RESEARCH ARTICLE

Evaluation of the diagnostic accuracy of lower urinary tract symptoms (LUTS) in uncomplicated UTI in Pakistani women

Waqar Azim Niaz[1], Haleema Yasmeen[2], Saadia Shamsher[3]

Abstract

Objective: To evaluate the diagnostic accuracy of lower urinary tract symptoms in uncomplicated urinary tract infection in women.

Method: The cross-sectional study was conducted from September 2020 to December 2021 after approval from the ethics review board of Jinnah Postgraduate Medical Centre, Karachi, and comprised data of women aged at least 16 years from 8 institutions across Pakistan. Data included menstruation status, symptoms, urinalysis and organisms found in urine samples. The association of urinalysis variables with symptoms among culture-positive patients was measured to assess the certainty of positive diagnosis. Data was analysed using SPSS 23.

Results: Of the 457 women with mean age 37.87±13.9 years, 182(39.8%) had a positive urine culture. Dysuria was the most significant symptom 120(65.9%), followed by daytime frequency 114(62.6%) amongst culture-positive patients. On urinalysis, 139(76.3%) had white blood cells, and 66(36.2%) had haematuria. Dysuria along with the presence of leucocyte esterase had the highest diagnostic utility (p=0.002). Urgency along with haematuria was strongly predictive of urinary tract infection (p=0.058).

Conclusion: The diagnosis of uncomplicated urinary tract infection in women could be reliably made based on a combination of symptoms along with urine analysis without urine culture.

Key Words: Urinary tract infection, Lower urinary tract symptoms, Urinalysis; Urine culture.

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Introduction

Urinary tract infection (UTI) is one of the most common health problems affecting patients of all ages. Women are especially prone to UTIs. Estimates suggest that about a third of women will have at least one episode of UTI requiring antibiotic therapy by the time they are 24 years of age, and over a lifetime, half will have at least one UTI[1,2,3,4].

Many patients who come to hospital and clinics with lower urinary tract symptoms (LUTS), such as frequency of micturition, dysuria, urgency and suprapubic pain, are diagnosed with UTI and have been empirically treated with antibiotics. The symptoms are not very clear-cut with regard to UTI. Overlap is seen with overactive bladder (OAB), stone disease and other forms of cystitis.

Simple acute cystitis is essentially an afebrile disease. Patients with acute cystitis present with irritative voiding symptoms, such as dysuria, frequency and urgency. Low-back and suprapubic pain, haematuria, and cloudy/foul-smelling urine are also common symptoms.

As typical urinary symptoms, like dysuria, frequency and urgency, are highly predictive of a UTI in female patients, therapy can be empirically started without performing a culture in women with symptoms of an uncomplicated UTI. However, 25% to 30% of these symptomatic women will have a negative urine culture[5]. Prescription of antibiotics without the confirmation of diagnosis in primary care setting, especially in suboptimal dose, poses the problem of drug resistance against various pathogens[6]. A common -related problem like UTI can thus get complicated.

Although diagnosis ideally involves confirmation of the presence of symptoms and a positive urine culture, in practice, a diagnosis is frequently made without the benefit of culture results.

Sensitivity based on a typical history is between 50% and 80%[7,8]. Absolute diagnostic reliability and maximally specific therapy would only be achieved if the gold standard[9] — urine culture — was generally used[10]. This approach would require considerable additional effort, but would be capable of greatly reducing the rate of antibiotic prescriptions.

[1]Department of Urology, Quaid e Azam International Hospital, Islamabad, Pakistan, [2]Department of Gynaecology, Jinnah Postgraduate Medical Centre, Karachi, Pakistan, [3]Department of Gynaecology, Hayatabad Medical Complex, Peshawar, Pakistan.

Correspondence: Waqar Azim Niaz. **Email**: waqaran2002@yahoo.com

ORCID ID: 0009-0006-4605-2334

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Urine dipsticks are one of the most frequently used instruments for diagnostic testing if there is clinical evidence that a patient is suffering from UTI[6]. The sticks most commonly used are the ones that may be able to detect nitrite (a metabolic product of typical pathogens of the urinary tract), leukocyte esterase, protein and blood (as a marker of inflammation). Pyuria is almost present in all symptomatic UTI in females, and its absence requires looking for an alternative diagnosis[2]. If nitrite is detected, this increases the probability of a UTI, but the sensitivity is relatively low[7]. The detection of blood is admittedly highly sensitive, but the specificity is low[8].

