EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 10
Issue: 4
09-14
Year: 2023

SEASONAL VARIATION OF THE INTERNATIONAL PROSTATE SYMPTOM SCORE IN PATIENTS WITH LOWER URINARY TRACT SYMPTOMS IN CENTRAL SRI LANKA

Anurudda Udaya Bandara Pethiyagoda[1]*, Kalyani Pethiyagoda[2], Sethma Dinushi Wijesinghe[1], Kasuni Samadhi Gunatilake[1], Vathma Samani Sunilrathne[1] and Yauni Wathsala Karunarathna[1]

[1]Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka.
[2]Department of Community Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka.

***Corresponding Author: Anurudda Udaya Bandara Pethiyagoda**
Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka.

Article Received on 27/01/2023 **Article Revised on 17/02/2023** **Article Accepted on 09/03/2023**

ABSTRACT

Objective: To investigate the association between Lower Urinary Tract Symptoms and climatic patterns in Central Sri Lanka, where the tropical climate is dominated by various topographical features, Southwest and Northeast monsoons and regional scale wind regimes. **Method**: This is a descriptive, cross-sectional study performed among the patients attending the General Urology Clinic at Teaching Hospital Peradeniya, Sri Lanka from 4th January 2019 to 20th December 2021. International Prostate Symptom Score was used to assess the severity of Lower Urinary Tract Symptoms. Climatic patterns were tracked using the monthly mean values of rainfall, maximum relative humidity at night and maximum daytime temperature. Data analysis was performed using simple linear regression and graphical representation. **Results**: There were 308 patients in the study group and 74.1% were males while 16.2% of the patients were female. Variation of the individual storage symptoms and the mean total score shows comparatively higher mean values in the middle of the Southwest Monsoon. However, all weather factors show minimum mean values in this season. From simple linear regression analysis between each weather parameter and each symptom, no statistically significant correlation was identified. **Conclusion**: Out of seven considered symptoms, variation of storage symptoms is mostly affected by the seasonal variation of climate according to the graphical analysis. It shows a negative correlation to the variation of climatic elements. According to simple linear regression, there is no statistically significant correlation between Lower Urinary Tract Symptoms and climatic factors in the study group. However, the number of first visit patients has increased in October, the month with highest rainfall.

KEYWORDS: central Sri Lanka, IPSS, LUTS, monsoon, seasonal variation, tropical climate.

INTRODUCTION

Lower Urinary Tract Symptoms (LUTS) are a common medical problem frequently seen in elderly men. According to the National Institute for Health and Care Excellence in the UK, LUTS comprises 3 types of symptoms; storage, voiding and post-micturition symptoms that affect the lower urinary tract.[1] Storage symptoms consist of frequency, urgency, nocturia and urgency incontinence. Weak stream, intermittent urinary stream, straining to void, hesitancy and terminal dribbling are the most common voiding symptoms. The most frequent post-micturition symptoms are the sensation of incomplete evacuation and post-micturition dribbling. Utilizing the International Prostate Symptom Score (IPSS)[2], assessing uroflowmetry parameters, post-void residual volume, prostate size, Prostate-Specific Antigen (PSA) are essential in the diagnosis and further management of LUTS. IPSS is a validated, self-administered questionnaire developed and modified by the American Urological Association (AUA).

The climate of Sri Lanka is dominated by various topographical features, Southwest and Northeast monsoons and regional scale wind regimes. The climate experienced during 12 months period in Sri Lanka can be characterized in 4 climate seasons as First Inter-monsoon season (IM1) from March to April, Southwest-monsoon season (SWM) from May to September, Second Inter-monsoon season (IM2) from October to November and Northeast-monsoon season (NEM) from December to February.[3]

Many studies have been conducted in countries with significant differences in temperatures at different seasons to determine the relationship between climatic conditions and LUTS.[4-8] However, fewer studies are carried out to

investigate the above intervention in tropical countries like Sri Lanka, where the climate is mostly monsoon driven. Therefore, our study aims at investigating any relationship between the weather conditions and LUTS in a study group in central Sri Lanka. This study will help both the general public and the medical experts to avoid common misconceptions and improve the quality of life of people.

