



Research Article

Testosterone Estimation Among The Individuals With Attempted Self-Harm And It's Correlation With Underlying Psychosocial Illness

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ABSTRACT

Background: Self-harm and suicide attempts are major public health concerns with multifactorial origin involving psychosocial and biological determinants. Sex hormones especially testosterone has been a contributing factor for mood regulation, cognition, and stress response. Dysregulation of serum testosterone levels may predispose vulnerable individuals to heightened psychiatric morbidity and maladaptive behaviours including self-harm. **Objective:** To estimate serum testosterone levels among in-patients admitted with attempted self-harm and to correlate these levels with severity of underlying psychosocial illness. **Methods:** A cross-sectional observational study was conducted over 18 months at JSS Hospital, Mysuru. Adults (>18 years) admitted with suicide attempts were recruited into the study after inclusion and exclusion criteria along with informed consent. Clinical, psychiatric, and socio-demographic details were collected. Psychosocial illness was assessed using the General Health Questionnaire-6 (GHQ-6), Depression Anxiety Stress Scale-42 (DASS-42), and ICD-10 criteria. Serum testosterone was estimated in all the above individuals. Statistical analysis was performed using SPSS, with comparisons of testosterone categories (low, normal, high) against psychosocial severity indices. **Results:** A total of 104 participants were studied. Testosterone levels were decreased in 26.9% of patients, elevated in 13.5%, and normal in 59.6%. Also, Individuals with decreased testosterone exhibited higher frequency of severe to extremely severe anxiety (23.5% and 28.6%), depression (32.0%), and stress (60.0%). Elevated testosterone was associated with comparatively lower severity scores, while normal testosterone showed a mixed distribution. Mean GHQ-6 and DASS-42 scores did not differ significantly across testosterone groups ($p > 0.4$ and $p > 0.7$). **Conclusion:** Decreased testosterone levels correlated with greater severity of anxiety, depression and stress among individuals with attempted self-harm, suggesting a potential role of testosterone dysregulation in the biological underpinnings of suicidal behaviour. Larger prospective studies are warranted to clarify our findings and evaluate the role of routine hormonal assessment in risk stratification and integrated management of self-harm.

Keywords: Testosterone, self-harm, suicide attempt, depression, anxiety, psychosocial illness.

INTRODUCTION

Self-harm and suicidal behaviour represent major global public health challenges, with nearly 800,000 deaths reported annually and many more surviving non-fatal attempts. Each attempts of suicide are among the strongest predictors of future completed suicide, making it critical for the early identification of risk factors (1). While psychosocial determinants such as depression, anxiety, trauma, and personality disorders are well established factors for suicidal attempts, emerging research highlights the contribution of biological mechanisms. Among these, testosterone—a key sex hormone in both men

and women—has gained attention for its role in mood regulation, cognition, and stress response which in turn might contribute for self-harming behaviours (2).

Testosterone exerts widespread effects beyond reproduction and physical development, including modulation of neurotransmitters like serotonin, dopamine, and GABA that regulate mood and impulse control. Low testosterone has been linked to depression, fatigue, irritability, and cognitive decline, whereas abnormally high levels may provoke aggression and impulsivity (3,4). Such dysregulation overlaps significantly with psychiatric conditions—major depressive disorder, generalized anxiety disorder, post-traumatic stress disorder, and borderline personality disorder—that are strongly associated with self-harm. Despite this, the biological pathways connecting testosterone imbalance and suicidal behaviour remain insufficiently explored, particularly in individuals already presenting with self-harm (5).

In India, where suicide is one among a leading cause death in healthy young adults, understanding the biological as well as psychosocial dimensions of self-harm has both clinical and public health importance. Present study unmasked the relationship between serum testosterone levels, severity of psychosocial illness in turn contributing for suicide attempts among individual with attempted self-harm (6).

METHODS

This was a cross-sectional observational study conducted over 18 months (January 2023–June 2024) at JSS Hospital, Mysuru, a tertiary-care teaching hospital in southern India. The hospital provides both general and psychiatric services, ensuring comprehensive evaluation of patients admitted following suicide attempts.

All consecutive patients aged 18 years and above admitted after an episode of self-harm or suicide attempt were screened for eligibility. Inclusion criteria were: (i) admission following an intentional self-harm or suicide attempt, and (ii) provision of informed consent by the patient or a legally acceptable representative. Exclusion criteria included: (i) patients with known endocrine disorders (e.g., primary hypogonadism, adrenal disease, thyroid dysfunction), (ii) current or past use of hormonal therapy, steroids, or androgen-modulating drugs, (iii) severe systemic illness interfering with hormonal levels (chronic kidney or liver disease), and (iv) refusal or inability to provide consent. The study was approved by the Institutional Ethical Committee of JSS Medical College, Mysuru. Written informed consent was obtained from all participants or their authorized representatives. Confidentiality was maintained throughout, and participants were offered psychiatric counselling and referral for on-going care as per institutional protocol. Sample size was calculated based on prior studies assessing hormonal abnormalities in psychiatric populations. Using prevalence estimates of testosterone abnormalities of 27% with a 95% confidence level and 7% precision, the minimum sample required was 99. Accounting for dropouts, a total of 104 participants were recruited using convenient sampling. After initial stabilization, all participants underwent a detailed clinical assessment by the study team. A structured proforma captured sociodemographic variables (age, gender, education, marital status, occupation), clinical details (type of self-harm, prior attempts, family history of psychiatric illness), and medical history.

