

# Prevalence and awareness of varicocele among athletes in Riyadh, Saudi Arabia

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**Purpose:** To evaluate the prevalence and awareness about symptoms, and complications of varicocele among athletes (bodybuilding and aerobics exercises) in Riyadh, Saudi Arabia.

**Patients and methods:** A cross-sectional study of male athletes aged between 18 and 48 years old was carried out in multiple branches of fitness centers over a period of 13 months in Riyadh, Saudi Arabia. A total of 382 face-to-face interviews using a predesigned questionnaire were conducted to identify the levels of knowledge, attitude, and practice. A randomly selected 48 subjects were examined. Varicocele was diagnosed and graded based on clinical examination and Doppler ultrasonography.

**Results:** Of the participants, 157 (41%) lacked knowledge and awareness regarding varicocele, its symptoms and complications. Of the examined participants, 22 (46%) were found to have varicocele. No difference in varicocele was found among bodybuilders and aerobic athletes ( $P=0.249$ ). Similarly, no difference was related to duration of exercise session whether for 1 hour or more ( $P=0.131$ ). However, our study revealed a higher rate of varicocele among athletes who exercised more than three times per week ( $P=0.009$ ). Testicular volume was neither significantly different among respondents with and without varicocele nor between the left or right sides within each group.

**Conclusion:** Knowledge about varicocele, its symptoms and complications is poor among male athletes in Riyadh, Saudi Arabia. Varicocele is more common in athletic men who are frequently exercising. Efforts to increase knowledge and enhance awareness of varicocele in young males, in general, are strongly warranted.

**Keywords:** athletes, varicocele, testis, awareness, knowledge

## Introduction

Varicocele is an abnormal tortuous dilatation of the pampiniform plexus in the scrotal portion of spermatic veins that drains blood from the testis.<sup>1</sup> The pathogenesis of varicocele formation, although somewhat unclear, is thought to be related to various factors resulting in an increase in pressure in the veins of the pampiniform plexus and its venous drainage. Varicocele is more common in the left side.<sup>1</sup>

Based on physical examination, varicocele is graded according to the system of Dubin and Amelar as grade 1, 2, or 3.<sup>2</sup> Subclinical varicocele is not palpable or visible at rest or during the Valsalva maneuver but is demonstrable by special tests. The diagnosis of subclinical should be confirmed by additional investigations.<sup>2,3</sup>

Varicocele is found in 15% of all men worldwide.<sup>4</sup> It is reported in 19–41% of men presenting with primary infertility and in 45–81% of men with secondary infertility and remains the most common cause of male infertility.<sup>4</sup> In the Gulf region (Qatar),

43% of infertile men were confirmed to have varicocele.<sup>5</sup> It has been reported in 24% of healthy young population in Turkey,<sup>6</sup> as a similar community to Saudi Arabia.

Varicocele-related pain increases during exercise suggesting a role of exercise in its pathophysiology.<sup>7</sup> Up to 30% of athletes are diagnosed with varicocele, representing a significantly higher incidence than in the general population, and up to 60–80% of bodybuilders are recorded as being affected.<sup>8</sup> In a study of over 1,000 males, Radojevic et al<sup>9</sup> showed that varicocele prevalence was higher in males playing basketball, football, handball, and volleyball than in sport-inactive controls (17.05% vs 12.35%). Some studies suggested that exercise (bodybuilding and aerobic) might be an aggravating factor of varicocele.<sup>7,10,11</sup> Athletes were found to have significantly worse varicocele than nonathletes.<sup>11</sup> Furthermore, it has been reported that subclinical varicocele will progress to clinically palpable varicocele over years of forced physical activity in athletes.<sup>12</sup>

Very few studies explored athletes' awareness of this condition. Half of young athlete participants of two studies were unaware why the genitals were examined on sports physical examination.<sup>13,14</sup>

This study aims to evaluate the prevalence and awareness regarding symptoms and complications of varicocele among athletes in Riyadh, Saudi Arabia. To our knowledge, no similar studies were locally conducted.

## Patients and methods

A cross-sectional study, community-based survey of male athletes (exercising for fitness and good health) was carried out over a period of 13 months (from July 2017 to August 2018). The study included five branches of fitness centers covering a population of 14,000 in Riyadh, Saudi Arabia. There were 382 questionnaire respondents, while there were only 48 examination respondents.

The study's sample population included all male athletes, aged 18–48 years old, practicing bodybuilding and/or aerobic exercises. Athletes below the age of 18 years were not included due to difficulty in obtaining legal consent. Athletes above 48 years of age were also excluded as their few numbers were not enough to be used as a representative data for this age group. Other exclusion criteria included subjects who were training for <6 months, diagnosed before they began exercising, had a previous surgery for varicocele, or having heavy-labor occupations that may affect validity of the study.