METHOD

This is a descriptive, cross-sectional study performed among patients attending the General Urology Clinic (GUC) at Teaching Hospital Peradeniya, Sri Lanka to identify the relationship between LUTS and climatic conditions. Approval for this research was granted by the Ethical Review Committee, Faculty of Medicine, Peradeniya, Sri Lanka. This study was conducted from January 2019 to December 2021. A total of 308 patients participated in this study. All participants were clinic attendees at the GUC and were newly diagnosed LUTS patients (first-visit patients). The patients were questionedusing a questionnaire including IPSS, which is a regularly used screening method in urology that assesses the severity of LUTS with respect to incomplete evacuation, urgency, frequency of urination, weak urine stream, intermittency, straining and nocturia. The prevalence of those symptoms in the previous month of the participants was assessed. Scores are generally obtained as a scale on the severity of each symptom. They can be added up to provide a total symptom score (from 0 to 35), with a higher number indicating more severe symptoms.[9] The IPSS score was translated into Sinhala and Tamil and the questions were asked by qualified invigilators during face-to-face interviews that lasted about 5-10 minutes on average. A written consent for this research was obtained from each patient at the beginning of the interview. All the responses were kept in a database. Monthly mean values of rainfall, relative humidity at night and maximum temperature for January 2019 to December 2021 were obtained from the Department of Meteorology, Sri Lanka for the nearest climate station (Katugasthota). Data analysis was performed using SPSS version 20.Graphical analysis and simple linear regressions were used to elaborate an association between IPSS and climate data.

RESULTS AND DISCUSSION

This study group consisted of 308 patients who attended the general urology clinic at the Teaching Hospital, Peradeniya from 4th January 2019 to 20th December 2021. 74.1% of the participants were male while 16.2 % were female. Difference between mean score of each symptom and age distribution of male and female groups is given in Table 1. In both male and female groups, mean age and mean symptom scores are increased when total IPSS>=7.

Table 1: Mean age and mean IPSS score for each symptom in males and females in the sample.

	All data – male (N = 258)	IPSS>=7 male (N = 228)	All data – female (N = 50)	IPSS>=7 Female (N = 42)
Age	63.60	64.27	52.34	51.14
Incomplete evacuation	2.57	2.84	2.18	2.45
Frequency	2.40	2.66	2.52	2.88
Intermittency	2.29	2.55	2.10	2.45
Urgency	2.34	2.60	2.58	2.81
Weak stream	2.84	3.14	1.90	2.26
Straining	1.59	1.71	2.04	2.43
Nocturia	2.31	2.46	2.18	2.36
Total score	16.34	17.97	15.50	17.64

Table 2 shows the summery of descriptive statistics of weather data.

Table 2: Descriptive statistics of weather data

	Range	Minimum	Maximum	Mean	Std. Deviation
Rain fall	286.81	47.18	333.99	151.98	90.58
RH Max. at Night	7.06	88.65	95.71	92.62	2.33
Max. Temperature	3.90	28.47	32.37	29.84	1.29

Figures 1, 2 and 3 show the mean monthly variation of weather parameters; relative humidity at night (Figure 1), maximum daytime temperature (Figure 2) and mean rainfall (Figure 3) from January 2019 – December 2021. The X-axis is separated into four categories according to the months included in the 4 seasons. In all 3 graphs, a common pattern is observed where the rainfall, maximum relative humidity at night and maximum daytime temperature are lower in the middle of the SWM than in the beginning. Other than that, values decrease again in January and December (NEM and IM2). In the variation of the rainfall and relative humidity at night, maximum mean values were observed at the end of SWM while the peak of maximum temperature is achieved at the beginning of IM1. The month with the coldest daytime is December, and the warmest months are March and April. Humidity typically depends on the seasonal patterns of rainfall in Sri Lanka.[10-12]

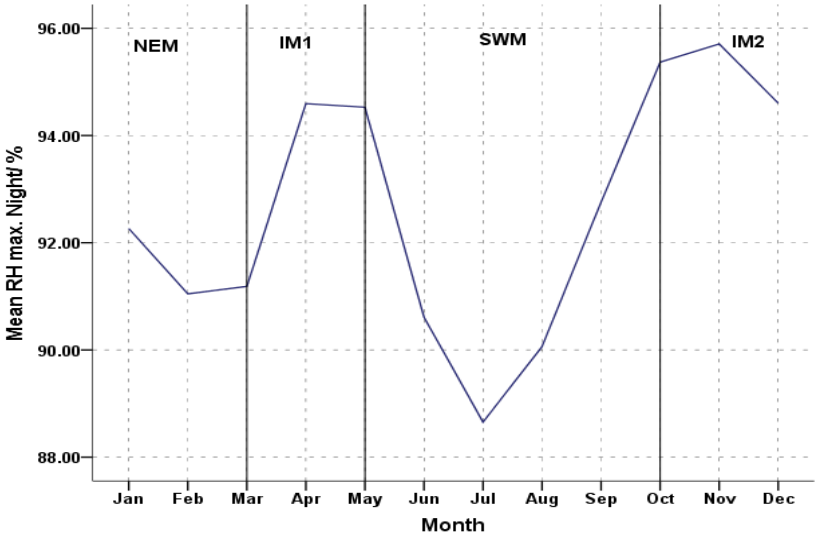

Figure 1: Variation of mean relative humidity at night from January 2019 to December 2021.

