

# The Relation ship between Varicocele and Body Mass Index

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## Summary:

**Background:**Varicoceles, present in 15% to 20% of men, are the most common abnormal finding among men presenting with infertility, yet controversy exists regarding their etiology. Anecdotal experience suggests that varicoceles are more prevalent in lean men, supporting the "nutcracker" effect of the superior mesenteric artery compressing the left renal vein over the aorta.

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**Materials and methods:** A total of 206 males with varicocele attending the urological out patient clinic were evaluated from their physical screening examinations. All subjects underwent history taking and physical examinations to evaluate for the presence and severity of varicocele ht,weight and BMI, those compared with 206 men without varicocele (control group)were selected randomly from general population.

**Results :** The mean ( $\pm$  SD) BMI of the 206 patients with varicocele was 25.2721 While that of control group was 28.8441( $P =0.0001$ ).which is clinically significant. Varicocele grade significantly decreased with increasing BMI category ( $p =0.0001$ ).

**Conclusions:** The results of this study indicate that there is a decreasing incidence of varicocele and varicocele grade with increasing BMI. Supporting the possibility that obesity results in a decreased nutcracker effect in which the adipose tissue prevents compression of the renal vein.

**Keywords:** Varicocele, Body Mass Index.

## Introduction:

Varicoceles are present in 15%to 20% of the normal male population and in up to 40% of patients with male infertility. In approximately 70% of patients with secondary infertility, a varicocele is an underlying cause. The World Health Organization reported that varicoceles were found in 25.4% of men with abnormal semen parameters compared with 11.7% of men with normal semen making it the most common abnormal physical examination finding in patients presenting for evaluation of male factor infertility.(1)(2).

The World Health Organization concluded that varicoceles are clearly associated with impairment of testicular function and infertility. (2).The pathogenesis of varix formation, although somewhat unclear, is thought to be related to various factors resulting in an increased pressure in the veins of the pampiniform plexus and its venous drainage. Classically, these include absent or incompetent venous valves in the internal spermatic veins, persistent embryologic venous collaterals, and increased venous pressure in the left renal vein. (3) The observation of an approximate 75% to 90% left-sided predominance suggests that the anatomic relationships of the left internal spermatic vein at its insertion into the left renal vein are of particular relevance, including possible compression of the left renal vein between the aorta and superior mesenteric artery, colloquially referred to as the "nutcracker phenomenon.(4).

Varicoceles have been associated with impaired semen quality and decreased Leydig cell function, and this impairment has been shown to be progressive in nature. However, varicocele repairs have been shown to improve not only

spermatogenesis but also Leydig cell function. A varicocele is now recognized as the most surgically correctable cause of male infertility, and a varicocele repair is the most commonly performed surgical procedure in treatment of male infertility. (1, 2, 5).

## Materials and methods:

A total of 206 males with varicocele attending the urological out patient clinic were evaluated from their physical screening examinations. All subjects underwent history taking and physical examination to evaluate for the presence and severity of varicocele those compared with 206 men without varicocele (control group) were selected randomly from general population.

The patients had complete data that included height, weight, presence or absence of varicocele, varicocele side and grade. Only palpable varicoceles were recorded, Varicoceles were categorized as small (grade I—palpable only with Valsalva), medium (grade II—palpable without Valsalva but not visible) or large (grade III—visible) by physical examination.

To account for the relationship between height and weight, body mass index was used. Body mass index was calculated from height and weight data according to the formula weight (kg)/height (m)<sup>2</sup>. Using the National Institutes of Health definition, those patients with a BMI of less than 25 kg/m<sup>2</sup> were categorized as normal weight. Patients with a BMI of 25 kg/m<sup>2</sup> to less than 30 kg/m<sup>2</sup> were considered overweight, those with BMI of 30 kg/m<sup>2</sup> to less than 35 kg/m<sup>2</sup> as obesity class I, those with BMI of 35 kg/m<sup>2</sup> or more as obesity class II.<sup>2</sup>

All data coded and entered to the computer by using statistical package for social signs (SPSS 14), comparison between variables measured by using chi-square test (student t-test ) and analysis of

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variance (ANOVA), Statistical significance was considered at  $p < 0.05$ .

