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RESEARCH ARTICLE / ÖZGÜN ARAŞTIRMA

Investigation of Severity in Lower Respiratory Tract Infection Due to Respiratory Syncytial Virus (RSV), Influenza A/B Virus, and RSV-Influenza A/B Coinfection

Respiratuvar Sinsityal Virüs (RSV), İnfluenza A/B Virüsüne Bağlı Alt Solunum Yolu Enfeksiyonu ve RSV-İnfluenza A/B Koenfeksiyonunun Şiddetinin Araştırılması

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ABSTRACT

Objective: Respiratory syncytial virus (RSV) infections can be found simultaneously with other viruses that cause upper and lower respiratory infections, and even in the same individual. Among these viruses, the most frequently isolated coinfection is RSV-influenza coinfection. In this study, we aimed to investigate the demographic and clinical characteristics, morbidity, and mortality of patients followed up and treated in our hospital for RSV or influenza A/B infection or RSV-influenza A/B virus coinfection.

Material and Methods: Obtained from all consecutive patients who were diagnosed as influenza or RSV infection or RSV and influenza A/B virus coinfection by multiplex polymerase chain reaction analysis from nasopharyngeal swab samples between January 2015 and January 2019 at Baskent University Medical Faculty Hospital and were hospitalized and followed up data were analyzed retrospectively. Groups of patients with influenza, RSV infection, and RSV-influenza coinfection were compared.

Results: No difference was found in the RSV-influenza coinfection group in terms of nasal O_2, high flow oxygen, non-invasive mechanical ventilation, and invasive mechanical ventilation requirements (p=0.411, p=0.859, p=0.258, and p=0.950, respectively). In terms of mortality rates, no difference was found between the RSV-influenza coinfection group and the other groups (p=0.403).

Conclusion: In our study, no difference was found in terms of demographic data, comorbidities, clinical severity of the disease, and mortality rates between patients with influenza, RSV infection, and RSV-influenza coinfection. For adults of all ages, RSV and influenza viruses are important pathogens in terms of hospital and intensive care hospitalization, mechanical ventilation, and mortality. Larger population studies are needed for RSV-influenza infections in adult patients.

Keywords: Coinfection, influenza virus, respiratory syncytial virus, severity.

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ÖZ

Amaç: Respiratuvar sinsityal virüs (RSV) enfeksiyonları, üst ve alt solunum yolu enfeksiyonlarına neden olan diğer virüslerle aynı anda ve hatta aynı kişide bulunabilir. Bu virüsler arasında en sık izole edilen koenfeksiyon, RSV-influenza koenfeksiyonudur. Bu çalışmada hastanemizde RSV veya influenza A/B enfeksiyonu veya RSV ve influenza A/B virüs koenfeksiyonu nedeniyle takip ve tedavi edilen hastaların demografik ve klinik özelliklerinin, morbidite ve mortalitesinin araştırılması amaçlandı.

Gereç ve Yöntemler: Başkent Üniversitesi Tıp Fakültesi Hastanesi'nde Ocak 2015 ile Ocak 2019 tarihleri arasında nazofarengeal sürüntü örneklerinden multipleks polimeraz zincir reaksiyonu analizi ile influenza veya RSV enfeksiyonu veya RSV ve influenza A/B virüs koenfeksiyonu olarak tanı konulan ve yatarak tedavi ve takip edilen ardışık tüm hastalardan elde edilen veriler geriye dönük olarak analiz edildi. İnfluenza, RSV enfeksiyonu ve RSV-influenza koenfeksiyonu olan hasta grupları karşılaştırıldı.

Bulgular: RSV-influenza koenfeksiyonu grubunda nazal oksijen, yüksek akımlı oksijen, noninvaziv mekanik ventilasyon ve invaziv mekanik ventilasyon gereksinimleri açısından fark bulunmadı (sırasıyla p=0,411, p=0,859, p=0,258, p=0,950). RSV-influenza koenfeksiyonu grubu ile diğer gruplar arasında mortalite oranları açısından fark bulunmadı (p=0,403).

Sonuç: Çalışmada influenza, RSV enfeksiyonu ve RSV-influenza koenfeksiyonu olan hastalar arasında demografik veriler, komorbiditeler, hastalığın klinik şiddeti ve mortalite oranları açısından fark bulunmadı. Her yaştan erişkin için RSV ve influenza virüsleri hastane ve yoğun bakım yatışları, mekanik ventilasyon ve mortalite açısından önemli patojenlerdir. Erişkin hastalarda RSV-influenza koenfeksiyonları için daha büyük popülasyon çalışmalarına ihtiyaç vardır.

