

Prevalence of influenza in children presented in pediatric emergency department

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Abstract

Introduction. Seasonal influenza is an acute respiratory infection (ARI) of global importance caused by influenza viruses A and B. Each year, millions of children get sick: thousands of children are hospitalized, and some children die from flu. The aim of this study is primarily, to estimate the prevalence of influenza infection among children presented in the emergency department, secondary, to observe the clinical manifestations, complications and risk factors of influenza cases. **Methods:** This study was conducted from January to April 2024 at the University Hospital Centre: "Mother Theresa" Tirana, Albania. Children from 1month -14 years, with flu-like signs defined by CDC as fever plus cough or sore throat, were assessed for influenza disease using the RT-PCR test of nasopharyngeal (NHF) swab, and the results were compared. **Results:** From 138 nasopharyngeal swabs examined 62(44.92%) resulted in influenza positive and 76(55.07%) influenza negative. About the types 43(69.35%) were type A and 19(30.65%) Type B, 32(74.41%) were A H1 and 11(17.74%) were AH3. There was no significant difference in almost all data between two groups ($p>0.05$) The most common complication was viral pneumonia 13(41.9%). Overall, this research shows a good correlation between ARIs and influenza viruses. **Conclusions:** Even though, a lot of study, especially in high income countries, have proven the benefits of influenza vaccines on ARIs, recently there has been noted a low rate of vaccination and a rising trend of influenza cases worldwide- so that, we believe they should take into consideration introducing the influenza vaccine in the main vaccination scheme.

Keywords: Influenza; Test; Prevalence; Manifestations; Complications; Vaccine

1. Introduction

Seasonal is an acute respiratory infection (ARI) of global importance caused by influenza viruses A and B. Millions of children get sick with seasonal flu; thousands of children are hospitalized, and some children die from flu, each year. [1] According to American Academy of Pediatric the Impact of influenza on children is estimated: 9% develop symptomatic infection annually. Significant morbidity in hospitalized children: 20% require ICU, 17% with pneumonia, 5% require mechanical ventilation, 8-10% experience neurologic complications and 0.5% die. [2] Typically occurs during fall, winter and spring season: all pediatric emergency departments and hospitals, ambulatory settings, worldwide, are overcrowded with children having signs and symptoms of acute viral respiratory infections of different stages. There is a consensus in the research community that influenza viruses play a significant role between respiratory infections and its complications. [1], [2], [3]. Each year it may differ in severity, and in the last few years, many studies have reported the increasing trend of influenza cases and its complications, and a low percentage of the pediatric population being vaccinated against influenza viruses. [3], [4],[11],[12]. According to World Health Organization (WHO) and CDC, the best way to reduce the burden of influenza and its complications is the vaccine, nevertheless, influenza continues to cause ARIs in pediatric population at high rate worldwide and in Albania too. As WHO recommends, the influenza surveillance

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is important to detect influenza types and subtypes to provide data necessary for selection of influenza vaccine components each year, just to be prepared for the next national epidemics. [5],[7].

The aim of this study is primarily to estimate the prevalence of influenza infection among children presented in the emergency department of our hospital. Secondly, to observe the clinical manifestations, complications and risk factors of influenza cases and to compare them with those of non-influenza cases.

2. Material and methods

This is a cohort prospective study, conducted from 1 January to 31 April 2024 at the University Hospital Centre: "Mother Theresa" Tirana, Albania. This study was approved by the Albania Health Service Ethical Committee.

In this study were included children presented to the pediatric emergency department of our hospital with signs and symptoms of acute respiratory infections consistent with flu-like illness as defined by CDC [6], for children who have at least fever plus cough or sore throat. Subjects without these 2 symptoms together and those hospitalized were excluded from the study. We recruited 138 subjects in the age range 1month to 14 years, who were tested for influenza disease using the RT-PCR method (Reverse Transcription polymerase chain reaction) of nasopharyngeal (NHF) swab, which is the gold standard for influenza [13]. Participants were divided into two groups based on the result of the test: those with an influenza positive test and those with an influenza negative test. Both groups have been followed for a period of 1 month for complications and hospitalizations. For this purpose, the pediatric emergency registry and the medical records of hospitalizations have been also used. The data of the two groups were compared using the chi-square test: p -value <0.05 was considered statistically significant. All data are represented as percentages and p -values. The data were analyzed using the SPSS 10 software.

