



Varicocele among healthy young men in Turkey; prevalence and relationship with body mass index

Haluk Soylemez, Murat Atar, Ahmet Ali Sancaktutar, Yasar Bozkurt, Necmettin Penbegul

Dicle University, Medical Faculty, Department of Urology, Turkey

ABSTRACT

Aim: Varicocele is characterized by abnormal tortuosity and dilatation of the veins of the pampiniform plexus within the spermatic cord and is one of the causes related to male infertility. This study aimed to investigate the correlation between varicocele and somatometric parameters. We also aimed to determine prevalence and treatment ratio of this disorder among healthy young Turkish men.

Materials and Methods: A total of 2061 young men aged from 19 to 34 years was enrolled and cross sectionally evaluated for status of varicocele. Body mass index was calculated. Patients were categorized as normal weight, overweight and obese using by National Institutes of Health criteria. Patients underwent physical examinations for the presence and grade of varicocele. If the varicocele was found and previously submitted to different treatment modalities, the age of treatment and outcomes were recorded.

Results: Varicocele was present in 498 men (24.2%). The mean age of the participants was 22.7 ± 1.8 years, and the median BMI was 22.8 ± 2.0 kg/m². There were no significant differences in age, height, weight and BMI among the patients with different grades of varicocele ($p > 0.05$). Although no significant difference was found in varicocele prevalence between normal weight and over-weight participants ($p > 0.05$), obese participants had significantly lower varicocele prevalence compared with normal or over weight participants ($p = 0.006$). A total of 49 men had scrotal pain and the treatment ratio was only 2.8%.

Conclusion: Prevalence of varicocele was found in about 24% of healthy young Turkish population. Participants with varicocele had significantly lower BMI values compared with those without varicocele. Our findings supported the hypothesis that individuals with a greater BMI may have advantages in relieving the varicocele, but further studies are required to clarify this issue. Additionally treatment ratio was low among young men with varicocele.

ARTICLE INFO

Key words:

Varicocele; prevalence; body mass index

Int Braz J Urol. 2012; 38: 116-121

Submitted for publication:
January 05, 2011

Accepted after revision:
June 26, 2011

INTRODUCTION

Varicocele is characterized by abnormal tortuosity and dilatation of the veins of the pampiniform plexus within the spermatic cord and is one of the causes related to male infertility. The prevalence of varicocele is approximately 15-20% in the general population and 30-40% in infertile

men (1). Levinger et al. proposed that varicocele prevalence increase over time and the risk of incidence is approximately 10% for each decade of life (2).

The etiology of varicocele is still unclear. Kumanov et al. suggested that weight and body mass index (BMI) have a protective role, and height, penile length and penile circumference were nega-

tive factors for the development of varicocele (3). Delaney et al. (4) retrospectively reviewed and obtained the height and weight of 43 consecutive males (mean age 14.3 years) under long-term follow-up for varicocele. They demonstrated that patients with varicocele are significantly taller and heavier than age-matched controls. Despite the significant differences in heights and weights, BMI was not different according to the results of that study (4). Nielsen et al. reported that varicoceles are less likely to be diagnosed among obese men focusing on 2106 men aged 18-85 years (5). Chen and Huang evaluated 102 varicocele patients and 97 age-matched male patients who did not have varicocele. They demonstrated that the prevalence of varicocele was higher in patients with a lower BMI (6).

In order to explore further this concept, we evaluated 2061 healthy males aged 19-34 years for the presence and grade of varicocele and investigate the correlation between varicocele and the somatometric parameters including age, height, and body mass index (BMI).

MATERIALS AND METHODS

A total of 2061 (aged 19 to 34) healthy young men (soldiers) in Turkish army aged 19-34 years were enrolled in the study during a general health examination between March 2009 and June 2009. During the examination of the participants, a comprehensive history was taken and physical examination including height and weight measurements and physical assessment for varicocele were performed by a single physician in a special room for all cases. If the varicocele was found, the treatment modalities used previously, the age of treatment and the treatment results were recorded by a health staff during examination.

