The relationship of urinary symptoms to significant bacteriuria

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SUMMARY. Selected samples of healthy people (804 males, 796 non-pregnant females and 400 pregnant women) were questioned about present and previous urinary symptoms. Mid-stream specimens of urine were cultured quantitatively. Symptoms in the males occurred more frequently in the presence of 'significant bacteriuria', but the numbers were too small to allow statistical analysis. Among the non-pregnant females frequency or burning micturition was found more frequently in those who had significant bacteriuria than in those whose urinary bacterial counts were low; for nocturia this difference was statistically significant ($p<0{\cdot}001$).

Of the pregnant women, comparison of those who had significant bacteriuria with those whose urine was normal showed that diurnal and nocturnal frequency, and loin pain, occurred more frequently in those with significant bacteriuria (for each of these symptoms $p<0{\cdot}01$).

These results suggest that the recent onset of nocturia is the most reliable symptom of urinary tract infection. There remain, however, many people with urinary symptoms and with low urinary bacterial counts in whom other causes for the symptoms should be sought.

Introduction

The relationship between 'significant bacteriuria' ($>10^5$ bacteria/ml) and chronic pyelonephritis is still not clearly defined (Asscher, 1970).

Apart from the South Wales studies including that on dysuria (Waters, Elwood, Asscher and Abernethy, 1970), prevalence surveys of supposedly healthy people have ignored symptomatology. Other surveys (Mond, 1964; Loudon and Greenhalgh, 1962; Steensberg, Bartles, Bay-Nielsen, Fanøe and Hede, 1969) have been of patients whose symptoms were severe enough for them to have sought medical attention.

Since many practitioners diagnose urinary tract infection or inflammation by the presence of symptoms (Eastwood, Bruce and Wren, 1965) and start treatment before receiving the results of urine culture, it seemed desirable that a study be undertaken to correlate the presence or absence of symptoms apparently referable to the urinary tract with the presence or absence of significant bacteriuria.

In addition an attempt has been made to correlate the presence of significant bacteriuria with a previous history of urinary infection or of operation on the urinary tract.

Method

A survey of 804 males and 1,196 females (400 of whom were pregnant) was undertaken as a selected layered sample selected to conform with the Registrar General's tables for age (1961) and social class (1951). Subjects were only included in the survey if they were healthy and had not had a urinary infection for which they had sought treatment during the preceding three months. Those found to have been treated with antibiotics for any reason in the previous three months were also excluded. Occupations were classified according to the Registrar General's list of occupations. Wives were classified according to their husband's work and those aged under 21 years according to their father's occupation. The survey was divided into upper, middle, and lower social classes rather than the 13 socio-economic groups so that comparisons could be made between groups of adequate statistical size.

Each patient gave a history of present urinary symptoms and past urinary tract disease and an obstetric history was obtained from the women.

Each subject (or parent in the case of young children) was questioned about the presence and duration of frequency both nocturnal and diurnal, scalding or burning micturition and dysuria (which were analysed subsequently as one symptom since many subjects could not distinguish between them); loin pain, and stress incontinence. (Those who admitted excessive fluid intake were not considered to have frequency). Questions were standardised, but inevitably there was considerable variation in the replies, memory for duration of symptoms tended to be vague and there was variation in symptom tolerance; it was also difficult to obtain details of the number and severity of previous episodes. These factors made detailed statistical analysis inadvisable.

The mid-stream specimens of urine were passed directly (without preliminary cleansing) straight into a wide-mouthed waxed carton. The specimen was either cultured immediately or stored for up to three hours in a refrigerated bag. The urine was cultured on nutrient agar using loops calibrated to deliver 0·01 ml and 0·001 ml. The plates were incubated aerobically at 37°C for 18 hours. Nutrient agar was selected for its storage properties; overgrowth with *Proteus* species usually did not make the colony counting too difficult although it delayed identification in those cultures where the count was more than 10^5/ml. Differential white cell counts were made on 10 mm^3 of urine stained by either Sternheimer and Malbin's (1951) or Prescott and Brodie's (1964) stain in an eosinophil counting chamber (Manners, 1952). Significant pyuria was considered to be present when the number of leucocytes was more than 49/mm^3.

The data were punched on to 80 column IBM cards which were then sorted on a Hollerith statistical sorting machine.

