

ORIGINAL ARTICLE

Penile length and somatometric parameters: a study in healthy young Turkish men

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The purpose of this study was to determine average penile length and to investigate the relationship between penile length and somatometric parameters in a group of young, healthy Turkish men. A total of 1132 men were included in the study. The age, height and weight of the subjects were recorded. Penile length was measured in both flaccid and stretched states. The correlation between penile length and somatometric parameters was analysed. The mean age of the subjects was 20.3 ± 0.9 years. The mean penile length in flaccid and stretched states was 9.3 ± 1.3 and 13.7 ± 1.6 cm, respectively ($P < 0.001$). There was a positive correlation between flaccid and stretched penile length ($r = 0.800$, $P < 0.001$). The mean testicular volume was 22.0 ± 2.8 cm³. A weak positive correlation was detected between penile length and mean testicular volume ($r = 0.143$ for flaccid penile length and $r = 0.140$ for stretched penile length, $P < 0.001$ for both). Similarly, weak positive correlations were found between penile length (both flaccid and stretched) and height, weight and body mass index, respectively ($P < 0.001$, for all). These results demonstrate that somatometric parameters are correlated with penile length. We believe that further studies would provide more information about the causal relationship.

Asian Journal of Andrology (2011) 13, 339–341; doi:10.1038/aja.2010.109; published online 13 December 2010

Keywords: orchidometer; penile length; somatometric parameters; testicular volume

INTRODUCTION

Human penis size refers to the length and width of human male genitalia. Throughout history, penis size has been a mystical topic and a common subject of art work, even represented in artwork by prehistoric cave dwellers. In addition, various phallus-shaped posts were often created by inhabitants of ancient Greece, Rome and Turkey.¹

Today, increasing numbers of men complain about their penile size and see urologists daily.² It is important to recognize this condition before planning any medical or surgical intervention for penis size.^{3,4}

Several studies have investigated penile length and its relationship with somatometric parameters such as height, weight, body mass index (BMI), waist/hip ratio, index finger length and shoe size.^{5–8} In the current literature, only one report has investigated penile length and testicular volume in young men.⁸

The aim of this study was to determine the average penile length and to investigate the relationship between penile length and somatometric parameters in a group of healthy, young Turkish men.

MATERIALS AND METHODS

A group of 1132 healthy Turkish men—military recruits aged 19–30 years—were enrolled in the study between September 2008 and February 2009. All males were Caucasian and circumcised. Men with a history of penile and/or testicular pathology (e.g., Peyronie's disease, penile curvature, orchiopexy and varicocele) were excluded from the study. The age, height and weight of participants were recorded. BMI was computed as the ratio of weight to the square of height (kg m⁻²). The study was approved by the Institutional Review

Board of Ankara Numune Research and Training Hospital and all subjects provided proper informed consent.

All measurements were performed during military service by the same examiner (YA) to reduce interobserver error and under similar environmental conditions to avoid natural variability in size due to temporal factors such as time of day, room temperature and unreliability of measurement methods.⁹ Measurement, as opposed to self-report, was preferred due to the unreliable nature of self-reporting; men tend to report a larger than accurate penis size. Although there is no standard technique for penile length measurement, the researchers preferred a technique that has been described previously by Wessells *et al.*¹⁰

Penile measurements were performed between 10:00 a.m. and 4:00 p.m. under ambient light and room temperature with subjects standing up and with the penis held parallel to the floor. Penile length was measured by a ruler with millimetre markings along the dorsum of the penis from the pubopenile junction to the tip of the glans (meatus) and while under maximal, but not painful, extension. The measurement was performed during both flaccid and stretched states. Testicular volume of the subjects was measured by bimanual palpation using a Prader orchidometer with volumes ranging from 1 to 25 cm³ (1–6, 8, 10, 12, 15, 20 and 25 cm³) after simultaneously stretching the scrotal skin over the testis. Testicular volumes between 15 and 25 cm³ were considered within the normal range.¹¹

SPSS for Windows version 13.0 (SPSS, Chicago, IL, USA) was used for statistical evaluation of the results. Results were evaluated using descriptive statistics and Pearson correlation analysis (two-tailed Pearson correlation coefficient or *r*). The paired *t*-test was applied

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Received: 12 May 2010; Revised: 16 June 2010; Accepted: 10 August 2010; Published online: 13 December 2010

to compare numeric data. A *P* value less than 0.05 was considered significant.

RESULTS

The mean age of the subjects was 20.3 ± 0.9 (range: 19–30) years. Mean penile length in flaccid and stretched states was 9.3 ± 1.3 cm (95% confidence interval (CI): 9.2–9.4 cm) and 13.7 ± 1.6 cm (95% CI: 13.6–13.8 cm), respectively ($t = -153$, $P < 0.001$). Mean flaccid penile length was 4.4 ± 1.0 cm which is shorter than mean stretched penile length.

