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Risk factors for respiratory infections in a group of pediatric patients

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ABSTRACT

Introduction: Specialized studies confirm the fact that respiratory infections are one of the main causes of morbidity and mortality within the pediatric population under 5 years of age. Despite the existence of countless clinical and paraclinical management protocols, the treatment and evolution of these patients are often unpredictable.

Methods: This study took place over a period of three years, comprising a final group of 181 pediatric patients, centralizing all social, demographic, clinical, and paraclinical data obtained from the observation sheets.

Results: This group included 181 patients with an average age of 3.33 (out of which 14.36% were aged under one year), an average weight at birth of 3,003.71 g, hospitalized at the Sf. Ioan Emergency Clinical Hospital for Children in Galati for an average number of days equal to 8.72. Most of them come from urban areas (62.43%) and the incidence of examinations reached its peak during the winter months (37.56%). Low incidences of anti-pneumococcal vaccinations (3.9%) or other additional vaccines (0.6%) were detected.

Conclusions: In conclusion, this descriptive statistical analysis has demonstrated that there is a number of complex interactions involving both emotional, psychological, and individual factors that can influence the therapeutic decision-making process for these pediatric patients.

Keywords: risk factors, therapeutic management, pediatric pathology

INTRODUCTION

The specialized literature defines respiratory infections as one of the main causes of morbidity and mortality in pediatric patients, fact demonstrated by international statistics showing a rather bleak picture: about 1.3 million of patients under 5 years of age die annually due to respiratory pathologies, while in underdeveloped countries respiratory infections can be responsible for about 34% of the deaths [1-4].

Clinical and paraclinical research has shown that there are several risk factors whose presence is responsible for the increased susceptibility of pediatric patients to respiratory infections. Specialized studies confirm the fact that these factors cannot be attributed only to patients' own characteristics such as age, gender, and associated comorbidities, but are also present due to the factors related to the environment of origin, namely the seasonal incidence [5-14].

MATERIAL AND METHODS

This research has the characteristics of a descriptive cross-sectional study conducted at the Sf.Ioan Emergency Clinical Hospital for Children in Galati for a period of 3 years on pediatric patients. The start of this study was approved by the Hospital Ethics Committee, each patient, in this case, legal guardians, filling in an informed consent form through which they expressed their participation in this research.

Social and demographic data was obtained from the patients enrolled in the study, as well as individual variables, data about any associated pathologies (family medical history, personal, pathological, and physiological history), as well as clinical and paraclinical information. All data obtained from the study of the observation sheets was introduced into the IBM Statistics V. 24 * SPSS, Inc. Chicago, IL, USA statistical analysis software) and Excel 2019, being subsequently filtered and sorted according to different criteria. From a descriptive point of view for the diagrams, graphic representations were used, by making use of software applications dedicated to programs. Category values were introduced into contingency tables and the non-parametric Chi-square (χ^2) test was done.

RESULTS

The descriptive statistical analysis will be initialized with a brief presentation of the main scalar, and individual variables, detected in the database. Thus, as observed in the table below, we can conclude the following:

Table 1. Descriptive statistics of the detected scalar values

	N	Minimum	Maximum	Mean	SD	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	SE	Statistic	SE
Age of patients (already turned)	181	0	14	3.33	3.197	1.553	0.181	2.052	0.359
Weight at birth (in grams)	181	1,900	4,100	3,003.31	499.767	-0.153	0.181	-0.443	0.359
APGAR score	181	6	10	8.77	0.829	13.068	0.181	174.091	0.359
Days of hospitalization	181	4	24	8.72	3.075	1.752	0.181	5.213	0.359