The current study was planned to evaluate the diagnostic accuracy of LUTS in uncomplicated UTI in women.

Materials and Methods

The cross-sectional study was conducted from September 2020 to December 2021 after approval from the ethics review board of Jinnah Postgraduate Medical Centre (JPMC), Karachi, and comprised data from 8 institutions across Pakistan. Data was collected using a questionnaire proforma of common LUTS by each researcher. All patients has urine samples sent immediately for routine urinalysis and for culture and sensitivity in an approved laboratory. Although dipstick urinalysis was not a primary objective, its addition was expected to enhance the diagnostic capabilities of symptoms in combination, justifying the use of antibiotics before getting urine culture results.

A pilot study was conducted on 85 subjects in May 2020, using the questionnaire and laboratory results to help calculate the sample size. Using two-sided Z- test, a sample size of 560 was calculated with Power Analysis and Sample Size Software (PASS) 2020 at 80.055% power to detect a difference (P1-P0) of -0.0600 to estimate the standard deviation (SD) and having a continuity correction with an alpha significance level of 0.050. This assumed that the population proportion under the null hypothesis (P0) was 0.5000. The expected number of dropout cases ranged 18-20%. The sample size was further divided into 7 strata. The sample was raised using stratified random sampling technique from each of 8 centres.

Those included were women aged at least 16 years who presented with UTI symptoms and had persistent LUTS in the preceding 7 days.

Women who had received antibiotics, were pregnant, diabetic, immune-compromised, and had a known urological or renal disease were excluded, and so were those having an indwelling catheter.

After taking written informed consent from the patients, data was collected. A validated checklist which was designed after a pilot study validation, was filled up by a medical practitioner, and the results were entered as positive or negative. LUTS included daytime frequency, nocturia, dysuria, urgency, haematuria, suprapubic pain, smelly turbid urine and others. Simultaneously, a urine sample for routine analysis, and a separate sample for culture and sensitivity were sent to the reference laboratory for evaluation, and the results were entered as positive or negative.

Data was entered into a Microsoft Excel 7.0 database, and was analysed using SPSS 23. Categorical variables, like menstruation status, symptoms, urinalysis and organisms found in urine samples, were presented as frequencies and percentages with 95% confidence intervals (CIs). Quantitative variables, like age, were presented as mean±SD. Effect modifiers, such as age, were classified into three groups; 18-40 years, 41-60 years and >60 years. The difference in mean age of overall patients and culture-positive patients was compared using the student's t-test. The association of urinalysis variables with symptoms among culture-positive patients was tested using the chi-square test of dependency, and their likelihood ratios (LHs) were measured to assess the certainty of positive diagnosis, $P<0.05$ was considered significant.

Results

Of the 457 women with mean age 37.87±13.9 years, 308(%) were aged 18-40 years, 115(%) were aged 41-60 years, and 34(%) were aged > 60 years (p=0.001). There were 182(39.8%) women with mean age 40.89±16.21 years who had a positive urine culture (p=0.01).

Overall, dysuria was the most common symptom 269(58.8%), followed by daytime frequency 258(56.4%), suprapubic pain 243(53.1%) and urgency 240(52.5%). Among culture-positive patients, dysuria was the most significant symptom 120(65.9%) (p=0.01), followed by daytime frequency 114(62.6%) (p=0.03), suprapubic pain 100(54.9%) (p=0.53), urgency 99)54.4%) (p=0.51) and haematuria 27(14.8%) (p=0.13).

On urinalysis, 139(76.3%) culture-positive patients had white blood cells (WBCs) (p=0.001). Haematuria was present in 66(36.2%) patients, nitrite positivity and leucocyte esterase positivity were 53(29.1%) and 51(28%), respectively. Proteinuria in culture-positive patients was detected in 35(19.2%) patients (p=0.001).

Dysuria along with the presence of leucocyte esterase had the highest diagnostic utility with specificity 85.4% and

Table-1: Urinalysis variables and three leading symptoms in culture-positive patients (n=182).

