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Epidemiological data on purulent otitis media in the pre- and post-COVID-19 periods: A hospital-based perspective

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Abstract

Introduction: The COVID-19 pandemic emerged in Europe at the end of 2019, while the first confirmed cases in Albania were reported in March 2020. The epidemic officially ended in 2023. From 2021 onward, following the most severe waves and the end of lockdowns and restrictive measures, hospitals and health centers became more accessible. A continuing challenge for the Albanian health system, as elsewhere, was post-COVID effects and pediatric population involvement.

Aim of the study: To provide a statistical overview of hospitalized acute and subacute purulent otitis media (OMA, OMSA) cases in the ENT Division and two pediatric divisions (infectious diseases and general pediatrics) at the Tirana University Hospital Center "Mother Teresa" (TUHC), comparing pre- and post-pandemic peak periods to understand the effect of isolation and the epidemic on these morbidities and age-group hospitalization trends.

Material and methods: Retrospective keyword-based screening ("otitis media") of the hospital internal database (SISP) and ENT surgical theater records at University Hospital "Mother Teresa." Two analyzed intervals were 2017–2018 and 2021–2022. Excluded cases were cholesteatoma and otitis media with perforation requiring tympanoplasty. Filtered records were subjected to statistical analysis.

Results: In 2017–2018, 40 pediatric and 41 adult patients were hospitalized for acute or subacute purulent otitis media, with mean ages of 8 years and 47.7 years, respectively. In 2021–2022, 18 pediatric and 18 adult cases were hospitalized, with mean ages of 3.9 years and 46.4 years. Total admissions decreased post-peak, while pediatric patients showed longer hospital stays, hospitalization at younger ages, and fewer surgical interventions, reflecting a more conservative approach in children. Data extraction revealed also substantial database inaccuracies, highlighting the need for more precise, individualized data parameters.

Conclusion: The post-COVID-19 period appears to have influenced otitis media epidemiology and management, particularly showing a shift toward younger pediatric hospitalization and longer inpatient care. The study emphasizes potential changes in disease and treatment patterns limited to hospitalized cases and identifies the need for future studies, including outpatient data and larger populations.

Keywords: COVID-19; Acute Otitis Media; Subacute Purulent Otitis Media; Epidemiology; Hospitalization; TUHC

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1. Introduction

The COVID-19 pandemic emerged in Europe at the end of 2019, with the first confirmed cases in Albania reported in March 2020. Strict lockdowns, social distancing measures, and restricted access to healthcare services characterized the early pandemic phase. From 2021 onward, following the most severe epidemic waves, healthcare services gradually resumed normal activity.

Different studies have shed light on shifts in epidemiology of several diseases like respiratory (1), cardiac (2) as well as chronic diseases like diabetes or hypertension (3, 4). Disruption of routine health care systems as well as changes in the lifestyle or social isolation; all have implications, especially in the management of chronic diseases (4).

In the field of ENT diseases, several reports have demonstrated an initial reduction in upper respiratory tract infections during the COVID-19 pandemic, followed by an increase in case numbers and related complications after the relaxation of epidemic control measures. (5,6,7)

Otitis media , particularly in its acute and subacute purulent forms (AOM), is among the most common upper respiratory infectious diseases, affecting both pediatric and adult populations. Its peak incidence appears between 6 and 24 months of age, being quite common in children under the age of 5. Its incidence decreases with age but can still affect older children or the adult population, being more pronounced during autumn and winter, coinciding with peaks in viral upper respiratory tract infections.

Changes in social interaction, school attendance, and healthcare-seeking behavior during the pandemic may have also influenced its epidemiology, the same as other similar diseases.

This study aims to evaluate the epidemiological differences in hospitalized purulent otitis media cases before and after the COVID-19 pandemic peak in a tertiary referral hospital, providing insight into indirect pandemic effects on ENT morbidity.

2. Material and methods

This is a retrospective study. The aim was to analyze the variation in cases hospitalized at Tirana University Hospital Center (TUHC) for acute and subacute otitis media during the pre- and post-pandemic periods. The objective was to understand the impact of social isolation and the epidemic itself on these morbidities. Both adult and pediatric cases were included in the study.

Two comparable two-year periods were taken into consideration: 2017-2018, before the outbreak of the COVID-19 epidemic, and 2021-2022, when the epidemic began to subside. The patients with AOM were hospitalized in three divisions: ENT Head and Neck Surgery, Infectious diseases in the pediatric hospital, and the general pediatric division, all of which are part of TUHC.