Anahtar kelimeler: Koenfeksiyon, influenza virüsü, respiratuvar sinsityal virüs, şiddet.

INTRODUCTION

Respiratory syncytial virus (RSV) infection is a leading cause of morbidity and mortality worldwide in children under 5 years of age with acute lower respiratory tract infections, the elderly, and immunocompromised adults.[1,2] The clinical impact of RSV infection on hospitalized adults has started to be detected more with the widespread use of multiplex molecular tests, therefore becoming more noticeable. Among adults, RSV infection causes a wide variety of clinical conditions, including upper respiratory tract infections, severe lower respiratory tract infections, and exacerbations of the underlying disease.[2] Many studies have shown that RSV infections cause serious lower respiratory tract disorders and cardiovascular complications in the elderly and immunocompromised patients, with mortality rates similar to those of adults infected with influenza.[3,4]

Influenza virus is one of the main viral respiratory pathogens that infect humans and pose a threat to public health.[5] In some cases, RSV infections can be found simultaneously with other viruses that cause upper and lower respiratory infections, and even in the same individual. Viral coinfections of the respiratory tract, defined as the detection of more than one viral pathogen in the same sample, can be detected in up to 30% of children with acute respiratory tract infections.[6] It has been reported that two viral infections are found simultaneously in 65% of all virus-positive episodes, and the most common virus in these cases is RSV (54%).[7] The most commonly isolated respiratory tract coinfection is the RSV-influenza coinfection.[1] In a study conducted in Brazil during the H1N1 2009 pandemic, viral coinfection was detected in 21.9% of the cases. It has been reported that the rate of viral coinfection is similar in children and adults.[8] Available clinical data on coinfections are conflicting, both in terms of the number of viruses involved and the severity of the condition.[9] In addition, there are not enough studies on viral coinfections in adult patients. In this study, our aim was to investigate the demographic and clinical characteristics, morbidity, and mortality in adult patients followed up and treated due to RSV and influenza A/B virus coinfection in our hospital. Our study was conducted to draw attention to viral infections, especially viral coinfections, with the COVID-19 pandemic.

MATERIAL AND METHODS

Study Population

The files of a total of 976 consecutive patients over the age of 18 who were hospitalized and treated for respiratory failure due to acute lower respiratory tract infection in Baskent University Medical Faculty Hospital between January 2015 and 2019 were analyzed. This study was conducted using data obtained from patients diagnosed with RSV and influenza infections before the pandemic, to eliminate the radiological and clinical findings caused by COVID-19

during the COVID-19 pandemic as a confounding factor. A total of 110 patients who were diagnosed with influenza, RSV infections, and RSV-influenza coinfection as the cause of lower respiratory tract infection by multiplex polymerase chain reaction (diagnosed with bronchitis, pneumonia, and bronchiolitis) were included in the study. The patients were organized into three groups, patients with influenza infection, patients with RSV infection, and patients with RSV-influenza coinfection. Respiratory viral coinfection was defined as the simultaneous detection of more than one viral pathogen in the same sample.[5] Data from all patients were analyzed retrospectively by making records using electronic and written file systems. The patients' demographic data, comorbidities, admission and discharge oxygen saturations, respiratory support treatments, corticosteroid requirements, length of stay at the general ward and the intensive care unit length of stay, hemodialysis requirements, antiviral drug use rates, and mortality rates were recorded. Deep tracheal aspirate/Bronchoalveolar lavage cultures are cultures taken on the 1st day of admission to the intensive care unit only in patients hospitalized in the intensive care unit. Sputum cultures are the cultures taken on the 1st day of hospitalization. Blood cultures are cultures taken from patients who are hospitalized in the ward or intensive care unit with only fever. Cultures taken within the first 3 days of hospitalization were considered community-derived, and cultures taken 3 days later were considered hospital-derived.

Ethical Committee

This study was approved by Baskent University Institutional Review Board (Project no: KA22/118) and supported by Baskent University Research Fund.