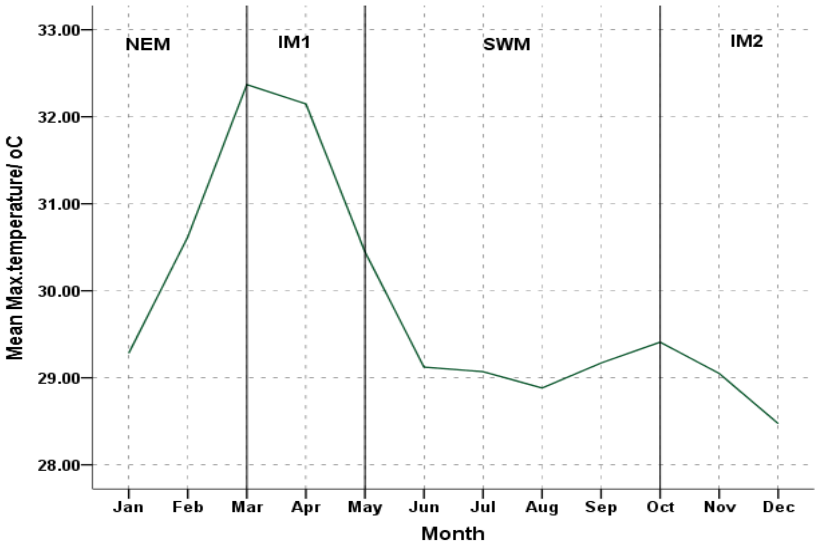

Figure 2: Variation of mean maximum temperature at daytime from January 2019 to December 2021.

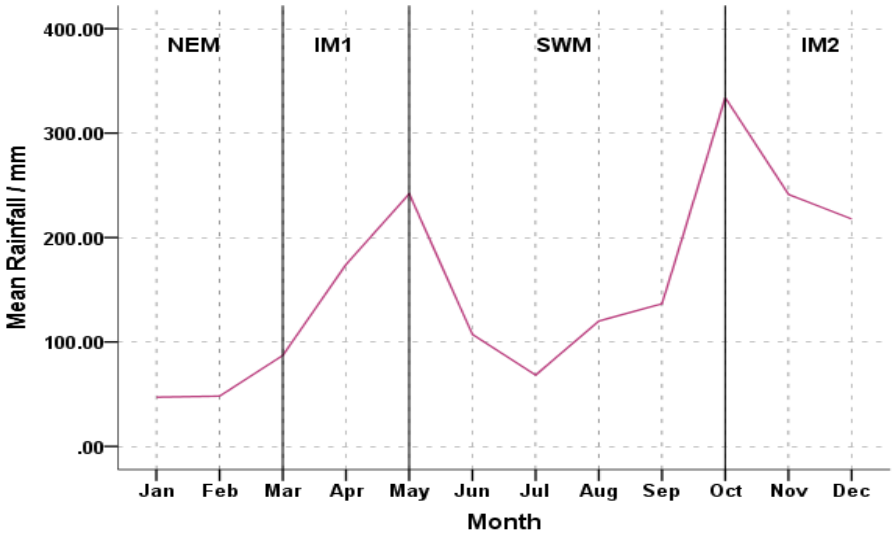

Figure 3: Variation of mean rainfall from January 2019 to December 2021.

Figure 4 shows the variation of IPSS recorded in 4 seasons. The monthly variation of storage symptoms is shown in Figure 4A while the variation of voiding symptoms together with post-micturition symptom is shown in Figure 4B. According to the graphs, frequency, urgency, nocturia, incomplete evacuation and weak stream have been increased in the middle of SWM season compared to other seasons.

