

Correlation of Varicocele and Body Mass Index Among Infertile Men in Abuja: A Cross Sectional Study

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ABSTRACT

Background: Varicocele is the most common abnormal finding among men presenting with infertility; however, there is controversy regarding its aetiology. This study aimed to determine the association between the occurrence of varicocele and Body Mass Index (BMI) at the Federal Medical Centre (FMC) in Abuja. **Materials and Methods:** This was a cross sectional study involving 51 men presenting with infertility aged 18 years and above from August 2024 to February 2025. All participants were evaluated for the presence of varicocele. Height and weight measurements were taken to calculate BMI, and a scrotal ultrasound was performed to confirm the presence of varicocele. The height, weight, and BMI of those with varicocele were compared to those without it (the control group). Data analysis was conducted using IBM SPSS Statistics version 27.0. **Results:** The mean age of the participants was 39.3 ± 10.2 years (range 18 to 68 years). The majority of patients were married (78.4%). Those without varicocele had a higher average BMI compared to those with varicocele, with values of 27.82 ± 2.74 and 25.74 ± 3.80 , respectively (p-value < 0.050), which is clinically significant. **Conclusion:** Our study indicates that there is a decreasing incidence of varicocele with increasing BMI, supporting the possibility that obesity may reduce the nutcracker effect.

Keywords: BMI, obesity, nutcracker, varicocele.

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INTRODUCTION

Varicocele is a medical condition characterized by the pathological dilation of veins of the pampiniform plexus. It is predominantly observed on the left side, with nearly 50% of affected individuals displaying bilateral involvement. The condition typically manifests around puberty, a period during which both the endocrine and exocrine functions of the testes undergo significant enhancement. The prevalence of varicocele is estimated at 15% within the general male population, escalating to 35% in individuals with primary infertility, and reaching up to 80% in those with secondary infertility [1,2].

The primary pathological mechanism underlying varicocele formation involves the dilation of the internal spermatic vein, accompanied by retrograde blood flow into the pampiniform plexus [1,2,3,4]. This phenomenon may arise from various anatomical and functional factors. Venography and cadaver studies have elucidated that the left internal spermatic vein drains into the renal vein at a perpendicular angle [5]. This anatomical configuration results in a prolonged drainage pathway and a substantial pressure differential, which may account for the higher prevalence of left-sided varicocele, as opposed to bilateral or isolated right-sided varicocele [6]. Additionally, venous incompetence and anatomical variations in the internal spermatic vein's drainage are considered contributory factors in the pathogenesis of varicoceles [7].

Moreover, a less common etiological factor contributing to varicocele formation is the nutcracker syndrome, characterized by the compression of the renal vein between the aorta and the superior mesenteric artery, leading to insufficiency of the internal spermatic vein. Epidemiological evidence suggests that this syndrome is more prevalent in adolescents than in adults, as well as among individuals possessing lower body mass indices [4,8]. A thorough clinical evaluation of patients presenting with varicocele should encompass a comprehensive reproductive and sexual history. The physical examination remains the cornerstone of varicocele diagnosis. The clinical detection and grading of varicocele are based on the criteria established by

Dubin and Amelar in 1970 [9, 10, 11], which are inherently subjective and rely on the physician's expertise.

Currently, Doppler imaging techniques—including color, power, or spectral Doppler scrotal ultrasound—are employed to enhance the evaluation of varicoceles. Utilizing high-frequency linear array transducers (≥ 7.5 MHz), Doppler findings may reveal venous flow at rest with intermittent or continuous flow reversal upon the Valsalva manoeuvre. The Sarteschi and Dubin classifications facilitate the grading of varicocele on a scale from 1 to 5.

Despite scrotal varicocele being the most prevalent abnormal finding in men evaluated for infertility, the aetiology surrounding it remains contentious. Anecdotal evidence indicates a higher prevalence of varicoceles among individuals with lower body mass indices, supporting the hypothesis of "nutcracker" syndrome. However, there remains a paucity of research investigating this relationship within our setting. Therefore, this study aims to examine the relationship between the body mass index (BMI) and varicocele in infertile male patients in Abuja.

MATERIALS AND METHODS

This study was conducted at the Urology and Fertility Clinic of the Federal Medical Centre, Abuja, between August 2024 and February 2025 whereby all adult male patients aged 18 to 58 years with varicocele were included. However, patients with a history of previous scrotal surgery, testicular masses, hydrocele or inguinal hernias were excluded after obtaining informed consent. Demographic data, including age, occupation, weight, height, and body mass index (BMI), were systematically collected and recorded using a structured proforma.

Participants were evaluated for the presence of varicocele, unilateral or bilateral and it was graded 1 to 3. Ultrasonographic assessments were conducted and graded according to the Sarteschi criteria, which range from grades 1 to 5, reflecting varying levels of severity in varicocele.