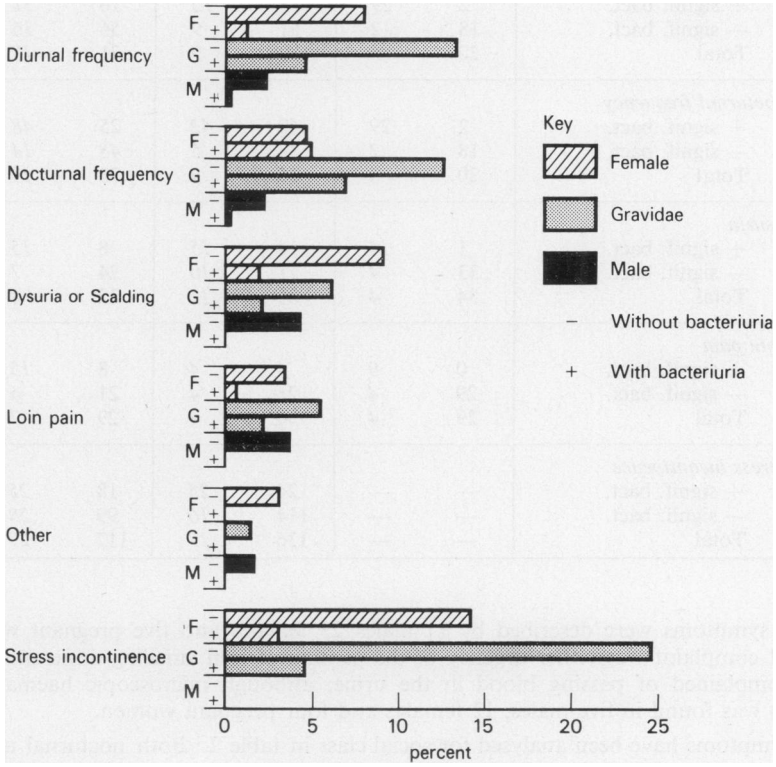

Figure 1
Bar diagram to illustrate prevalence of symptoms shown as percentages of total survey (2,000 people)

Results

Significant bacteriuria (>10^5 bacteria/ml) was found in seven males (one per cent), 95 females (12 per cent) and 52 pregnant women (13 per cent). Of these four males, 13 non-pregnant and

16 pregnant females had significant numbers of both bacteria and leucocytes (>49/mm³) in their urine. The prevalence of symptoms is shown in table 1. Diurnal and nocturnal frequency have been analysed separately since many subjects reported different durations for each of these symptoms; also, not all those who had diurnal frequency had nocturia and the converse was also found; approximately half of those with diurnal frequency also had nocturia.

The association of symptoms and significant bacteriuria is also shown in table 1. For comparison the prevalence of symptoms in patients with and without significant bacteriuria have been expressed as percentages and are depicted in the bar diagrams (figures one and two) Symptoms were relatively more frequent in the group with significant bacteriuria; the difference was most significant with respect to nocturia in the non-pregnant females ($p<0{\cdot}001$). The prevalence of both nocturia and dysuria in the pregnant women was significantly higher in the group with significant bacteriuria and the same was found with respect to loin pain ($p<0{\cdot}01$).

TABLE 1

PREVALENCE OF SYMPTOMS AND CORRELATION WITH SIGNIFICANT BACTERIURIA

Symptom	*Male*		*Female*			
			Non-pregnant		*Pregnant*	
	Number	*%*	*Number*	*%*	*Number*	*%*
Diurnal frequency						
+ signif. bact.	2	*29*	11	*12*	16	*31*
— signif. bact.	18	*2*	61	*9*	56	*16*
Total	20	*3*	72	*9*	71	*18*
Nocturnal frequency						
+ signif. bact.	2	*29*	40	*42*	25	*48*
— signif. bact.	18	*2*	35	*5*	*48*	*14*
Total	20	*3*	75	*9*	73	*18*
Dysuria						
+ signif. bact.	1	*14*	14	*15*	8	*15*
— signif. bact.	33	*4*	71	*10*	24	*7*
Total	34	*4*	86	*11*	32	*8*
Loin pain						
+ signif. bact.	0	*0*	4	*4*	8	*15*
— signif. bact.	29	*4*	26	*4*	21	*6*
Total	29	*4*	30	*4*	29	*7*
Stress incontinence						
+ signif. bact.	—	—	24	*25*	18	*25*
— signif. bact.	—	—	114	*16*	99	*28*
Total	—	—	136	*17*	117	*29*

Other symptoms were described by 11 males, 23 females and five pregnant women; the commonest complaint was either urgency or the passing of foul smelling urine and strangury. No one complained of passing blood in the urine, although microscopic haematuria (>10 RBC/mm³) was found in five males, 12 females and four pregnant women.

