

Review Article

A Study of the Urethral and Stretched Penile Lengths in the Adult, Indian, Male Population

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There are few contemporary studies about the normal Urethral and Penile Length and the paucity of data about the same is surprising. This paper aims to add to the existing sparse anatomical data about the same. 264 male patients (age 18-82 years) admitted at a Tertiary Care Center, for any non-urological indication, between January, 2019 and April, 2020, who fulfilled the inclusion and exclusion criteria, were included in the study. The methodology was based on direct measurement of the Stretched Penile Length (penopubic junction to tip of glans) and estimating the Urethral Length by measuring the exposed segment of an indwelling Foley catheter and subtracting it from the total catheter length (measured from the base of balloon to the 'Y' junction). The mean Urethral Length was 17.8 cm (14-30 cm) and the mean Stretched Penile Length was 7.8 cm (5-12 cm). There was no correlation between the age, BMI and Urethral Length or the Stretched Penile Length.

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Key words : Male Urethral Length, Stretched Penile Length.

The indwelling Urethral Catheter is an ubiquitous device and transurethral access is almost mandatory for Endoscopic Surgeries in Urology. While there are a multitude of studies on penile length in children and adolescents¹⁻⁶ and adults⁷⁻⁹, there are very few contemporary studies about the Urethral Length^{10,11} and the paucity of data about the same is surprising. This paper aims to add to the existing sparse anatomical data.

MATERIALS AND METHODS

264 male patients at a Tertiary Care Center, admitted for any non-urological indication, between January, 2019 and April, 2020, who fulfilled the inclusion and exclusion criteria, were included in the study.

Inclusion Criteria :

All male patients admitted at a Tertiary Referral Center for any non-urological indication.

Only patients who already had an indwelling catheter were included.

Exclusion Criteria :

Age less than 18 years

Any prior history of Transurethral, Urinary Bladder,

Editor's Comment :

■ This study adds to the scant global data on normal urethral length and almost non-existent data on the normal, adult, penile length in the Indian subcontinent. The findings can be invaluable for optimizing size of urethral devices and especially for customizing penile implants for the Indian population.

Prostate or Penile Surgery (except circumcision).

H/o prior traumatic urethral catheterisation or instrumentation

Any patient where such history was not available, could not be elicited or where immobility or altered sensorium precluded weighing or accurate measurements.

Similarly, any patients with visible orthopaedic prosthetic devices like external fixators were also excluded to avoid skewing of the BMI estimation.

Any patient having a urethral catheter other than a Foley catheter eg, Nelaton catheter or infant feeding tube etc.

Any patient with an endocrine condition (previously known or evident on examination) which could affect development of the genitalia.

Any patient where examination showed anomalies of the external Genitalia or Urethra like hypospadias or epispadias.

No patient was catheterised solely for the purpose of the study. History and informed consent was obtained from the patient and/or an attendant and the penile measurements were all taken with the subjects in supine posture. The brand of the indwelling catheter was noted. The catheter was then held upright without

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traction and the flaccid penile length noted. The penis was then stretched gently and the catheter was marked at the level of the external Urethral Meatus using an indelible marker (mark 'C'). Using a commercially available steel ruler, the Stretched Penile Length was then noted by resting the base of the ruler perpendicular from the pubic symphysis. The length of the catheter from the 'Y' junction of the catheter (marked 'B') to this marking was measured. The length of the Urethra was estimated by subtracting the length 'BC' from the length 'AB'.

Thereafter, the patients were weighed taking care to see that the urine collecting bags were emptied before doing so and the height was measured in erect posture.

Markings were as follows :

A (notional) : The base of the Foley catheter balloon (which rests at the bladder neck)

B (actual) : The 'Y' junction of the Foley catheter

C (actual) : The marking on the catheter at the level of the external Urethral meatus

Thus the Urethral Length was calculated as follows:

$AB - BC = AC$ (Estimated Urethral Length)

Where AB is the distance from the Bladder neck to the 'Y' junction of the catheter, BC is the distance from the 'Y' junction till the external meatus and AC is the estimated distance from the Bladder neck till the external urethral meatus (the urethral length) (Fig 1).

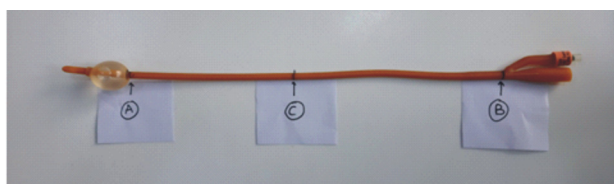


Fig 1 — Foley Catheter With Measurement Markings

The data were tabulated, basic statistics derived and statistical analysis done for correlation between the various measurements (Tables 1-4).