Ethical approval was obtained from the Health Research Ethics Committee (HREC) of the institution before data collection. The structured proformas utilized for data gathering were pre-tested to ensure reliability and validity. Statistical analysis was performed using IBM SPSS version 27.0. Descriptive statistics were used for demographic baseline data, with frequencies and percentages applied to continuous variables and chi-square tests utilized for categorical variables. The Pearson Chi-square test was employed to explore the relationship between the presence of scrotal varicocele and BMI. A confidence level of 95% was maintained throughout the analysis, with a p-value of ≤ 0.05 considered statistically significant.

RESULTS

A total of 51 males participated in the study with mean age of 39.3 ± 10.2 years (range 18 to 68). Most participants were married (78.4%), predominantly within the 30–39 age group (45.1%) as depicted in Table 1.

Table 1: Sociodemographic characteristics of the patients (n=51).

Parameter	Frequency	Percent (%)
Age Group		
Mean = 39.3 ± 10.2 years		
20-29	6	11.8
30-39	23	45.1
40-49	12	23.5
50-59	8	25.7
60 and above	2	3.9
Marital Status		
Married	40	78.4
Single	11	21.6

Table 2 showed there was no significant difference in height between varicocele and non-varicocele patients ($p=0.491$). A marginally significant difference in BMI was observed, with non-varicocele patients having a higher BMI (27.82 ± 2.74) compared to varicocele patients (25.74 ± 3.80) ($p=0.050$).

Table 2: Comparison of the weight, height and the BMI of patients (n=51).

Parameter	Varicocele (N=34) Mean $\pm$ SD	No Varicocele (N=17) Mean $\pm$ SD	p-value
Height	1.70 ± 0.04	1.69 ± 0.02	0.491
Weight	72.88 ± 10.52	80.47 ± 8.48	0.013*
BMI	25.74 ± 3.80	27.82 ± 2.74	0.050*

SD=Standard Deviation, * = statistically significant

Table 3A: Dubin and Amelar clinical grades of varicose veins (n=34).

Parameter	Varicocele (Bilateral) N=19	Varicocele (Left) N=34
Grade 1	2(10.5%)	2(5.9%)
Grade 2	10(52.6%)	12(35.3%)
Grade 3	7(36.8%)	20(58.8%)

Table 3B showed that Grade 4 was the most frequent for bilateral varicocele (63.2%), followed by Grade 2 (15.8%) and Grade 3 (10.5%). Similarly, on the left, Grade 4 was predominant (47.1%), followed by Grade 2 (23.5%) and Grade 5 (8.8%). The left varicocele grades were slightly more severe than the right.

Table 3B: Sarteschi grades of varicose veins (n=34)

Parameter	Varicocele (Bilateral) N=19	Varicocele (Left) N=34
Grade 1	1(5.2%)	0(0%)
Grade 2	3(15.8%)	8(23.5%)
Grade 3	2(10.5%)	7(20.6%)
Grade 4	12(63.2%)	16(47.1%)
Grade 5	1(5.2%)	3(8.8%)

DISCUSSION

This study elucidates that the mean age of adult patients diagnosed with scrotal varicocele within this community is 39.3 ± 10.2 years. This finding is congruent with earlier investigations, such as the study conducted by Jeje et al., which reported a median age of 36.65 years in Lagos, Southwest Nigeria. Similarly, Muhammad et al. noted a mean age of 35 years among patients in Sokoto, Northwest Nigeria [12, 13].

The demographic analysis revealed that a significant majority of the participants, specifically 40 individuals (78.4%), were married, predominantly

within the age range of 30 to 39 years. Notably, traders constituted the largest occupational group, comprising 35.3% of the cohort, while 64.7% of participants possessed tertiary education, thereby facilitating effective communication regarding their condition.

A comparative assessment revealed no significant difference in height between patients with scrotal varicocele and those without ($p = 0.491$). However, there was a statistically significant variance in mean weight, with patients devoid of scrotal varicocele exhibiting a higher mean weight compared to their counterparts ($p = 0.013$). These findings align with existing literature [4, 8]. A marginally significant difference in Body Mass Index (BMI) was observed, indicating that non-scrotal varicocele patients had a higher BMI ($p = 0.050$). This observation corroborates previous reports by Alsaikhan *et al* [2], which propose an inverse correlation between varicocele prevalence and BMI. While some studies have demonstrated no appreciable differences in BMI between men with and without varicocele, research by Damsgaard *et al* [4] has indicated that men with a BMI of less than 20 had a higher prevalence of varicocele compared to those with a BMI exceeding 25 ($p < 0.05$). This suggests that scrotal varicocele is more prevalent among adults with lower BMI.

