



SEASONAL VARIATION AND URINARY TRACT INFECTIONS IN CENTRAL SRI LANKA

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ABSTRACT

Introduction: Urinary tract infections (UTIs) are the most common bacterial infections ranging from asymptomatic to severe sepsis. Understanding the seasonality dynamics of UTI may provide a valuable insight into the determinants of infection, which can help clinicians and infection control specialists understand the risk factors for these infections and ultimately improve their prevention. **Materials and Methods:** This is a retrospective study done with the records of patients admitted to Teaching Hospital, Peradeniya from January 2017 to August 2019 for severe and acute episodes of UTI. Climate data of the corresponding months were collected from Department of Meteorology. We used the data recorded in the nearest weather station (Katugastota). **Results:** The study covered 80% of all first consultations in the outpatient clinic at Teaching hospital, Peradeniya. The association of incidence of UTI in Central Sri Lanka with average rainfall and average relative humidity is significant as described in this study. There was only a little significance between the incidence of UTI and average air temperature. A significant increase of UTI was observed in the first inter monsoon periods when weather changes from one climate season to the other. **Conclusions:** New studies should be done over a large sample in different geographical areas with more pronounced climate changes to get a more comprehensive understanding.

KEYWORDS: UTI, Seasonal variation, Sri Lanka.

INTRODUCTION

Urinary tract infections (UTIs) are the most common bacterial infections ranging from asymptomatic to severe sepsis.^[1, 2] It also contributes to the most nosocomial infection in many hospitals and accounts for approximately 35% of all hospital-acquired infections.^[3,4] Bacteria are the primary organisms that cause UTI and gram negative bacteria causes 80-85% of the infections and among them exist the *Escherichia coli* that is the most frequent pathogen.^[4]

In England 2015, UTIs in the overall population were reported as the second most common cause for antibiotic prescribing in primary care and prescribing for UTI has been increasing from 2010 to 2015.^[5] Most of this prescribing is likely to be in women, as UTIs are more prevalent in women.^[6] As such, antibiotic treatment for UTI is an important driver of antibiotic resistance.

Seasonal variation in the incidence of *E. coli* bloodstream infection has recently been reported in different countries.^[7] One study showed UTI incidence was higher in the winter,^[12] in autumn,^[13] and others in

summer.^[14-17] Additional studies suggested seasonality varied by causative organism.^[18,19] *E.coli* is the common organism for UTI.^[8] Despite this fact, little is known about the seasonality of UTIs in the community. Understanding the seasonality dynamics of UTI may provide a valuable insight into the determinants of infection, which can help clinicians and infection control specialists understand the risk factors for these infections and ultimately improve their prevention.^[9] If seasonality was evidenced, it could also help to orient research along pathophysiological pathways.^[10,11]

The aim of the present study was to explore the seasonality and trends of UTI in Sri Lanka to consider the changes in weather correlate with acute episodes of lower UTI in men and women over 2017-2019.

MATERIALS AND METHODS

Methodology

We retrospectively reviewed the records of patients admitted to Teaching Hospital, Peradeniya from January 2017 to August 2019 for severe and acute episodes of UTI. Climate data of the corresponding months were

collected from Department of Meteorology. We used the data recorded in the nearest weather station (Katugastota). The available monthly meteorological data included average temperature (measured in degree Celsius), average relative humidity (recorded in percentage) and total rainfall (measured in millimeters).

Statistical analysis

Correlation and chi square test were performed to discover whether there is a relationship between variables. Statistical significance at $p < 0.05$ was accepted for all analysis. Data was analyzed using Statistical Package for the Social Sciences (SPSS) version 20.

RESULTS AND DISCUSSION

The study covered 80% of all first consultations in the outpatient and inward patients at Teaching hospital, Peradeniya. A total of 2477 patients were enrolled in our study during a period of 32 months. Of the study group, 36.7% (910/2477) of patients were male and 63.3% (1567/2477) were female. There was a significant difference between female and male patients ($p < 0.001$). The average age of all patients was 41.63 ± 25.04 years. The average age of male patients was 37.92 ± 27.92 with a median age of 41 years and the average age of female patients was 43.77 ± 22.95 with a median age of 46 years.

