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PCP IN NON-HIV PATIENTS - CLINICAL, DEMOGRAPHIC, AND TREATMENT OUTCOME IN PATIENTS DIAGNOSED WITH PCP AT MAX HOSPITAL

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Abstract

Background

The occurrence of Pneumocystis pneumonia (PCP) in patients who do not have human immunodeficiency virus (HIV) infection is still rising. In this study, we detected possible factors for in-patient mortality in HIV–negative patients with PneumoCystis Pneumonia admitted in ICU.

Methods

This study conducted a retrospective analysis of medical records for 53 non-HIV-infected PCP patients admitted to Max Hospitals in Delhi. Clinical traits were assessed, and aspects associated with mortality during hospitalization were evaluated.

Results

Total 53 patients were selected in study. Overall, mortality rate was 13.36%. The univariate analysis indicated that nonsurvivors were older than 55 years, were more likely to use high-dose steroids (≥1 mg/kg/day prednisone equivalent), receive caspofungin during hospitalization, require invasive ventilation, develop shock during hospitalization, had higher Acute Physiology and Chronic Health Evaluation (APACHE) II scores on ICU admission, lower PaO2/FiO2 values (mmHg) on admission and underlying comorbidities. Multiple studies has s showed that age , use of high-dose steroids and a low oxygenation index on admission were associated with high mortality rate.

Conclusions

The death rate among non-HIV- patients with PCP was raised, and factors predicting a poor outcome included older age, high-dose steroid use during hospitalization, low oxygenation index upon admission, and existing comorbid conditions. Using caspofungin while hospitalized may not affect the prognosis of non-HIV-infected ICU patients with PCP

1 INTRODUCTION

Pneumocystis pneumonia (PCP) is an infection which poses a significant risk to immunocompromised individuals, by Pneumocystis jiroveci (P. jiroveci [Pj]).1 Due to advancements in effective antiretroviral therapy and standard prophylactic measures, the occurrence of PCP in human immunodeficiency virus (HIV) patients has significantly declined globally.2, 3 However, PCP remains a concern as its incidence has notably risen in patients undergoing treatment with corticosteroids, biological agents, or immunosuppressive drugs.4, 5 This infection has become

increasingly prevalent in this group due to changes in treatment protocols, including the more frequent use of immunosuppressive therapies for individuals with cancers, inflammatory conditions, and solid organ transplants (SOTs). HIV-negative individuals with PCP usually show signs of quickly advancing respiratory failure, and the mortality rate is between 33.3% and 69.3%. These individuals often need more intensive care. So far, limited research has been conducted to pinpoint predictive factors of PCP in patients without HIV. Consequently, the primary aim of this research was to convey our experiences with PCP treatment.

METHODS

Study design

- This retrospective analysis involved hospitalized patients at Max Hospital Saket from 2021 to 2023. Data were collected retrospectively from medical records.
- Our inclusion criteria included the following: (1) PCP detected via sputum, tracheal secretions aspirate, or bronchoalveolar lavage (BAL)fluid samples using silver methylamine stain or polymerase chain reaction (PCR); (2) negative HIV result; (3) a possible link between immune deficiency and onset of PCP.
- Patients with non-significant RTPCR results were exclude.
- HIV positive patients were excluded from the study.

Data collection

We examined the clinical information of subjects. Data on demographics, clinical status, and laboratory results, including age, gender, pre-existing health issues, immune function, early symptoms, microbiological results, time from symptom onset to diagnosis, antibiotics administered, complications, and outcomes, were gathered. Data on ventilation comprises of oxygen therapy or ventilatory assistance provided upon admission, respiratory support mode, PaO2/FiO2 ratio, duration of intubation, platform pressure, and tidal volume recorded at admission.

From 2021 to July 2023, 62 patients tested positive for PCP through silver methoxamine staining or PCR. Ultimately, 53 patients participated in the study (3 were excluded because of HIV positivity, 6 were excluded due to PCP colonization).