URINALYSIS (in 182 cultural positive patients)	SYMPTOMS (in 182 cultural positive cases)											
	Dysuria (n=120) (65.98%)				Daytime frequency (n=114) (62.64%)				Suprapubic pain (n=100) (54.95%)			
	n	% (n=120)	LH Ratio	p-value	n	% (n=114)	LH Ratio	p-value	n	% (n=100)	LH Ratio	p-value
WBCs n= 139 (76.4%)	94	78.33%	0.732	0.390	85	74.56%	0.563	0.453	75	75.00%	0.233	0.629
RBCs n= 66 (36.3 %)	42	35.00%	0.242	0.623	41	35.96%	0.012	0.914	38	38.00%	0.288	0.592
Nitrites n= 53 (29.1%)	39	32.50%	2.001	0.157	33	28.95%	0.004	0.947	32	32.00%	0.897	0.344
Leukocyte Esterase n= 51 (28.0%)	42	35.00%	9.16	0.002	34	29.82%	0.496	0.481	29	29.00%	0.105	0.745
Proteinuria n= 35 (19.2%)	30	25.00%	8.474	0.004	31	27.19%	14.353	0.001	24	24.00%	3.333	0.068
IN COMBINATIOS OF 02												
Proteinuria +Nitrites n= 19 (10.4%)	18	15.00%	10.12	0.001	18	15.80%	11.930	0.001	16	15.00%	5.300	0.020
Proteinuria + Leukocyte Esterase n= 23 (12.6%)	22	18.33%	11.148	0.001	21	18.42%	11.148	0.001	18	18.00%	6.174	0.013
Proteinuria +WBCs n= 32 (17.6%)	27	22.50%	6.59	0.011	28	24.56%	11.730	0.001	22	22.00%	3.069	0.080
Proteinuria +RBCs n= 14 (7.7%)	11	9.17%	1.159	0.282	12	10.53%	3.946	0.047	8	8.00%	0.030	0.863
Nitrites + Leukocyte Esterase n= 32 (17.6%)	26	21.67%	4.399	0.036	23	20.18%	1.463	0.226	20	20.00%	0.905	0.341
Nitrites +WBCs n= 46 (25.3%)	34	28.33%	1.749	0.180	28	24.56%	0.082	0.775	28	28.00%	0.897	0.348
Nitrites +RBCs n= 19 (10.4%)	13	10.83%	0.059	0.809	14	12.28%	1.158	0.282	13	13.00%	1.600	0.206
Leukocyte Esterases +WBC n= 48 (26.4%)	39	32.50%	7.299	0.007	31	27.19%	0.106	0.745	27	27.00%	0.045	0.832
Leukocyte Esterase +RBCs n= 20 (11.0%)	16	13.33%	2.143	0.143	13	11.40%	0.054	0.816	12	12.00%	0.234	0.629
WBCs +RBCs n= 57 (31.3%)	38	31.67%	0.02	0.888	34	29.82%	0.315	0.575	32	32.00%	0.048	0.827
IN COMBINATIOS OF 03												
Proteinuria +Nitrites +Leukocyte Esterase n= 17 (9.3%)	16	13.33%	8.487	0.004	16	14.04%	10.066	0.002	14	14.00%	4.534	0.033
Proteinuria + Nitrites +WBCs n= 19 (10.4%)	18	15.00%	10.119	0.001	18	15.79%	11.938	0.001	15	15.00%	5.300	0.020
Proteinuria + Nitrites +RBCs n= 7 (3.8%)	6	5.00%	1.459	0.227	7	6.14%	2.841	0.092	4	4.00%	0.014	0.905
Proteinuria + Leukocyte Esterase +WBCs n= 22 (12.1%)	21	17.50%	12.665	0.001	20	17.54%	7.228	0.007	16	16.00%	3.334	0.068
Proteinuria + Leukocyte Esterase +RBCs n= 10 (5.5%)	9	7.50%	3.298	0.069	9	7.89%	4.073	0.044	6	6.00%	0.110	0.740
Proteinuria + WBCs +RBCs n= 14 (7.7%)	11	9.17%	1.159	0.280	12	10.53%	3.946	0.047	8	8.00%	0.030	0.863
Nitrites + Leukocyte Esterase +WBCs n= 30 (16.5%)	24	20.00%	3.405	0.065	21	18.42%	0.854	0.350	19	19.00%	1.035	0.309
Nitrites + Leukocyte Esterase +RBCs n= 12 (6.6%)	9	7.50%	0.493	0.482	9	7.89%	0.887	0.345	9	9.00%	2.204	0.138
Nitrites + WBCs +RBCs n= 18 (9.9%)	13	10.83%	0.632	0.547	13	11.40%	0.815	0.367	12	12.00%	1.134	0.287
Leukocyte Esterase +WBCs +RBCs n= 20 (11.0%)	16	13.33%	2.143	0.143	13	11.40%	0.054	0.816	12	12.00%	0.234	0.629
IN COMBINATIOS OF 04												
Proteinuria +Nitrites +Leukocyte Esterase +WBCs n=20 (11.0%)	16	13.33%	2.143	0.143	13	11.40%	0.054	0.815	12	12.00%	0.234	0.629
Proteinuria + Nitrites +Leukocyte Esterase +RBCs n=16 (8.8%)	15	12.50%	7.693	0.006	15	13.16%	9.153	0.002	13	13.00%	5.341	0.021
Proteinuria + Nitrites +WBCs +RBCs n=6 (3.3%)	5	4.17%	0.94	0.332	6	5.26%	5.735	0.017	4	4.00%	0.353	0.552