College of Medicine, King Saud University Institutional Review Board clearance was obtained prior to the initiation

of the study. All participants provided a written informed consent, and the study was conducted in accordance with the Declaration of Helsinki. During these sport center visits, the aims of the study were explained to the eligible members and data were collected by personal, face-to-face interviews, using a predesigned questionnaire. The questionnaire included details on awareness of participants regarding symptoms and complications of varicocele, type and frequency of exercise, previous diagnosis and surgery for varicocele, and presence of family history of varicocele (Supplementary material S1).

Forty-eight subjects were randomly selected from the five fitness centers in proportion to their population sizes and were examined in the urology clinic in King Khalid University Hospital. Varicocele was diagnosed clinically using a predesigned form (Supplementary material S2). Subjects were requested to stand upright relaxed for inspection of visible enlargement and while applying Valsalva maneuvers (eg, cough) for palpable enlargement of pampiniform plexus. Varicocele was graded based on clinical examination and application of the Dubin and Amelar grading system.<sup>2</sup> A person was considered to have grade 1 if the varicocele is palpable during Valsalva maneuver but not otherwise, grade 2 if palpable at rest, grade 3 if visible and palpable at rest. Abnormal findings during physical examination were further evaluated by high-resolution, color-flow Doppler ultrasonography to assess maximum vein diameter, blood flow direction, grade of varicocele (if present), testicular size, and any other pathology. Testicular size was measured in three dimensions. The volume of the testicles was calculated by multiplying the dimensions with the standard coefficient of 0.71. Vein diameter of 3 mm or larger while patient was at rest was considered diagnostic for varicocele. Respondents with bilateral varicoceles were assigned the grade of the most advanced side.

## Data analysis

Descriptive statistics are presented as the mean  $\pm$  SD and percent. For comparative statistics, chi-squared/Fisher's exact tests and independent/paired *t*-test were used as appropriate. A *P*-value <0.05 was considered significant for all tests performed. All statistical analysis was performed using IBM SPSS Statistics version 21.0 (IBM Corporation, Armonk, NY, USA).

## Results

Out of 382 athlete participants, 157 (41%) have never heard about varicocele. Among the 225 athletes who reported knowl-

edge about varicocele, 172 (76.4%) correctly defined varicocele as dilatation of the testicular veins. Others (53, 23.6%) incorrectly defined it as a testicular inflammation, absence of one testis or testicular torsion. Similarly, 177/225 (78.7%) properly reported dull testicular pain as the most common symptom of varicocele while 157/225 (69.8%) appreciated the relation of varicocele to male infertility (Table 1).

Out of the 48 examined respondents, 26 (54.2%) had no varicocele. Left varicocele was diagnosed in 17 (35.4%) and bilateral varicocele in 5 (10.4%). Prevalence and grades of varicocele detected are shown in Figure 1.

We tested the association of varicocele prevalence and grade with the frequency of exercising (3, 4, or 5 days/week),

**Table 1** Knowledge regarding varicocele definition, most common symptom, and relation to infertility

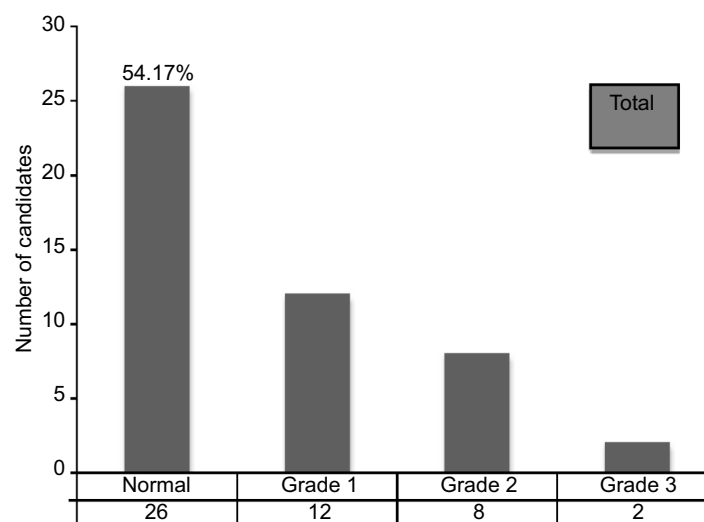
knowledge question	Number (%)
Varicocele definition	
Dilatation of testicular veins	172 (76.4)
Others	
Testicular inflammation	29 (12.9)
Absent testis	7 (3.1)
Testicular torsion	13 (5.8)
Others	4 (1.8)
Varicocele most common symptom	
Dull recurrent testicular pain	177 (78.7)
Back pain	19 (8.4)
Scrotal rash	9 (4)
Scrotal itching	15 (6.7)
Others	5 (2.2)
Relation of varicocele to infertility	
Yes	157 (69.8)
No	68 (30.2)

