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Fat-soluble vitamin deficiencies in pediatric chronic liver disease: the impact of liver transplantation

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OBJECTIVES

Fat soluble vitamin (FSV) deficiency is a common feature in chronic liver diseases (CLD).

The **aims** of our study were:

- Evaluate **the prevalence of FSV deficiency** in a cohort of paediatric patients awaiting liver transplant (LT)
- Assess **the impact of the transplant** on vitamin status
- Analyze relationships between plasma vitamin levels and risk of **acute rejections** and **liver fibrosis**.

METHODS

166 children with CLD (Male/Female: 85/81) evaluated for LT were enrolled.

Anthropometric and **biochemical** (liver function tests, vitamin A, D and E plasmatic concentrations) **data** were **collected at waiting list registration (T0)** and **twelve months after LT (T1**). Acute cellular rejections and fibrosis score sec. Ishak were assessed at **protocol biopsies** .

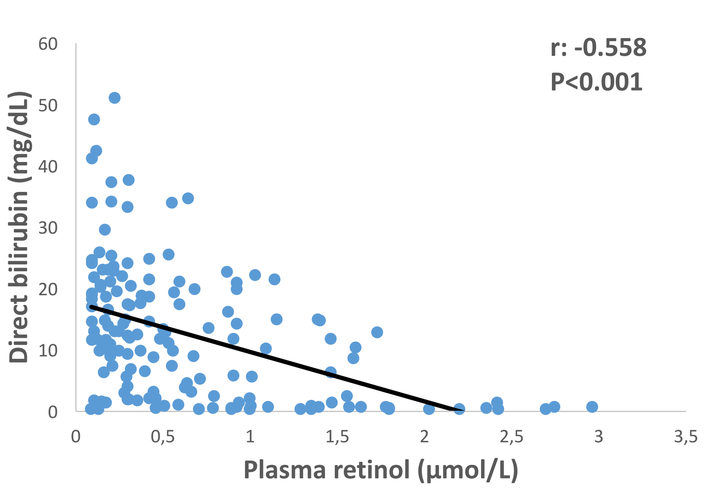
Before LT, only cholestatic patients were under **oral supplementation**.

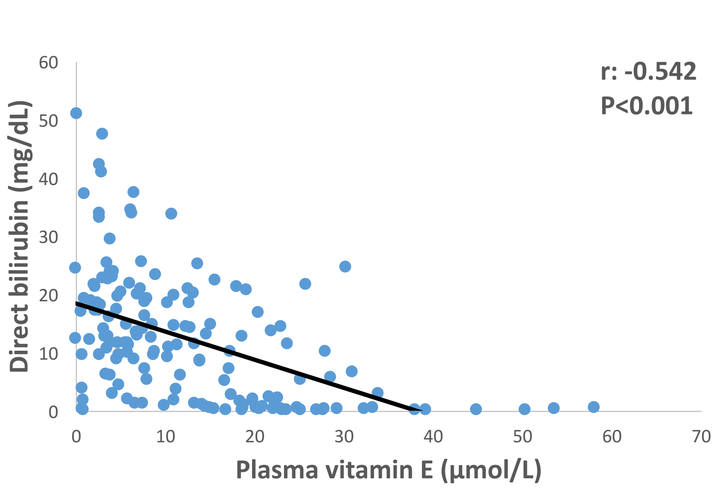
FSV deficiencies were defined as:

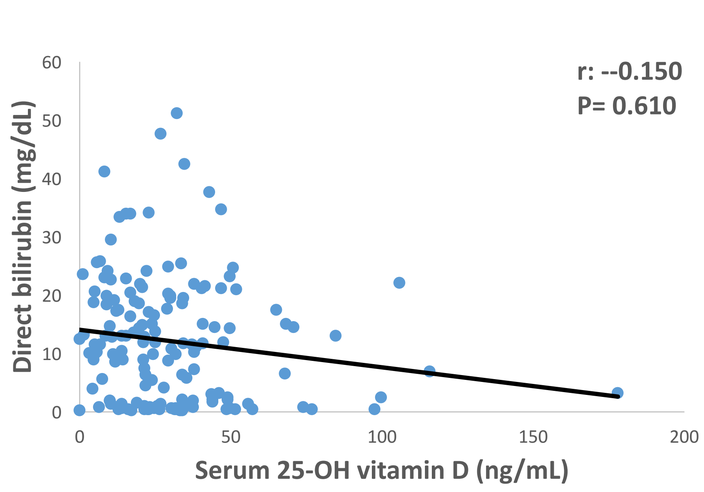
Vit A< 0,7 µmol/L, **25-OH Vit D< 20 ng/mL** and **Vit E< 7 µmol/L**.

