ORIGINAL ARTICLE

COMPARISON OF SERUM TESTOSTERONE LEVELS AMONG STUDENTS STUDYING IN RELIGIOUS INSTITUTIONS AND NON-RELIGIOUS INSTITUTIONS

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Background: Testosterone levels are shown to be affected by the social environment where individuals spend most of the duration of their daily activities. It has been reported that religion may play a role in reducing harm and contributing to the resilience of young people. Objective of the study was to compare the serum Testosterone level of the College students with that of the Madrassa students of the same age group. **Methods:** This was a cross-sectional study with a total of 145 participants between 18–25 years of age. Subjects from the religious institutions (Madrassa) were 30 and non- religious institutions (Colleges) were 115. Fasting blood samples were obtained from all participants for serum testosterone levels (measured using Radioimmunoassay (RIA) technique). **Results:** Students studying in religious institutions (*Madrassa*) have significantly (p=0.001) lower serum Testosterone (6.5±2.01 ng/ml) levels compared to students of the non-religious institution, i.e., 9.08±3.07 ng/ml. **Conclusion:** The social environment of studies like *madrassa* or college affects testosterone hormone levels.

Keywords: Serum testosterone levels; Religious institutions; Madrassa

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INTRODUCTION

Testosterone levels are shown to be affected by the social environment where individuals spend most of the duration of their daily activities. It has been reported that religion may play a role in reducing harm[1] and contributing to the resilience of young people[2]. Besides, practicing religion is found to be protective against participation in adolescents' health risk behaviours. Furthermore, the higher level of religious practices are associated with lower levels of smoking, alcohol consumption, marijuana, and illicit drug abuse. There is also a reduction in suicidal tendencies[3], depression[4], anxiety, and stress[5,6] in people with religious beliefs compared to non-religious personnel. Sexuality is an area that frequently catches the interest of individuals in a different walk of life such as researchers, policymakers, health practitioners, and preachers of religious doctrines (*Mashaaikh*). This interest largely stems due to the potential negative consequences associated with sexual activity in young adults. Therefore, individuals practicing religions are shown to be less likely involved in sexual activity due fearing of sin, and cognitive dissonance especially in our society. However, there are sociological models of sexuality, which focus on social controls that either inhibit or facilitate the expression of sexual motivation.[7]

Moreover, the biological models of sexuality postulate that testosterone is responsible for sexual interest and motivation.[8–10]

Testosterone is a dominant factor in male sexual libido and ejaculation while erectile mechanisms can function despite abnormally low levels of Testosterone. Therefore, increasing the level of testosterone might have a predisposition to engage in erotic behavior.[11] Clinical studies, in which exogenous Testosterone was administered to adult hypogonadal males, have provided strong empirical support for hormonal effects on sexual interest.[12,13] The biological and sociological approaches to sexuality are essentially linked to each other providing a biosocial interaction model. Therefore, the two sociological factors "religiosity and sexuality" can be linked through a biological factor (Testosterone). So, religiosity can be linked to sexuality (sexual attitude) and in turn, it can affect the levels of the testosterone. Therefore, in this study, we have assessed the relationship of religiosity (religious environment and practices) to the serum levels of Testosterone of individuals in different educational/religious/social environments. Therefore, we have recruited the individuals who are studying in different educational settings. One group studied in the alimentary/college system and were compared to students studying in the religious schools (*Madrassa*).

MATERIAL AND METHODS

This was a cross sectional study with a total number of 145 subjects recruited. The study participants included students from both religious institutions, i.e., *Madrassa* (n=30) and non-

religious institutions, i.e., colleges (n=115). All the participants of the study were in the age group of 18–25 years. Subjects with a history of hypogonadism, hyperthyroidism, hypothyroidism, and mental illness like depression were all excluded from the study. Venous blood samples from all the participants were taken after obtaining consent

Fasting venous blood sample using an aseptic technique from the antecubital vein was collected from each individual between 7:00–9:00 am due to diurnal variation of the testosterone levels. Blood samples were transported to laboratory of Institute of Radiotherapy and Nuclear Medicine (IRNUM) in a cold box. Serum from each blood sample was separated by centrifugation at the rate of 1500–2000 revolution/sec for 10 min. The serum was tipped out with micropipette into sterile plastic tubes, labelled, properly sealed and stored at –20 °C. Analysis for serum testosterone levels were done at the end using RIA technique.

