5-2019

Improved Vitamin D Status Over Time in Children Undergoing Hematopoietic Cell Transplantation

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BACKGROUND

Vitamin D is an essential nutrient that plays an important role in calcium homeostasis and bone health and has important immunomodulatory effects. Vitamin D deficiency is prevalent in children undergoing hematopoietic cell transplantation (HCT), and has been correlated with risk of post-transplant complications and inferior survival.

OBJECTIVE

To determine vitamin D status pre transplant, at 100 days, 180 days, one year, and two years post-transplant

STUDY DESIGN

A prospective non-interventional, IRB approved study of vitamin D status over time in pediatric HCT patients

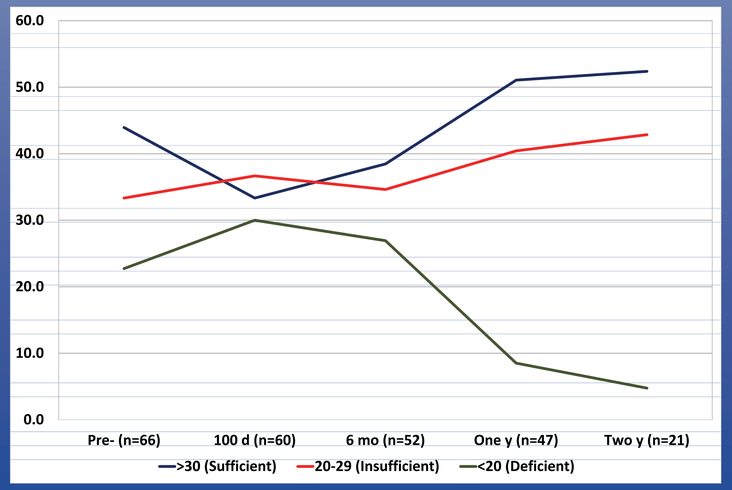
METHODS

Patients between >1 mo. and ≤21 y were eligible. Blood samples were drawn to measure 25-hydroxy vitamin D ("vitamin D") levels at pre-HCT, and 100 days, 6 mo., 1 y, and 2 y post-HCT time points. Vitamin D levels were classified as sufficient (≥30 ng/ml), insufficient (20–29 ng/ml) or deficient (<20 ng/ml). All patients were followed by registered dieticians. Logistic mixed models were used to examine vitamin D status across time. Chart Review was completed to determine Vitamin D supplementation.

TABLE 1. BASELINE CHARACTERISTICS BY PRE-HCT VITAMIN D GROUPS

	SUFFICIENT (>30 ng/ml)	INSUFFICIENT (20-30 ng/ml)	DEFICIENT (<20 ng/ml)
TOTAL (N = 66)	29 (43%)	22 (33%)	15 (23%)
AGE RANGE			
<4 y (N = 22)	14 (63%)	5 (23%)	3 (14%)
4-12 y (N = 23)	10 (43.5%)	10 (43.5%)	3 (23%)
>12 (N = 21)	5 (24%)	7 (33%)	9 (48%)
GENDER			
Male (N = 45)	20 (45%)	19 (42%)	6 (33%)
Female (N = 21)	5 (24%)	7 (33%)	9 (43%)
RACE / ETHNICITY			
White (N = 47)	19 (40%)	19 (40%)	9 (20%)
Non-white (N = 19)	7 (37%)	6 (31.5%)	6 (31.5%)
TYPE OF HCT			
Allogeneic (N = 48)	21 (44%)	15 (31%)	12 (25%)
Autologous (N = 18)	3 (17%)	7(39%)	8 (44%)

FIGURE 1. VITAMIN D SUFFICIENCY, INSUFFICIENCY AND DEFICIENCY OVER TIME



RESULTS

Sixty-six patients were enrolled, median age 8.1 y (0.4 y -20.5 y). 73% of patients received myeloablative conditioning. The median vitamin D level prior to HCT was 27 ng/ml (range: 8 ng/ml – 69 ng/ml). Levels were insufficient and deficient in 33% and 23% patients (Table 1). Only 24% of children >12 y had sufficient vitamin D levels compared with 44% and 64% in ages 4-12 and below 4 y respectively. Only 24% female patients had normal vitamin D levels compared with 45% male patients.

Compared to pre-HCT, estimated odds of "below sufficient" (either insufficient or deficient) were 47% higher at 100 days, 30% higher at 6 mo., 69% lower at 1 y, and 81% lower at 2 y (linear trend p = .023) and estimated odds of sufficiency were 39% lower at 100 days, 21% lower at 6 mo., and 41-42% higher at 1 y and 2 y (linear trend p = .087)(Figure 1). The proportion of patients receiving supplemental vitamin D were 7.5%, 10%, 19%, 30% and 42% at pre-HCT, +100 days, 6 mo., 1 and 2 y post-HCT time-points, respectively.

CONCLUSIONS

We show a high prevalence rate of vitamin D insufficiency and deficiency prior to and early after HCT. We also found that the odds of vitamin D sufficiency improved over 1 – 2 y post-HCT. We suggest that all pediatric patients should be screened for vitamin D status prior to and at day 100 post-transplant and those with low levels (<20 ng/mL) treated. Clinical significance of this approach needs to be examined in a large multicenter trial.