Among the 51 participants analyzed, 66.67% (34 individuals) were found to have scrotal varicocele, all cases being unilateral on the left side, with 55.88% (19 individuals) exhibiting bilateral involvement. The Dubin and Amelar Clinical Grading System illustrated varying distributions of severity, with Grade 2 being the most common classification on the right side (52.6%), whereas Grade 3 was predominantly observed on the left side (58.8%). According to the Sarteschi Classification of Varicose Veins, Grade 4 varicocele was the most frequently identified across both sides, accounting for 63.2% in bilateral instances and 47.1% on the left side. These observations support previous literature indicating that varicoceles are more frequently observed and tend to exhibit greater severity on the left side. Research conducted by Keller *et al*. [1] and Alsaikhan

et al. [2] has similarly noted that varicoceles are typically larger and more prevalent on the left, with up to 50% of men with varicocele presenting with bilateral pathology.

CONCLUSION

The findings of this study suggest a decreasing incidence of varicocele associated with increasing BMI, thereby supporting the hypothesis that obesity may contribute to a reduced nutcracker effect. Further research is warranted to substantiate these findings.

Recommendation

We recommend that future studies aim for larger sample sizes.

Limitations of the Study

1. The sensitivity of the ultrasound equipment may influence the grading accuracy of varicoceles.
2. There exists a potential for observer error in both clinical and ultrasonic assessments of varicocele grades.

Conflict of interest

There are no conflicts of interest

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REFERENCES

1. Keller JJ, Chen YK, Lin HC. Varicocele is associated with erectile dysfunction: A population-based case-control study. *J Sex Med*. 2012; 9:1745-52.
2. Alsaikhan B, Alrabeeah K, Delouya G, Zini A. Epidemiology of varicocele. *Asian Journal of Andrology*. Medknow Publications; 2016; 18:179-181.
- Prins J, Blanker MH, Bohnen AM, Thomas S, Bosch JLHR. Prevalence of erectile dysfunction: a systematic review of population-based studies. *Int J Impot Res*. 2002; 14:422-32.

3. Clavijo RI, Carrasquillo R, Ramasamy R. Varicoceles: prevalence and pathogenesis in adult men. fertility and Sterility. Elsevier Inc. 2017; 108:364-9.
4. Damsgaard J, Joensen UN, Carlsen E, Erenpreiss J, Blomberg Jensen M, Matulevicius V, et al. Varicocele Is associated with impaired semen quality and reproductive hormone levels: A study of 7035 healthy young men from six European countries. Eur Urol. 2016; 70:1019-29.
5. Asala S, Chaudhary SC, Masumbuko-Kahamba N, Bidmos M. Anatomical variations in the human testicular blood vessels. Ann Anat 2001; 183:545-9.
6. Ergün S, Bruns T, Soyka A, Tauber R. Angioarchitecture of the human spermatic cord. Cell Tissue Res. 1997; 288:391-8.
7. Comhaire F, Kunnen M. Selective retrograde venography of the internal spermatic vein: A conclusive approach to the diagnosis of varicocele. Andrologia. 1976; 8:11-24.
8. Vanlangenhove P, Dhondt E, Van Maele G, Van Waesberghe S, Delanghe E, Defreyne L. Internal spermatic vein insufficiency in varicoceles: A different entity in adults and adolescents? Am J Roentgenol. 2015; 205:667-75.
9. Bertolotto M, Freeman S, Richenberg J, Belfield J, Dogra V, Huang DY, et al. Ultrasound evaluation of varicoceles: Systematic literature review and rationale of the ESUR-SPIWG guidelines and recommendations. Journal of ultrasound. Springer science and business media deutschland gmbh; 2020; 23:487-507.
10. Foroughi AA, Dallaki M, Hosseini SA, Ariaifar A. Relationship of clinical and ultrasonographic grading of varicocele with semen analysis profile and testicular volume. J Reprod Infertil. 2022; 23:84-92.
11. Belay RE, Huang GO, Shen JKC, Ko EYK. Diagnosis of clinical and subclinical varicocele: How has it evolved? Asian J Androl. 2016; 18:182-5.
12. Jeje EA, Alabi TO, Ojewola RW, Ogunjimi MA, Osunkoya SA. Male infertility: An audit of 70 cases in a single centre. African journal of urology. 2016; 22:223-226.
13. Muhammad AS, Agwu NP, Abdulwahab-Ahmed A, Khalid A, Onwuasoanya UE, Mungadi IA. Pattern of presentation and management of varicocele in a tertiary hospital in northwestern nigeria. Journal of medical and basic scientific research. 2021; 1:43-47.
14. Muhammad AZ, Grema BA, Shuaibu A, Michael GC. Prevalence, severity, and correlates of erectile dysfunction among male adult patients of a primary care clinic in north-west nigeria. Afri health sci. 2023; 23:670-81.