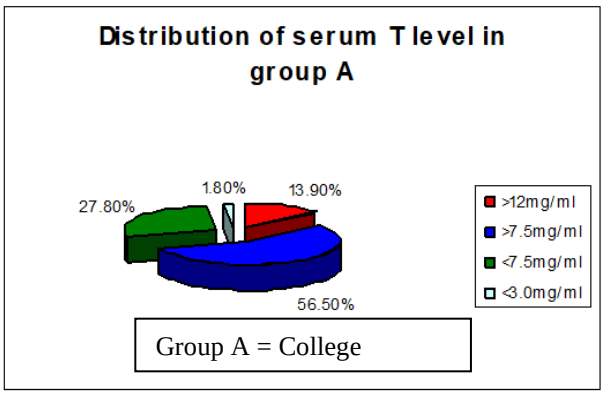
The data obtained were recorded and put in excel sheet. Statistical analysis was done using SPSS software version 13.0. The mean and SD of serum Testosterone for the two groups was calculated & compared using Independent sample t-test.

RESULTS

In this study we had two groups; Group A (n=115) participants were students studying in non-religious institution (college) and Group B (n=30) were students of religious institution (madrassa). All subjects were having the ages between 18–25 years. Group B had a mean serum Testosterone level of 6.5 ng/ml (SD±2.012) compared to Group A with a mean value of 9.08 (±3.074 ng/ml) as shown in the table-1. Maximum level was 10.1 ng/ml in group B and minimum level was 3.2 ng/dl. The mean of this group B was significantly (p=0.001) lower as compared to the mean of college students. Nine students had more than 7.5 ng/dl while 21 students had less than 7.5 ng/dl and no student had less than 3.0 ng/dl of serum Testosterone level Figure-1. Maximum Testosterone level was 16.9 ng/dl in group A and minimum level was 3.2 ng/dl. Out of all students 13% (24 out of 115) students had high level of serum testosterone level, i.e., having a value of more than 12 ng/dl (range is 3.5–12 ng/dl). It is clear from table-1 that there is a highly significant difference (p<0.001) between Testosterone levels of both groups table-1 and figure-2.

Table-1: Comparison of Testosterone level between Madrassa & College students

Variable	Group A (n=115)			Group B (n= 30)			*p*-value
	Mean	SD	CV	Mean	SD	CV	
Testosterone level in ng/ml	9.08	3.074	33.85	6.50	2.012	30.95	0.001



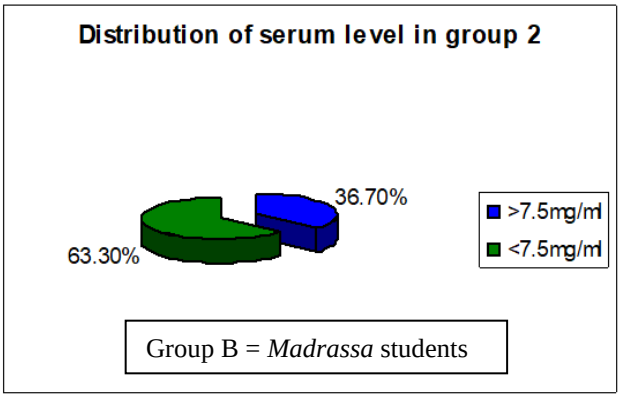


Figure-1: Distribution of serum Testosterone (T) levels among Group A and Group B.

DISCUSSION

In this study we found that individuals studying in religious institutions had well-controlled secretions of Testosterone that was within normal range compared to higher levels in the group of individuals in colleges. One of the reasons might be that they obey religious teachings and norms. Therefore, they have less sex provoking thoughts compared to those who are not practicing. Furthermore, individuals in religious networks did not have interaction with ladies and subsequently are less likely to have promiscuous relations. In contrast, the college students had their serum Testosterone levels above the normal range or near the upper normal range.