The symptoms have been analysed for social class in table 2. Both nocturnal and diurnal frequency were more frequently mentioned by those from the lower social classes as was burning or painful micturition. Loin pain and stress incontinence did not show increasing prevalence as the social scale was descended, but the highest social groups did have a lower prevalence of these symptoms.

Nearly 25 per cent of all the females and five per cent of the males had had previous urinary infection of varying severity (urethritis in males was excluded). This was increased to 35 per cent and 14 per cent respectively of those who had significant bacteriuria. When the data were

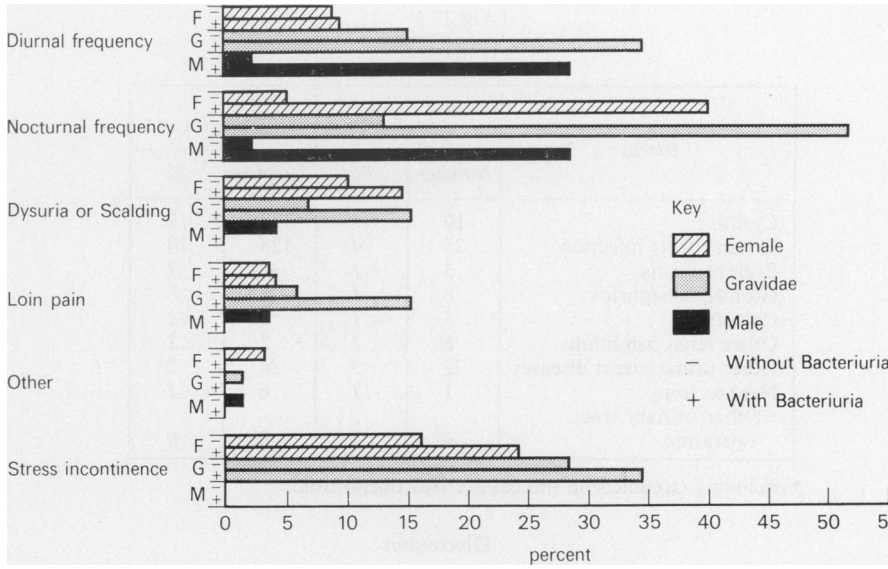

Figure 2

Bar diagram to show prevalence of symptoms expressed as percentages of non-bacteriuric and bacteriuric subjects respectively.

TABLE 2

CORRELATION OF SYMPTOMS WITH SOCIAL CLASS

Symptom	*Sex*	*Social class*						*Total*	
		Upper		*Middle*		*Lower*			
		Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Diurnal frequency	M	3	*1·5*	9	*2·4*	8	*3·4*	20	*2·5*
	F	14	*6·1*	79	*12·7*	50	*14·1*	143	*11·9*
Nocturnal frequency	M	3	*1·5*	9	*2·4*	8	*2·4*	20	*2·5*
	F	14	*6·1*	79	*12·7*	55	*15·9*	148	*12·3*
Dysuria	M	8	*4·0*	14	*3·5*	12	*5·2*	34	*4·2*
	F	17	*7·5*	60	*9·6*	41	*11·8*	118	*9·8*
Loin pain	M	3	*1·5*	16	*4·4*	10	*4·2*	39	*3·7*
	F	4	*1·5*	37	*5·9*	18	*5·2*	59	*5·0*
Stress incontinence	M	—	—	—	—	—	—	—	—
	F	38	*11·7*	146	*23·2*	69	*19·9*	253	*21·2*
Distribution of survey	M	202	*25·1*	366	*45·5*	236	*29·3*	804	*100·0*
	F	228	*19·1*	622	*52·0*	346	*28·9*	1196	*100·0*

analysed by decade of age, it was found that seven per cent of boys and seven per cent of girls aged less than ten years had had urinary infection; in those aged over 70 years 27 per cent of males and 30 per cent of females had previous histories of urinary tract infection.

Table 3 shows the prevalence of previous disease of the urinary tract. Nephrectomy had been performed on seven people (<0·5 per cent) and 11 (<one per cent) had passed urinary calculi. Of the females 182 (15 per cent) had had one episode of urinary infection; 35 (three per cent) had had two episodes; 19 (1·5 per cent) had had three episodes and 52 (4·2 per cent) had had more than three episodes; 74 (6·2 per cent) had had infection during pregnancy and 17 of these women had had urinary infections in every pregnancy.