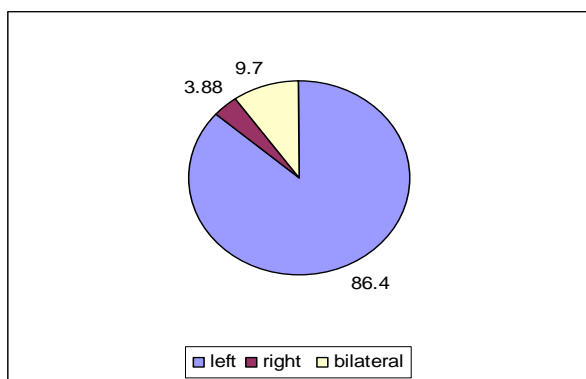
**Results:**

The mean ( $\pm$  SD) age of 206 patients with varicocele was 30.9 While that of control group was 31.8( $p=0.5$ ), (Table1). The mean ( $\pm$  SD) BMI of the 206 patients with varicocele was 25.2721 While that of control group was 28.8441( $P =0.0001$ ).which is clinically significant. (Table1).

Among the varicocele group; Varicoceles were present on the left side in 86.4%, bilateral in9.7% and on the right side in 3.8% of patients. (Fig .1).

**Table1: Patient characteristics, by BMI category:**

GROUP	N	Mean	SD	P
AGE pat.	206	30.9561	11.1216	0.5
control	206	31.8431	14.8050	
BMI pat.	206	25.2721	5.2706	0.001
control	206	28.8441	6.0802	



**(Fig .1).Percentage of varicocele according to the side.**

The characteristics of the cohort broken down by BMI category are summarized in (Table 2). Obese men, defined as those having a BMI between 30 and 35  $kg/m^2$  and very obese men, defined as those having a BMI greater than 35  $kg/m^2$ , had a significantly lower incidence and low grade of varicoceles than did men with a BMI less than 30  $kg/m^2$  ( $P =0.0001$ ).

**Table 2: Comparison between BMI score with varicocele prevalence and grade:**

Varicocele		BMI. SCORE				Total
		Less than 25	25-30	30-35	35 or more	
Grade 1	count	21	31	25	4	81
	% within GRADE	25.9%	38.2%	30.8%	4.8%	
2	count	34	30	7	3	74
	% within GRADE	45.9%	40.5%	9.4%	4%	
3	count	41	8	2	0	51
	% within GRADE	80.3%	15.6%	3.9%	0	
Total	count	96	69	34	7	206
	% within GRADE	46.6%	34.3%	16.5%	3.3%	

Varicocele grade significantly decreased with increasing BMI category ( $p =0.0001$ ). (Table 3).

There was no significant association between BMI and varicocele side ( $p=0.086$ ).

**Table 3: Comparison between mean BMI with varicocele grade:**

GRADE	N	Mean BMI	SD	P value
1	81	27.9240	4.7512	0.0001
2	74	25.0175	4.1209	
3	51	20.0577	3.9502	
TOTAL	206	25.0577	5.2260	

**Discussion:**

A varicocele is a dilatation of the scrotal portion of the pampiniform plexus/internal spermatic venous system that drains the testicle. Approximately 75% to 90% of varicoceles are left side. The incidence of bilaterality is anywhere from 15% to 50% but isolated right varicoceles are fairly rare. One theory postulates that the length of the left internal spermatic vein and the angle with which it drains into the left renal vein can result in increased hydrostatic pressure. This increased pressure is transmitted to the scrotal pampiniform plexus causing dilatation and tortuosity of the plexus. Increased pressure in the left internal spermatic vein may result from compression of the left renal vein between the aorta and the superior mesenteric artery, a phenomenon known as the nutcracker effect. Another theory describes absent or malfunctioning venous valves as a potential cause of varicocele formation. (6, 7).

Prabakaran S et al concluded that Varicocele was more prevalent in tall boys with a lower BMI, who had quickly progressed through puberty. (4).

Delaney et al performed a retrospective review of 43 adolescent boys with varicocele, and noted that patients with varicocele were taller and heavier than age matched controls. Observation that adolescent males with varicoceles generally have an athletic build. (3).

In this study:A total of 206 patients with varicoceles. The mean BMI of those with varicoceles (25.2721) was significantly less than those without varicoceles (28.8441). ( $P= 0.001$ ).

Also the grade of varicocele significantly correlate inversely with increased BMI ( $P=0.0001$ ).

Among the varicocele group; Varicoceles were present on the left side in 86.4%, bilateral in9.7% and on the right side in 3.8% of patients.

The results of the current study may be explained by several ways; BMI is a measure of adiposity. In those patients with a higher BMI it is plausible that there is a decreased nutcracker effect or compression of the left vein due to increased adipose tissue between the superior mesenteric artery and aorta.

Tsao CW et al show the prevalence of varicoceles inversely correlated with obesity. A total of 1050 young males were evaluated from their physical screening examinations. The means of BMI, of those without varicoceles was greater than those with varicoceles. (6, 8).

