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Original Article

Influence of seasonality in pediatric Respiratory tract infections: A Hospital-Based retrospective Study in Jaffna

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Abstract

This study aims to determine the prevalence, age distribution, and seasonal variation of respiratory infection in the Jaffna peninsula. This study was a descriptive retrospective study in which all patients 12 years of age and below who presented with signs and symptoms of respiratory tract infections and received inward treatment between January 2016 and December 2020 were included. During that period, a total of 2924 data were analyzed. The analysis showed significant correlations between the seasons and disease burden. This knowledge can provide insight into managing resources effectively in resource-limited settings.

Keywords: Seasonality, Climate, Respiratory infections, Infectious diseases

Introduction

Seasonal variation of diseases among children is well known, especially for infectious and chronic diseases. Identification of the significance of the seasonal variation will help to improve understanding of the risk factors of diseases.

A study was published in the European Journal of Paediatrics in April 2016 which included all newly referred patients (51,054) to a teaching hospital in the Netherlands over six years (2008–2013). Seasonality was analyzed using simple moving averages, the standard error of the mean, and the percentage monthly variation. Among those, four diseases fulfilled the definition of seasonality. Respiratory tract infections had a peak in January, gastroenteritis peaked in February and March, functional complaints peaked in March and November, and asthma had a peak in March and October. The respiratory infections peaked during the winter season whereas the functional complaints peaked during the exam months and reached a nadir during the summer school holidays. (2)

A descriptive retrospective study on seasonal variations of respiratory viruses among children with respiratory tract infections in Saudi Arabia was published in 2018. All patients below 14 years of age with signs and symptoms of respiratory tract infections were included in the study. A total of 4611 patients were included from January 2013 to December 2014. Viruses were detected throughout both years, with a peak in December, January, February, and March which showed clear seasonal variation. (3)

Further, knowledge of seasonal variation may improve resource planning in health departments. As healthcare workers, we experience variations in the number of admissions annually, but apart from the well-known variation in respiratory diseases knowledge about patterns and causes of other diseases is lacking. Hospitalization patterns can be credited to not just medical reasons, but also environmental and social factors. This study aimed to analyze the extent to which seasonal variation plays a role in pediatric respiratory tract infections.

Methodology

A descriptive study was conducted at the University Paediatric Unit, Jaffna Teaching Hospital including all admissions from 2016 to 2020. All children below 12 years admitted with Respiratory tract infections such as upper (URTI) and lower (LRTI) respiratory tract infection, Bronchiolitis, and viral-induced wheeze were recruited into the study. URTI, LRTI, Bronchiolitis, and viral-induced wheeze cases were defined according to the ICD 10 classification of (WHO). Data were extracted from the Patient Management System(PMS) developed which is implemented at Professorial Paediatric unit Jaffna to improve the quality of documentation, minimise errors, and maintain a detailed patient database for instant retrieval

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The seasonal changes of the Jaffna district were obtained from the website of the meteorological department (4). Climate is the sum of atmospheric elements and their variations, solar radiation, temperature, humidity, clouds and precipitation, atmospheric pressure, and wind. With that, the seasons of Sri Lanka are divided into four seasons: First inter-monsoon, Southwest Monsoon, Second inter-monsoon, and Northeast monsoon falling in the months March to April, May to September, October to November, and December to February respectively.

The pattern of infection was described and analyzed between the number of cases of each infection and major seasons. Statistical significance was analyzed with ANOVA test and post hoc test.

Results

Out of 10, 923 total admissions in the five years, 2924 (26.7%) were admitted with Respiratory tract-related infections. Among them 50.5% were male and 49.5% were female. Highest number of admissions was noticed among younger children (0-5yrs). It was observed that the highest number of cases was reported in the Northeast monsoon (December to February) and the lowest numbers were observed in the southwest monsoon season (May to September). The analysis resulted in a statistically significant association between seasonal variation and the number of admissions [F (3,56) =5.8, p-0.002, CI=95%]. A Turkey post hoc test was performed to assess the number of admissions with respiratory infections between the seasons in Sri Lanka. It was observed that total number of cases in the first and 2nd inter-monsoon (p-0.18) and between the southwest and second inter-monsoon (p-0.01) were statistically significant.