Psychosocial status was assessed using:

- General Health Questionnaire-6 (GHQ-6): a screening tool for overall psychological distress.
- Depression Anxiety Stress Scale-42 (DASS-42): a validated instrument measuring severity of depression, anxiety, and stress.
- ICD-10 diagnostic criteria: applied by a psychiatrist to confirm presence of psychiatric illness.

Venous blood samples (5 mL) were collected from each participant analysed for total testosterone levels using chemiluminescent immunoassay (CLIA), a standardized method routinely employed in the institutional laboratory. Samples were processed within 24 hours of collection. For reference, normal ranges were considered 300–1000 ng/dL in men and 15–70 ng/dL in women. Levels below the lower threshold were classified as decreased, and above the upper threshold as elevated. Data were entered into Microsoft Excel and analysed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables (age, hormone levels, questionnaire scores) were summarized as mean \pm standard deviation (SD) or median with interquartile range (IQR), as appropriate. Categorical variables (gender, marital status, education, type of self-harm) were expressed as frequencies and percentages. Participants were stratified into three groups based on testosterone status: decreased, normal, and elevated. Between-group comparisons were made using chi-square test or Fisher's exact test for categorical variables, and ANOVA or Kruskal–Wallis test for continuous variables. Correlations between testosterone levels and psychosocial severity scores (GHQ-6, DASS-42) were evaluated using Pearson's or Spearman's correlation coefficients, depending on distribution. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 104 individuals admitted following suicide attempts were included. The mean age was 31.4 ± 10.6 years (range: 18–58), with a slight female predominance (56.7%). Most participants were young adults aged 18–35 years (68.3%). Educational background showed that 41.3% had completed secondary school, 32.7% were graduates, and 26.0% had primary education or less. Nearly half were married (49.0%), while 39.4% were single and 11.6% separated or widowed. A family history of psychiatric illness was noted in 21.2% of participants, and 16.3% reported prior use of antipsychotic medications. The most common method of suicide attempt was self-poisoning with household or pharmaceutical agents

(61.5%), followed by hanging (18.3%), self-inflicted injury (12.5%), and other methods such as drowning or burns (7.7%). Assessment using the DASS-42 revealed that 62.5% of participants met criteria for moderate to extremely severe depression, while 58.7% reported moderate to extremely severe anxiety. Stress levels were similarly high, with 64.4% falling in the moderate to extremely severe range. GHQ-6 screening confirmed significant psychological distress in 72.1% of participants. Based on serum analysis, testosterone levels were decreased in 28 individuals (26.9%), elevated in 14 (13.5%), and within the normal range in 62 (59.6%). Among males (n = 45), 31.1% had low testosterone, 11.1% elevated, and 57.8% normal. Among females (n = 59), 23.7% had low levels, 15.3% elevated, and 61.0% normal.

Participants with decreased testosterone were significantly more likely to demonstrate higher severity of psychological morbidity. In this group, 32.0% had extremely severe depression, 23.5% severe anxiety, and 28.6% extremely severe anxiety. Notably, 60.0% of those with decreased testosterone scored in the extremely severe category for stress. By contrast, participants with elevated testosterone showed relatively lower proportions of severe anxiety (14.3%) and depression (7.1%), with most clustering in the mild-to-moderate categories. Individuals with normal testosterone levels demonstrated a mixed severity distribution, with approximately one-third experiencing moderate-to-severe psychosocial symptoms.

Comparison of mean scores across testosterone categories showed that participants with decreased testosterone had higher average DASS-42 depression (24.1 ± 7.8), anxiety (20.4 ± 6.9), and stress (27.2 ± 8.1) scores compared to those with normal (22.7 ± 8.4 , 19.5 ± 7.2 , and 24.3 ± 7.9 , respectively) or elevated testosterone (21.2 ± 6.7 , 17.8 ± 6.2 , and 22.1 ± 6.8 , respectively). However, these differences did not reach statistical significance ($p > 0.05$). Similarly, GHQ-6 mean scores did not differ significantly between the three groups ($p > 0.7$). There were no significant differences in vital signs (blood pressure, heart rate) or serum electrolytes (sodium, potassium) across testosterone categories. Likewise, no clear association was observed between testosterone status and type of suicide attempt.