Microbiological Identification

RSV and influenza infection were confirmed by analysis of nasopharyngeal specimens using RSV Nucleic Acid Detection Kit (Quidel, Sofia RSV FIA, SanDiego, CA92121 USA.) and FA/FB Virus Nucleic Acid Detection kit (Quidel, Sofia Strep A+ FIA, SanDiego, CA92121 USA). Microbiological isolates were identified and antimicrobial susceptibility tests were performed using a Phoenix100 automated analyser (Becton, Dickinson and Company; Franklin Lakes, NJ).

Statistical Analysis

SPSS 26 was used for data analysis. When analyzing continuous variables, the student's t-test was used if parametric test assumptions were met, and the Mann-Whitney U-test was used if not. P values represent the comparisons made respectively according to the relevant variables, p value <0.05 was considered significant.

RESULTS

Of the 110 patients included in the study, 49 (44.5%) had influenza infection alone, 40 (36.3%) had RSV infection alone, and 21 (19%) had RSV-influenza coinfection. The mean age was 69.62±19.98 years in all patients, 70.63±19.19 in the influenza infection group, 66.85±22.07 in the RSV infection group, and 66.20±22.95 in the RSV-influenza coinfection group. There was no difference between the groups in terms of mean age (p=0.370). Of all patients, 59 (52.9%) were female and 51 (47.1%) were male. The distribution by gender is given in Table 1. The most common comorbidities were chronic obstructive pulmonary disease, asthma, hypertension, cancer, coronary artery disease, congestive heart failure, diabetes mellitus and chronic renal failure, cancer, cerebrovascular disease, and solid organ transplant (SOT)-related immunosuppression. There was no difference between the groups in terms of comorbidities (Table 1).

In our study, triple coinfection in the form of influenza A, B, and RSV infection was detected in the tests performed simultaneously in one patient who was included in the RSV-influenza coinfection group. This patient was diagnosed with chronic obstructive pulmonary disease and diabetes mellitus and was discharged with 90% oxygen saturation (SpO_2) on room air after 3 days of general ward and 7 days of intensive care stay. The patient who had influenza A and B coinfection had been diagnosed with lymphoma and was lost to fungal superinfection.

Oxygen saturation on admission was 81.60±8.37 in all groups, 80.53±8.35 in the influenza infection group, 83.33±8.31 in the RSV infection group, and 82.25±8.89 in the RSV-influenza coinfection group. Discharge oxygen saturation was 85.47±11.64 in all groups, 85.04±11.61 in the influenza infection group, 87.33±11.87 in the RSV infection group, and 87.65±12.24 in the RSV-influenza coinfection group. There was no difference between the RSV-influenza coinfection group and the other groups in terms of the saturation on admission and discharge (p=0.684 and p=0.215, respectively). The average length of stay at the general ward was 6.18±8.37 days in all groups, 6.14±9.41 in the influenza infection group, 10.82±4.0 in the RSV infection group, and 9.35±13.21 in the RSV-influenza coinfection group. The average intensive care unit length of stay was 8.63±11.64 in all groups, 9.53±11.20 in the influenza infection group, 10.82±4.0 in the RSV infection group, and 9.35±13.21 in the RSV-influenza coinfection group. There was no difference between the RSV-influenza coinfection group and the other groups in terms of the average length of stay at the general ward and the average intensive care unit length of stay (p=0.223 and p=0.221, respectively) (Table 2). The most frequently isolated bacterial and fungal pathogens in all groups: Escherichia coli, Staphylococcus epidermidis, Staphylococcus haemolyticus, Staphylococcus aureus, Stenotrophomonas maltophilia, Klebsiella pneumoniae, Pseudomonas aeruginosa, Acinetobacter baumannii, Aspergillus fumigatus, and Candida species. Bacterial and fungal infections isolated from those with influenza infection, RSV infection, and RSV-influenza coinfection are given in Table 3.

No difference was found in the RSV-influenza coinfection group in terms of nasal oxygen (O_2), high-flow oxygen, non-invasive mechanical ventilation, and invasive mechanical ventilation requirements (p=0.411, p=0.859, p=0.258, and p=0.950, respectively). When all groups were compared, there was no difference between the groups in terms of steroid requirement (p=0514). The hemodialysis requirement was higher in the RSV infection and RSV-influenza coinfection groups (p=0.013 and p=0.008, respectively). Twenty-two (32.4%) of all patients, 16 (72.7%) of the influenza infection group patients, 11 (50%) of the RSV infection group patients, and 5 (22.7%) of the RSV-influenza coinfection group patients were lost, no difference was detected in the RSV-influenza coinfection