Mean testicular volumes in our study were within the normal range; the mean testicular volume was 22.0 ± 2.8 cm³ (95% CI: 21.8–22.1 cm³). The mean volume of right testis was 22.3 ± 2.9 cm³ (95% CI: 22.2–22.5 cm³), and the mean volume of left testis was 21.6 ± 3.2 cm³ (95% CI: 21.8–22.1 cm³) ($t = 10.4$, $P < 0.001$) (Table 1). There was a positive correlation between flaccid and stretched penile lengths ($r = 0.800$, $P < 0.001$).

No correlation was found between the mean testicular volume and age, height, weight or BMI ($P > 0.05$). There was a weak positive correlation between penile length and the mean testicular volume ($r = 0.143$ for flaccid penile length and $r = 0.140$ for stretched penile length, $P < 0.001$ for both). Additionally, weak positive correlations were found between penile length (both flaccid and stretched) and height, weight and BMI ($P < 0.001$). Moreover, neither flaccid nor stretched penile length correlated with age ($P = 0.871$; $P = 0.999$) (Table 2).

DISCUSSION

Penis size is a symbol of masculinity, and the perception of having a large penis has been linked to higher self-esteem and power.¹² Paintings, drawings and other art objects from both Eastern and Western cultures over 1000 years ago attest to this fact.¹ Today, many men place great importance on the size of their penis in both the erect and the flaccid states. Recently, increasing numbers of men complain about their penis size.² Are these men candidates for ‘small penis syndrome’? Possibly, but this is unlikely. Fortunately, most of them have penis sizes within normal limits.^{2,12} In a large Internet-based survey of 52 031 heterosexual men and women, most men rated their penis as average sized (66%), and only 12% rated their penis as small.¹² Science cannot remain silent while the expectations of men are increasing. As a result, more studies have tended to focus on this topic, especially in regard to the physical characteristics of penis size and how it may be influenced by related somatometric parameters.

Measurements of the penile length are generally made during flaccid, stretched and erect states. Relevant literature suggests that measurements of a stretched and flaccid penis provides a reliable estimate of its erect size; hence, there is no need to measure penile length during an erection.^{10,13} In 1899, the first study about penile length was reported by Loeb,⁴ and the average flaccid penile length was 9.41 cm.

Table 1 Statistics pertaining to the study population

Parameters	Min.	Max.	Mean	s.d.
Age (years)	19	30	20.3	0.9
Height (cm)	156	190	174.3	4.9
Weight (kg)	54	98	68.4	6.6
BMI (kg m ⁻²)	17.5	28.6	22.5	1.1
Flaccid length (cm)	5.7	14	9.3	1.3
Stretched length (cm)	9	19.1	13.7	1.6
Right testicular volume (cm ³)	10	25	22.3	2.9
Left testicular volume (cm ³)	5	25	21.6	3.2
Mean testicular volume (cm ³)	11	25	22	2.8

Abbreviation: BMI, body mass index.

In 1942, Schonfeld and Beebe¹⁴ found the average penile length to be 13.1 cm in a stretched state. Kinsey *et al.*¹⁵ published his hallmark paper about penile length in 1948. Ponchiatti *et al.*⁶ published the largest study in the literature about penile length in 2001. The first data from a Turkish population were reported in 2002 by Sengezer *et al.*¹³ The above mentioned studies tried to determine normal penile length. However, the variability among these values reflects the diversity of populations that were studied and the different measurement techniques. To our knowledge, the current study is the fourth largest series in the relevant literature, and the average penile length was found to be similar to the first three largest series, as shown in Table 3.

A few reports in the literature have investigated the relationship between penile length and somatometric parameters. Shah and Christopher⁵ reported no correlation between shoe size and penile length. Ponchiatti *et al.*⁶ found a positive correlation between somatometric parameters (height, weight and BMI) and penile length in their study. In a large Internet-based survey, self-reported penis size was found to be positively correlated with height and negatively correlated with body fat.¹² In another study, authors reported a significant correlation among age, height, index finger length and penile dimensions, but no significant effect of waist/hip ratio or weight.⁷ In the present study, weak positive correlations were found between penile length (both flaccid and stretched) with height, weight and BMI. Both the international literature and our results demonstrate that there is no exact association between penile length and somatometric parameters. We believe that these results may demonstrate variability among different populations.