This is due to the fact that they might have more interaction with ladies and also less control over their sight/eyes.

One of the possible mechanisms regarding the high level of Testosterone in college students is the visual sexual stimulus to be more likely to cause increase in Testosterone levels. As soon as a person sees a provoking sight, the visual signals are transmitted to the CNS through retina. These signals start secreting dopamine from the ultra-short acting dopaminergic neurons present between inner nuclear and inner plexiform layers in retina.[14] This activates both the new and old system of the visual pathways. The old system activates the older areas of the brain especially the hypothalamus (via optic tract), ventral geniculate nucleus of the thalamus midbrain and the surrounding basal regions of the limbic system including amygdala. This is the area of the brain that presumably control behavioural functions of the body including sexual behaviours and hormonal secretion.[15] This may indirectly lead to increased secretion of the gonadotrophin releasing hormones and hence activating the hypophysial-hypothalamic gonadal axis (HPG) axis. This in turn can lead to increase in the testosterone levels in the circulating blood. This physiological arousal in the form of secretion of Gonadotropin-Releasing Hormone (GnRH) is very important point where social variable (religiosity) in a way is converted into biological effect, i.e., either increasing or decreasing the release of hormones. The hypothalamus is also involved in the control of sexual activity in males as is evident by the fact that stimulation along the medial forebrain bundle in the neighbouring hypothalamic areas causes penile erection with considerable emotional display in monkeys. In contrast, lesion of specific hypothalamic regions in adult rats leads to abolishment of sexual behaviour and reduction in serum Testosterone levels.[14]

There is evidence that stronger visual sexual stimuli cause increase secretion of dopamine, leading to stronger activation of HPG axis.[16] This causes increased secretions of GnRH, LH and hence a rise in serum Testosterone levels. The same mechanism may be true for other stimuli like auditory and olfactory but there are no convincing studies to this hypothesis. A possible hypothesis may be that: The activities going on in one's surroundings such as visual, auditory, olfactory and speaking are integrated in thought processes. These thoughts strike the hypothalamus which acts like a bandmaster for the hormonal orchestra (vegetative functions). The social environment where the individuals spend most of the time affects the overall thought processes leading to adaptation of behaviours according to the social circle. This is turn can lead to secretion of certain hormonal secretions according to situations such as in response to rage, anger, fear, pleasure etc. Therefore, the social environment such as studying in religious and non-religious institutions can affect the differences in the serum testosterone levels.

Literature linking the religiosity and testosterone levels is very scarce. In one study, both religiosity and testosterone are taken as predictors of sexual attitudes and activity among adolescent males, has showed no significant interaction between religious attendance and free Testosterone index.[7] In addition, the biosocial model predicted by Udry *et al* shows similar findings.[11] Both of these studies were in contrast to our study where we have showed significant interaction between religiosity and serum Testosterone, predicting a rise in religious environment and practices lead to low level of Testosterone (but within normal range) while non-religious young adults had high levels of Testosterone (above the normal range or the upper normal range).In another study by Rodney Stark, they mentioned that low levels of testosterone as seen in women lead to high incidence of religiosity compared to men with high serum Testosterone levels.[17] In previous studies Testosterone was kept as an independent variable predicting the religiosity. This is a notion of Basal model which suggests that more the testosterone in individuals further will he be from religion. While in our study the religiosity is the independent variable predicting and controlling the serum Testosterone level (Reciprocal model), suggesting that the religion which prohibits certain visual and auditory queues inadvertently reduces the serum testosterone.[18]

CONCLUSION

This study concludes that the social environment where individual study has impact on the hormonal profile such as the Testosterone levels of the individual. The social environment of study like *Madrassa* or college and thought processes affects the HPG axis and hence modifies the hormonal profile of the individuals.

AUTHORS' CONTRIBUTION

NK, SHH: Conceived idea, design, research methodology, literature search, data collection, and write-up. UR, NZ, SG: Literature review, data interpretation. AR: Proof reading.

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