Nielsen ME et al concludes that Varicoceles were less likely to be diagnosed among obese men. (1). Celiktas M et al evaluated a possible effect of the amount of retroperitoneal fat tissue on testicular venous drainage to shed light on the mechanism of varicocele occurrence. The relationship between bilateral pampiniform plexus diameters and retroperitoneal fat distribution was stronger and significant.(9).

Another possible explanation is decreased detection of varicoceles in the overweight patient population due to difficulty in palpation on physical examination. It is likely that large varicoceles would be easily detected even in obese patients and small varicoceles might be missed on physical examination. If this the case in the current study one would expect the prevalence of small varicoceles to be less in obese patients. However, one would not expect the prevalence of large varicoceles to decrease in obese patients because they would likely be easily detected on physical examination, regardless of patient weight.(10).

BMI and varicocele development is intriguing to the extent that obesity in men is associated with alterations in serum sex hormone concentrations, including decreased testosterone and increased estradiol. The contribution of alterations in the hormonal milieu to the development of varicoceles represents a potential area for further investigation. (11).

The limitation of the present study was the reliance of the diagnosis on physical findings with no ancillary imaging (Color Doppler imaging) to diagnose sub clinical varicoceles or confirm the diagnosis of the clinical varicoceles. Nevertheless, the methods of the present study were consistent with the American Urological Association guidelines for the detection of varicoceles, which recommend that ancillary diagnostic measures not be used in a standard evaluation (12).

Larry I. et al recommend that, The diagnosis of varicoceles although can be achieved radiographically, but the physical examination remains the “gold standard.”and radiographic testing to diagnose varicoceles should be used only when the presence of a varicocele is uncertain on physical examination or recurrence is suspected or persistent. (2).

#### Conclusions:

The results of this study indicate that there is a decreasing prevalence of varicocele, and varicocele grade with increasing BMI. Supporting the possibility that obesity results in a decreased

nutcracker effect in which the adipose tissue prevents compression of the renal vein.

#### References

- 1-Nagler and Martinis, 1997. Nagler HM, Martinis FG: *Varicocele*. In: Lipshultz LI, Howards SS, ed. *Infertility in the Male*, 3rd ed.. St. Louis: Mosby-Year Book; 1997:336-359.
- 2-Larry I.Lipshul Tz,MD Anthony J.Thommas JR.,MD ,AMBA.AMPH ;*Surgical Management of Male Infertility* ,Wein: Campbell-Walsh Urology, 9th ed. 2007. Chapter 20 P(658-659).
- 3-D.P. Delaney, M.C. Carr, T.F. Kolon, H.M. Snyder and S.A. Zderic, *The physical characteristics of young males with varicocele*, *BJU Int* 94 (2004), p. 624.
- 4-Prabakaran S, Kumanov P, Tomova A, Hubaveshki S, Agarwal A.*adulescent varicocele association with somatometric parameters*. *Urol Int*. 2006;77(2):114-7.
- 5- Matthew E. Nielsen , Stephen Zderic, Stephen J. Freedland and Jonathan P. Jarow\_ *Insight on pathogenesis of varicoceles: Relationship of varicocele and body mass index* *Urology*. 2006 Aug;68(2):392-6.
- 6- Tsao CW, Hsu CY, Chou YC, Wu ST, Sun GH, Yu DS, Fan PL, Chen HI, Chang SY, Cha TL.*the relationship between varicocele and obesity in a young adult population* *Int J Androl*. 2008 Oct 21.
- 7-May M, Taymoorian K, Beutner S, Helke C, Braun KP, Lein M, Roigas J, Hoshcke B *Body size and weight as predisposing factors in varicocele*. *Scand J Urol Nephrol*. 2006;40(1):45-8.
- 8-Tsao CW, Hsu CY, Chou YC, Wu ST, Sun GH, Yu DS, Fan PL, Chen HI, Chang SY, Cha TL *Is obesity correlated with sexual function in young men?* *J Androl*. 2009 May-Jun;30(3):275-9.
- 9-Celiktas M, Aikimbaev K, Aridogan IA, Soyupak S, Inal M. *effect of the amount of retroperitoneal fat tissue on testicular venous drainage*\_ *Urol Int*. 2009;83(1):92-7.
- 10-P.S.W. Davies, D.A. Lanham and M.A. Stead et al., *Body mass index and the prediction of percentage body fat in Australian and Chinese women*, *Ann Hum Biol* 28 (2001), pp. 467–470.
- 11-D. Gallagher, M. Visser and D. Sepulveda et al., *How useful is BMI for comparison of body fatness across age, sex, and ethnic groups*, *Am J Epidemiol* 143 (1996), pp. 228–239.
- 12- I.D. Sharlip, J.P. Jarow and A.M. Belker et al., *Best practice policies for male infertility*, *Fertil Steril* 77 (2002), pp. 873–882.