Note. SD: Standard deviation & SE: Standard error

1. The age of the patients has a normal Gaussian distribution curve, discreetly deviated to the left. The average value is 3.33 years, with a maximum peak of incidence around 3 years. The associated SD is ± 3.19 years, the values of the defined statistical indices suggesting the existence of a homogeneous distribution. Such statistical data allows us to admit that the maximum prevalence of respiratory tract infections occurs in subjects under 5 years of age, a hypothesis in accordance with specialized studies.
2. From the point of view of weight at birth, the Gaussian curve does not show deviations, the mean value being 3,003.31 g with SD of ± 499.76 g. It can be seen that the minimum weight at birth is 1,900 g, while the maximum reaches the threshold of 4,100 g. Apgar scores have an incidence peak of around 9 points, defining a discreet deviation to the right of the Gaussian curve. A minimum APGAR score of 6 points is noted, with an average value of 8.77 and a SD of ± 0.829.
3. The number of patients' days of hospitalization, although a variable with a normal Gaussian distribution, shows deviation to the left, with a peak of incidence on the 8-day threshold. The MV is 8.72 days with an associated SD of ± 3.075 days, extreme values describing a wide range between a minimum of 4 days and a maximum of 24 days (**Table 1**).

The gender distribution of patients is in favor of males in the case of children aged 1-10, while female sex predominates for extreme ages (less than 1 year or over 10 years of age), $p = 0.675$. There are no significant incidences related to the environment of origin, the distributions being approximately equal, irrespective of the age groups (however, most of them come from urban areas–68% of the patients aged 1-3).

Most patients had normal weight at the time of the examination, but an important percentage of those aged 1-3, about 21%, but also 13.3% of those aged 3-10 were underweight ($n = 27$, 18.75% of the total of those in the age groups 1-10). The diet of the subjects in the first year of life had been predominantly artificial (46.10% of the total of patients), followed by a percentage of 33.70% patients who had been exclusively on natural diet.

Table 2 is showing the seasonal variation of respiratory pathologies, although there is no statistical significance according to the Chi-square test ($p = 0.869$). It has a particular distribution, namely the predominant incidence of the winter season in patients up to 3 years of age, while for those who go beyond this threshold, there is a maximum incidence of examinations during the spring. Although an extremely low percentage of patients were institutionalized, 1.6%, their distribution was predominant in the age group over 10. The Chi-square test, by the 0.000 value of p confirms the existence of statistically significant differences. Finally, it is noted that 3.8% of the patients had immune deficiencies.

The statistical analysis carried out confirms that out of the 181 pediatric patients, a number of 76 subjects (that is a percentage of 41.98%) present risk factors that can contribute to the existence of slow or even unfavorable clinical evolutions.

From the point of view of vaccinations it can be seen that vaccines were administered in accordance with the national immunization schemes in the case of 141 subjects (77.90%).

For a number of 33 patients, an outpatient treatment was attempted. It consisted of either antibiotic treatment (12.12% of patients) or symptomatic treatment.

DISCUSSION

The current clinical research was meant to highlight certain risk factors that can influence the clinical and paraclinical evolution of upper respiratory infections in children.

The age and gender of the patients in the studied group have not significantly influenced the incidences of associated respiratory pathologies. The meta-analysis made in [15] on 4 studies, is in line with the findings of the current research, suggesting the inconsistency of the effect that these two variables may have on the evolution of pediatric patients with respiratory infections.

Although the chi square test values do not confirm the existence of a statistically significant difference, an increased incidence of urban patients was noticed, in contrast with most of the existing studies, but justifiable in terms of an increased and easy addressability to medical services for urban patients [16, 17].

As previously mentioned, at the level of the group, there is a predominance of cases in patients under 5 years of age (79.55% of the total) according to international studies as follows: Gondar, with an infection rate for children under 5 of 26.3%, Addis Ababa (23.9%). The infection rate found in clinical research exceeds those in India (41.6%), Cameron (54.7%), Nigeria (64.9%), Kenya (69, 4%) or even Bangladesh (70%) [18-24].

