

GH Dynamics in Oral Glucose Tolerance Test in Children and Adolescents with Tall Stature

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Abstracts

GH secretion varies according to sex and pubertal stages: for girls GH secretion increases in the 2nd Tanner stage and the secretion peak is reached in the 3rd Tanner stage and for boys GH secretion increases in the 3rd Tanner stage and the secretion peak is reached in the 4th Tanner stage.

Tall stature is defined as the height > + 2 SD for age and sex (equivalent to > 97th percentile or 98th percentile).

Evaluation of a child with tall stature is necessary to predict final height, to exclude an associated pathology, to receive a therapy to restrict the final stature (where it will be excessive) and for psychological counseling.

Oral glucose tolerance test (OGTT) is a step in the evaluation of children and adolescents with tall stature for documenting a possible autonomous GH secretion. There are insufficient data on GH suppression in OGTT in children and adolescents in various stages of pubertal development.

Objectives

Assessment of GH dynamics in OGTT in children and adolescents with tall stature in various stages of pubertal development for documenting a possible autonomous GH secretion.

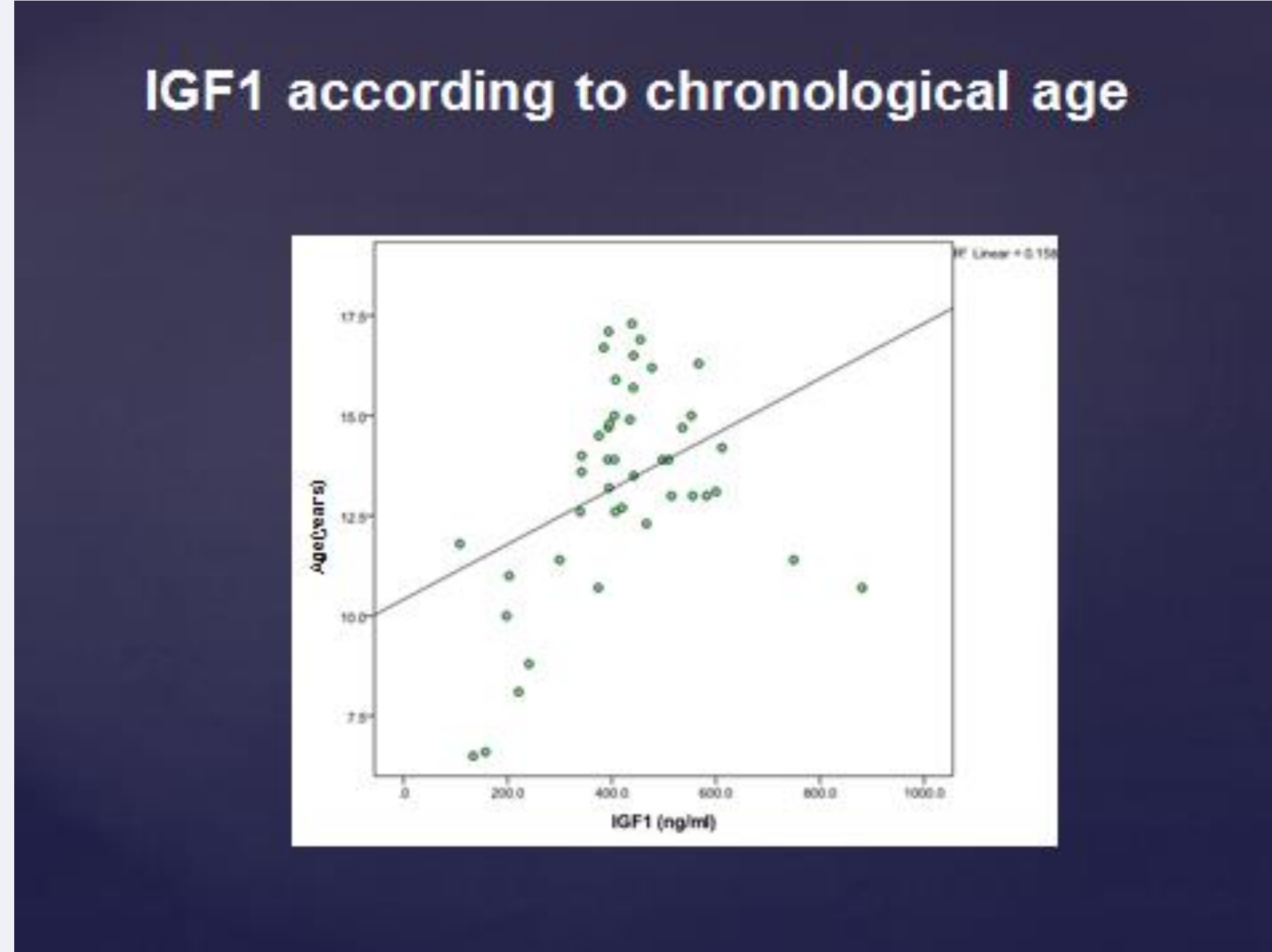
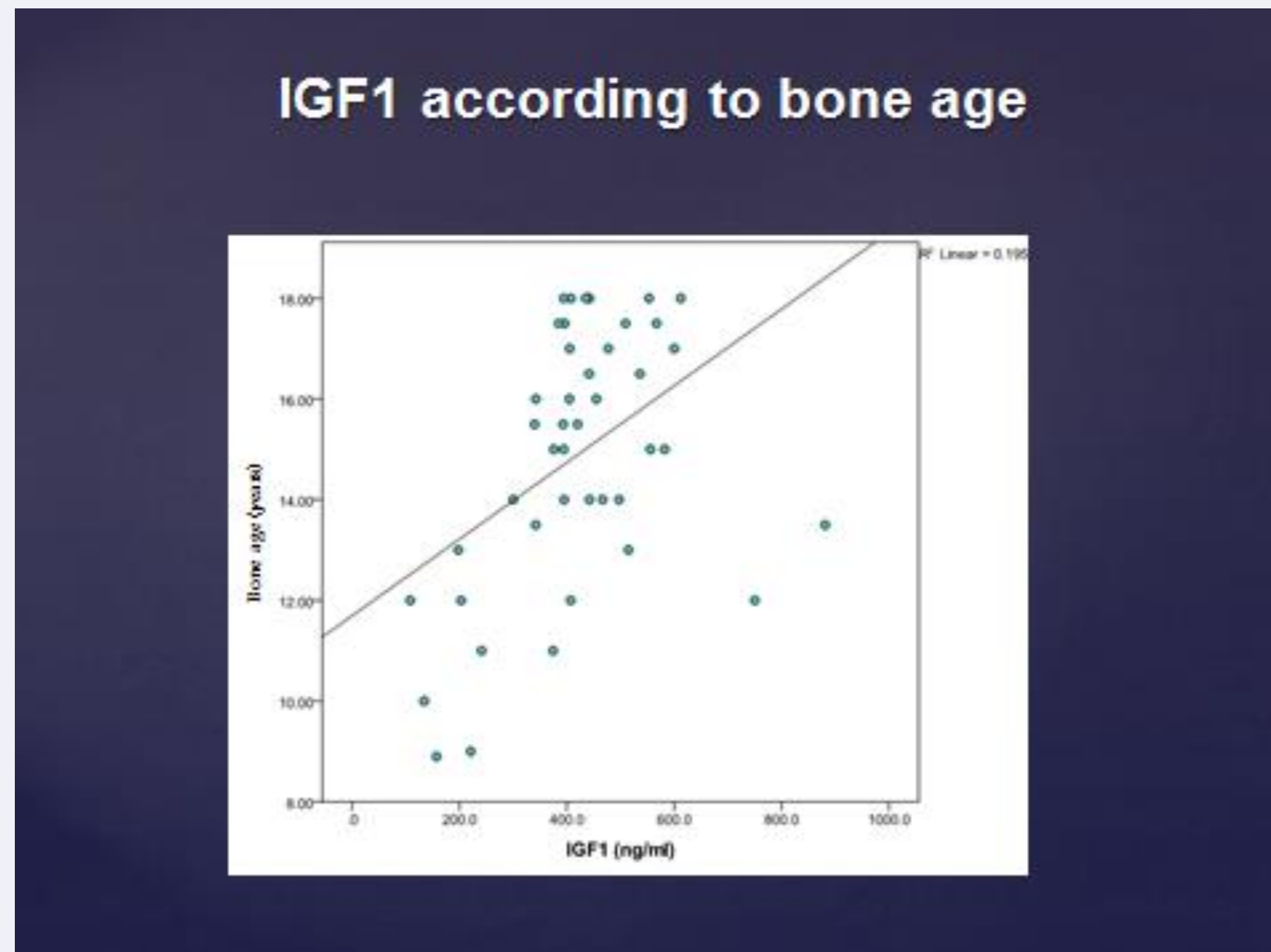
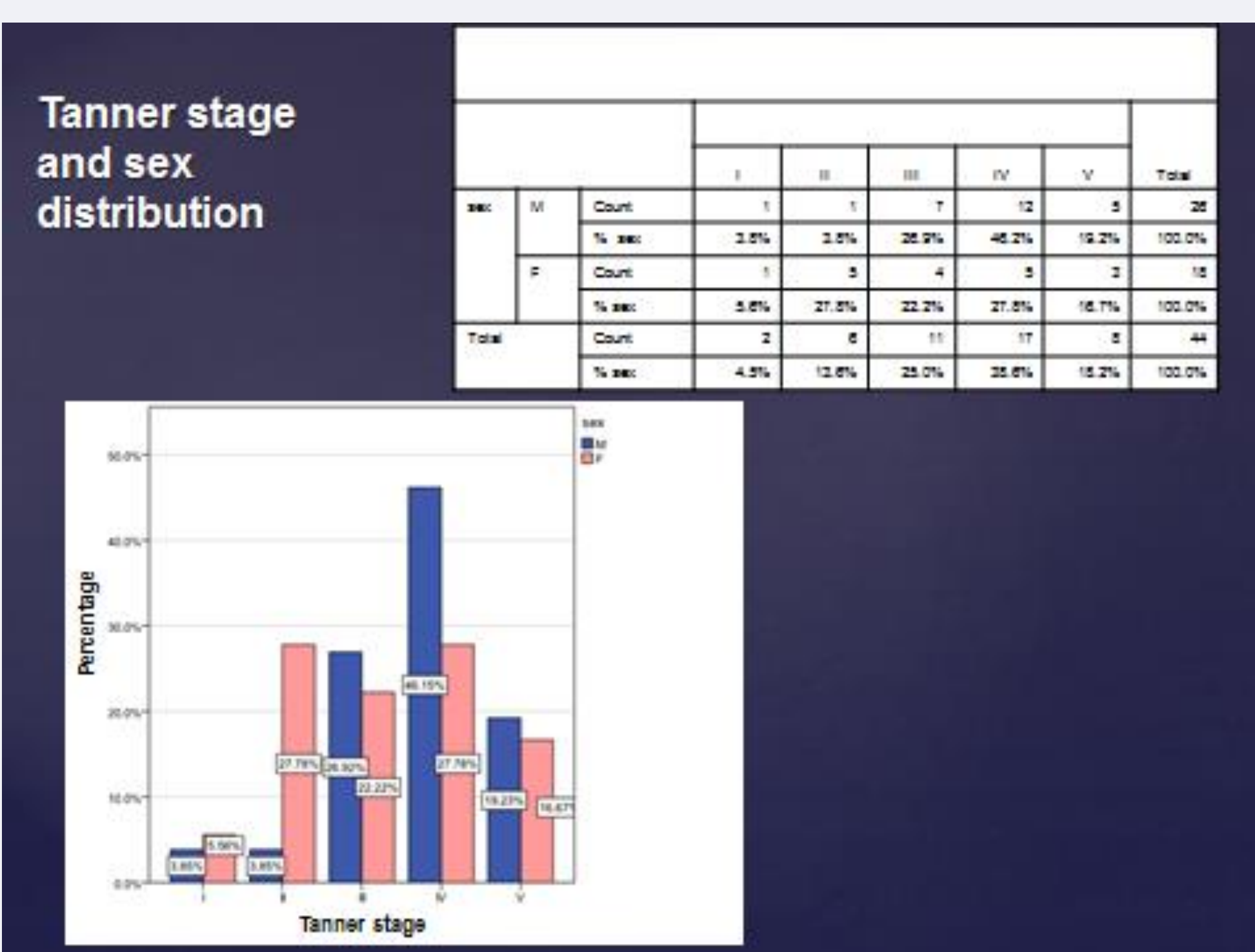
Methods