The study was conducted using the central database of TUHC, searching for the keyword “otitis media.” Additional data were extracted from the ENT division’s surgical database, which includes all otitis media–related surgeries for both adults and children.

Cases involving cholesteatoma surgery, as well as otitis media with perforation treated solely with tympanoplasty, were excluded.

In total, 256 subjects were considered for further analysis, but only 117 met the inclusion criteria for the selected diagnoses. For each case, information on age, gender, season, diagnosis, surgical procedure performed, and length of hospitalization was collected and analyzed.

Data were analyzed using IBM SPSS Statistics (version 26.0, IBM Corp., Armonk, NY, USA).

3. Results

After data cleaning, 40 pediatric cases and 41 adult cases met the criteria for acute and subacute OM and were hospitalized during 2017–2018, while 18 adult and 18 pediatric cases were hospitalized during 2021–2022.

Figure 1 presents the graphics of the time period and group distribution, notably larger groups for the first time period.

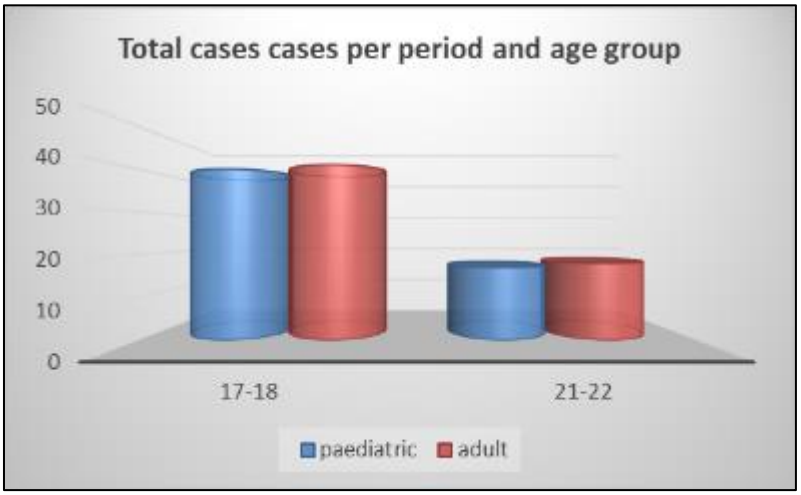

Figure 1 Number of paediatric and adult cases for each time interval

During the first period in study, the average age of the children hospitalized was 8 yo (SD= 5.1), varying from 0.7 to 17 yo, while for the hospitalized adults was 47.7 (SD = 18.0), varying from 19 to 83 yo.

The same figures for the second analyzed period were a mean pediatric age of 3.9 (SD = 4.5), with the smallest hospitalized child being 0.2 years old and the oldest 18 years old, while the mean adult age was 46.4 (SD = 14.2), varying from 19 to 70 years old. These values are shown in the figure 2 below.

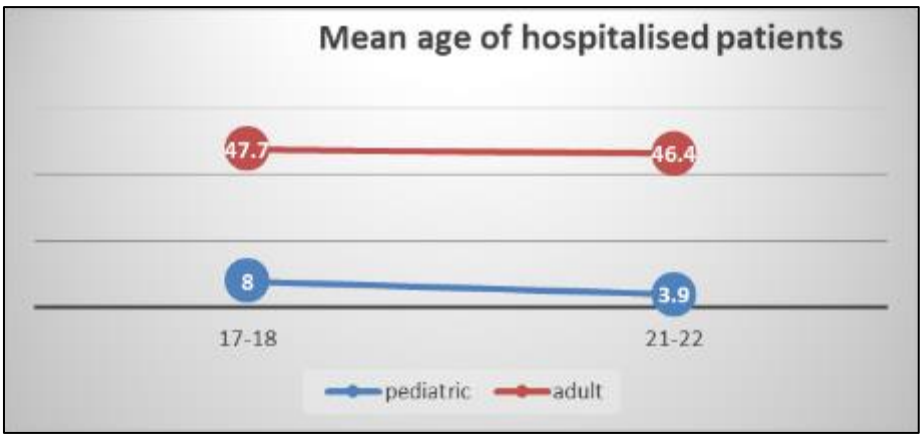

Figure 2 The mean age of hospitalized patients, both pediatric and adults in both time periods (before and after pandemics)

A univariate analysis was performed with age as the dependent variable, while the fixed factors included year (ped.year) and gender (ped.gender).