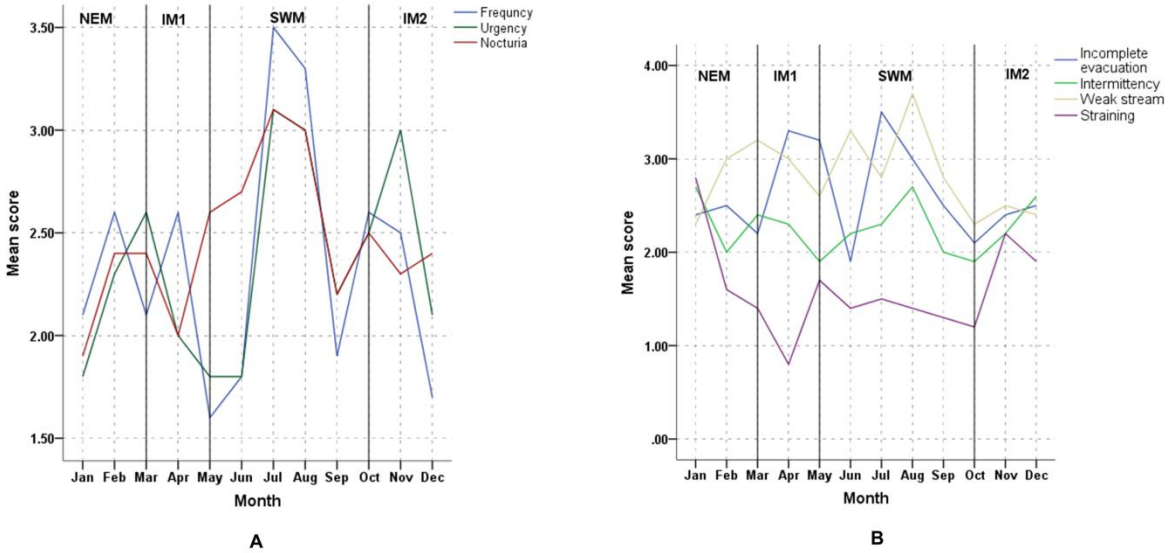

Figure 4: Variation of IPSS recorded in 4 seasons from January 2019 to December 2021. (A)Variation of mean values of storage symptoms; (B)Variation of voiding and post micturition symptoms.

The average mean values of all 7 LUTS were calculated considering the whole period of study (January 2019 – December 2021) and is depicted in Figure 5. According to the graphical analysis, variation of the individual storage symptoms shows a similar pattern to each other in the 4 seasons with some minor differences. The patterns of variation of the voiding and post-micturition symptoms were much scattered with no season showing significant impact on the symptoms.

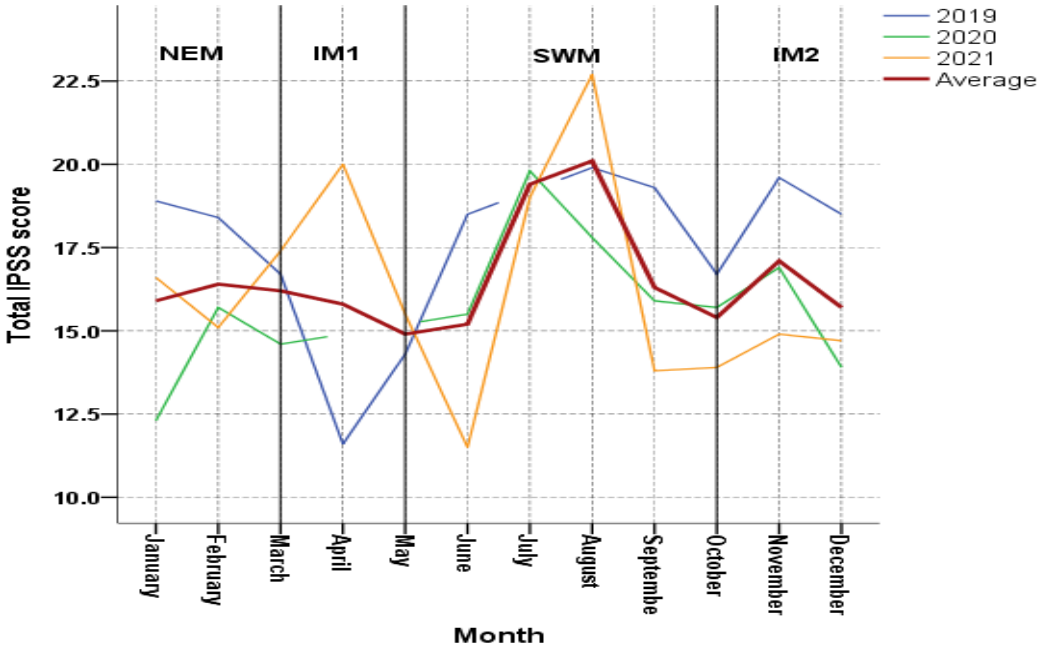

Figure 5: Variation of mean values of total IPSS from January 2019 to December 2021.