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Proteinuria + Leukocyte Esterase +WBCs +RBCs	n=12 (6.6%)	9	7.50%	0.493	0.482	9	7.89%	0.887	0.346	9	9.00%	2.204	0.138
Nitrites + Leukocyte Esterase +WBCs +RBCs	n=7 (3.8%)	6	5.00%	1.459	0.227	7	6.14%	6.715	0.010	4	4.00%	0.014	0.905
IN COMBINATIOS OF 05													
Proteinuria +	n=10 (5.5%)	8	6.67%	3.298	0.069	9	7.89%	4.073	0.044	6	6.00%	0.110	0.740

Table-2: Urinalysis variables and additional symptoms in culture-positive patients (n=182).

URINALYSIS (in 182 cultural positive patients)		**SYMPTOMS (in 182 cultural positive cases) Urgency (n=99) (54.40%)**				**Nocturia (n=81) (44.51%)**				**Haematuria (n=27) (14.84%))**			
		n	**% (n=99)**	**LH Ratio**	**p-value**	**n**	**% (n=81)**	**LH Ratio**	**p-value**	**n**	**% (n=27)**	**LH Ratio**	**p-value**
WBCs	n= 139 (76.4%)	77	77.78%	0.237	0.627	66	81.48%	0.021	0.143	26	96.30%	9.345	0.002
RBCs	n= 66 (36.3 %)	42	42.42%	3.598	0.058	28	34.57%	0.002	0.670	16	59.26%	6.965	0.008
Nitrites	n= 53 (29.1%)	28	28.28%	0.074	0.786	33	40.74%	0.096	0.002	13	48.15%	5.166	0.023
Leukocyte Esterase	n= 51 (28.0%)	30	30.30%	0.562	0.453	27	33.33%	0.020	0.154	14	51.85%	8.145	0.004
Proteinuria	n= 35 (19.2%)	22	22.22%	1.266	0.261	26	32.10%	15.829	0.001	9	33.33%	3.616	0.057
IN COMBINATIOS OF 02													
Proteinuria +Nitrites	n= 19 (10.4%)	11	11.10%	0.105	0.745	16	19.75%	14.291	0.001	7	25.93%	6.454	0.011
Proteinuria +Leukocyte Esterase	n= 23 (12.6%)	13	13.13%	0.048	0.826	17	20.99%	9.363	0.002	8	29.63%	6.738	0.009
Proteinuria +WBCs	n= 32 (17.6%)	19	19.19%	0.390	0.532	24	29.63%	14.895	0.001	9	33.33%	4.720	0.030
Proteinuria +RBCs	n= 14 (7.7%)	11	11.11%	3.833	0.050	9	11.11%	2.397	0.122	5	18.52%	4.139	0.042
Nitrites +Leukocyte Esterase	n= 32 (17.6%)	18	18.18%	0.054	0.816	20	24.69%	5.070	0.020	10	37.04%	7.043	0.008
Nitrites +WBCs	n= 46 (25.3%)	22	22.22%	1.068	0.301	29	35.80%	8.565	0.003	13	48.15%	7.877	0.005
Nitrites +RBCs	n= 19 (10.4%)	11	11.11%	0.105	0.746	13	16.05%	4.932	0.026	8	29.63%	9.590	0.002
Leukocyte Esterase +WBCs	n= 48 (26.4%)	27	27.27%	0.091	0.784	25	30.86%	1.509	0.219	14	51.85%	9.520	0.001