The results indicate that the time period had a meaningful influence on the age at which patients were hospitalized, with significant differences in mean age observed across the studied years ($F = 8.890$, $p = .004$). By contrast, age did not differ significantly between males and females ($p = .245$), and the effect of time period was similar for both genders, as shown by the non-significant interaction between year and gender ($p = .461$). Although the overall model was statistically significant ($p = .016$), it accounted for a relatively small proportion of the variability in age, explaining 17.5% of the total variance ($R^2 = .175$).

The same statistical analyses were applied to the adult population. Neither time period nor gender had a statistically significant effect on the number of hospitalized patients ($p > 0.05$).

The study explored the seasonal variation of cases with otitis media, acute or subacute, in both groups, during pre- and post-COVID time periods. It was noted, as already presented in Fig. 3 below, that the pediatric and adult populations show different seasonal variations. Before the pandemic, the seasonal distribution of hospitalized pediatric cases was relatively stable throughout the year, with a slight decrease during the winter months. In contrast, in the post-pandemic period, winter seasons accounted for the highest number of pediatric hospitalizations.

While for adult population, both winter and spring are the most problematic seasons, with a slight increase of cases in spring after the pandemic.

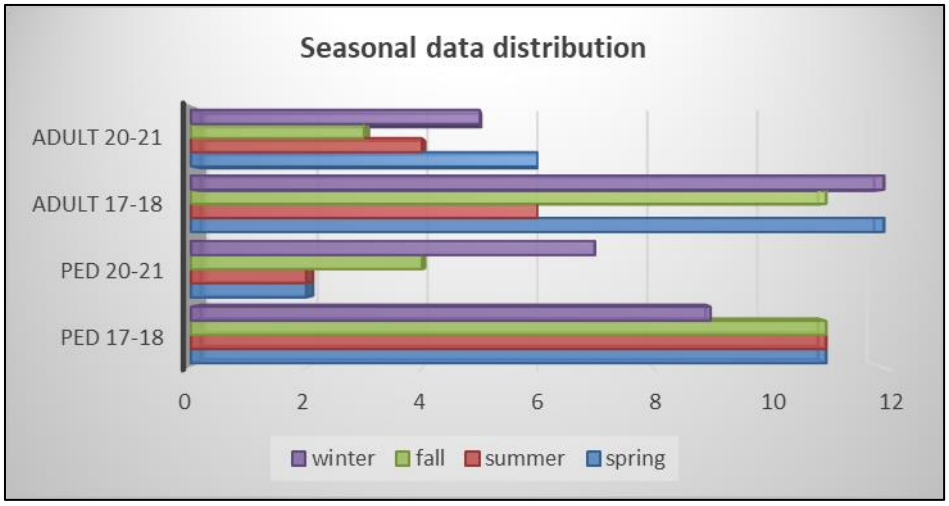

Figure 3 Distribution of hospitalized cases for both adult and pediatric populations for both time periods taken into analysis

As the gravity of cases hospitalized is reflected somehow in the duration of hospitalization, we calculated the average duration of hospitalization for each group and each time period. These data are presented in the table 1. The trend indicates an increase in the duration of hospitalization among children with acute otitis media, alongside a reduction in hospitalization duration among adult patients.

Table 1 Mean hospitalization duration for each group age and each period in the study.

	ped 17-18	**ped 20-21**	**adult 17-18**	**adult 20-21**
Hospitalisation duration (aver days)	6.6	8.5	7.4	6.9

The last variable analyzed by the study was the need to undergo a surgical procedure. The surgical procedures encountered varied from a simple myringotomy to a radical mastoidectomy (2 adults). Several drainage procedures of retroarticular abscesses and antrotomies were performed in children. Fig 3 below presents a graphical representation of these cases in percentages of the hospitalized cases.

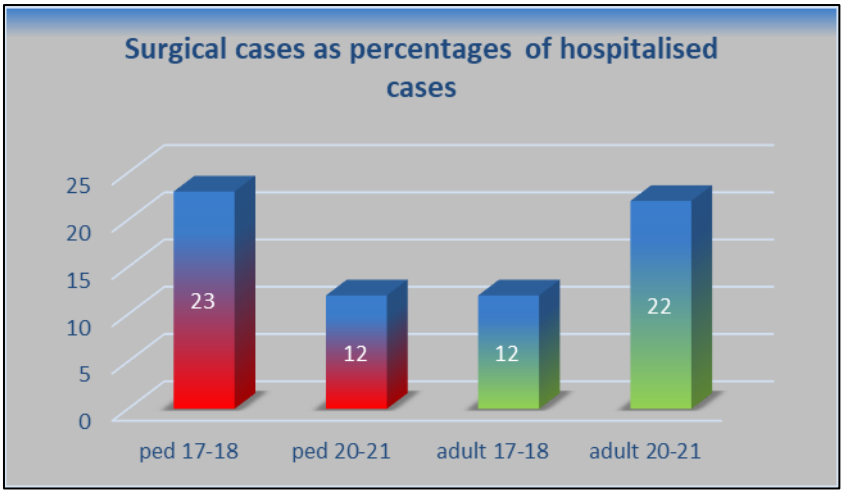

Figure 4 Percentage of patients who underwent a surgical intervention, for each group and time period in the study

