

Changes in testosterone levels and sex hormone-binding globulin levels in extremely obese men after bariatric surgery

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Objectives

- Obesity is a risk factor for hypogonadotropic hypogonadism in men. Increase in body weight was found to be associated with decrease testosterone level and sex hormone-binding globulin (SHBG) level.
- The aim of this study was to evaluate the change in testosterone levels in extremely obese men after bariatric surgery.

Methods

- This is a prospective study including 29 morbidly obese men undergoing bariatric surgery.
- Main outcomes were changes in serum levels of total testosterone (TT), free testosterone (cFT), SHBG, Estradiol, adiponectin and leptin at 1 and 6 months after bariatric surgery.

Table 1. Baseline Characteristics of Participants (n=29)

Age (year)	30.8 ± 8.1
Comorbidities [n(%)]	
Hypertension	19 (65.5%)
Diabetes	7 (24.1%)
Dyslipidemia	19 (65.5%)
NAFLD/NASH	20 (69.0%)
Obstructive sleep apnea	29 (100%)
Type of surgery	
RYGB	15 (51.7%)
SG	14 (48.3%)
Body weight (kg)	168.3 ± 35.0
BMI (kg/m ²)	56.8 ± 11.7
SBP (mmHg)	133 ± 26
DBP (mmHg)	83 ± 12
FPG (mg/dL)	99.0 (89.3-122.8)*
HbA1c (%)	6.0 (5.2-6.3)*
Total Cholesterol (mg/dL)	211 ± 56
HDL (mg/dL)	39 ± 11
Triglyceride (mg/dL)	178 ± 86
LDL (mg/dL)	139 ± 42
25-OH vitamin D (ng/ml)	18.2 ± 5.5

Data are expressed as means ± SD or number (percentage).

*Median (Interquartile range).