3. Results

Of 138 nasopharyngeal swabs examined 62(44.92%) resulted in influenza positive and 76(55.07%) influenza negative. OF the types of influenza detected 43(69.35%) were type A and 19(30.65%) type B, whereas, of the subtypes A, 32(74.41%) were A H1 and 11(17.74%) were AH3. On type B, there are not any other designations. OF 138 randomized patients, the age group 5-14 year were mostly tested 72(52.2%) and among them 44(57.9%) had negative result, 28(45.2%) had positive one, $p=0.255$ (table 1). There was no significant difference in almost all data between the two groups ($p>0.05$) (table 1 and table 2), except in two of them, "Sore throat" and "Croup" in which there were significant differences as the p -value was less than 0.05 ($p\leq 0.05$): The data "Sore Throat" in the group of influenza negative, has a higher percentage comparing with the other group (24.2% vs 46.1%, $p=0.008$) meanwhile the data "Croup" dominates in the group of influenza positive (16.1% vs 1.3%, $p=0.001$) (table 1).

Table 1 Age groups and clinical manifestations observed in both groups

		Results		Total	P value
		Positive	Negative		
Age groups	1m-12m	7	9	16	0.255
		11.3%	11.8%	11.6%	
	13m-4y	27	23	50	
		43.5%	30.3%	36.2%	
	5y-14y	28	44	72	
		45.2%	57.9%	52.2%	
Fever in °C	<39°C	8	7	15	0.488
		12.9%	9.2%	10.9%	
	≥ 39°C	54	69	123	
		87.1%	90.8%	89.1%	
Cough	58	71	129	0.976	
	93.5%	93.4%	93.5%		

Rhinitis		56	64	120	0.289
		90.3%	84.2%	87.0%	
State	good	52	66	118	0.622
		83.9%	86.8%	85.5%	
	tired	10	10	20	
		16.1%	13.2%	14.5%	
Sore throat		15	35	50	0.008
		24.2%	46.1%	36.2%	
Throat redness		18	18	36	0.477
		29.0%	23.7%	26.1%	
Croup		10	1	11	0.001
		16.1%	1.3%	8.0%	
Conjunctivitis		2	1	3	0.444
		3.2%	1.3%	2.2%	
Rales		11	10	21	0.456
		17.7%	13.2%	15.2%	
Muscle pain		6	3	9	0.175
		9.7%	3.9%	6.5%	
Gastrointestinal signs		12	11	23	0.444
		19.4%	14.5%	16.7%	
Ear pain		0	3	3	0.114
		0.0%	3.9%	2.2%	

During the follow up period 31(22.46%) patients had been complicated and treated as inpatients or outpatients and among them the most common complication was viral pneumonia with 13(41.9%) cases, as it is demonstrated in the chart below (figure1), 16 (51.6%, $p=0.525$) cases had been hospitalized: 6(37.5%) were positive cases and 10(62.5%) were negative ones (table 2). Mean age of hospitalization was 24.8(2.5-78 month) month. There were no intensive care unit admissions and no death among the study population. None of the children had ever been vaccinated against influenza viruses. Only 3 children had comorbidities: two children had Bronchial Asthma, and one Neurofibromatosis.

