

# THIAMINE DEFICIENCY. INCREASINGLY LIKELY COMPLICATION OF CHRONIC HIGH-FLUX HEMODIALYSIS

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## OBJECTIVES

Patients (pts) on hemodialysis (HD) are prone to develop thiamine (B1) (265 daltons) deficiency because of low intake and loss of water-soluble vitamins into the dialysate, even more with use of high-flux membranes. Pts lacking B1 may develop symptoms which are often confused with cerebral and cardiovascular complications of uremia and subsequently progress to Wernicke's encephalopathy (1-4).

Aim of this study was to investigate B1 deficiency in HD pts treated with high-flux membranes, taking into account that the elderly dialysis population is increasing and it is more likely to develop malnutrition.

## METHODS

We evaluated levels of B1 in whole blood samples by HPLC in 107 HD pts. All data are presented as number (percentage), mean  $\pm$  standard deviation (SD), or median when appropriate. Pearson's correlation (r) method for variables that might have had an impact on B1 levels was evaluated.

## RESULTS

38 F and 69 M, aged  $68.2 \pm 14.4$  years, on dialysis for 62.6 (3-357) months, 77 receiving bicarbonate HD (BHD) and 30 mixed hemodiafiltration (HDF) with high-flux dialysers (94 helixone and 13 polymethylmethacrylate with effective surface area 1.6-2.2 m<sup>2</sup>), mean Kt/V urea  $1.5 \pm 0.39$ , mean body mass index (BMI)  $24.9 \pm 4.4$  and mean albumin  $3.82 \pm 0.36$  g/dL.

Median and mode B1 level was 46  $\mu$ g/L and 40  $\mu$ g/L respectively (normal range 28-85) and B1 deficiency was observed in 6/107 pts (5.6%) with median B1 level of 24  $\mu$ g/L.

**Pts of low-B1 group** (2 F and 4 M) were older ( $75.8 \pm 7.1$  years), on dialysis for a longer period of 90.3 months (5-261), 5 receiving BHD and 1 mixed-HDF, lower Kt/V urea ( $1.25 \pm 0.19$ ), lower BMI ( $22.2 \pm 4.9$ ) and lower albumin's level ( $3.47 \pm 0.29$  g/dL).

**Pts of normal-B1 group** (36 F and 65 M) had median B1 level of 47  $\mu$ g/L, were younger ( $67.5 \pm 15.9$  years), on dialysis for 61 months (3-357), 72 receiving BHD and 29 mixed-HDF, mean Kt/V urea  $1.51 \pm 0.39$ , mean BMI  $25.1 \pm 4.4$  and levels of albumin  $3.84 \pm 0.34$  g/dL. We do not observed correlation between B1 levels and Kt/V urea, membranes' surface area and HD modalities, but positive correlation with duration of dialysis (r 0.23), levels of albumin (r 0.19) and BMI (r 0.24).

Patient characteristics of the study cohort

	All patients (n=107)	Low-B1 group (n=6)	Normal-B1 group (n=101)
Age (years)	68.2 $\pm$ 14.4	75.8 $\pm$ 7.1	67.5 $\pm$ 15.9
Gender (male)	69 (64.5%)	4 (66.7%)	65 (64.4%)
Months on dialysis	62.6 (3-357)	90.3 (5-261)	61 (3-357)
Median B1 level ( $\mu$ g/L)	46	24	47
Hemodialysis modality			
BHD	77 (72%)	5 (83.3%)	72 (71.3%)
HDF	30 (28%)	1 (16.7%)	29 (28.7%)
Mean Kt/V urea	1.5 $\pm$ 0.39	1.25 $\pm$ 0.19	1.51 $\pm$ 0.39
Mean BMI	24.9 $\pm$ 4.4	22.2 $\pm$ 4.9	25.1 $\pm$ 4.4
Mean albumin (g/dL)	3.82 $\pm$ 0.36	3.47 $\pm$ 0.29	3.84 $\pm$ 0.34

## CONCLUSIONS

In conclusion B1 deficiency was not statistically associated with dialyser membrane, HD modality and adequacy. Further studies aimed to investigate B1 mass removal during high-flux HD may lead to a better understanding of the influence of the dialysis procedure on B1 metabolism. In our opinion, B1 supplementation should be considered for long-term chronic HD pts who developed malnutrition-inflammation syndrome and may easily develop vitamin deficiency.

## REFERENCES

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