

The Correlation between Serum TSH Levels and BMI Percentiles in Hypothyroid Children Who are Chemically Euthyroid on Levothyroxine Replacement

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OBJECTIVES

To investigate, whether there is a relation between TSH (Thyroid Stimulating Hormone) levels and BMI (Body Mass index) percentiles in hypothyroid children who are chemically euthyroid, on treatment with levothyroxine

METHODS

We did a retrospective cross sectional study that consisted of chart review of 154 cases of children (ages 6 months to 21 years that met our inclusion criteria) with a diagnosis of primary hypothyroidism who were on treatment and chemically euthyroid (normal TSH), at RUSH University Medical Center (RUMC) and Stroger Hospital (SH) pediatric endocrinology outpatient clinics (Chicago, IL, U.S.) from 2008 to 2014. Subjects were identified using ICD-9 codes.

Subjects were divided according to category of BMI percentiles into healthy weight, overweight, and obese groups.

To estimate the proportion of healthy weight, overweight, and obese children within each TSH group, subjects were divided into groups, lower TSH group (TSH <2.5 mIU/L) and upper TSH group (TSH ≥2.5mIU/L).

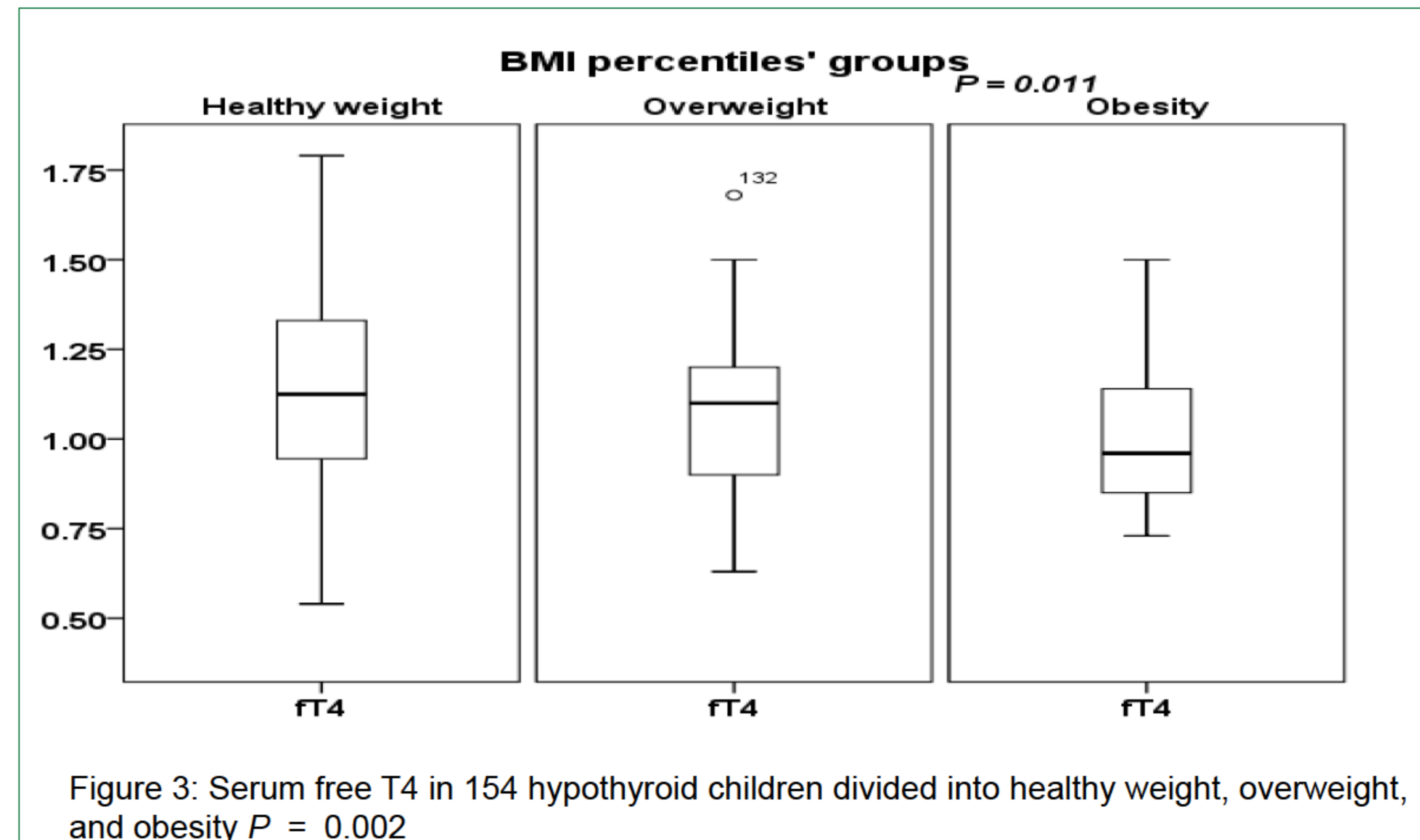
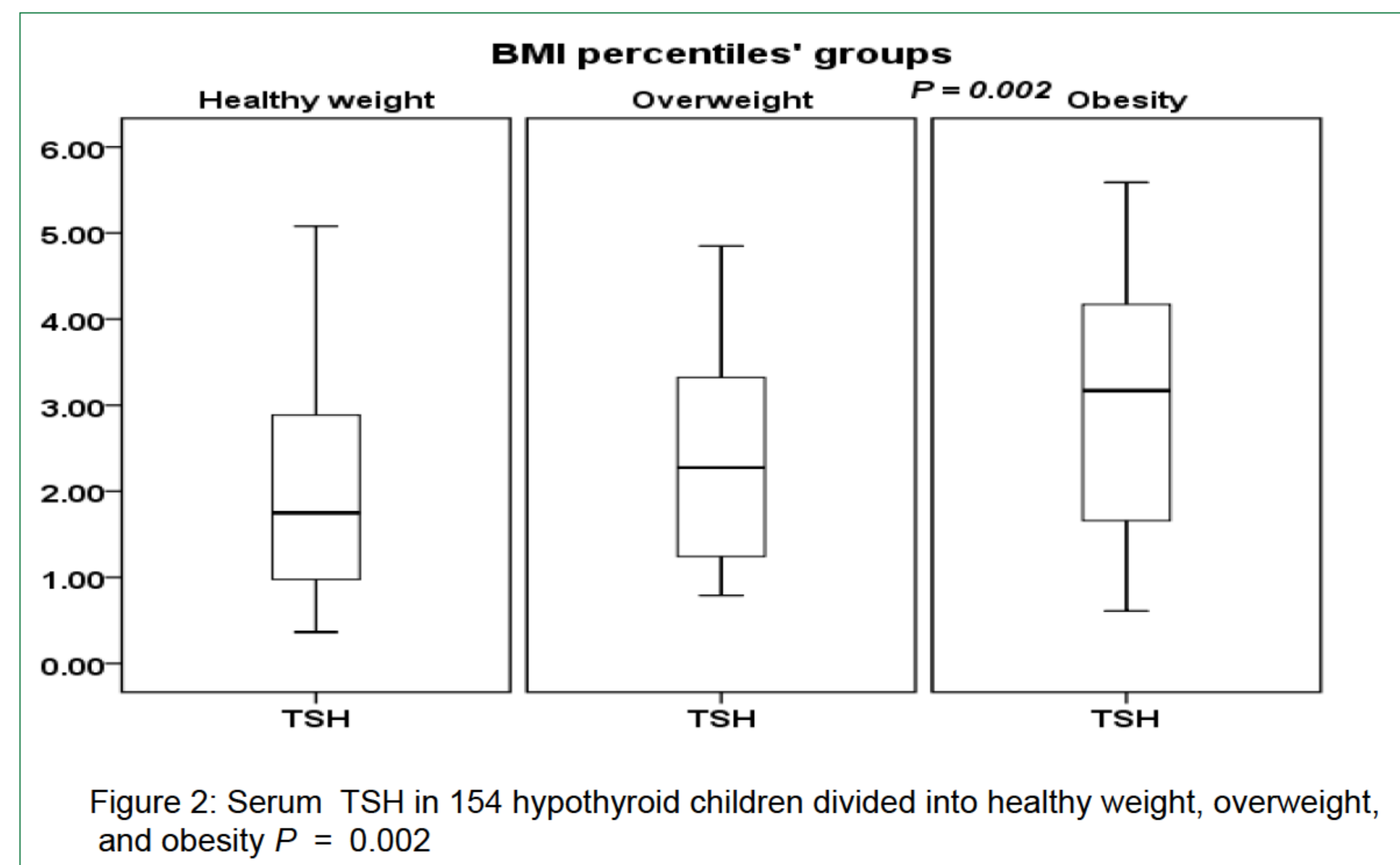
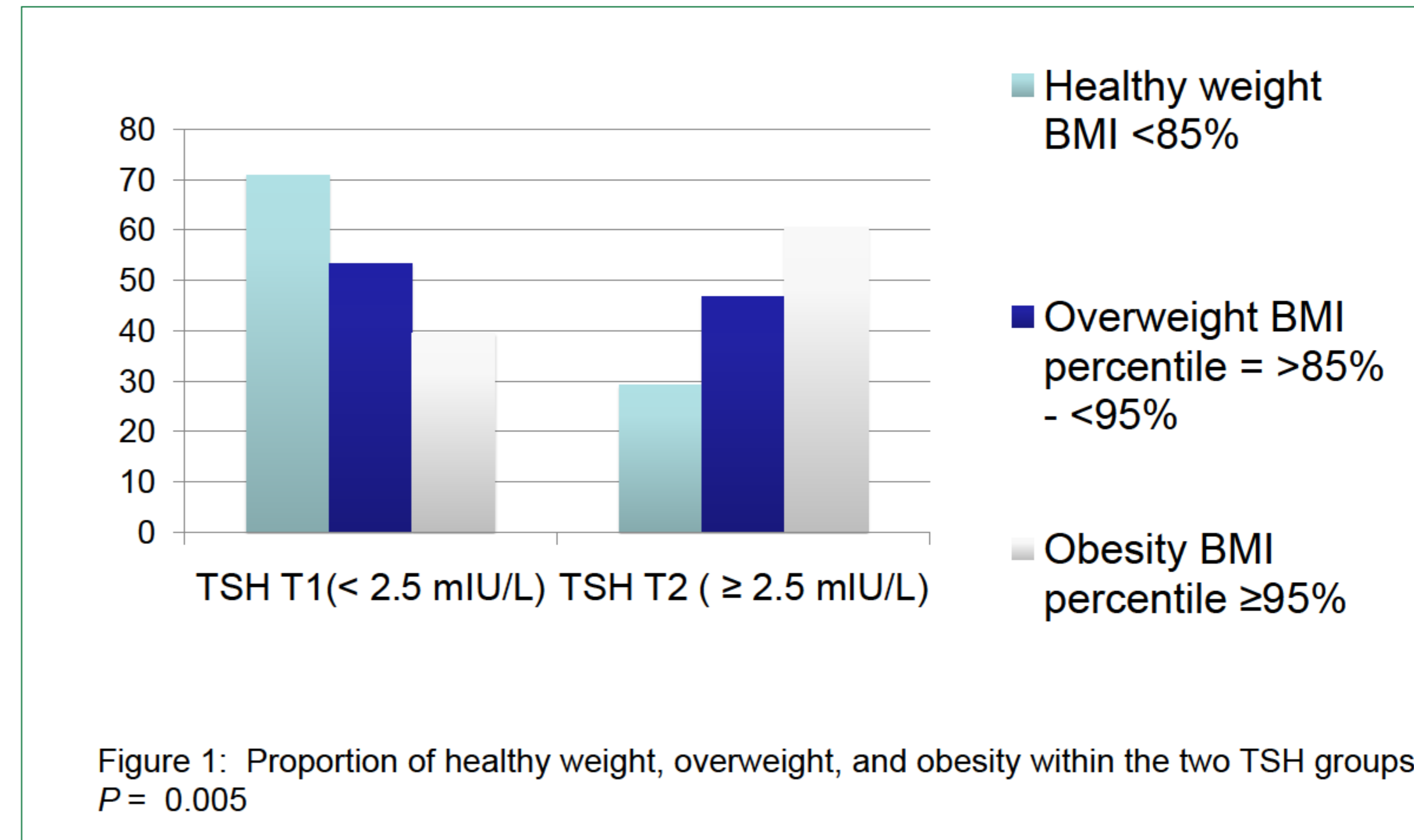
The results were drawn using Spearman's rho Coefficient, Linear regression, Chi-square, and Kruskal-Wallis Test.

RESULTS

When the subjects were divided according to TSH levels into two groups, the percentage of healthy weight within the lower TSH group was 70.2% while the percentage of obesity within the upper TSH group was 60.5% $P = 0.005$. (Fig. 1).

When the subjects were divided according to category of BMI percentiles into healthy weight, overweight, and obese groups, there was a significant difference in the median serum TSH between these groups as it was 1.7 mIU/L in the healthy weight group, 2.3 mIU/L in the overweight group, and 3.2 mIU/L in the obese group ($P = 0.002$) (Fig. 2).

In addition, we found a significant statistical difference in the median serum free T4 in these groups as it was 1.13 ng/dL in the healthy weight group, 1.10 ng/dL in the overweight group, and 0.96 ng/dL in the obese group ($P = 0.011$). (Fig. 3).



CONCLUSIONS

In children diagnosed with primary hypothyroidism that are chemically euthyroid on treatment with levothyroxine, there is a positive correlation between TSH levels and BMI percentiles. However it is very difficult to establish if the higher TSH levels are a cause or a consequence of the obesity. More studies are needed to understand this correlation.