Leukocyte Esterase +RBCs	n= 20 (11.0%)	13	13.13%	1.037	0.308	11	13.58%	0.995	0.319	9	33.33%	12.740	0.001
WBCs +RBCs	n= 57 (31.3%)	37	37.37%	3.748	0.053	25	30.86%	0.014	0.905	16	59.26%	10.578	0.001
IN COMBINATIOS OF 03													
Proteinuria +Nitrites +Leukocyte Esterase	n= 17 (9.3%)	9	9.09%	0.016	0.899	13	16.05%	7.938	0.005	6	22.22%	4.951	0.028
Proteinuria +Nitrites +WBCs	n= 19 (10.4%)	10	10.10%	0.027	0.871	16	19.75%	1.291	0.010	7	25.93%	6.454	0.011
Proteinuria +Nitrites +RBCs	n= 7 (3.8%)	5	5.05%	0.886	0.346	5	6.17%	2.158	0.142	3	11.11%	3.351	0.067
Proteinuria +Leukocyte Esterase +WBCs	n= 22 (12.1%)	12	12.12%	0.000	0.998	17	20.99%	11..157	0.001	8	29.63%	7.364	0.007
Proteinuria +Leukocyte Esterase +RBCs	n= 10 (5.5%)	8	8.08%	3.028	0.082	8	9.88%	1.022	0.312	4	14.81%	3.405	0.065
Proteinuria +WBCs +RBCs	n= 14 (7.7%)	11	11.11%	3.833	0.050	9	11.11%	2.397	0.122	5	18.52%	3.596	0.058
Nitrites +Leukocyte Esterase +WBCs	n= 30 (16.5%)	16	16.16%	0.015	0.898	19	23.46%	5.145	0.023	10	37.04%	8.124	0.004
Nitrites +Leukocyte Esterase +RBCs	n= 12 (6.6%)	8	8.08%	0.799	0.372	8	9.88%	2.557	0.110	5	18.52%	5.530	0.019
Nitrites +WBCs +RBCs	n= 18 (9.9%)	10	10.10%	0.011	0.917	12	14.81%	3.976	0.046	8	29.63%	11.382	0.001

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Leukocyte Esterase +WBCs +RBCs	n= 20 (11.0%)	13	13.13%	1.037	0.308	11	13.58%	0.995	0.319	9	33.33%	12.270	0.001
IN COMBINATIOS OF 04													
Proteinuria +Nitrites +Leukocyte Esterase +WBCs	n=20 (11.0%)	13	13.13%	1.037	0.308	11	13.58%	0.995	0.319	9	33.33%	12.274	0.001
Proteinuria +Nitrites +Leukocyte Esterase +RBCs	n=16 (8.8%)	8	8.08%	0.136	0.712	13	16.05%	9.988	0.002	6	22.22%	5.594	0.018
Proteinuria +Nitrites +WBCs +RBCs	n=6 (3.3%)	5	5.05%	2.321	0.128	4	4.94%	1.235	0.267	2	7.41%	1.335	0.248
Proteinuria +Leukocyte Esterase +WBCs +RBCs	n=12 (6.6%)	8	8.08%	0.799	0.372	8	9.88%	2.557	0.110	5	18.52%	5.530	0.019
Nitrites +Leukocyte Esterase +WBCs +RBCs	n=7 (3.8%)	5	5.05%	0.866	0.346	5	6.17%	2.158	0.142	3	11.11%	3.351	0.067
IN COMBINATIOS OF 05													

LH ratio: Likelihood ratio, WBC: White blood cell, RBC: Red blood cell.