RESULTS

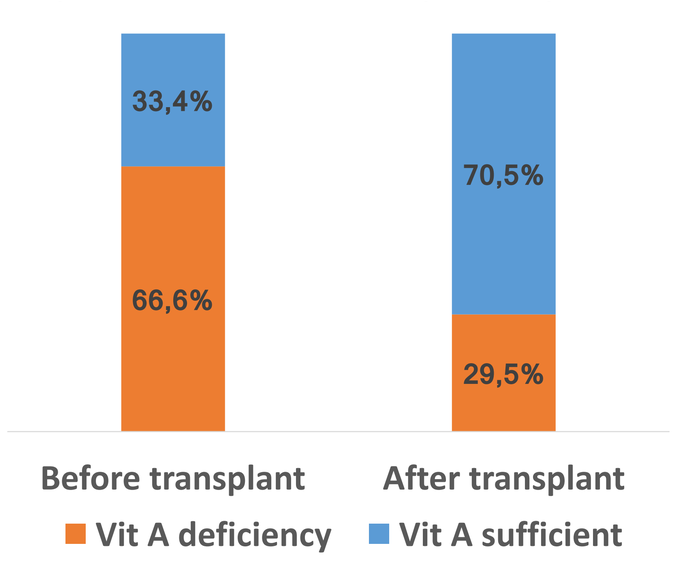
- **Median age** at waiting list inclusion time was 9.1 months (IQR: 15.8); **the indications for LT** were: cholestatic disorders (75.9%), metabolic diseases (15.7%), tumors (7.2%), and vascular anomalies (1.2%).
- **At T0, deficiencies** were found as follow: **vitamin A in 66.6%, vitamin E in 40.6**% and **vitamin D in 36.3%** of patients. Prevalence of subjects with **vitamin A deficiency** was higher in patients with **cholestatic disorders (77.2%)** than those with non-cholestatic disorders **(36.8%) (p<0.001);** similar results were found in patients with **vitamin E deficiency (50.9% vs 10.5%, p<0.001)** but not in patients with vitamin D deficiency **(37.6% vs 30.8%, p=0.441) (figure 1)**.
- In correlation analysis, all **FSV were negatively associated with PELD score** assigned at T0, while only vitamin A (r: -0.558, p< 0.001) and E (r: -0.542, p< 0.001) levels were inversely associated with **direct bilirubin concentrations.**

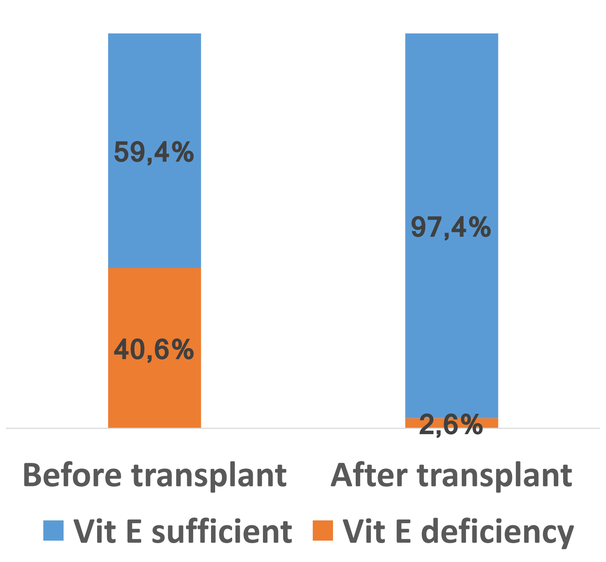


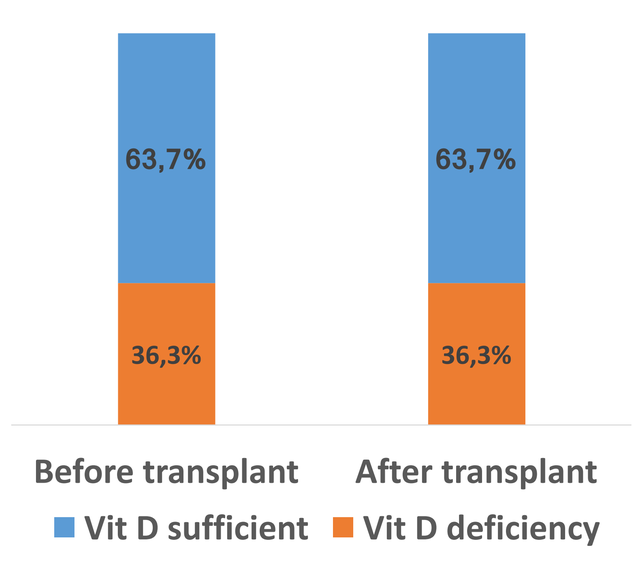




- **At T1,** median plasma **retinol improved from 0.41 to 0.90 µmol/L** (p< 0.001), median plasma **vitamin E from 7.84 to 18.94 µmol/L (p< 0.001)** and the **prevalence** of patients with vitamin A and E deficiency **decreased to 29.5% and 2.6%**, respectively. Before and after LT, median **vitamin D levels** remained similar **(25.3 vs 21.1 ng/mL, p=0.230)**, maintaining the same proportion of subjects with deficiency **(36.3%)**.
- 12 months after LT, 147 patients underwent to **protocol liver biopsy**: 63 children out 147 (42,8%) had at least one histologically-documented **acute cellular rejection** event, but **no correlations** were found between the number of rejections/liver fibrosis severity and plasma vitamin levels pre- or post-transplant.







CONCLUSIONS

FSV deficiency is a major problem of children with CLD as it can manifest both in the **pre- and post-transplant** period and can affect also patients with **no-cholestatic diseases**.

Liver transplant was effective to improve **vitamin A and E status**, but it did not affect **vitamin D.**

A consensus is needed to define optimal **nutritional management of these patients** in order to prevent deficiencies.

The authors declare no conflict of interest