duration of the exercise session (1 hour vs >1 hour), as well as the type of exercise, whether, mainly aerobics (jogging, cycling, swimming, etc), bodybuilding or both (Table 2). Prevalence and grade of varicocele were found to be significantly related to the number of days they exercise/week ( $P=0.009$ ). Of the examined athletes with varicocele, 2/22 (9.1%) were exercising for 3 days/week and the remaining 20 (90.9%) were exercising for >3 days. Furthermore, 75% of the examined athletes with grade 2 varicocele exercise 4 days/week while 100% of the examined athletes with grade 3 varicocele exercise 5 days/week (Table 2). No significant differences were found between varicocele prevalence and grade with the duration of exercise sessions ( $P=0.131$ ) or with the type of exercise ( $P=0.249$ ).

Testicular volume showed no significant difference among respondents with and without varicocele both on the left ( $P=0.589$ ) and the right ( $P=0.497$ ) sides (Table 3). Similarly, the right testicular volume was slightly and insignificantly more than on the left side within each group (Table 3).

## Discussion

A large percentage of our athlete participants (41%) lacked the knowledge and awareness regarding varicocele, its symptoms and complications. Furthermore, a good portion of the respondents who had heard about varicocele incorrectly identified its definition (53/225, 23.7%), symptoms (38/225, 21.3%), and relation to infertility (68/225, 30.2%). Similar results were reported about knowledge regarding benign testicular disorders (BTDs) in Pakistan, where more than half of the participants had little knowledge about BTDs (including varicocele).<sup>15</sup>



**Figure 1** Prevalence and grade of varicocele.

**Table 2** Varicocele grades and relation to type, frequency and duration of exercise

Parameter	Grade 1 varicocele (%)	Grade 2 varicocele (%)	Grade 3 varicocele (%)	P-value <sup>a</sup>
Type of exercise				0.249
Aerobics	6 (50)	2 (25)	0 (0)	
Body building	4 (33.3)	2 (25)	2 (100)	
Both	2 (16.7)	4 (50)	0 (0)	
Frequency of exercise/week				0.009
3 days	0 (0)	2 (25)	0 (0)	
4 days	6 (50)	6 (75)	0 (0)	
5 days	6 (50)	0 (0)	2 (100)	
Duration of exercise session				0.131
≤1 hour	2 (16.7)	2 (25)	2 (100)	
>1 hour	10 (83.3)	6 (75)	0 (0)	

Note: <sup>a</sup>Fisher's exact test.

**Table 3** Volume of the right and left testes in the examined respondents group

Parameter	Left testis volume (mL)	Right testis volume (mL)	P-value
Respondents with varicocele	16.23±6.2	16.69±6	0.379 <sup>a</sup>
Respondents without varicocele	17.05±3.3	17.97±4.1	0.163 <sup>a</sup>
P-value	0.589 <sup>b</sup>	0.497 <sup>b</sup>	

Notes: <sup>a</sup>Paired t-test. <sup>b</sup>Independent t-test.

The lack of studies regarding the knowledge and awareness about varicocele in the general population as well as in athletes in Saudi Arabia is due to the taboo nature of this topic as considered by the majority of participants. Both social and religious restrictions are placed in the Saudi society when discussing such sensitive topics. Other developing countries such as Pakistan and Nigeria also showed similar trends.<sup>15,16</sup> Thus, the level of knowledge and awareness remains excessively inadequate in such areas of the world.

Varicocele has been reported in ~40% of men presenting with infertility and has been associated with a progressive decline in fertility.<sup>1,4</sup> Relation of varicocele to infertility has been appreciated by more than half (69.8%) of our respondents who had heard about varicocele. Similar results were reported.<sup>15</sup>

Our results showed that 46% of examined athletes have varicocele. Gulino et al<sup>8</sup> reported a high incidence (up to 30%) of varicocele in a population of athletes and up to 60–80% in the subgroup of bodybuilders. Conversely, we did not find any relation between bodybuilding and varicocele in particular. The same rate of varicocele was encountered among bodybuilders and aerobic athletes ( $P=0.249$ ). Others reported a similar prevalence of varicocele in the different sports practiced.<sup>10</sup>

Our findings revealed a higher rate of varicocele among athletes who exercised more than three times per week ( $P=0.009$ ) but no relation has been found to the duration of

exercise/session ( $P=0.131$ ). Others reported an increasing number of athletes with higher grade of varicocele in the group with 7–12 hours training per week compared to the group of 6 hours/week.<sup>10</sup> It is obviously clear that increasing the number of sessions/week, as in our findings, will increase the total exercise duration with more varicocele development and/or higher varicocele grade.