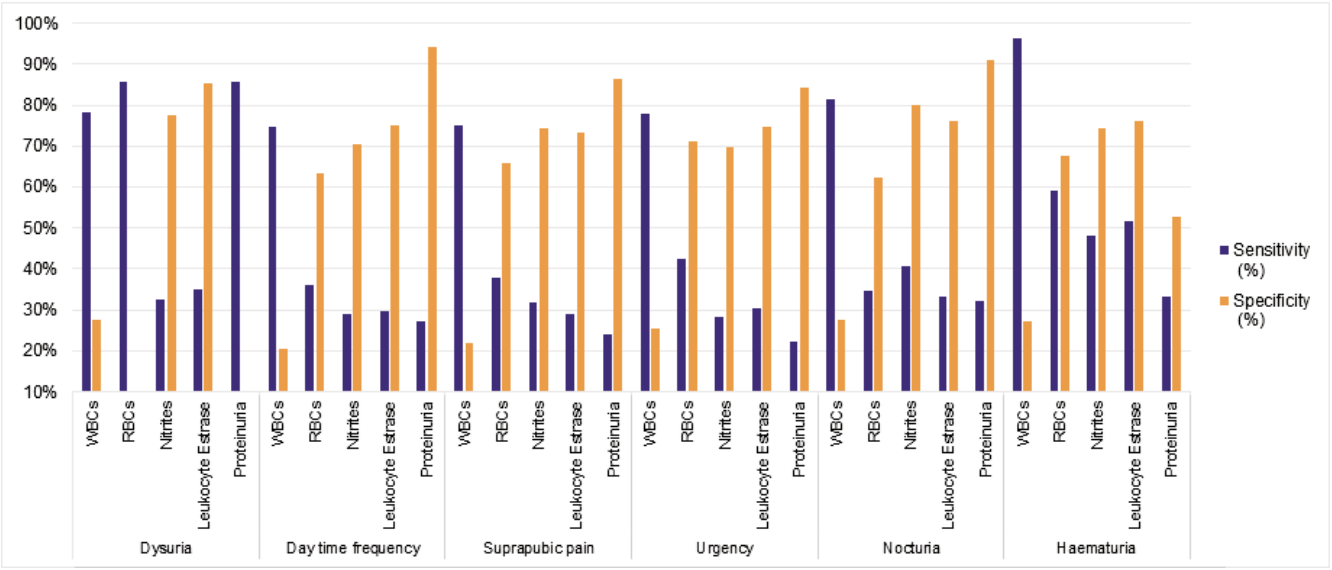

Figure-1: Sensitivity and specificity of symptoms in relation to urinalysis.
Note:
WBCs n=139(76.4%), RBCs n=66(36.3%), Nitrites n=53(29.1%), Leucocyte esterase n=51(28.0%), Proteinuria n=35(19.2%)
WBC: White blood cell, RBC: Red blood cell.

sensitivity 35% (odds ratio [OR]: 3.17; p=0.002). Urgency along with haematuria was strongly predictive of UTI having positive predictive value (PPV) 63.6%, specificity 71.0%, sensitivity 42.4% likelihood OR of 1.81 (p=0.058). Nocturia in the presence of nitrites and proteinuria on urinalysis was also strongly suggestive of UTI (OR: 4.83; p=0.001). Haematuria in the presence of pyuria, nitrites, leucocyte esterase and proteinuria was the single most common symptom that was highly significant in the diagnosis of UTI (OR: 9.66; p=0.002) (Tables 1-2, Figures 1-2).

Discussion

The current study aimed at relating a combination of LUTS best indicative to diagnose UTI keeping urine culture test as the gold standard. The study sample was limited to women seeking medical care with LUTS presumably related to UTI.

Of the 457 participants evaluated in the current study, only 182(39.8%) were found to have positive urine cultures, which was in line with already published studies[11].