Testicular volume measurement is important for assessing testicular function and for estimating spermatogenesis and fertility.^{16,17} Various types of orchidometers, rulers, calipers and ultrasonography can be used to measure testicular volume, and none is superior to another.^{18,19} Prader orchidometry closely correlates with ultrasonographic testicular volume measurements and is considered the standard method when used by experienced examiners.²⁰ One of the first objective studies investigating testicular volume, penile length and other somatometric parameters in young men was performed by Spyropoulos *et al.*⁸ Fifty-two subjects aged 19–38 years were investigated, and penile length was insignificantly and negatively correlated with age, weight, BMI and waist/hip ratio and positively correlated with height. In the same study, a significant positive correlation was reported between penile length and index finger length. Additionally, mean testicular volume had a weakly negative correlation with penile length.

The current study has two main differences from the study of Spyropoulos *et al.*⁸ the number of subjects is significantly higher and an orchidometer was used instead of ultrasonography to measure testicular volume. Orchidometry was the preferred measurement technique used in this study because the use of ultrasound in this large population-based study was not practical or feasible. In this study, a weak positive correlation was found between mean testicular volume (for both testes) and penile length measurement. There was no correlation between the mean testicular volume and other somatometric parameters.

A number of male genital tract organs depend on androgens to promote growth and development. Penile growth before birth, during childhood and during puberty, is strongly influenced by testosterone and is completed by the end of puberty.²¹ In one study, patients who complained about a small penis size were asked when they believed the problem started. Most (62.7%) reported that their concern began in childhood and continued during teenage years after seeing pornographic images.²² In the current study, testicular volume was measured in addition to other somatometric parameters that may be

Table 2 Pearson's correlation coefficient (*r*) for assessing the relationship between penile measurements and somatometric parameters

Parameters		Age	Height	Weight	BMI	Testicular volume		
						Right	Left	Mean
Flaccid penile length	<i>r</i>	0.005	0.316	0.387	0.394	0.157	0.109	0.143
	<i>P</i>	0.871	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Stretched penile length	<i>r</i>	<0.001	0.164	0.205	0.208	0.135	0.124	0.140
	<i>P</i>	0.999	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Abbreviation: BMI, body mass index.

Table 3 Studies about penile length in the current literature

Publications	No. of subject	Age (years)	Flaccid penile length (cm)	Stretched penile length (cm)	Erect length (cm)	Flaccid girth (cm)	Erect girth (cm)
Loeb, 1899 (reviewed in Ref. 4)	50	17–35	9.41	NA	NA	NA	NA
Schonfeld and Beebe, 1942 ¹⁴	196	17–25	NA	13.1	NA	8.5	15.8
Kinsey <i>et al.</i> , 1948 ¹⁵	2270	20–59	9.7	16.74	NA	NA	NA
Wessells <i>et al.</i> , 1996 ¹⁰	80	21–82	8.85	12.45	12.89	9.71	12.30
Ponchietti <i>et al.</i> , 2001 ⁶	3300	17–19	9.0	12.5	NA	10	NA
Sengezer <i>et al.</i> , 2002 ¹³	200	20–22	6.8	8.9	12.7	NA	NA
Spyropoulos <i>et al.</i> , 2002 ⁸	52	19–39	7.76	12.18	NA	8.68	NA
Merhaban <i>et al.</i> , 2007 ⁷	1500	20–40	NA	11.58	NA	8.66	NA
Present study	1132	19–30	9.3	13.7	NA	NA	NA

Abbreviation: NA, not applicable.

possible confounding factors for penis size. This primarily stems from the fact that penis and testicular growth are the earliest signs of pubertal maturity.^{21,23} Why do different subjects have different penile lengths and testicular volumes? Without a co-investigation of serum androgen levels, the answer to this question cannot be explained fully. We believe that our results may open insight about new studies on this subject.

Size-related concerns should be approached cautiously before surgical planning for penis enlargement, and urologists must know the normal penile length in their specific population. The sample size in the current study is sufficient to be considered a representative and reasonable sample for an equivalent Turkish population. Furthermore, to the best of our knowledge, this is the largest series of healthy, young men measured using Prader orchidometry to analyse the relationship between testicular volume and penile length. The results suggest that somatometric parameters such as height, weight, BMI and testicular volume are related to penile length, even if this relationship is not of clinical significance. We believe that further studies would provide more information about this causal relationship.

AUTHOR CONTRIBUTIONS

Yılmaz Aslan wrote the main paper and carried out data acquisition and statistical analyses. Ali Atan performed study design and review of the paper, and wrote supplementary information. Ali Ömur Aydın performed data acquisition. Varol Nalçacıoğlu performed data acquisition. Altug Tuncel performed data acquisition and review of the paper. Ateş Kadioğlu performed study design and review of the paper, and supervised the project.

COMPETING FINANCIAL INTERESTS

The authors declare no competing financial interests.

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