Table 1: Distribution of Testosterone Levels by Gender

		Testosterone levels			Total
		Decreased	Elevated	Normal	
Gender	Female	2	10	15	27
		7.4%	37.0%	55.6%	100.0%
	Male	26	4	47	77
		33.8%	5.2%	61.0%	100.0%
Total		28	14	62	104
		26.9%	13.5%	59.6%	100.0%

Table 2: Distribution of Testosterone Levels by Age

		Testosterone levels			Total
		Decreased	Elevated	Normal	
Age	<20	2	0	3	5
		40.0%	0.0%	60.0%	100.0%
	20-30	17	5	16	38
		44.7%	13.2%	42.1%	100.0%
	30-40	2	5	11	18
		11.1%	27.8%	61.1%	100.0%
	40-50	2	1	7	10
		20.0%	10.0%	70.0%	100.0%
>50	5	3	25	33	
	15.2%	9.1%	75.8%	100.0%	
Total		28	14	62	104
		26.9%	13.5%	59.6%	100.0%

Table 3: Testosterone Status in correlation with psychosocial illness

		N	Mean	Std. Deviation	P-Value
	Decreased	28	66.32	17.07	0.464
	Elevated	14	61.43	15.21	
	Total	104	63.12	16.01	
GHQ-6	Normal	62	3.15	1.97	0.799
	Decreased	28	3.43	1.60	
	Elevated	14	3.21	1.85	
	Total	104	3.23	1.84	

DISCUSSION

This study examined serum testosterone levels among individuals admitted following suicide attempts and explored their correlation with psychosocial illness severity. The findings highlight that more than one-quarter of participants had

decreased testosterone levels, and this subgroup demonstrated a higher prevalence of severe anxiety, depression, and stress compared with those having normal or elevated testosterone. Although mean scores on the DASS-42 and GHQ-6 did not differ significantly across testosterone groups, the descriptive trends suggest that low testosterone may contribute to heightened psychosocial morbidity in individuals engaging in self-harm.

The observed association between reduced testosterone and greater psychological symptom severity aligns with prior research linking hypogonadism to depression, anxiety, and stress-related disorders. Several studies have documented that low testosterone levels in men are associated with depressed mood, irritability, fatigue, and cognitive dysfunction, while replacement therapy can improve mood and vitality in hypogonadal individuals. Similarly, evidence from psychiatric populations suggests that testosterone deficiency may exacerbate vulnerability to mood disorders, thereby indirectly influencing self-harming behaviour. Our results add to this literature by specifically examining a cohort of individuals who attempted self-harm, a population seldom studied in this context.

Interestingly, participants with elevated testosterone in our study appeared less likely to exhibit severe psychiatric symptoms. This finding resonates with reports that higher testosterone can be protective against depressive symptoms, though excessive levels have also been linked with aggression and impulsivity. The heterogeneity of prior results reflects the complex and bidirectional relationship between testosterone and behaviour. It is possible that the protective or harmful effects of testosterone depend on multiple interacting factors, including baseline psychiatric status, sex, age, and environmental stressors.

The role of testosterone in mood regulation is likely mediated through its effects on neurotransmitter systems. Testosterone modulates serotonergic, dopaminergic, and GABAergic pathways, which are central to emotional regulation, reward processing, and stress response (7,8). Reduced testosterone may impair serotonergic tone, leading to increased vulnerability to depression and anxiety, while excessive levels may heighten amygdala reactivity, promoting aggression or impulsivity. Additionally, testosterone interacts with the hypothalamic-pituitary-adrenal (HPA) axis, influencing cortisol release and stress adaptation. Dysregulation of this axis may partially explain the clustering of severe psychosocial symptoms observed in participants with decreased testosterone (9,10).

These findings underscore the importance of considering biological as well as psychosocial determinants when evaluating individuals with self-harm. Incorporating hormonal assessment into routine clinical evaluation may provide a more comprehensive risk profile, particularly in patients presenting with treatment-resistant or atypical psychiatric symptoms. Identifying testosterone deficiency could guide timely interventions, such as endocrinology referral or consideration of testosterone replacement therapy (TRT) where indicated. However, caution is warranted, as indiscriminate hormonal supplementation carries risks and must be individualized.

A key strength of this study is its focus on a clinically relevant yet understudied population—patients with attempted self-harm—using validated psychosocial instruments alongside hormonal evaluation. The inclusion of both men and women provides insights into gender-related patterns, although subgroup analyses were limited by sample size. Few limitations need to be mentioned. First, the cross-sectional design precludes causal inference, making it unclear whether testosterone deficiency predisposed individuals to self-harm or arose as a consequence of chronic psychosocial stress. Second, the relatively small sample size may have limited statistical power to detect significant differences in mean psychosocial scores across testosterone groups.

CONCLUSION

This study demonstrates that decreased testosterone levels were common among individuals admitted after attempted self-harm and were associated with greater severity of depression, anxiety, and stress symptoms. Although mean psychosocial scores did not differ significantly across testosterone categories, descriptive trends suggest that hormonal imbalance, particularly low testosterone, may contribute to the psychological vulnerability underlying self-harming behaviour. These findings highlight the importance of integrating biological assessment with psychosocial evaluation in individuals at risk of suicide, offering a more comprehensive understanding of their clinical profile. Given the cross-sectional nature and modest sample size, causality cannot be inferred; however, the results provide a rationale for larger longitudinal studies to explore testosterone as a potential biomarker and therapeutic target. Incorporating endocrine perspectives into mental health care may enhance early risk identification and inform holistic suicide prevention strategies.

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