It was further hypothesized that the low age of patients was a predominant risk factor in the incidence of respiratory infections, fact proven as well by the number of days of hospitalization (there was an inverse proportionality, highly significant statistically between the age of patients–the variable X and the number of days of hospitalization as Y variable, according to an equation $Y = 3.76 - 0.05 * X$, and a linear R^2 of 0.002). And this time the conclusion was in line with those obtained in the specialized studies, being partially justifiable starting from the premise that the young age of the patients was associated with immune deficiencies [25, 26].

It is important to remember that the low percentage of natural dieting, in our case 33.7%, is a determining factor in the increased incidence of respiratory diseases according to international studies [27-29].

Table 2. Seasonal variation of respiratory pathologies

		Patients' groups of age								Safety index
		Under 1		1-3 years old		3-10 years old		Over 10 years old		
		C	CV N (%)	C	CV N (%)	C	CV N (%)	C	CV N (%)	
Patients' gender	F	12	46.2%	56	56.0%	24	53.3%	4	40.0%	0.675136
	M	14	53.8%	44	44.0%	21	46.7%	6	60.0%	
Patient's environment of origin	R	13	50.0%	32	32.0%	18	40.0%	5	50.0%	0.283015
	U	13	50.0%	68	68.0%	27	60.0%	5	50.0%	
Seasonal variations of respiratory infections	Spring	6	23.1%	30	30.0%	18	40.0%	4	40.0%	0.869
	Summer	3	11.5%	6	6.0%	3	6.7%	1	10.0%	
	Autumn	8	30.8%	24	24.0%	8	17.8%	2	20.0%	
	Winter	9	34.6%	40	40.0%	16	35.6%	3	30.0%	
Weight index	Normal weight	24	92.3%	78	78.0%	39	86.7%	10	100%	0.393
	Underweight	2	7.7%	21	21.0%	6	13.3%	0	0.0%	
	Paratrophy	0	0.0%	1	1.0%	0	0.0%	0	0.0%	
Diet	Natural	11	42.3%	29	29.0%	17	37.8%	4	40.0%	0.807
	Artificial	9	34.6%	37	37.0%	15	33.3%	4	40.0%	
	Mixed	6	23.1%	34	34.0%	13	28.9%	2	20.0%	
Institutionalized	No	26	100%	99	99.0%	45	100%	8	80.0%	0.000
	Yes	0	0.0%	1	1.0%	0	0.0%	2	20.0%	
Immune deficiency	No	25	96.2%	94	94.0%	45	100%	10	100%	0.885
	Ig A immune deficiency	1	3.8%	3	3.0%	0	0.0%	0	0.0%	
	Ig A and Ig G immune deficiency	0	0.0%	2	2.0%	0	0.0%	0	0.0%	
	Ig G and Ig M immune deficiency	0	0.0%	1	1.0%	0	0.0%	0	0.0%	

Note. C: Count & CV: Column valid

Other risk factors that have the potential to increase the incidence of respiratory diseases detected in the analyzed population: are the collectivity (42%) and recurring hospitalizations (68.5%).

CONCLUSIONS

Current research has confirmed that risk factors have been detected within the analyzed group, factors that can influence the incidence of respiratory pathologies within the Sf. Ioan Emergency Clinical Hospital for Children in Galati, of which we mention: age under 5, socioeconomic conditions (the prevalence of infections and examinations being higher for urban areas), associated pathologies (such as nutritional status, type of diet, weight at birth), contact with sick people, collectivity and not least, institutionalized patients.

Author contributions: LSM, AN, LCN, MPD, & OMM: validation & supervision; **LSM & OMM:** writing–original draft preparation; **AN & MPD:** investigation; **AN, OMM, & LSM:** conceptualization, methodology, software, formal analysis, resources, data curation, writing–review & editing, & funding acquisition; & **LSM:** visualization & project administration. All authors have agreed with the results and conclusions.

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Ethical statement: The authors stated that the study was approved by Sf. Ioan Emergency Clinical Hospital for Children Ethics Committee on 16 November 2020 (Approval code: 19398). Written informed consents were obtained from the participants.

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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