RESULTS

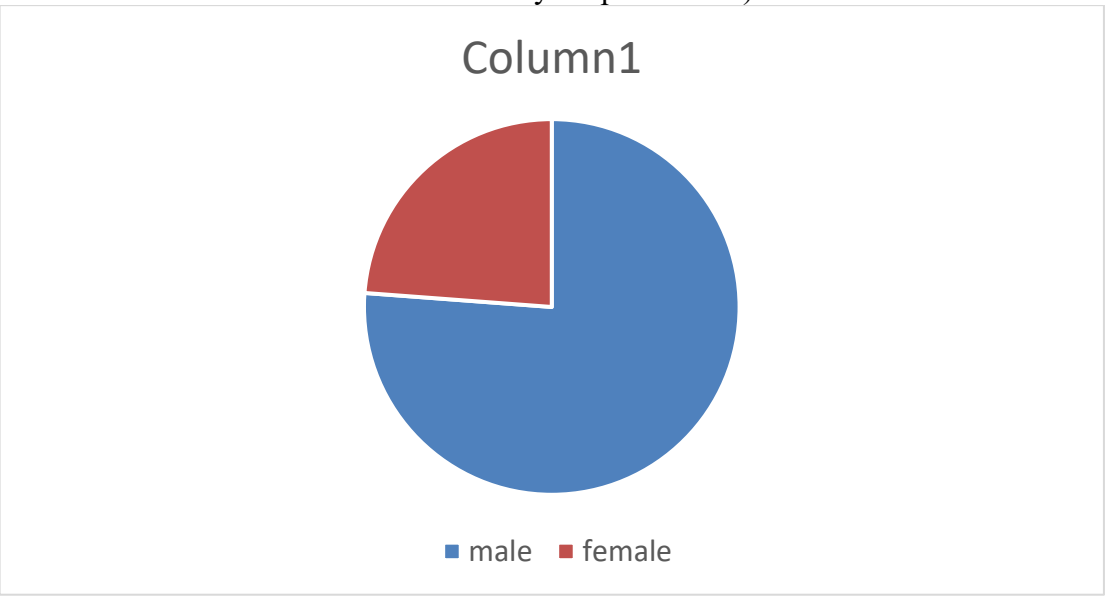
Demographics, characteristics, management, and outcomes

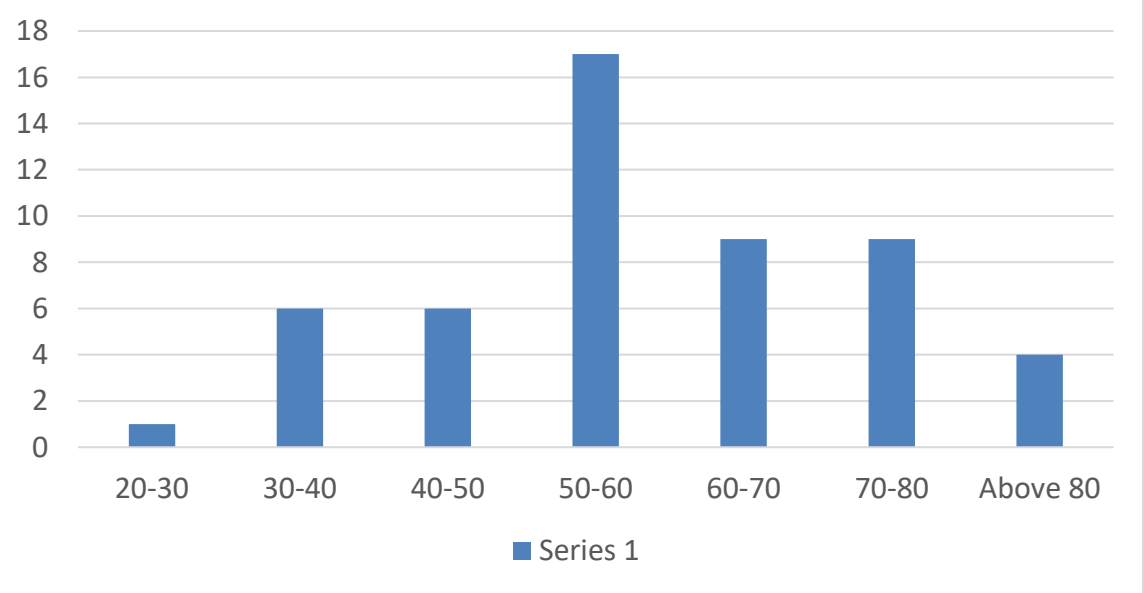
The characteristics of 53 patients are given in Table 1. Out of 53 patients 15 were female and38 were male. (29% of patients were female). In non survivor 1 was female and res were male. The average age was 55 ± 10 years. In non survivors median age was higher. Out of 53 patients 47 were diagnosed in BAL and 6 in sputum. Out of 53 diagnosed patients only 4 were positive for Silver Methamine stain.