Results

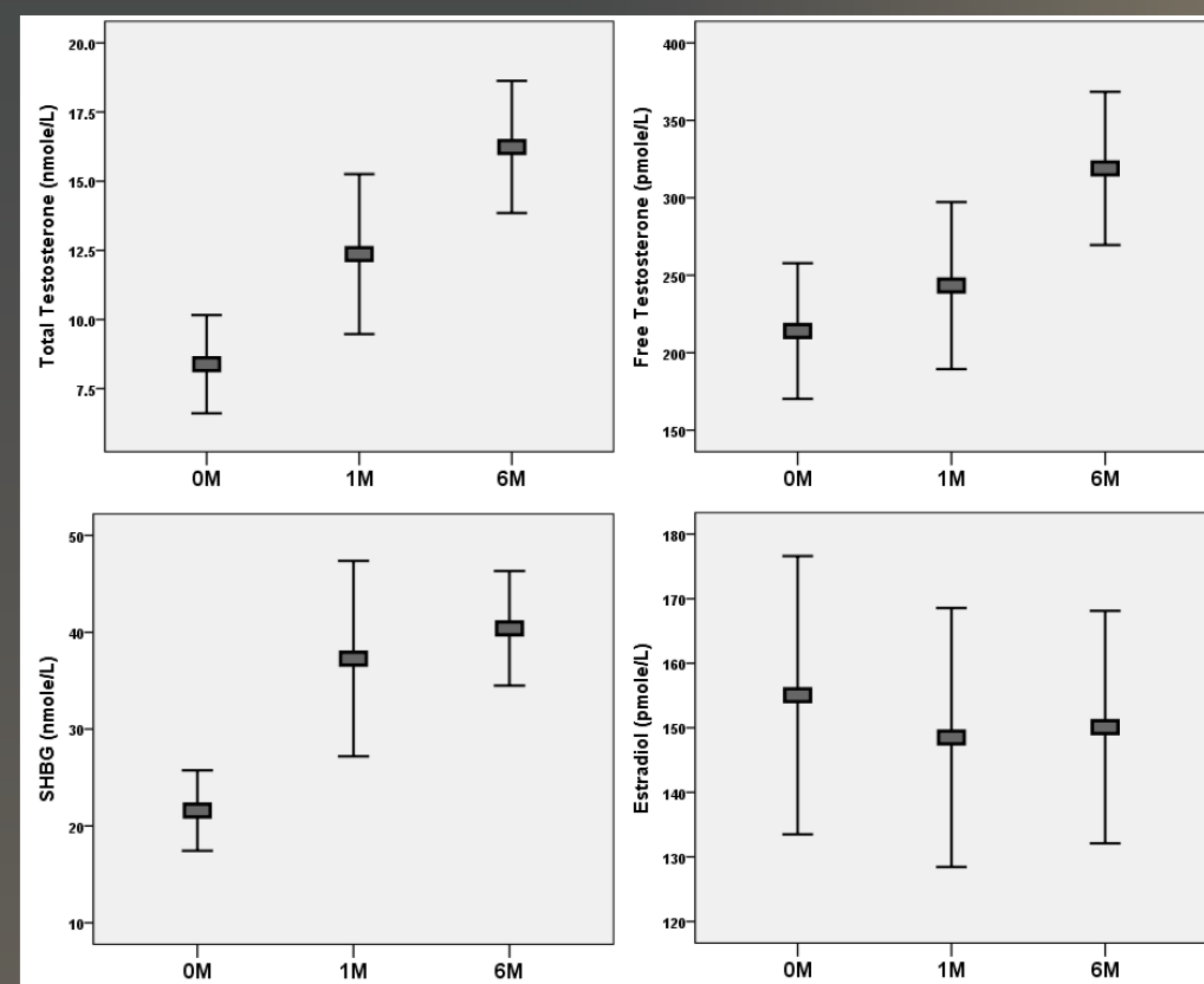
- Sixteen patients underwent Roux-en-Y gastric bypass and 13 patients underwent sleeve gastrectomy.
- At baseline, 22 patients (75.9%) had low TT levels (<10.4 nmole/L) and 16 patients (55.2%) had low cFT levels (<225 pmole/L).
- Total testosterone and SHBG levels increased significantly at 1 month after surgery ($p < 0.001$) whereas cFT levels have not changed.
- At 6 months after surgery, TT, cFT and SHBG levels increased significantly (all p -values < 0.001) and 23 patients (79.3%) had normal TT levels.
- There were no changes in estradiol levels.
- Leptin levels decreased and adiponectin levels increased significantly after surgery.
- Early increases in TT levels were associated with increases in SHBG levels ($r = 0.472$, $p = 0.042$) but not with changes in body weight, BMI, adiponectin or leptin.

Table 2. Changes in parameters after 1 and 6 months from bariatric surgery

	Baseline	Month 1	Month 6
Body weight (kg)	168.3 ± 34.9	146.0 ± 31.7 ^b	126.2 ± 25.5 ^b
BMI (kg/m ²)	56.9 ± 11.7	50.2 ± 11.0 ^b	42.9 ± 9.0 ^b
Total testosterone (nmole/L)	8.38 ± 4.67	12.60 ± 6.09 ^b	15.81 ± 5.95 ^b
Calculated free testosterone (pmole/L)	214.0 ± 113.0	245.3 ± 114.7	307.9 ± 121.7 ^b
SHBG (nmole/L)	21.59 ± 10.71	39.59 ± 21.46 ^b	40.67 ± 15.48 ^b
Estradiol (pmole/L)	155.1 ± 56.6	155.2 ± 39.4	149.5 ± 47.1
Adiponectin (µg/ml)	6851.5 ± 4793.5	11942.9 ± 8727.6 ^b	12456.2 ± 9160.2 ^b
Leptin (ng/ml)	46.21 ± 18.86	32.84 ± 17.72 ^b	21.32 ± 11.01 ^b

Compared with baseline values using paired t-tests; ^a $p < 0.05$, ^b $p < 0.01$

Figure 1. Changes in parameters after bariatric surgery



Conclusion

- Increases in TT and SHBG levels occurred early at 1 month after bariatric surgery while improvements in cFT levels were observed at 6 months after bariatric surgery.
- No change in estradiol levels was found.
- Changes in total testosterone levels tend to be correlated with SHBG levels but not with body weight or adipokines levels.

References

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