RESULTS

There was no correlation between the age, BMI and Urethral Length or the Stretched Penile Length. A weak correlation was demonstrated between estimated

Parameter	Median	Mean	Min	Max
Age (years)	38.5	41.4	18	82
Height (cm)	165	163.2	132	190
Weight (kg)	65	63.3	35	98
Body Mass Index (BMI)	23.7	23.8	15.1	36.2
Catheter Size (Fr)	18	16.7	12	18
Length of Urethra (cm)	17	17.8	14	30
Stretched Penile Length (cm)	7.95	7.8	5	12

Table 2 — Age Distribution

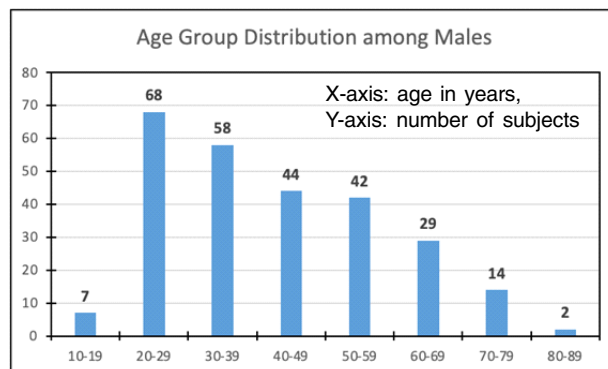
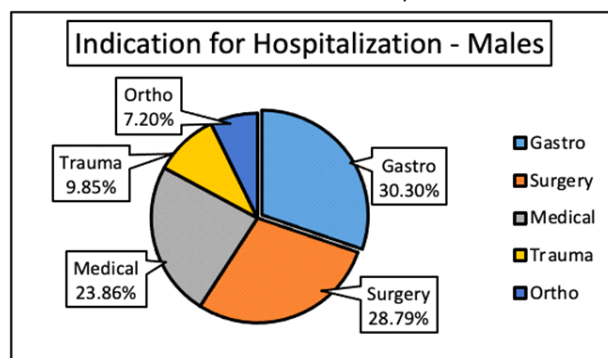


Table 3 — Indication for Hospitalization



Ortho-Orthopedics, Trauma-Any non-urological trauma, Medical-Any medical illness, Gastro-Any medical or surgical gastrointestinal or hepatobiliary pathology, Surgery-Any general surgical procedure

Urethral Length and the Stretched Penile Length. The 'p' value for BMI versus stretched Penile Length was significant (<0.05) but the R/PE value was less than 6, hence the correlation is not considered as significant. This correlates with previously published data¹⁰.

DISCUSSION

MRI has been used to study Urethral Anatomy and has the advantage of being non-invasive and also identifying additional conditions like inflammation, Sinuses, Fistulae or Diverticula¹². However, it is operator and software dependent. On the contrary, measurements using urethral catheters^{10,11} give a direct and more reliable estimate of the urethral length and are less observer dependent.

The advantage of our technique was that neither was any patient catheterised for the sole purpose of the study, nor did the measurement require removal of any indwelling catheter. While due diligence was done during data collection and all the data was collected by the same investigator, the measurements could have been affected by the degree of stretch on the penis and the amount of suprapubic fat.

There is no gold standard or best technique accepted for measuring Stretched Penile Length and we used the penopubic skin junction to glans tip measurements. We did record the flaccid penile girth for all subjects in this series, but did not include it in the analysis as this correlates poorly with erect measurements¹³. Given the location of the study and the fact that the subjects were catheterised and admitted for some pathology, measurement of erect penile girth or length was not feasible. The pubic bone to tip of glans measurement is more accurate and reliable, while the penopubic skin to glans measurement can be affected by Obesity^{14,15}.

Also, we have not taken into consideration the duration of hospital stay at the time of the study which may have had some effect on the weight. Similarly, we have also not taken into account the effect on weight of any debilitating illnesses or malignancies which the patients may have been suffering from. However, since the total number of patients falling into these categories was miniscule, we presume that these did not have a significant bearing on the final results (Table 5).

CONCLUSIONS

Our data adds to the existing scant information about the male Urethral and Penile Length available in the literature. The same may be applied to optimising the size of Urethral and/or Penile devices or implants for the Indian subcontinent.

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	BMI versus UL		UL versus SPL		BMI versus SPL		Age versus SPL	
R	-0.03	-2.66%	0.24	24.00%	-0.13	-12.64%	-0.12	-11.56%
R ²	0.00	0.07%	0.06	5.76%	0.02	1.60%	0.01	1.34%
Coeff Alienation(K)	1.00	99.93%	0.94	94.24%	0.98	98.40%	0.99	98.66%
t	-0.43		4.00		-2.06		-1.88	
p value	0.67	66.68%	0.0001	0.01%	0.04	4.01%	0.06	6.07%
Std Error (SE)	0.06		0.06		0.06		0.06	
Probable Error (PE)	0.04		0.04		0.04		0.04	
R/PE	-0.64		6.14		-3.10		-2.82	

BMI : Body Mass Index, UL : Estimated Urethral Length, SPL : Stretched Penile Length

Parameter	Kohler ¹⁰	Krishnamoorthy ¹¹	Aslan ⁷	Spyropoulos ⁹	Our study
n=	109	422	1132	52	264
Mean Urethral Length (cm)	22.3	17.55			17.8
Urethral Length range (cm)	15 - 29	14 - 22.5			14 - 30
Stretched Penile Length (cm)			13.7	12.18	7.8

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