Table 1: Demographic characteristics and comorbidities

	Total n=110 (100%)		Influenza infection n=49 (44.5%)		RSV infection n=40 (36.3%)		Coinfection n=21 (19%)		p
	n	%	n	%	n	%	n	%	
Age	69.62±19.98		70.63±19.19		66.85±22.07		66.20±22.95		0.547[1] 0.182[2] 0.370[3]
Female	59	52.9	27	45.7	21	35.5	11	18.6	0.329[1]
Male	51	47.1	22	43.1	19	37.2	10	19.6	0.008[2]* 0.048[3]*
COPD	17	25	12	70.6	12	70.6	7	41.2	0.876[1] 0.255[2] 0.219[3]
Asthma	5	7.4	3	60	3	60	1	20	0.614[1] 1.000[2] 1.000[3]
HT	46	67.6	33	71.7	29	63	15	32.6	0.932[1] 0.307[2] 0.403[3]
CAD/CHF	35	51.5	23	65.7	24	68.6	12	34.3	0.230[1] 0.093[2] 0.364[3]
Cancer	10	14.7	9	90	2	20	1	10	0.262[1] 0.012[2]* 0.260[3]
DM	27	39.7	19	70.4	19	70.4	11	40.7	1.000[1] 0.116[2] 0.096[3]
IS	6	8.8	4	66.7	5	83	3	50	1.000[1] 0.203[2] 0.349[3]
CKD	15	22.1	10	66.7	12	80	7	46.7	0.745[1] 0.059[2]* 0.116[3]
CLD	4	5.9	2	50	2	50	0	0	0.310[1] 1.000[2] 0.312[3]
CVD	4	5.9	4	100	2	50	2	50	0.570[1] 1.000[2] 0.575[3]

*: p<0.05 was considered statistically significant. Mann-Whitney U, Pearson Chi-square test p[1]: Influenza, p[2]: RSV, p[3]: Coinfection. RSV: Respiratory syncytial virus, n: number, COPD: Chronic obstructive pulmonary disease, HT: Hypertension, CAD-CHF: Coronary artery disease/congestive heart failure, DM: Diabetes mellitus, IS: Immunosuppression, CKD: Chronic kidney disease, CLD: Chronic liver disease, CVD: Cerebrovascular disease.

group compared with the other groups in terms of 30-day all-cause mortality (p=0.403) (Table 2). Oseltamivir was used in 94.5% of all patients, 100% of patients with influenza and RSV-influenza coinfection, and 85% of patients with RSV infection. Thoracic computed tomography (CT) has been performed for 28 patients in influenza infection group, 19 patients in RSV infection group and all patients with coinfection. No pneumonia was observed in the chest X-ray of the patients who did not have thorax CT. However, since viral pneu-

Table 2: Clinical characteristics and mortality

	Total n=110 (100%)		Influenza infection n=49 (44.5%)		RSV infection n=40 (36.3%)		Coinfection n=21 (19%)		p
	n	%	n	%	n	%	n	%	
Admission SpO_2	81.60±8.37		80.53±8.35		83.33±8.31		82.25±8.89		0.090[1] 0.042[2]* 0.684[3]
Discharge SpO_2	85.47±11.64		85.04±11.61		87.33±11.87		87.65±12.24		0.375[1] 0.033[2]* 0.215[3]
HD	15	22.1	11	73.3	13	86.7	9	60	1.000[1] 0.013[2]* 0.008[3]*
Nasal O_2	61	89.7	43	70.5	6	59	17	27.9	0.664[1] 1.000[2] 0.411[3]
High flow O_2	18	26.5	14	77.8	9	50	5	27.8	0.528[1] 0.375[2] 0.859[3]
NIMV	31	45.6	23	74.2	16	51.6	7	22.6	0.720[1] 0.269[2] 0.258[3]
IMV	31	45.6	21	67.7	19	61.3	9	29	0.468[1] 0.705[2] 0.950[3]
Length of stay at the general ward/days	6.18±8.37		6.14±9.41		10.82±4.0		35±13.21		0.541[1] 0.102[2] 0.223[3]
Intensive care unit length of stay/days	8.63±11.64		9.53±11.20		8.80±10.67		11.35±13.48		0.217[1] 0.995[2] 0.221[3]
Corticosteroid requirement	48	70.6	35	72.9	27	56.3	13	27.1	0.807[1] 0.594[2] 0.514[3]
Mortality	22	32.4	16	72.7	11	50	5	22.7	0.932[1] 0.307[2] 0.403[3]

