Original Article

Role of Testicular Size as a Parameter for Predicting Infertility in Indian Males

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Abstract

Context (Background): While the semen analysis appears to be the cornerstone in the evaluation of male fertility, the testicular size is a cheap, easy, and convenient to measure yet an ignored parameter for predicting the same. There is insufficient literature for identifying the testicular size cutoff among the Indian men. **Aims:** The study is aimed to correlate between the testicular volume and length with exocrine testicular function and to set a cutoff size for infertility in Indian men. **Settings and Design:** The study examined 354 cases over a period of 2 years. The cases comprised 258 men presenting with infertility as well as 96 fertile men as control. **Materials and Methods:** All the patients had their testes examined using Seager's calipers and Prader's orchidometer, infertile men had their semen analysis. **Statistical Analysis:** SPSS software and Chi-square test were applied, keeping $P < 0.05$ statistically significant. **Results:** The mean testicular volume and length in azoospermic patients were 10.3 ml and 2.4 cm, respectively, whereas in oligoasthenospermic patients they were 13.2 ml and 3.2 cm, respectively. The mean testicular volume, length among cases, and controls were 12.6 ml, 3.2 cm, 18.3 ml and 3.81 cm, respectively. **Conclusion:** Testicular size correlates significantly with severity of exocrine and endocrine functions. The testicular volume and length average for predicting infertility among Indian men should be 18 ml and 3.8 cm, respectively, unlike the international standards of 20 ml and 4.6 cm.

Keywords: *Male infertility, oligospermia, semen analysis, testis*

Introduction

Infertility refers to the failure to achieve clinical pregnancy after 12 or more months of regular unprotected sexual intercourse.[1] Male infertility is commonly due to deficiencies in the semen parameters. Male infertility contributes to approximately 50% of infertility cases.[1,2] Production of mature sperms is the function of testes. Seminiferous tubules which constitute over 80% of testicular size are responsible for the same.[3] Hence, testicular size has been associated with testicular function. Evaluation of male infertility has included clinical examination, semen analysis, ultrasonography, vasography, and testicular biopsy.[2] The measurement of testicular size is simple, quick, and noninvasive. The assessment of testicular size is important, as atypical dimensions have been reported to be present in as many as 64% of men with infertility.[4] However, racial variations in testicular size do exist. The minimum testicular size that is associated with normal spermatogenic function among Indian men is yet to be clearly defined. This is a prospective study that was done to determine the mean testicular size among fertile Indian men, and the relationship between testicular size measured using Seager's calipers and Prader's orchidometer in Indian men and their sperm production.

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Materials and Methods

The study was conducted at our center, a tertiary medical institution. The study was done over a period of 2 years (September 2017–September 2019) in which 258 patients diagnosed with male infertility were studied. Institutional Ethics Committee clearance was obtained. Inclusion criteria for infertile patients were aged between 21 and 45 years seeking treatment for primary infertility.[5] Ninety-six individuals with apparently normal fertility were recruited from among the hospital patients with unrelated problems for comparison. The main inclusion criteria for the fertile individuals were the absence of any history of fertility challenge and history of impregnation of sexual partner within the past 2 years. All patients and controls were between the age group of 21–45 years. Approval for the study was granted by the ethics committee, and the informed consent was obtained from all patients. The testicular size was measured using Prader's orchidometer and Seager's calipers. The semen was collected after a 3–4 days abstinence by masturbation, processed, and analyzed using the WHO criteria.[6] Two reports of semen analysis at least 1 week apart were taken. The results were analyzed, and statistical evaluation was done using the SPSS software. $P < 0.05$ was considered statistically significant.

Results

A total of 352 men were prospectively evaluated between September 2017 and September 2019. Of the infertile group, 186 men were oligospermic and 72 were azoospermic. There was no statistically significant difference between the age distributions of the two groups. The mean testicular volume and length in azoospermic patients were 10.3 ml and 2.4 cm, respectively, whereas in oligoasthenospermic patients they were 12.2 ml and 3.2 cm, respectively. ($P = 0.04$ volume) ($P = 0.005$ length) The mean testicular volume, length among cases and controls were 12.6 ml and 3.2 cm, 18.35 ml and 3.81 cm, respectively ($P = 0.02$ length) ($P = 0.001$ volume). The testicular volume and length correlate significantly with a sperm density ($P = 0.02$ and 0.04, respectively).

Discussion

Semen analysis is a chief component in the assessment of male fertility. Over the past few decades, there have been reports to suggest decreased human semen quality (defined as sperm density) in the general population.[7] In this study, most of the cases and controls were in the 30–39 years of age group. This is to be expected since patients in the reproductive age group are the ones that tend to present to the fertility clinic. We have observed in our study that mean testicular length and volume among controls, that is, fertile individuals were 3.81 cm and 18.35 ml, respectively, which is lesser than the average described for the Western counterparts, that is, 4.6 cm[8] and 20 ml,[9] respectively.[3,10] This was significantly higher than the average testicular volume and length of 12.6 ml and 3.2cm in subfertile men. This is consistent with the reports of other authors that have documented lower testicular volumes in men with infertility and oligospermia.[3,5,10,11]

Testicular size is also an indicator of the severity of infertility. We have observed that sperm counts are directly proportionate to testicular volume and length with statistical significance.

This study had some limitations. Fertility was only assumed in most of the control group based on the history alone, thereby making an accurate comparison of volume and degree of spermatogenesis between the two groups impossible. Other workers have tried to exclude patients with pathologies thought to affect spermatogenesis from their study.[12,13] We, however, feel that this is practically impossible, as not all the factors affecting testicular function are known.

Sakamoto in Japan in an assessment of 397 infertile patients using USS reported that patients with TTV of 20 ml (or mean 10 ml) or more had normal sperm parameters.[13] They also reported a TTV below 15 ml (MTV – 7.5 ml) as indicative of severe oligospermia ($<5 \times 106$ ml^{-1}). Racial differences may also account for the conflicting results as blacks are known to have bigger testes than Asians.[2] More recently, Condorelli also found reduced semen parameters in patients with MTV of <12 ml.[14] Studies done on testicular sizes in infertile men worldwide have shown a similar correlation with exocrine[3,4] and endocrine functions.[1,2]

Conclusion

Testicular size correlates significantly with sperm density among fertile and infertile men. The testicular volume and length average for predicting infertility among Indian men should be 18 ml and 3.8 cm, respectively, unlike the international standards of 20 ml and 4.6 cm. Hence, testicular size measurement is an important parameter in the initial evaluation of male infertility.

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Conflicts of interest

There are no conflicts of interest.

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