Our study included 44 subjects, 18 girls and 26 boys, aged between 6.5 years and 17.3 years diagnosed with constitutional tall stature.

- The inclusion criterion was height $\geq +2$ DS.
- The exclusion criteria were: diabetes, thyroid dysfunction, Cushing's syndrome, hypothalamic-pituitary pathology, renal failure, medication that alters glucose/ GH dynamics such as estrogen and thyroid hormones.
- The following parameters were assessed: historical and auxological data, clinical examination, laboratory evaluations: karyotype, thyroid function, androgens, IGF1 (CLIA method with detection limit 3-1500ng/ml), IGFBP3, prolactin, evaluation of other pituitary hormone deficiency, bone age, cardiac ultrasound, eye examination, CT/MRI of the hypothalamic-pituitary region. OGTT was performed with 1.75 g/kg of glucose po. Glucose and GH (CLIA method with detection limit 0,1-80 ng/ml) were tested at 0, 30, 60, 90 and 120 minutes.
- Brain imaging was performed in 20 cases.
- Statistical analysis was performed using PASW software version 18, 2010 using Pearson correlation, T test, and Mann-Whitney test and the level of significance used was $p < 0.05$.

Results

- The mean age of the group was 13.3 years + / - 2.61 years.
- The mean age of girls was 11.85 years + / - 2.92 years.
- The mean age of boys was 14.3 years + / - 1.83 years.
- The mean standard deviation of patients' height was + 3,1 SD for girls and + 3,0 SD for boys.
- The mean standard deviation of target height was +1SD for girls and +0,6 SD for boys.
- The mean difference between standard deviation of child height and standard deviation of target height was +2,49 for girls and +2,61 for boys.
- Standard deviation of the average BMI was +0,31 SD for girls and +0,53 SD for boys.
- The mean of bone age was 13,72 years for girls and 15,71 years for boys.
- There was a positive and statistically significant correlation between age and IGF1, $r = 0.398$, $p < 0.01$, $r^2 = 0.16$ and between bone age and IGF1, $r = 0.441$, $p < 0.01$, $r^2 = 0.19$.
- GH suppression was different according to sex and pubertal stage:
- For boys in stage III and IV Tanner we observed GH values > 1 ng/ml.
- For girls GH nadir was higher than for boys.
- The lowest value of GH both for girls and boys was at 90 minutes.
- 2 patients with IGF1 $> +2$ DS for chronological age had normal levels of IGFBP3.
- In 6 patients with GH suppression > 1 ng/ml, the levels of IGF1 and IGFBP3 were normal.
- CT/MRI of the hypothalamic-pituitary region revealed an inhomogeneous pituitary gland.