According to the Figure 1 the highest frequency of UTIs were observed in the first inter monsoonal (IM) period till the beginning of North-eastern monsoon during the year 2019. During the year 2018, the overall UTI frequency seems to be comparatively low to 2017 and 2019. The period between the end of February till May, which is usually the hottest period of the year has reported the highest frequencies in UTIs in all three years, where as in the second half of the year UTIs show a gradual decrement in frequency, and have reported more or less similar frequencies during 2017 and 2018 (Figure 2). Though four seasons are not very pronounced in Sri Lanka the seasonal variation of UTI were compatible with a study done in Taiwan, which shows the variation of UTI occurrence rate being highest in the summer and lowest in the winter.^[20]

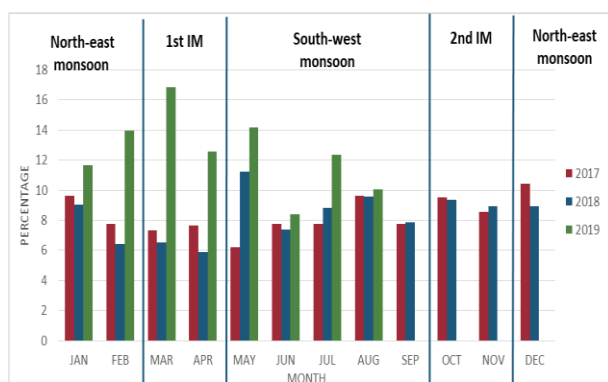


Figure 1. Presentation (incidence) of UTI during 2017, 2018 & 2019.

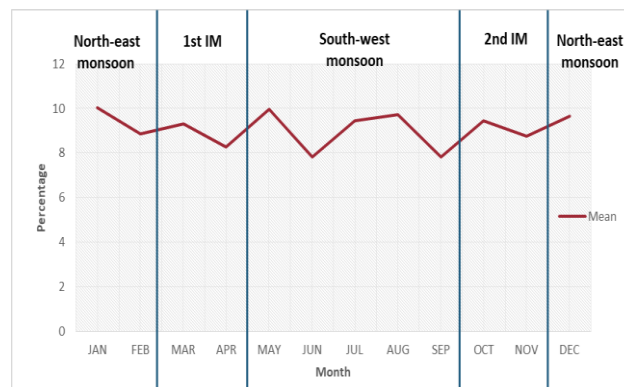


Figure 2. Presentation (incidence) of UTI during 2017, 2018 & 2019.

Table 1- Correlation of variables with UTIs.

	Pearson correlation			Significance (2 tailed)
	2017	2018	2019	
Average air temperature	-.129	.093	-.114	0.058
Average rainfall	.597	.326	.504	0.01
Average relative humidity	.351	.391	.218	0.03

The comparative analysis of the frequency of UTIs with the Average air temperature shows that, there is only a little correlation between the two variables (Table 1). In a research done in USA where the temperature changes during the seasons are marked, they have found that warmer weather is associated with an increase of hospital admissions for UTIs.^[21] Another study done in University of Iowa has shown the similar results.^[22]

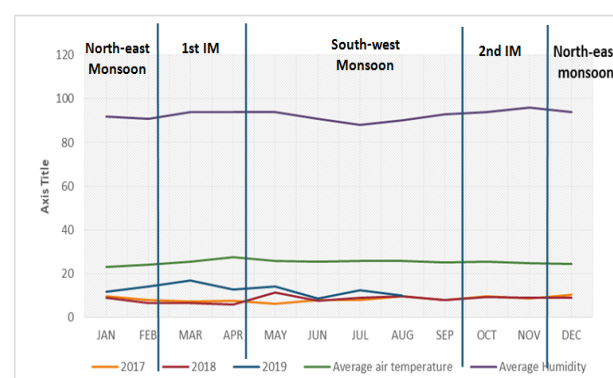


Figure 3. Average air temperature and Average relative humidity with UTI.

However, the Average rainfall and Average relative humidity there was a significant association with the frequency of UTIs (Table 1, Average rainfall $p = 0.01$ and Average relative humidity, $p = 0.03$)

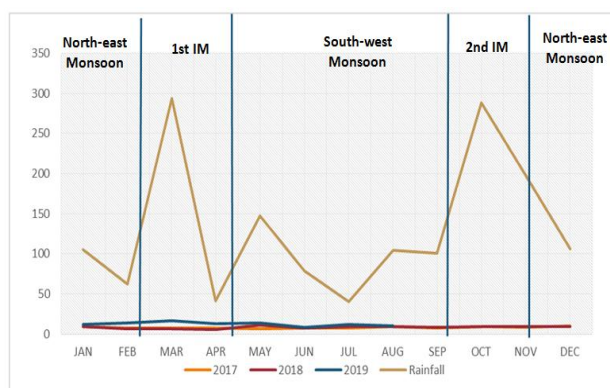


Figure: 4. Average rainfall and UTI.

It is seen that the effects of climatic changes on UTI in countries with different geographic features have been investigated and different results have been found. We found a significant correlation between the mean monthly number of patients with UTI and average rainfall and average relative humidity.

These findings of our study have important implications for healthcare planning, primary care prevention strategies and allocation of available resources.

CONCLUSIONS

The association of incidence of UTI in Central Sri Lanka with average rainfall and average relative humidity is significant as described in the study. There was only a little correlation between the incidence of UTI and average air temperature. This could be due to the fact that there is no pronounced seasonal variation of temperature in Central Sri Lanka. A significant increase of UTI was observed in the first inter monsoon periods when weather changes from one climate season to the other.

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