Bikaner to study the Hypo-glycemic effects of Camel milk.

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