TABLE 3

PAST HISTORY

Disease	Males		Females	
	Number	%	Number	%
Cystitis	10	1	138	12
Urinary tract infection	35	4	128	10
Pyelonephritis	3	<1	30	3
Glomerulonephritis	8	1	6	<1
Calculi	5	<1	6	<1
Other renal conditions	6	1	2	<1
Other urinary tract diseases	22	3	26	2
Nephrectomy	1	<1	6	<1
* Other urinary tract operation	6	1	0	0

* excluding circumcision (no case of hydronephrosis)

Discussion

This survey has provided further evidence that the correlation between symptoms referable to the urinary tract with the presence of significant bacteriuria is not good. Relatively fewer symptomatic subjects whose urine was normal were found than in a previous survey (Mond, 1964); other surveys were not comparable.

Urinary bacterial counts fluctuate (Thomson-Walker, 1925); this may explain why some patients were symptomatic and had low urinary viable counts. Other causes of low bacterial counts such as recent antibiotic therapy and preliminary washing with antiseptic solutions were excluded in this survey. Some workers, especially in the paediatrics (Pryles, Lüders and Alkan, 1961) consider 10^4 bacteria/ml to be significant. That disease of the genital tract may produce urinary symptoms has been known for many years (Herrold, Ewert and Maryan, 1936) and was confirmed in this survey, but it was observed that the converse also occurred.

Individual symptoms may have different causes; frequency may be due to prostatic hypertrophy or polyuria may be confused with frequency; dysuria may have been due to the urethral syndrome. It was observed that loin pain was more frequent in pregnancy especially among those who attended hospital outpatient clinics. Another interesting observation was the occurrence of apparently genuine stress incontinence in some pre-pubertal girls.

Some women seen in the survey regarded hourly micturition as normal and did not apparently have nocturia. It appeared that the recent onset of nocturia was a more reliable symptom of urinary infection than the presence of diurnal frequency. The importance of recent onset of nocturia does not support the findings of Sussman, Asscher, Waters, Evans, Campbell, Evans and Edmund Williams (1969) but if the ratios between the prevalences in their bacteriuric and control groups are calculated then nocturia, frequency and dysuria occurred 2·25, 2·0 and 1·8 times respectively more often in their bacteriuric group. Loin pain and fever was seven times more common in the bacteriuric group, but such patients would have been excluded from this survey as "not healthy". Similarly, although Lawson, Clarke, McFarlane, McAllister and Linton (1973) claimed that there were no significant differences between any of the groups with respect to the presenting symptoms, the greatest percentage difference was in the occurrence of nocturia.

Recall for previous urinary infection appeared to be relatively short, but it was interesting that as many boys as girls had had urinary infections during childhood; the sex ratio in adults appeared to be one male to five females, but in elderly persons the ratio reverted again to one to one. It was found that 17 women had had infection during every pregnancy, but the true percentage is not known since some of the primigravidae may voluntarily have no more pregnancies.

The analysis of the data by social class supported the contention (Monto and Rantz, 1963) that more of those from the lower social classes had frequency and burning or painful micturition;

loin pain and stress incontinence did not show this trend although there was a lower prevalence in the upper social classes. This may be due to a difference in symptom tolerance levels, but a more likely explanation is that those in the higher groups had already sought medical advice and thus became ineligible to participate in the survey.

It is difficult to estimate the significance of symptoms apparently referable to the urinary tract especially when they are not incapacitating; but from the results of this survey it is suggested that the recent onset of nocturia is an indication for laboratory examination of the urine. It is also difficult to estimate the significance of significant bacteriuria. It would appear that these problems may only be solved by a prolonged follow-up study of selected groups.

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VAGINAL COMPLAINTS

Thousands of women whose vaginal complaints have not responded to treatment, or who are too fastidious to approach their doctors, write to the agony columns of women's magazines.

There they get the sort of advice that one wishes was stacked up on a health education self-help shelf next to the tropical fish in every doctor's waiting room. Nurse Williams of *Woman* magazine, has been answering readers' letters on the vaginal and urinary ' itises ' for 16 years or so.

She is convinced women get ' scant attention ' from their doctors. Every time she writes about the subject thousands seek her advice, and even six or eight months after a mention they are still writing in.

Some have suffered misery for years. Embarrassment plays a large part in failure to see a doctor. But even when help is sought, many doctors give poor advice, and the expected cure may not be forthcoming even though the right medicine is prescribed.

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