Majority of the current patients were aged 18-40 years,

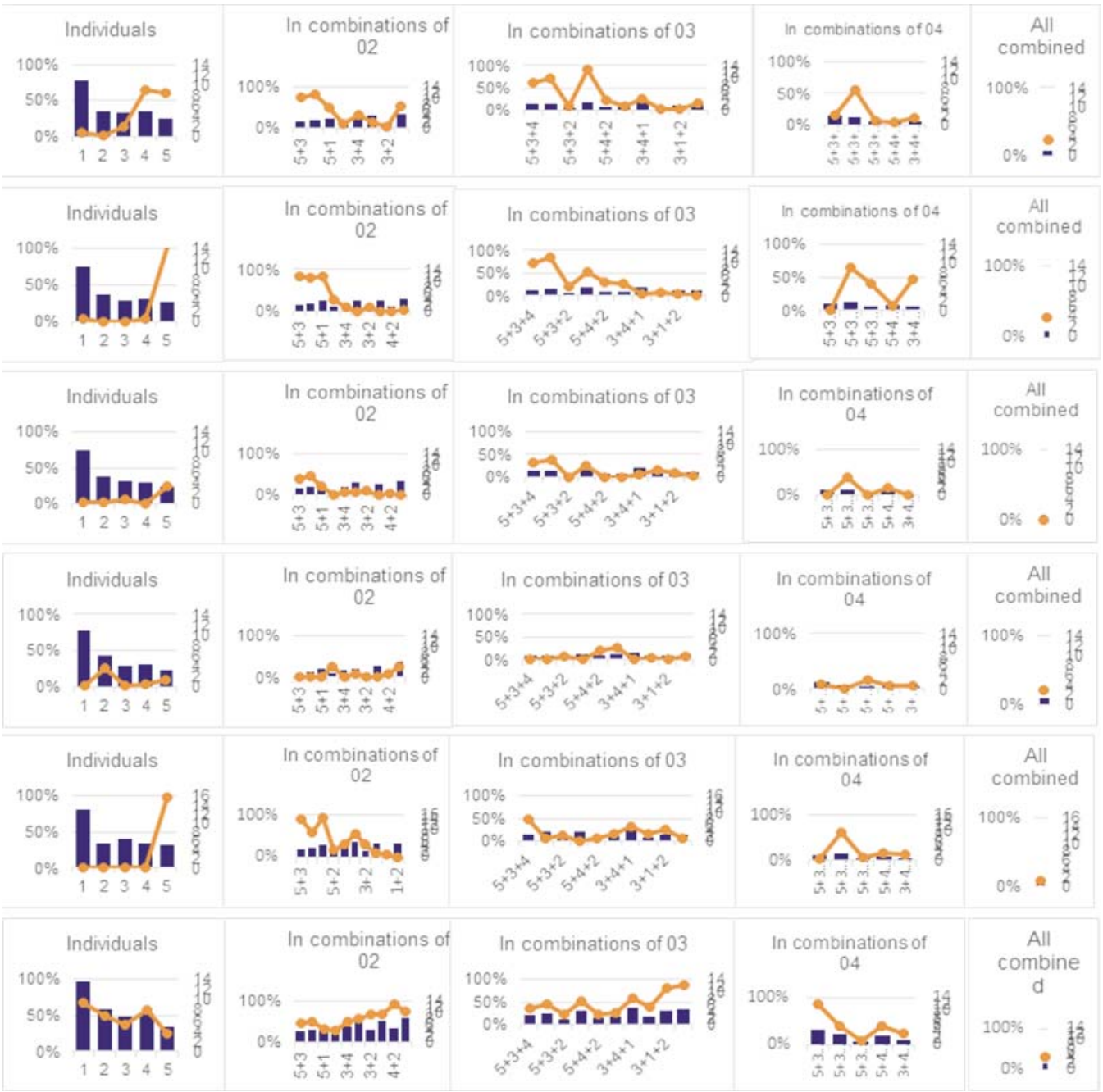

Figure-2: Correlation between symptoms and urinalysis (alone and in combinations) with positive likelihood ratio and percentages.

signifying that female UTI was most common in the childbearing age group. This was in line earlier findings[3].

In culture-positive patients, escherichia (E.) Coli was found to be the most common organism (56%) causing UTI. This finding is similar to what has been reported worldwide[10,12]. However, one study recommended the use of low colony count of 10^2 which resulted in increased prevalence of UTI from 42.7% to 57.3%[13]. Lowering the threshold to colony count of 103 increased the detection

of E. Coli in culture-negative urine samples in symptomatic women, but it was referred to as women having 'urethral syndrome'[5].

