

## **Abstract**

**Title:** Comparison of thiamine status in type II diabetes mellitus with and without lower extremity amputations: A prospective case control study.

**Background:** Diabetes Mellitus is quickly gaining the status of an epidemic in our country. The complications arising out of diabetes are one of the commonest problems encountered in the surgical outpatient clinics and the wards. Diabetic neuropathy along with microangiopathy predisposes the individual to development of diabetic ulcers which are treated with debridements or minor/major amputations depending upon the extent and severity of the lesion. Thiamine is a water soluble vitamin which takes part in the carbohydrate metabolism and is found to be deficient in chronic hyperglycaemic states. Thiamine and its synthetic derivatives have been shown to accelerate healing of ischemic diabetic limbs in animal models. Hence studies are required to determine and establish a correlation of diabetic patients undergoing lower extremity amputations and their thiamine levels.

**Aim:** To assess the thiamine levels of patients undergoing lower limb amputations due to uncontrolled diabetes mellitus type II

**Study Design:** Hospital based prospective case-control study

**Materials and Methods:** A hospital based prospective case control study was done among the patients in the wards of the general surgical units. The cases were the patients with diabetes mellitus, who underwent lower extremity amputations. The controls were the patients in the wards of the general surgical units with diabetes mellitus who were otherwise healthy and did not undergo a lower extremity amputation. A one-on-one interview was conducted using a questionnaire detailing the patient demographics, anthropometrics and neurological examination. A blood sample was collected, under standard precautions, for the

measurement of Erythrocyte Transketolase Activity (ETKA), and the value was recorded in the data collection sheet. The routine investigations done for diabetic work-up were collected from the hospital medical records system and recorded in the data collection sheet. The normal range of Transketolase activity was deduced from the control arm of the study.

**Conclusion:** The mean erythrocyte transketolase levels measured among the cases were lower than that for the control group but the difference was not statistically significant. Low thiamine levels were identified by using the mean value of the control arm as the lower limit of normal erythrocyte transketolase level. Using this value, sixty two percent of the cases were identified to have low thiamine levels. The low thiamine levels did not show any significant association with age, gender, body mass index or mode of diabetic treatment.

The low thiamine levels were also compared to markers of glycaemic control and level of neuropathy among the cases. However, there was no significant correlation between the low thiamine levels and HbA1c, urinary micro-albumin and modified neuropathy disability score. Interestingly, the median neuropathy score among the cases (NDS=8) was significantly higher than that in the control arm (NDS=4). This was an important finding since a score of six or more was predictive of foot ulceration and subsequent risk of amputation, in the precious limb of the patients who had already undergone amputations of the contra-lateral limbs. Also the median urinary micro-albumin among the cases (urine micro-albumin=70.5mg/mg of creatinine) was significantly higher than that among the controls (urine micro-albumin=17mg/mg of creatinine). The prevalence of abnormal urinary micro-albumin, suggestive of incipient diabetic nephropathy, was significantly high among cases (75%) as compared to the controls (33.3%).

In view of the above, it is imperative that further role of thiamine should be investigated to establish a correlation between thiamine deficiency and complications of diabetes mellitus.

**Keywords:** Diabetes mellitus, neuropathy, amputation, angiopathy, thiamine, benfotiamine.