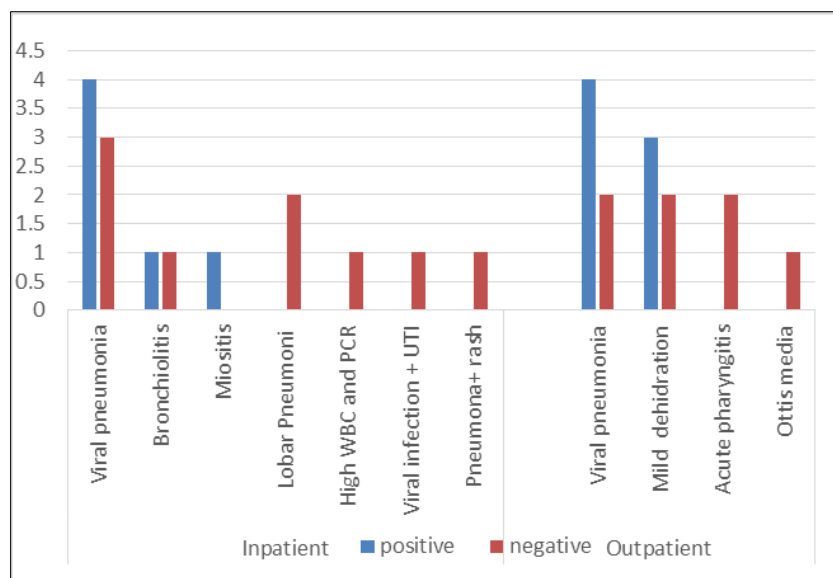


Figure 1 All complications observed between two groups

Table 2 Illustrates other characteristics including in the study

		Positive	Negative	Total	P value
Chest x-ray		9	9	18	0.643
		14.5%	11.8%	13.0%	
Blood test		3	6	9	0.470
		4.8%	7.9%	6.5%	
Hospitalizations		6	10	16	0.525
		9.7%	13.2%	11.6%	
Treatment	symptomatic	54	60	114	0.209
		87.1%	78.9%	82.6%	
	antibiotics	8	16	24	
		12.9%	21.1%	17.4%	
Day of NPH sample	1-3rd	51	65	116	0.602
		82.3%	85.5%	84.1%	
	4-6th	11	11	22	
		17.7%	14.5%	15.9%	
Household contacts		36	50	86	0.352
		58.1%	65.8%	62.3%	

table 2.

Of all influenza positive cases, the involvement of low airways was noted in 11(17.7%) patient vs 10(13.2%) of negative ones (p=0.456) (table 1). 8(12.9%) positive cases required the use of antibiotic vs 16(21.1%) of negative ones (p=0.209) (table 2). The peak of positive cases was in February with 27 (43.54%) cases. Since this month there has been a decline in influenza cases and an increase in those negative ones. (figure 2).

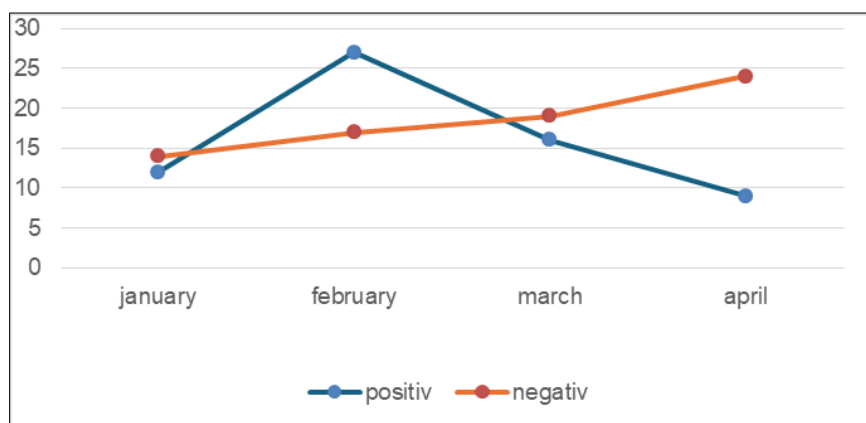


Figure 2 Demonstrates the changes of influenza positive and negative cases over the months of the study

In January prevail the subtype AH1 meanwhile in April type B (figure 3).