The study was approved by the Local Institutional Review Board and all subjects provided proper informed consent. Varicocele was identified in a heated room during scrotal examination in the upright position before and during Valsalva's maneuver and was clinically classified as grade 1 - palpable only during the Valsalva's maneuver, grade 2 - palpable without the need of

Valsalva's maneuver, and grade 3 - visible from a distance without palpation (7).

Body mass index was calculated from height and weight data according to the formula of $BMI = \text{weight (kg)}/\text{height (m)}^2$. Using the National Institutes of Health definition, participants with a BMI of less than 25 kg/m^2 were categorized as normal weight, participants with a BMI of 25 kg/m^2 to less than 30 kg/m^2 were considered overweight and those with BMI of 30 kg/m^2 or greater were considered obese (8).

Statistical analysis

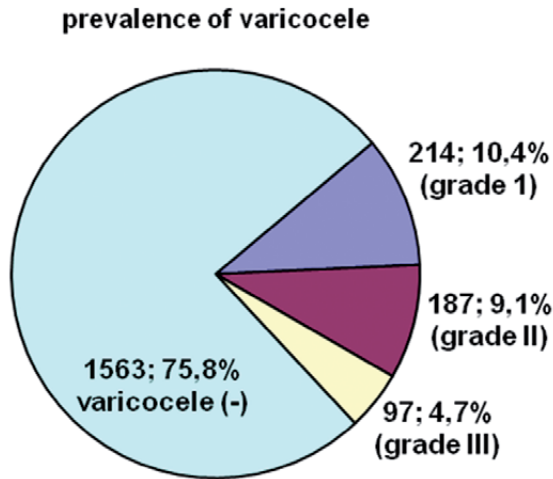
The statistical analyses were performed by SPSS for Windows 15.0 (SPSS Inc, Chicago, IL). Data were presented as mean plus or minus standard deviation. One-way ANOVA with Post Hoc Tukey test was used to analyze differences of anthropometric measurements among the various varicocele grades. Chi-square analysis was used to compare varicocele prevalence among the various BMI categories. A p-value less than 0.05 was used as a threshold for statistical significance.

RESULTS

The mean age of the participants was 22.7 ± 1.8 years, and the median BMI was 22.8 ± 2.0 kg/m^2 . Varicocele was present in 498 men (24.2%). In relation to grade, 97 (4.7%) were found as grade III, 187 (9.1%) were grade II, and 214 (10.4%) were grade I. Prevalence of different grades of varicocele are shown in Figure-1. Differences in the mean age, height, weight and BMI among the participants with different grades of varicocele (non-varicocele group, grades 1, 2 and 3) are shown in Table-1. There were no significant differences in age, height, weight and BMI among the patients with different grades of varicocele ($p > 0.05$). Although no significant difference was found in varicocele prevalence between normal weight and overweight participants ($p > 0.05$), obese participants had significantly lower varicocele prevalence compared with normal or overweight participants ($p = 0.006$) (Table-2).

No significant differences were found in varicocele grades between the participants with

Figure 1 - Prevalences of varicocele grades in 2061 young men in Turkey.



normal weight and overweight ($p > 0.05$). However, it was observed statistically significant difference in varicocele grades between the obese patients and the others ($p = 0.031$): obese participants had lower prevalence of Grades 2-3 compared with normal or overweight participants ($p < 0.05$) (Table-3).

A total of 49 (17.25% of all grade II and grade III varicocele patients) men had scrotal pain. Six patients were treated by open varicocele ligation procedure and there was no recurrence. The mean age at operation was 18 (12-22) years. Hydrocele developed after the surgical treatment only in one patient. Eight patients had been managed by conservative treatment including nonsteroidal analgesic drugs.

