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NORMAL VALUES OF FREQUENCY VOLUME PARAMETERS IN 788 ASYMPTOMATIC VOLUNTEERS COMPARED TO VOLUNTEERS WITH ELEVATED I-PSS.

Hypothesis / aims of study

Frequency volume charts (FVC) record the volumes voided as well as the time of each micturition, day and night, for at least 24 hours [1]. The International Prostate Symptom Score (I-PSS) is a standardised and validated questionnaire to objectify LUTS complaints. In a group of 'healthy' male volunteers participating in an ongoing longitudinal non-invasive study of changes in urinary bladder function secondary to prostatic enlargement [2] we established normal values of frequency volume parameters, and their dependence on I-PSS.

Study design, materials and methods

Between November 15, 2001 and December 12, 2003, 1020 men aged 38-77 were included in the longitudinal study [2]. Inclusion criteria were: written informed consent and ability to void standing with a maximum free flowrate ≥ 5.4 ml/s. Exclusion criteria were: diabetes mellitus and conditions such as heartfailure and Parkinsonism, previous surgery or medication of the cerebrum, the heart, kidney, bladder and / or prostate, and the use of anticoagulants. Dormant LUTS were not a study criterion. All eligible volunteers completed a frequency volume chart (FVC) of (at least) three consecutive days, including the bed and wake up times. Urinary production was calculated by assuming the bladder was always emptied completely and that production was constant between voidings. By linear interpolation production was calculated for each of the 24 hours, and averaged for the numbers of the days the FVC's were kept [3]. The free flowrate was assessed with a Dantec® rotating disc flowmeter. A transabdominal ultrasonography with an Aloka® SSD-1700 device was done to assess the prostate volume. Additionally, all men completed the International Prostate Symptom Score (I-PSS). For the present analysis men were subdivided in two groups using an I-PSS of 10 as cut off value. Median and 25th and 75th percentile were used as descriptives. Mann-Whitney-U- test was used as study statistics. P<0.01 was considered statistically significant.

Results

	Total n=935			I-PSS≤10 n=788			IPSS>10 n=147		
	%25	Median	%75	%25	Median	%75	%25	Median	%75
I-PSS	3	5	8	2	4	6	12	13	16
Age [yr]	48	54	65	48	53	64	50	59	66
Medianvol [ml]	185	220	295	190	230	300	158	200	250
Meandayvoids	4.8	5.8	7.0	4.7	5.7	7.0	5.7	6.7	8.2
Meannightvoids	0.0	0.5	1.0	0.0	0.5	1.0	0.5	1.0	1.5
Meandayprod [ml/h]	60.3	83.3	115.6	59	81	112	71	98	128
Q_{max} [ml/s]	11.3	15.6	21.6	11.7	16.1	22.4	9.6	12.8	19.0
Prosvol [ml]	23	31	41	23	30	40	25	34	48

Table 1. For abbreviations, see text.

	Age [yr]	Medianvol [ml]	Meanday voids	Meannight voids	Meanday prod [ml/l]	Q_{max} [ml/s]	Prosvol [ml]
Mann-Whitney-U-test	p=0.001	p<0.0001	p<0.0001	p<0.0001	p=0.001	p<0.0001	p=0.006

Table 2. U-test for comparing both groups.

935 Men (92% of 1020) properly completed the FVC, IPSS and succesfully voided in the flowmeter. 788 Men had an I-PSS≤10 whereas 147 had an I-PSS >10. Table 1 shows the 25th, median and the 75th percentile in both subgroups for age, the I-PSS, the median voided volume, the mean number of voids at day and at night, the mean urinary production at daytime, the maximum free flowrate (Q_{max}), and the prostate volume. The p-values of the Mann-Whitney-U-test for comparing both groups are given in table 2.

Interpretation of results

All participants in this study were healthy male volunteers, the characteristics are shown in table 1, total n=935. An I-PSS of 10 was (arbitrarily) chosen as cut off value to subdivide the study population in two subgroups with practically no and mild to moderate LUTS. The values in the subgroup of 788 volunteers with practically no LUTS (I-PSS≤10) may be considered normal values. Averaged over the whole range of ages (a flat distribution between 38 and 77) these males voided a median volume of 230 ml, 6 times a day, and 0.5 times a night and produced 81 ml of urine per hour during the daytime. They had a median maximum flowrate of 16 ml/s and a prostate volume of 30 ml. These values are most likely age dependent, and will be stratified for age in subsequent analysis. The age, several FVC parameters, the free flow rate Q_{max}, and the prostate volume were statistically significantly different in the subgroup with I-PSS>10, see p-values. Men with an I-PSS ≤10 were younger than men with I-PSS>10. Obviously, with increasing age men had more LUTS as assessed by FVC and I-PSS. Men with mild to moderate LUTS voided more frequently during day and night times than asymptomatic men. They also had on average a smaller median voided volume, and higher urinary production at daytime. These findings support the symptoms frequency, urgency, and

polyuria in men with(out) LUTS. Since Diabetes Mellitus (DM) and heartfailure (HF) were exclusion criteria, the relative polyuria was probably an effect of LUTS. The finding of a lower free flowrate in men with mild LUTS underlines the role of the alterated bladder function or (mild) bladder outlet obstruction (BOO) in men with LUTS. The statistically significant difference in the prostate volume in both groups as assessed bij transabdominal ultrasonography forms a debatable confirmation that an increasing age is somewhat connected with an increase in size of the prostate gland. This latter might be the underlying pathophysiological cause of the changed bladder function and/ or BOO.

Concluding message

In this study, men with mild to moderate LUTS (I-PSS>10) voided on average more frequently and smaller volumes than men with no LUTS (I-PSS ≤10). They also had a higher urinary production both in the day and in the night and a lower free flowrate. These findings were all statistically significant. Therefore, a FVC (of at least three consecutive days) and a I-PSScore provide consistent information even in cases of mild LUTS.

References

[1] Urology 61(1): 37-49 (Jan 2003).
[2] Urology 63: 56-60 (2004).
[3] Sc J Urol Nephrol 30: 257-263 (1996).

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HUMAN SUBJECTS: This study was approved by the The Medical Ethics Committee of Erasmus Medical Centre, number 202.680/2001/148. but did not follow the Declaration of Helsinki - with approval by the ethics committee - in the sense that not applicable. Informed consent was obtained from the patients.