

## VARIATIONS OF TESTOSTERONE LEVEL BY AGE, TIME AND SEASON IN LARGE MALE COHORT

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**Objectives.** Testosterone is an essential hormonal parameter, but data on its level in general population and seasonal and diurnal dynamics are scarce. Though age differences in children have been reported, adults are regarded as a homogenous cohort (Mulhall, 2018), complicating differentiation between age-related decrease from late hypogonadism.

The aim of the study was to analyze testosterone age, seasonal and diurnal variability in male outpatients.

**Materials and Methods.** 10945 anonymized ambulatory male total testosterone tests performed in 2015–2021 at SIA “Centrālā laboratorija” (ARCHITECT i4000SR) were analyzed by IBM SPCC v.25.

**Results.** Testosterone was near zero till age 10 (mean 0.15 ng/mL, 5<sup>th</sup>–95<sup>th</sup> percentile 0.02–0.25 ng/mL); transition was observed at age 11–14 (2.48, 0.12–7.11 ng/mL), increase at 15–17 (5.23, 1.63–9.54), peak at 18–40 (7.45, 2.04–16.50), decrease at 41–55 (5.69, 1.44–10.70) and plateau after 55 (3.39, 0.13–8.82).

At age 0–10, 95<sup>th</sup> percentile was increased between 7:00 and 11:00 (Kruskal-Wallis  $p = 0.011$ ) and in January–April ( $p = 0.039$ ). At age 18–40, 95<sup>th</sup> percentile was lower in the morning ( $p < 0.01$ ) and dropped in September–December ( $p < 0.01$ ). Variation in other age groups were insignificant.

Applying manufacturer reference range 2.3–10.2 ng/mL, 27.70% adult tests were abnormal: 6% low and 9% high at age 18–40, 11% and 6% at 41–55, 41% and 2% at  $> 55$ .

**Conclusions.** Though the studied population was not healthy, the cohort is sufficient for preliminary assumptions.

Adult testosterone norms are not applicable to children. The obtained 5<sup>th</sup>–95<sup>th</sup> pediatric percentiles coincide with published series (Cohen, 2020; Baum, 2020) and could be tentatively used as reference.

Testosterone decreases with age; at least 3 adult age groups should be separated: 18v40 (peak), 41–55 (decrease of upper norm) and  $> 55$  (lower norm drops). This approach reduces the unreasonable 41% low results in elders and reclassifies half of the elevated results at 18–40.

Daytime and seasonal variations may be important for testing regimen and interpretation.