DISCUSSION

The definitive etiology of varicocele is not well known, but its increased frequency of presen-

Table 1 - Anthropometric measurements of participants according to varicocele grades (mean ± SD).

	Varicocele grades				P
	None (n = 1287)	Grade 1 (n = 179)	Grade 2 (n=161)	Grade 3 (n=93)	
Age, year	22.6 ± 1.8	22.9 ± 1.9	23.1 ± 1.6	22.1 ± 1.7	NS
Height, cm	174.8 ± 5.5	175.0 ± 5.3	175.7 ± 5.6	176.1 ± 5.1	NS
Weight, kg	69.0 ± 7.0	70.0 ± 5.9	70.4 ± 6.9	71.2 ± 5.8	NS
BMI, kg/m ²	22.6 ± 2.0	22.8 ± 1.8	22.7 ± 1.7	22.1 ± 1.6	NS

NS: not significant ($p > 0.05$)

Table 2 - The relationship between presence of varicocele and obesity.

	Total n (%)	Normal weight n (%)	Overweight n (%)	Obese n (%)	P
Varicocele +	498 (24.1)	433 (25.2)	57 (20.7)	8 (12.1)	0.006
Varicocele -	1563 (75.9)	1287 (74.8)	218 (79.3)	58(87.9)	
Total	2061 (100.0)	1720 (100.0)	275 (100.0)	66 (100.0)	

Table 3 - The distribution of varicocele grades according to body mass index.

Varicocele grades	Normal weight n (%)	Overweight n (%)	Obese n (%)	P
Grade 1	179 (10.4)	29 (10.5)	6 (9.1)	0.031
Grade 2	161(9.4)	24 (8.7)	2 (3.0)	
Grade 3	93 (5.4)	4 (1.5)	0 (0)	
Total	433 (100.0)	57 (100.0)	8 (100.0)	498

tation on the left side preponderance has led to the discussion of several theories. These included an increased length of the left spermatic vein, its right-angle entry into the higher pressure left renal vein, an increased absence of valves in the left spermatic vein compared with the right, and the possibility of the “nutcracker” phenomenon with compression of the left renal vein between the aorta and superior mesenteric artery (9,10). In general, all of these theories are based on an increased hydrostatic column of fluid within the left spermatic vein when in the upright position. These etiologic origins are similar to those proposed for varicose veins elsewhere in the body (11).

Although the prevalence of varicocele has been studied extensively, the results are complex. It has been accepted that it is present in approximately 15% of all population. In contrast, 35% of men with primary infertility and up to 70% of men with secondary infertility present varicocele (12). Furthermore, approximately 69-81% of men with secondary infertility have varicocele (8,13). In some studies, varicocele rates have been reported lower than our data; in a large epidemiological study the prevalence was 11.7% in the general population and 25.4% in the infertile male population (14,15). Akbay et al. detected varicocele in 293 (7.2%) of 4052 boys (16). However, there are convincing data showing that this condition is more frequent in the general population. In 2006, Pfeiffer et al. performed a Doppler-based study on the prevalence of varicocele in 2756 children (10.2 years) and 2008 adolescents (14.6 years) and detected varicocele in 18.0% of the children and 42.7% of the adolescents (17). They concluded that even in children varicocele is not a rare phenom-

enon and in adolescents this condition is rather common. Mickevicius and Bosas studied one hundred patients and measured the thickness of veins of plexus pampiniformis by echoscopy. They found a varicocele in 24% of all patients by this method (18). Levinger et al. designed a retrospective study that consisted of 504 consecutive healthy men in older population (54.7 years) and found varicocele in 175 of the 504 men (34.7%). They concluded that the incidence of varicocele increases approximately 10% for each decade of life and reaches up to 75% above the eighth decade (2). In our present study varicoceles were detected in 24% of 2061 young Turkish men. Our results are in concordance with findings of former studies suggesting that the prevalence of the varicocele is more frequent.