In the variation of the storage symptoms and the total IPSS score, comparatively higher mean values are observed in the middle of SWM than at the margins where rainfall and relative humidity at night show minimum mean values. Although people have a belief those urinary symptoms like frequency, nocturia increase

on rainy days, this study shows a negative relationship between rainfall and those storage symptoms. The relationship between temperature and LUTS is also a negative correlation where more LUTS were experienced in colder months. That relationship has been shown in previous research as well. To quantify the above relationships, simple linear regression was performed in-between each LUT symptom and climatic factor. However, no statistically significant continuous correlation was observed between any LUTS and whether condition (Table 3).

Table 3: Results from simple linear regression analysis between climate data and each Lower Urinary Tract Symptom.

	Rainfall (mm)			Max. Relative humidity at night (%)			Max. temperature at daytime (°C)		
	Sig.	Unstandardized coefficients	Standardized coefficients	Sig.	Unstandardized coefficients	Standardized coefficients	Sig.	Unstandardized coefficients	Standardized coefficients
Incomplete evacuation	0.788	0(.002)	-.276	0.622	-0.035(.068)	-.159	0.663	.055(.123)	.141
Frequency	0.521	-.001(.002)	-.206	0.143	-.117(.074)	-.449	0.825	-0.034(.149)	-.072
Intermittency	0.184	-.001(.001)	-.411	0.337	-.038(.038)	-.304	0.585	-.04(.07)	-.176
Urgency	0.991	1.92E+05(.002)	.004	0.383	-.058(.064)	-.277	0.594	-.065(.118)	-.172
Weak stream	0.124	-.002(.001)	-.469	0.026	-.119(.046)	-.637	0.425	.086(.103)	.254
Straining	0.575	-.001(.002)	-.18	0.799	0.018(.07)	.083	0.174	-.168(.115)	-.42
Nocturia	0.881	0(.001)	-.049	0.054	.087(.04)	-.569	0.292	-.092(.083)	-.332
Total score	0.267	-.006(.005)	-.349	0.042	-.412(.117)	-.592	0.362	-.364(.381)	-.289

This study has several limitations. The results of this study highly depend on the number of participants. This study group was not a constant set of patients from the beginning to the end of the study period but clinic attendees complained about LUTS in the general urology clinic. Even though there is a pattern observed between the variations of IPSS with the climate, those mean values are highly dependent on the number of clinic attendees. From Figure 6, it is clear that there are huge ups and downs in the bar graph (Figure 6A) contributing to a considerable variation of the mean number of clinic attendees in 12 months (Figure 6B).