*: p<0.05 was considered statistically significant. Mann-Whitney U, Pearson Chi-square test p[1]: Influenza, p[2]: RSV p[3]: Coinfection. n: number, SpO_2:Oxygen saturation, HD: Hemodialysis, O_2:Oxygen, NIMV: Non-invasive mechanical ventilation, IMV: Invasive mechanical ventilation.

monia can be easily missed on chest X-ray, statistics was made on patients who had thoracic CT, excluding patients who were determined only by chest X-ray. Accordingly, pneumonia was diagnosed in 9 (32.1%) of 28 patients with influenza infection, 4 (21.1%) of 19 patients with RSV infection, and 8 (38.1%) of 21 patients with RSV-influenza coinfection. There was no difference between the groups in terms of the frequency of pneumonia (p=0.498).

DISCUSSION

The mechanisms of disease virulence in viral coinfections are not fully understood. Virus-virus interactions can occur through (1) direct interactions of viral genes or gene products, (2) indirect interactions resulting from changes in the host environment, and (3) immunological interactions.[10] Different viruses can potentiate or inhibit each other's effects when they are present in the same host at the same time.

Table 3: Isolated secondary bacterial and fungal pathogens

	Influenza infection n=49 (44.5%)	RSV infection n=40 (36.3%)	Coinfection n=21 (19%)
Blood culture (n)	(1) *Candida species* (ho) (3) *S. epidermidis* (ho) (1) *S. haemolyticus* (ho) (1) *S. aureus* (ho)	(1) *E. coli* (ESBL) (ho) (2) *S. epidermidis* (ho) (1) *S. aureus* (ho)	(1) *E. coli* (ESBL) (ho) (2) *K. pneumoniae* (ESBL) (ho) (1) *S. haemolyticus* (ho) (1) *S. aureus* (ho) (1) *S. epidermidis* (ho)
Sputum culture (n)	(3) *S. maltophilia* (cb) (1) *K. pneumoniae* (cb)	(2) *S. maltophilia* (cb) (1) *K. pneumoniae* (ho)	(2) *S. maltophilia* (cb) (1) *K. pneumoniae* (ho)
Deep tracheal aspirate/ Bronchoalveolar lavage (n)	(2) *P. aeruginosa* (ho) (1) *K. pneumonia* (ho) (1) *A. baumannii* (ho) (2) *Candida species* (ho) (1) *A. fumigatus* (ho)	(1) *P. aeruginosa* (ho) (Carbapenem resistant) (2) *Candida species* (ho)	(1) *S. aureus* (ho) (1) *P. aeruginosa* (ho) (Carbapenem resistant) (ho) (1) *Candida species* (ho)

n: number, *Escherichia coli, Staphylococcus epidermidis, Staphylococcus haemolyticus, Staphylococcus aureus, Stenotrophomonas maltophilia, Klebsiella pneumoniae, Pseudomonas aeruginosa, Acinetobacter baumannii, Aspergillus fumigatus*, ESBL: Extended spectrum beta-lactamase positive, ho: hospital-origin, cb: community-based.

It has been reported that coinfection with RSV is associated with decreased IFN-gamma responses and a more severe clinical course compared to other viruses, and airway obstruction is more severe when RSV contributes to coinfection.[11]

In the study by Zhou et al.,[12] RSV-influenza (c-RSV-influenza) periods were defined as consecutive individual weeks during which at least 10% of the diagnostic tests for both viruses were positive. The results of this study generally demonstrated that acute respiratory disease prevalence was higher during RSV-only, influenza-only, and c-RSV-influenza epidemic periods compared to periods without RSV and influenza epidemics. It has been shown that the prevalence of acute respiratory disease tends to be highest in adults aged ≥65 years during c-RSV-influenza, and the incidence of four advanced medical outcomes (hospitalization, admission to the intensive care unit, mechanical ventilation, and death) increases with advancing age.

The differences in studies conducted during lower respiratory tract infections, which are generally observed in children, may be due to the lower or upper respiratory tract infection in the selected cases, seasonal, geographical, epidemic-pandemic periods, demographic data, and differences in disease severity and the fact that it was performed in outpatients or inpatients. According to the results of a study, in which eight prospective epidemiological studies were retrospectively reviewed, two viruses were the cause of 5% of acute respiratory tract virus infections.[13] Triple viral coinfections have also been reported.[5] In our study, there was a patient with triple coinfection including influenza A-B-RSV, and this patient was discharged from the hospital in a good clinical condition.