Table 1. The four seasons of Jaffna peninsula

Seasons	Duration	Rainfall
First inter monsoon (FIMS)	March - April	50-100 mm
South-West Monsoon (SWMS)	May - September	Northwest 200-300 mm Southeast 100-200 mm
Second inter monsoon (SIMS)	Oct- November	500- 750 mm Strong wind + Wide-spread rain
Northeast monsoon (NEMS)	Dec – Feb	300-500 mm Dry cold wind

Table 2. The number of admissions of RTI throughout the seasons

	Gender	URTI	LRTI	Bronchi-olitis	Viral induced wheeze
FIMS	M	148	150	51	15
	F	108	173	34	13
SWMS	M	126	159	121	37
	F	122	152	76	31
SIMS	M	88	117	81	22
	F	100	92	58	18
NEMS	M	178	189	78	39
	F	156	130	68	27
Age	0-5	817	921	558	168
	6-12	197	221	09	34
Total		1026	1162	567	202

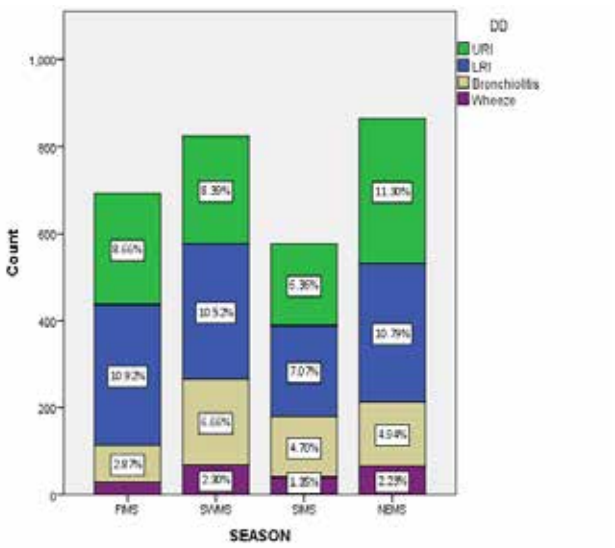

Figure 1. The number of admissions of RTI throughout the seasons

Discussion

Seasonal variations in pediatric respiratory tract infections (RTIs) have long been recognized, yet their precise patterns and implications remain underexplored in many regions. This study presents findings from a retrospective study conducted at the University Pediatric Unit, Jaffna Teaching Hospital, aimed at elucidating the influence of seasonality on RTI admissions among children.

Drawing upon existing literature and methodologies, the study analysed admissions data spanning from 2016 to 2020, encompassing children under 12 years diagnosed with various RTIs, including upper and lower

respiratory tract infections, bronchiolitis, and viral-induced wheeze. The study leveraged the International Classification of Diseases (ICD-10) classification system for disease categorization.

The investigation incorporated meteorological data to correlate seasonal changes in the Jaffna district with trends in RTI admissions. Climate data, including rainfall, temperature, and wind patterns, were analysed alongside admission records to identify associations between environmental factors and disease incidence.

Results revealed a notable seasonal variation in RTI admissions, with a peak observed during the Northeast monsoon season (December to February) and decreased admissions during the Southwest monsoon season (May to September). Statistical analyses indicated a significant association between seasonal variation and the number of admissions, with colder, windier months correlating with heightened RTI incidence.

The analysis resulted in a statistically significant association between seasonal variation and the number of admissions [F (3,56) =5.8, p-0.002, CI=95%]. It showed a positive association with rainfall and cold windy weather. The admissions due to respiratory infection were very high among the wettest months of the Jaffna peninsula from October to February.

Limitations of the study, including the lack of virological data to identify specific pathogens, were acknowledged. Another limitation of this study is that it is hospital-based surveillance and assumes the hospital admissions are proportionate to the less severely affected population who are in the community.

However, the findings underscored the importance of understanding seasonal trends in RTIs for optimizing healthcare resource allocation and guiding clinical management strategies.

In conclusion, this study sheds light on the seasonal dynamics of paediatric RTIs in the Jaffna region, providing valuable insights for healthcare planning and disease management. By elucidating the influence of seasonality on RTI patterns, the study contributes to the broader understanding of infectious disease epidemiology and underscores the significance of climate-health correlations in public health initiatives.

As a country with limited resources, we are still far from incorporating virological studies into the free healthcare system, still, these kinds of analyses may help make clinical guidelines that may help local practitioners rationally prescribe antivirals and antibiotics.

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