For many diseases, in recent years, attention has focused on whether they are associated with a certain type of physical constitution. In regard to varicocele, data are not pure and consistent. Smith was the first to hypothesize that patients with varicocele were taller and heavier, on the basis of a comparison of 840 patients with varicocele with an age-correlated group without varicocele (19). Tsao et al. showed that the prevalence and severity of varicoceles were inversely correlated with obesity, which indicates that obesity may result in a decreased nutcracker effect (20). Handel et al. reported that the prevalence of varicocele decreases with increasing BMI, and the reason is increased adipose tissue that decreases compression of the left renal vein and prevents detection due to adipose tissue in the spermatic cord (21). Delaney et al. retrospectively evaluated 43 patients (mean age 14.3 years) with varicoceles regarding their physical appearance and compared

the data with age-correlated normal values from the Centers for Disease Control and Prevention. They also concluded that children with varicoceles were significantly taller and heavier, but did not show significant differences in BMI (4). Our findings were also parallel to these previous studies, although no statistically significance has occurred between somatometric parameters and varicoceles. However, our study showed that increased weight and height and decreased BMI correlated with increasing degree of varicocele. These results may be due to younger age of our participants, since most of the participants aged 20-21 years and had normal weight. These results need further evaluation with studies including more obese participants.

In contrast to the results of other previous studies, Stavropoulos et al. (22) examined 2376 school children (range 9-16 years) and detected varicocele in 98 of them. In that study, children with varicocele had a significantly lower body weight and there was no differences related to height (22). The prevalence of varicoceles in that study was low (4.1%), contrary to the literature previously mentioned. Unfortunately, the authors did not publish comparative BMI data. Another problem of this study was the low age of the participants.

Chen and Shuang evaluated 197 patients with and without varicocele (6). They showed that patients with grade 3 varicoceles more frequently had a lower BMI than patients with grades 1 and 2 varicoceles, but the differences were not significant. However, the prevalence of varicocele was higher in patients with lower BMI. Similar to that study, we found significant difference in varicocele grades between the obese patients and the others, so that obese participants had lower prevalences of grades 2-3 compared with normal or overweight participants. Both study findings suggested that patients with a greater BMI may have advantages in relieving the nutcracker phenomenon, which causes significant varicoceles.

Although the major indication for the treatment of varicocele is subfertility, a small part of the patients presents scrotal pain associated with varicocele. In the literature, the estimated incidence of pain caused by varicocele is 2-10%

(23). Treatment of painful varicocele traditionally consists of conservative measures, followed by surgical or radiological techniques if the conservative measures fail to treat the abnormality. In the present study 9.8% (n = 49) of all varicocele patients had scrotal pain resembling to the ratio reported in the literature. However, surgical ligation had been performed only in 2.8% of the patients and 8 had received oral analgesics.

Our study is an epidemiological screening of varicocele among healthy young men in Turkey and the majority of our participants was in the same decade of life. Novelty of the study was the treatment rate among the varicocele patients. However, this study had some limitations. First, we did not use other imaging studies, such as Doppler ultrasound, to prove the varicocele grades. Second, the number of obese patients were small. Therefore, we need to include more obese cases in future studies. Third, because of we did not investigate semen analysis of varicocele patients, the real treatment necessity was unknown.

In conclusion, prevalence of varicocele was found about 24% of healthy young Turkish population and patients with varicocele had significantly lower BMI levels than those without varicocele. Therefore, our findings support the hypothesis that patients with a greater BMI may have advantages in relieving the varicoceles, but further studies are required to clarify this issue. In addition, treatment rate was low.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Jarow JP: Effects of varicocele on male fertility. *Hum Reprod Update*. 2001; 7: 59-64.
2. Levinger U, Gornish M, Gat Y, Bachar GN: Is varicocele prevalence increasing with age? *Andrologia*. 2007; 39: 77-80.
3. Kumanov P, Robeva RN, Tomova A: Adolescent varicocele: who is at risk? *Pediatrics*. 2008; 121: e53-7.
4. Delaney DP, Carr MC, Kolon TF, Snyder HM 3rd, Zderic SA: The physical characteristics of young males with varicocele. *BJU Int*. 2004; 94: 624-6.