It is obvious that the number of surgeries in the pediatric population decreased after the pandemic, but the contrary is seen in the adult population.

4. Discussion

There is an emerging body of evidence for changes in the epidemiology or courses of diseases before and after the Covid 19 pandemic (1,4,5,8). Some diseases were suppressed due to social restrictions (9), the normality of the healthcare system was also disrupted (10), including the check-ups and follow-ups of certain conditions and also the "immunity dept" has its role (11,12). The latter concept suggests that reduced exposure to certain pathogens during the COVID-19 pandemic, diminished the population's immunity and consequently led to atypical outbreaks, thereby altering the incidence and seasonality of several diseases. This mechanism may explain the observed shift in the age distribution of acute otitis media in the pediatric population in our study, from a mean age of 8 yo to 3.9 yo.

Although our study was based exclusively on hospitalized cases and did not assess the overall incidence of AOM in the general population, we observed a statistically significant shift in the mean age of pediatric patients toward younger ages. A similar trend was noted in the adult population (from 47.7 to 46.4); however, this change did not reach statistical significance. The study of Gasko-Laborda J. C. et al (11), found a rebound in the pediatric and respiratory-transmitted seasonal viral infections. And it is already known that viral infections often lead to purulent otitis media. It can additionally be postulated that this age shift, is more pronounced in children, as their immune system is still immature and undergoing development.

The same theory of "immunity debt" may explain the changes in the seasonal distribution of AOM in both adult and pediatric populations in the study, although more pronounced in children, making winter harsher for them in comparison with adults.

Looking at hospitalization patterns, we found that children tended to stay in the hospital longer but underwent fewer surgical procedures, whereas adults had shorter stays with a higher proportion of surgeries. This suggests that pediatric cases were being managed more conservatively, while adult patients may be directed toward surgical treatment more readily, accounting for their overall shorter hospital time.

In terms of absolute numbers, there was a decrease in total hospitalizations across all age groups. The study includes a total of 117 cases. This number of cases is not sufficient to allow generalizations regarding the incidence or prevalence of the pathology in the general population.

Most studies on this topic are focused on acute otitis media, its complications, or otitis media with effusion (OME) during the pandemic, and they generally report a decrease in cases presented to healthcare services (13–16). Our findings align with these observations, but they reflect a later post-pandemic period. Interestingly, Korkomaz et al. (17) reported an increase in AOM cases in their population; although their data spanned a longer time and a smaller cohort, their trend differs from what we observed in our series. Another study, the one of Ishimori et al (18), reported an increase in age of presentation, but their classification of pre -Covid , Covid and post- Covid was different from ours. The German study

(19), which considered 2022–2023 as the post-COVID period, declared that surgical procedures for acute otitis media increased across all age groups, suggesting that the disease may have become more severe. Many other studies are now examining AOM and its complications in the post-pandemic era, but differences in time periods considered, patient numbers and methodologies make it difficult to compare results directly.

These different findings also raise some interesting questions: How much does social behavior influence the timing and the status of the disease at presentation? Do different populations approach healthcare differently in the aftermath of COVID-19? And should we also consider the psychological impact of the pandemic on populations when interpreting these trends?

5. Conclusion

In conclusion, our study suggests that the post-COVID-19 period has influenced the epidemiology and management of otitis media. We observed a noticeable shift in the pediatric population toward younger ages, accompanied by longer hospital stays and fewer surgical interventions, suggesting a more conservative approach in children. Although our study was limited to hospitalized cases, it emphasizes how the pandemic and its aftermath may have altered typical patterns of otitis media. Future studies including outpatient data and larger populations are needed to fully understand these trends and their implications for health systems.

Compliance with ethical standards

Disclosure of conflict of interest

No competing interests declared.

Statement of ethical approval

The present research work contains studies performed on humans subjects from anonymized hospitalized data with institutional clearance obtained by respective departments.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study via hospital admission consent permitting clinical data usage for research and publication.

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