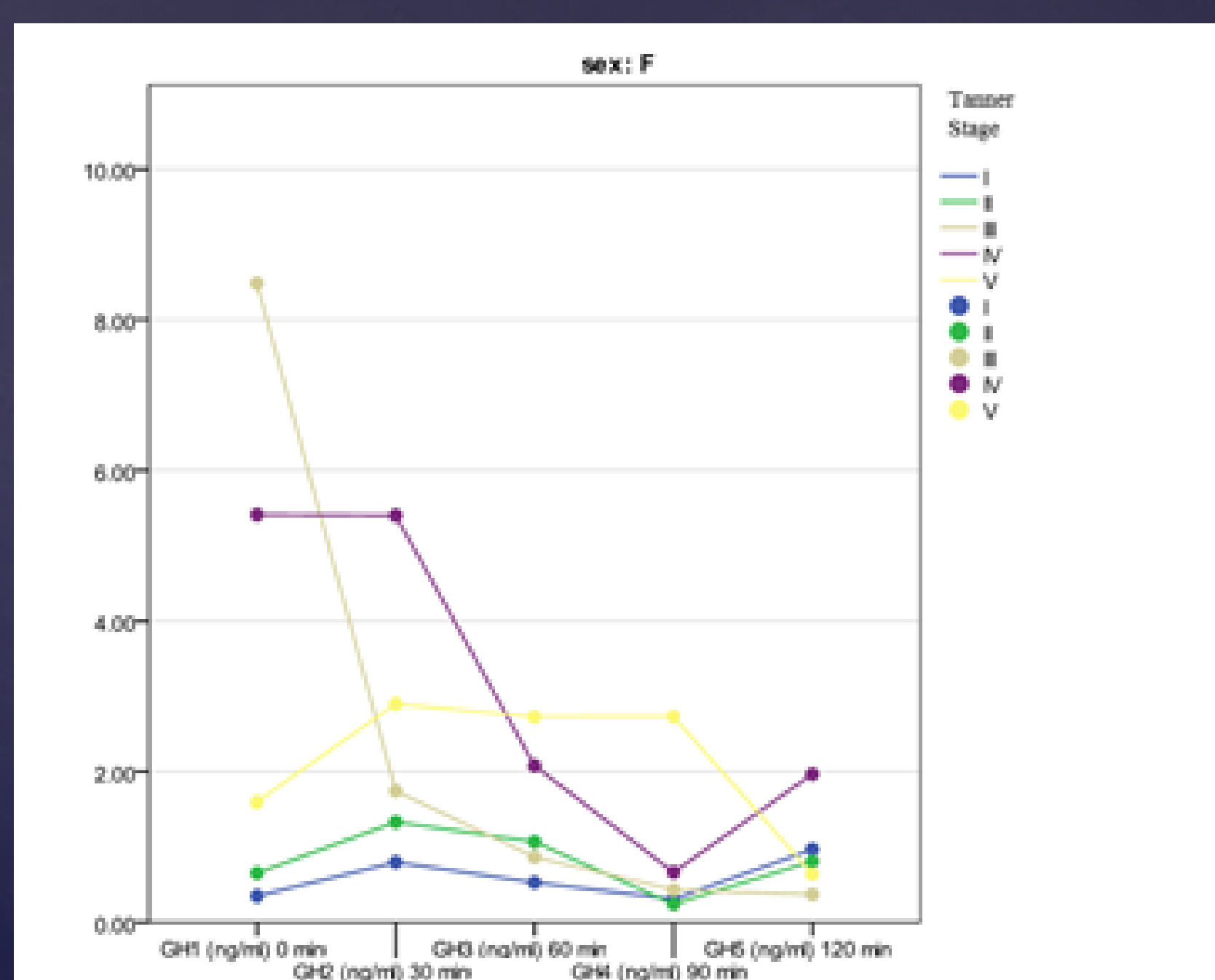


Conclusions

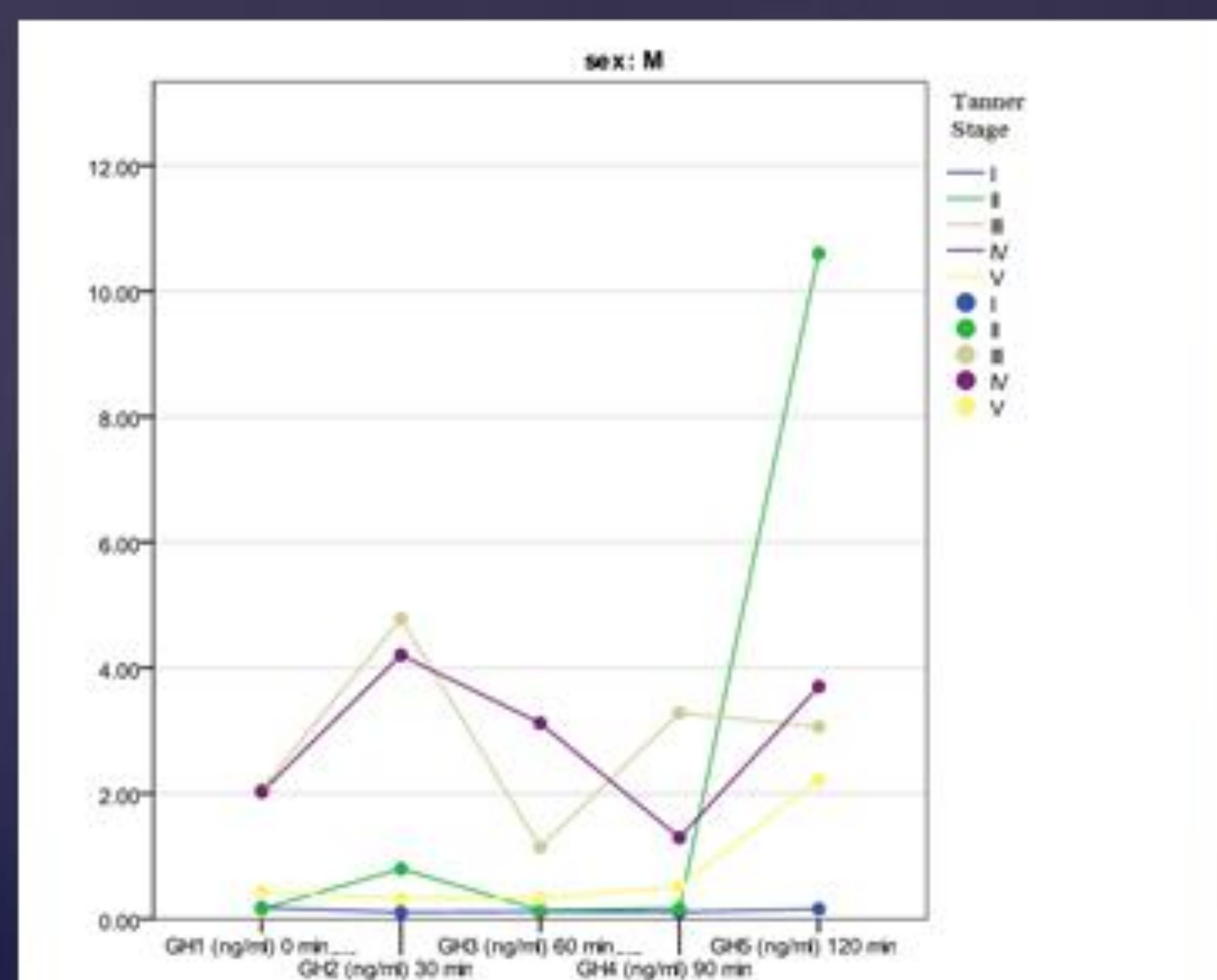
GH level is high at puberty compared to the level seen in adulthood and data obtained in the oral glucose tolerance test in adulthood can not be extrapolated for children and adolescents.

It is necessary to establish new cutoff for GH suppression in oral glucose tolerance test according to sex and pubertal stage both for normal height and tall stature.

GH values in OGTT in girls at different pubertal stages



GH values in OGTT in boys at different pubertal stages



Percentage of cases (%) with GH < 1ng/ml at different moments of OGTT and at different pubertal stages for girls and for boys