5. Nielsen ME, Zderic S, Freedland SJ, Jarow JP: Insight on pathogenesis of varicoceles: relationship of varicocele and body mass index. *Urology*. 2006; 68: 392-6.
6. Chen SS, Huang WJ: Differences in biochemical markers and body mass index between patients with and without varicocele. *J Chin Med Assoc*. 2010; 73: 194-8.
7. Dubin L, Amelar RD: Varicocele size and results of varicocelectomy in selected subfertile men with varicocele. *Fertil Steril*. 1970; 21: 606-9.
8. No authors listed: Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults--The Evidence Report. National Institutes of Health. *Obes Res*. 1998; 6(Suppl 2): 51S-209S.
9. Saypol DC: Varicocele. *J Androl*. 1981; 2: 61-71.
10. Coolsaet BL: The varicocele syndrome: venography determining the optimal level for surgical management. *J Urol*. 1980; 124: 833-9.
11. Clarke GH, Vasdekis SN, Hobbs JT, Nicolaidis AN: Venous wall function in the pathogenesis of varicose veins. *Surgery*. 1992; 111: 402-8.
12. Witt MA, Lipshultz LI: Varicocele: a progressive or static lesion? *Urology*. 1993; 42: 541-3.
13. Shafik A, Bedeir GA: Venous tension patterns in cord veins. I. In normal and varicocele individuals. *J Urol*. 1980; 123: 383-5.
14. Madgar I, Weissenberg R, Lunenfeld B, Karasik A, Goldwasser B: Controlled trial of high spermatic vein ligation for varicocele in infertile men. *Fertil Steril*. 1995; 63: 120-4.
15. Nieschlag E, Hertle L, Fishedick A, Behre HM: Treatment of varicocele: counselling as effective as occlusion of the vena spermatica. *Hum Reprod*. 1995; 10: 347-53.
16. Akbay E, Cayan S, Doruk E, Duce MN, Bozlu M: The prevalence of varicocele and varicocele-related testicular atrophy in Turkish children and adolescents. *BJU Int*. 2000; 86: 490-3.
17. Pfeiffer D, Berger J, Schoop C, Tauber R: A Doppler-based study on the prevalence of varicocele in German children and adolescents. *Andrologia*. 2006; 38: 13-9.
18. Mickevicius R, Bosas P: Incidence of varicocele measured by echoscopy. *Medicina (Kaunas)*. 2002; 38(Suppl 1): 66-8.
19. Smith SM: Body size and weight in relation to varicocele and hernia. *Ann Hum Genet*. 1957; 21: 304-12.
20. Tsao CW, Hsu CY, Chou YC, Wu ST, Sun GH, Yu DS, et al.: The relationship between varicoceles and obesity in a young adult population. *Int J Androl*. 2009; 32: 385-90.
21. Handel LN, Shetty R, Sigman M: The relationship between varicoceles and obesity. *J Urol*. 2006; 176: 2138-40; discussion 2140.
22. Stavropoulos NE, Mihailidis I, Hastazeris K, Moissidou R, Louka G, Filiadis I, et al.: Varicocele in schoolboys. *Arch Androl*. 2002; 48: 187-92.
23. Maghraby HA: Laparoscopic varicocelectomy for painful varicoceles: merits and outcomes. *J Endourol*. 2002; 16: 107-10.

Correspondence address:

Dr. Haluk Söylemez
Department of Urology
Dicle University, Medical Faculty
21280, Diyarbakir Turkey
Fax: + 90 412 248-8440
E-mail: drhaluks@gmail.com