Patient history is the single most common tool in diagnosing uncomplicated UTI in primary care settings. In women presenting with one or more symptoms, probability of having UTI is 50 %, but with specific combinations of recent onset frequency with dysuria without vaginal discharge or irritation, the PPV of UTI is 90% [2,14,15], practically ruling in the diagnosis of UTI. In the present study, the most common symptoms reported by the patients were dysuria, daytime frequency, suprapubic pain and urgency.

In culture-positive patients, dysuria was the most common symptom identified (65.9%), followed by daytime frequency (62.6%) which were both highly significant.

Dipstick tests of nitrite, leucocyte esterase, blood and protein are commonly employed in the laboratory diagnosis that independently predict UTI[16]. These variables augment the diagnostic capabilities of the urinary symptoms. In the absence of these variables, diagnosis of UTI is highly unlikely[6].

In the current study, on urinalysis, the presence of WBCs was found to be the most significant predictor of UTI in females (76.3%; p=0.001) with sensitivity ranging 75-96% and specificity 17-27%. This was in line with a recent study[15]. Although, the presence of nitrites and leucocyte esterase are found to be much less frequent, they are significant indicators of UTI diagnosis, especially in the presence of common symptoms[14,4]. Overall sensitivity of nitrites is 19-48% and specificity 90-100% while leucocyte esterase has higher sensitivity of 62-98% but it has low specificity of 55-96%[15]. The current study found nitrite positivity of 29% and leucocyte esterase positivity of 28% in culture-positive patients, which were quite low. This may be because of the higher threshold of 10^6 colony count figure used as standard reporting of positive urine culture in the participating laboratories. A study applied dipstick decision rule that improved diagnosis of UTI considering nitrites, leucocyte esterase and blood as independent variables. It reported PPV of 92% in positive nitrites with positive leucocyte esterase or positive blood[6].

Proteinuria alone is an uncommon predictor of UTI, but its presence in association with other parameters becomes significantly attributable to the diagnosis of UTI. It was found to be only 19% in the current culture-positive patients, as reflected in other studies[2]. However, negative dipsticks results do not reliably rule out UTI in a patient having symptoms strongly suggestive of infection.

Haematuria, although less common in patients with confirmed UTI, when present, is highly significant of UTI prediction[10]. Its presence increases the pre-test probability of UTI from 65% to 75%. The current study found haematuria in 36.2% of culture-positive patients, and it was found to be the most reliable predictor of UTI, especially in the presence of other positive urinalysis predictors.

When analysing the combination of symptoms in association with variables of urinalysis, very strong correlations with the prediction of UTI in females can be found[11].

Dysuria, along with the presence of leucocyte esterase, was found to have the highest diagnostic utility with a specificity of 85.4% and sensitivity of 35%. Similarly, urgency along with haematuria was strongly predictive of UTI, having PPV 63.6%, specificity 71.0%, and sensitivity 42.4% (p=0.058). Nocturia in the presence of nitrites and proteinuria on urinalysis was also strongly suggestive of UTI (PPV: 62.2%; p=0.001).

Haematuria in the presence of pyuria, nitrites and leucocyte esterase was the single most common symptom that was highly significant in the diagnosis of UTI (OR: 9.66; p=0.002). This was in line with published studies[10].

Strongest correlation for the diagnosis of UTI was found to be in patients having dysuria, frequency and urgency with pyuria, positive nitrites and leucocyte esterase on urinalysis along with haematuria and proteinuria[16].

Some recent studies have argued that, in addition to the symptoms, a symptom severity score, like the Acute Cystitis Symptom Score (ACSS, has proven to be significantly useful in the diagnosis of acute cystitis in females[17,18]. Further studies may establish the role of ACSS in improving the diagnosis of UTI in females based on symptomatology.

The current study has a major limitation of being a non-interventional cohort. This needs to be expanded further, involving a community-based cohort population.

Conclusion

The diagnosis of uncomplicated UTI in women can reliably be made based on a combination of symptoms along with urine analysis without urine culture testing. Therefore, focussed and appropriate antibiotics can be given in these women, thus obviating the use of

antibiotics in every suspected woman with uncomplicated UTI.

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WAN, HY, SS: Concept, design, data acquisition and revision.