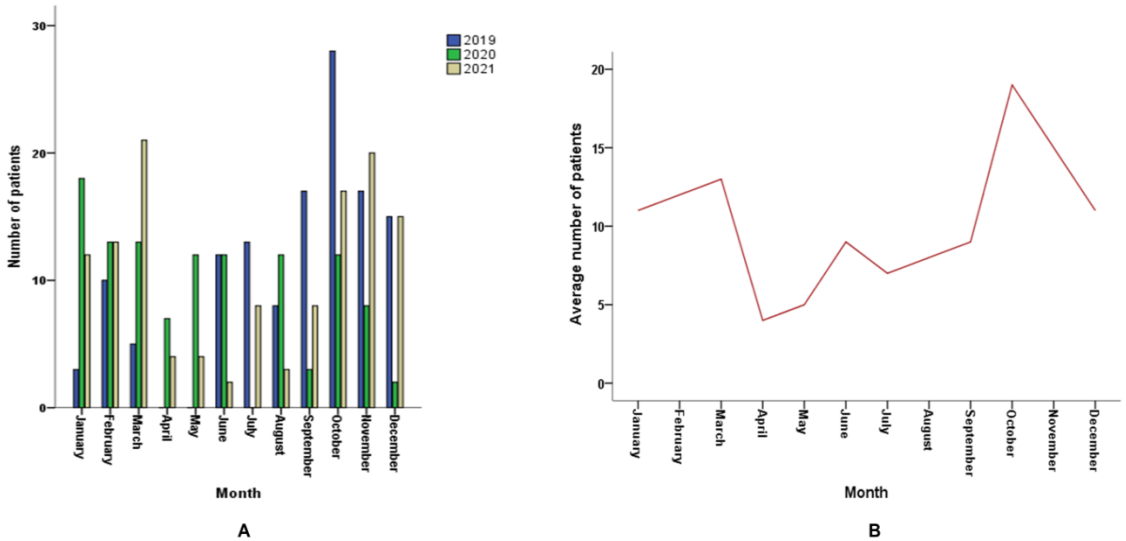

Figure 6: Number of clinical attendees of GUC at THP from January 2019 to December 2021. (A) Graph of the total number of clinic attendees; (B) Graph of the average number of clinic attendees.

For an instance, the minimum mean number of patients was observed in April and May as there were no clinics held in April and May 2020 due to continuous lockdown periods. Due to the difficulties faced during the COVID pandemic (from the beginning of 2020) and many other reasons, this variation of the number of patients is observed. However, in all 3 years, highest mean number of first visits have been occurred in October (Figure 6B), the month with highest mean rainfall (Figure 3). Another limitation in this study is that the IPSS is not an objective outcome measure of BPH/LUTS, but rather a subjective outcome measure. Objective measures like uroflowmetry would be more helpful to determine the relationship between LUTS and

seasonal variation.

CONCLUSION

Climate in the Central province of Sri Lanka shows seasonal variation marked by four monsoons. Variation of rainfall, relative humidity at night, the maximum daytime temperature in those four seasons shows a similar pattern. Out of all LUTS, variation of storage symptoms is mostly affected by the seasonal variation of climate according to the graphical analysis. It shows a negative correlation to the variation of climatic elements. The average number of first visits was increased in the month of October, where there was high rainfall. However, according to simple linear regression, there is no statistically significant correlation between LUTS and the above climatic factors in this study group.

REFERENCES

1. Hollingsworth JM and Wilt TJ. Lower urinary tract symptoms in men. BMJ, 2014; 349 (June 2015).
2. Gratzke C, Bachmann A, Descazeaud A, Drake MJ, Madersbacher S, Mamoulakis C, et al. EAU guidelines on the assessment of non-neurogenic male lower urinary tract symptoms including benign prostatic obstruction. Eur Urol, 2015; 67(6): 1099–109.
3. Department of Meteorology SL. Climate of Sri Lanka. Available from: https://www.meteo.gov.lk/index.php?option=com_content&view=article&id=94&Itemid=310&la.
4. Choi HC, Kwon JK, Lee JY, Han JH, Jung HD and Cho KS. Seasonal variation of urinary symptoms in Korean men with lower urinary tract symptoms and benign prostatic hyperplasia. World J Mens Health, 2015; 33(2): 81.
5. Cartwright R, Mariappan P, Turner KJ, Stewart LH and Rajan P. Is there seasonal variation in symptom severity, uroflowmetry and frequency–volume chart parameters in men with lower urinary tract symptoms? Scott Med J, 2014; 59(3): 162–6.
6. Watanabe T, Maruyama S, Maruyama Y, Kageyama S, Shinba H, Otsuka A, et al. Seasonal changes in symptom score and uroflowmetry in patients with lower urinary tract symptoms. Scand J Urol Nephrol, 2007; 41(6): 521–6.
7. Yoshimura K, Kamoto T, Tsukamoto T, Oshiro K, Kinukawa N, Ogawa O. Seasonal alterations in nocturia and other storage symptoms in three Japanese communities. Urology, 2007; 69(5): 864–70.
8. Shim SR, Kim JH, Doo SW, Yang WJ, Song ES, Song YS. Association between ambient temperature and lower urinary tract symptoms: A hospital-based cross-sectional analysis. LUTS Lower Urine Tract Symptoms, 2018; 10(1): 38–44.
9. Lee KC and Weiss JP. Diagnosis, assessment, and examination. Nocturia, 2020: 41–69.
10. Geirsson G, Lindström S and Fall M. The bladder cooling reflex and the use of cooling as stimulus to the lower urinary tract. J Urol, 1999; 162(6): 1890–6.
11. De Zheng S and Oort AH. Humidity - Temperature relationships in tropical troposphere. J Clim, 1995; 8(8): 1974–87.
12. Sobel AH. Tropical weather. Nat Educ Knowl, 2012; 2(12).