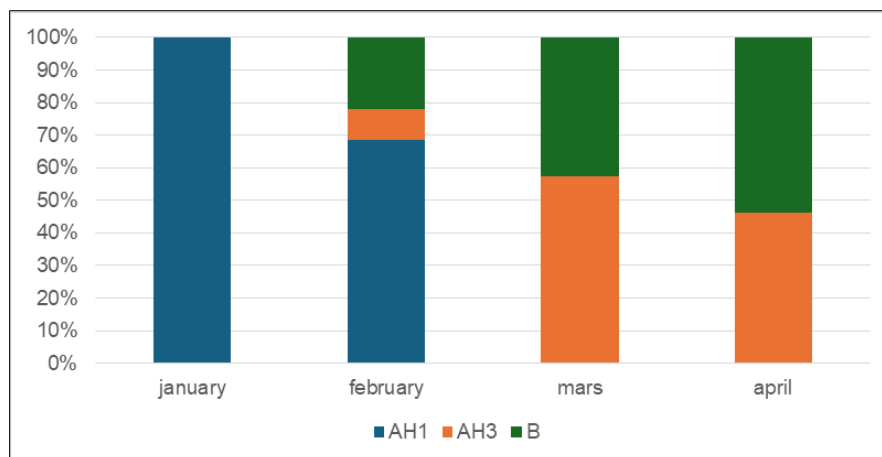


Figure 3 The monthly distribution of influenza cases by types and subtypes detected

4. Discussion

In this study, it is found that there is no significant difference between influenza cases and non-influenza cases (44.92% vs 55.07%). Overall, this research shows that there is a good correlation between acute respiratory infections and influenza viruses aligning with our initial hypothesis which states influenza plays an important role in the ARIs. The type A of influenza dominates the B type. (69.3% vs 30.6%).

The data of this study suggest that fever at high rate 39-40 °C, cough and rhinitis are the major symptoms among influenza cases with 87.1%, 93.3% and 90.5% respectively. High fever, its duration and cough are the most common causes that parents bring their children to ED. Because of small working group and some other circumstances, it was not possible to evaluate the exact length of fever and cough. The mean age of influenza hospitalizations was 24.8(2.5m-78m) month which is consistent with the literature saying that children less 5 years especially 2 years, are more likely to have severe cases. [1]. This survey demonstrates that the hospitalization rate among influenza cases were low 6 (9.67%), considering the overpopulation of ED and of our hospital at that period of study. This is due to the exclusion of admissions in this study as well as the short period of study. Meanwhile, the most frequent complications were viral pneumonia 4(6.45%), 8(12.9%) patient received antibiotics, and no one received antivirals. Overall, these findings are consistent with those of some other similar previous studies, and they differ basically because they are multicenter ones. [8], [9],[10]

The strength of this experiment is that influenza was laboratory confirmed disease using RT-PCR test which has high sensitivity and specificity.[13].

This is the first time that this kind of study was conducted by our ED. By highlighting the impact of influenza on children health this research as well as all worldwide studies around influenza, underscore the importance of measures to prevent and control this disease. These findings contribute to knowing the whole picture of influenza characteristics in the Albanian pediatric population, as the ED play an important role in influenza surveillance system.

According to the WHO the only effective way to decrease the burden of influenza and its complications is the vaccination. Because of the low rate of influenza vaccination in the Albanian pediatric population limiting for some adult categories, this study carries significant implication for policymakers and parent emphasizing the need for strategies to mitigate the implementation of this vaccine among Albanian children.

This study has several limitations that may have interfered with the outcomes. Firstly, the short of period of study: the period January to April was the initiation of the survey. This experiment was conducted in a single center study, pediatric emergency department of University hospital: "Mother Theresa", Tirana, which is the most important and biggest hospital of Albania. Summarizing, small sample size had led to less severe cases, risk factors and comorbidities limiting our ability to establish the causality between influenza viruses and important diseases. The homogeneity of our specimen may restrict the generalizability of our outcomes to broader population. This project is ongoing process for the next influenza season, 2024-2025, 2025-2026-including also the hospitalizations. Future studies should explore if higher rate of influenza vaccines implementation in Albanian pediatric population can reduce the acute respiratory infection ED presentations.

Considering these findings, intervention need to be done to decrease the burden of influenza among children in Albania. Health care institutions, should consider expanding implementation of influenza vaccines in all children. Collaboration between health care providers, educational institutions is essential to create supportive environment for parent acknowledging the role of influenza vaccines on their infant's live, contributing so to increasing the influenza vaccine rate among pediatric population in Albania.

5. Conclusion

In conclusion, this study has confirmed the important role of influenza among pediatric ARIs. Even though, a lot of study, especially in high income countries, have proven the benefits of influenza vaccines on ARI, recently there has been a low rate of vaccination and a rising trend of influenza cases- so, we believe they should take into consideration introducing the influenza vaccine in the main vaccination scheme.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all participants including in the study.

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