Although our findings had shown a smaller ipsilateral testicular volume in the respondents with varicocele compared to those without varicocele, the difference was not found to be statistically significant. Similarly, no difference was found in the testicular volume between both sides within each group. Di Luigi et al<sup>11</sup> reported a significantly lower left testis volume than contralateral testis. This may be explained by the small sample number of the examined respondents which did not allow obtaining a statistical difference.

Exercise increases the spermatic vein diameter and reflux time in patients with varicoceles.<sup>7</sup> Athletes with varicocele had significantly lower spermatozoa progressive forward motility ( $P<0.5$ ). Moreover, 6 months after restriction of sport activities, Radojevic et al<sup>9</sup> reported complete healing of the varicocele in 18 of the basketball, football, volleyball, or handball (BFVH) group and reduction of varicocele by one grade in 19 out of the other 31 participants of the same group. Furthermore, all the parameters of the seminal fluid analysis measured were shown to have improved in the BFVH group. This further underscores the significance of

awareness regarding varicocele, particularly in athletes who have delayed fertility issues. Awareness must be raised that exercise may be a potential cause for male fertility problems.

There is a strong need for a more effective role to enhance knowledge and awareness of varicocele and BTB. Various methods concerning spreading awareness including visual and print media, social media, and campaigns are warranted.

Our study is limited by the small number of examined respondents which limits generalization of conclusions over athletes as well as the general population in Saudi Arabia. However, our study added new information about varicocele among athletes in Saudi Arabia. We recommend that the knowledge regarding BTB be made more readily available to the general population.

## Conclusion

The rate of knowledge regarding varicocele among athletes in Saudi Arabia is low.

We demonstrated a high rate of varicocele among them. We are calling for more efforts to improve knowledge and awareness of varicocele and benign testicular disorders among athletes as well as the general population. More studies of larger sample size are still warranted.

## Acknowledgment

This study was supported by a grant from the College of Medicine Research Center, Deanship of Scientific Research, King Saud University, Riyadh, Saudi Arabia.

## Disclosure

The authors report no conflict of interest in this work.

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## Supplementary materials

### S1 Questionnaire

Thank you for participating in our questionnaire. We assure you that the information taken from you is for study and research purposes only, that will lead to better understanding of varicocele effect on healthy male athletes in Saudi Arabia.

Date: / / 201	
Name (optional):	Age:
Occupation:	Nationality:
Marital status:	Do you have children: Yes ( ) No ( ) If yes: Number of children: Age of youngest child:

- Have you heard about varicocele?  
Yes  No
- What is varicocele:
  - Dilatation of the testicular veins
  - Inflammation of the testes
  - Absent of one of the testes
  - Testicular torsion
  - I do not know
- Which of the following is a symptom of varicocele?
  - Dull, recurring pain in your testes
  - Back pain
  - Rash around scrotum
  - Itching of the scrotum
  - I do not know
- Can varicocele lead to infertility?  
Yes  No  I do not know
- How long have you been exercising?
  - Less than 6 months
  - From 6 months to 1 year
  - From 1 to 3 years
  - More than 3 years
- How many days per week? (specify from 1 to 7)
 

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Which type of exercise?
  - Aerobics mainly (eg, jogging, swimming, cycling, etc)

- Bodybuilding mainly
  - Others. Specify .....
- During or after exercise, have you ever felt any pain or a heavy feeling in the scrotal area?  
Yes  No
  - Are you currently diagnosed as a varicocele patient?  
Yes  No
  - If yes, since when?
    - Before starting exercise.
    - During first 6 months of exercise.
    - From 6 months to 1 year of exercise
    - More than 1 year of exercise
  - What is/are treatment option(s) for varicocele?  
Medical  Surgical
  - Did you receive any surgical treatment for varicocele?  
Yes  No
  - Have any of your family members been diagnosed with varicocele?  
Yes  Specify ..... No

### S2 Examination Form

Date: / / 201	
Name (optional):	Age:
Number:	

Examination/side	Right side	Left side
Inspection (visible)	<input type="checkbox"/>	<input type="checkbox"/>
Palpation	w/o Valsalva	<input type="checkbox"/>
	w Valsalva	<input type="checkbox"/>
Size of testis		

Presence of varicocele	<input type="checkbox"/>	<input type="checkbox"/>
Grade of varicocele	I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/>	I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/>

Note:

**Investigation Form:****Scrotal ultrasound findings:**

Item	Right	Left
Testicular size	× × × cm	× × × cm
Arterial blood flow		
Presence of varicocele		
Grade		
Maximum vein diameter	mm	mm
Other pathology		

**Semen analysis result:**

Item	First	Second
Volume		
Sperm count		
Sperm concentration		
Percentage motility		
Progressive motility		
Abnormal morphology		

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