In the study by Goka et al.,[14] coinfection between seasonal influenza A and B viruses was associated with a significant increase in the risk of admission to the intensive care unit/death, while it was reported that RSV/influenza A coinfection also increased this risk, but it was not statistically significant. A study of 34.459 patients, 8011 of whom were positive for influenza A or influenza B virus, showed that coinfection was significantly associated with cardiopathy and death compared with monoinfected patients. It has been stated that influenza virus coinfection occurs frequently and may lead to a poorer disease outcome.[5]

Results from cohort studies evaluating the severity of respiratory viral coinfections are conflicting. While some studies have suggested that respiratory tract viral coinfections affect the severity of the disease,[13,15,16] some studies have reported no relationship.[17,18]

A systematic review and meta-analysis of 21 studies involving 4.280 patients to assess the clinical severity of viral coinfections compared to single viral respiratory infections documented no differences between viral coinfections and single respiratory tract infections in terms of clinical disease severity.[6] In contrast to a study, in which coinfection with influenza A and influenza B viruses was associated with a significant increase in the risk of admission to the intensive care unit and death,[14] another study involving adult patients diagnosed with H1N1 infection reported that viral coinfection had little effect on mortality.[19]

Similar to our study, according to the results of a single adult study conducted on adult patients hospitalized for RSV infection, influenza infection, and RSV-influenza coinfection, the rate of invasive mechanical ventilation was higher in patients with RSV-influenza coinfection, and 60-day all-cause mortality attributed to RSV-influenza coinfections was found to be significantly higher than in influenza and RSV-monoinfected patients.[3] In our study, there was no difference between the groups in terms of the need for invasive mechanical ventilation and the 30-day all-cause mortality rates.

Just as they were reported in only 2 cases in our study, influenza A and B coinfections were also reported rarely in other studies.[20] No antiviral was used for RSV infection in any of the patients included in our study. However, the use of empirical Oseltamivir since the 1st day of hospitalization with a preliminary diagnosis of influenza infection for the clinical signs on admission in the majority of all patients (95%) may have reduced the potenial clinical effects of influenza infection.

Bacterial/fungal infections were also observed in the patients included in our study. Although we did not have enough patients to make a meaningful comparison between the groups, bacterial/fungal infections were observed with similar factors and numbers in all three groups. Viruse's infections predispose to bacterial or fungal infections. It is known that influenza and RSV virus predispose to Streptococcus pneumoniae, S. aureus and Haemophilus influenzae, and Moraxella catarrhalis infections.[21,22] The reason for the isolation of hospital-acquired infectious agents in addition to these bacteria in our study may be due to factors such as the high mean age of the patients included in the study, intensive care unit admission, multiple comorbidities, and SOT. A. fumigatus was isolated in the bronchial lavage of a kidney transplanted patient in the influenza patient group. Influenza-associated invasive aspergillosis (IPA) is a well-known complication especially in immunocompromised patients. The incidence of IPA has been reported to be as high as 34% among SOT recipients with severe influenza. It has been reported that the incidence of IPA is 4% in non-influenza respiratory viral infections, especially RSV, parainfluenza, and adenovirus.[23]

Limitations

As in other studies, since a homogeneity in terms of the patients' age, comorbidities, and disease severity could not be achieved in our study, the clinical severity and mortality evaluations could not be carried on in homogeneous groups, which may have led to incorrect evaluations. In our study, the clinical severity of RSV-influenza coinfection was investigated, and viral identification was made only for RSV and influenza viruses in the cases included in the study. Studies performed using a molecular method that can simultaneously detect all respiratory viral agents will be more valuable.

CONCLUSION

According to our knowledge to date, RSV and influenza viruses are important viral pathogens for adults of all ages in terms of hospitalization, intensive care hospitalization, mechanical ventilation, and mortality. The results of our study showed that the coexistence of this infection does not play a poor prognostic role for the patient. To eliminate the heterogeneity in the data, more studies with large populations are needed to homogenize the ages and comorbidities of the patients. It is also necessary to consider the factors that predispose to coinfection. Since studies on viral coinfection are generally conducted for childhood viral infections, more studies are needed in adult patients.

Disclosures

Ethics Committee Approval: The study was approved by The Baskent University Medical and Health Sciences Research Board (date: 01.03.2022, number: KA22/118).

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