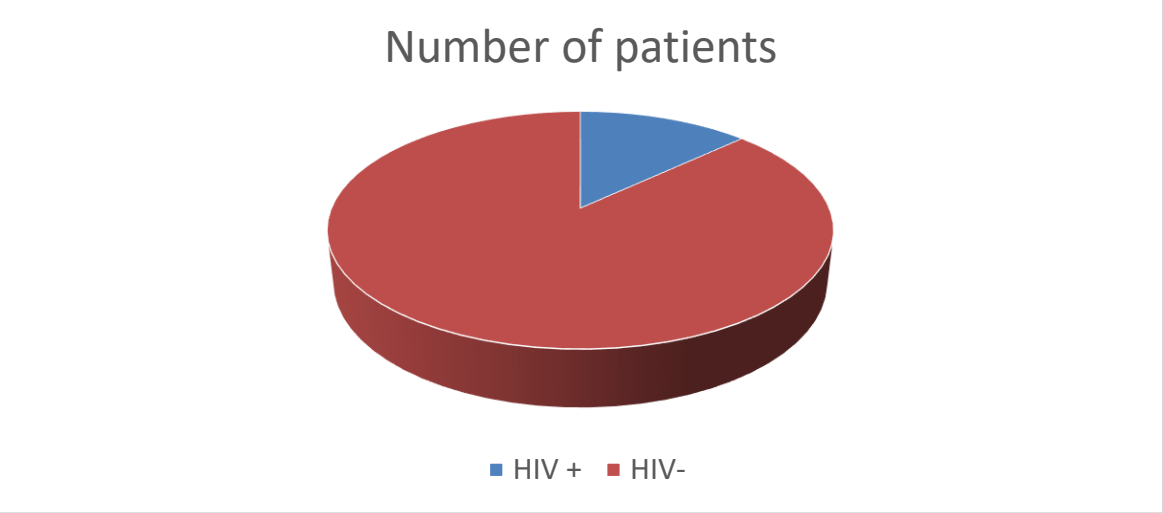
Malignancy was the most common underlying disease (n = 16, 30%). In 13 patient of Malignancy, Ca Breast was the most common malignancy (n=10, 19%). ILD is the second most common cause (n=10, 19%) followed by CKD (n = 9, 17%), Organ transplant (n = 5, 9.3%), ulcerative colitis (n = 3, 6%), COPD (n=2, 3.5%), Psoriasis (n=2, 3.5%), vasculitis (n = 1, 1.8%), and Autoimmune Encephlitis (n = 1, 1.8%), CLD (n=1, 1.8%). 12 patients had Diabetes and 6 were hypertensive, along with other comorbidity.

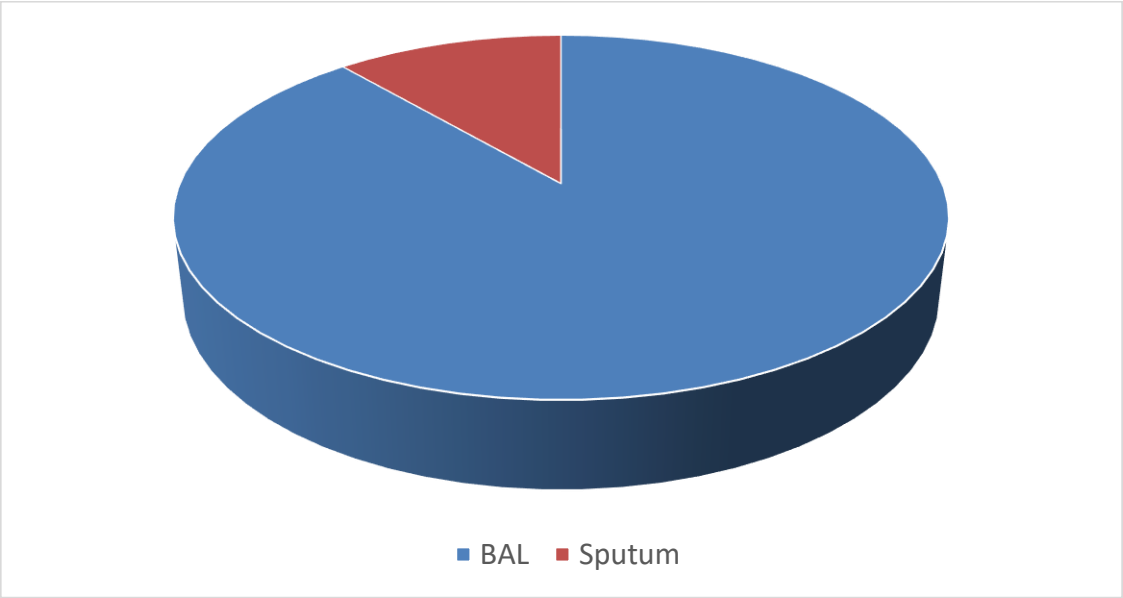
52.8% (n = 28,) of patients were getting treated with steroids, and most of them also received combinations of immunosuppressive drugss (30%, n = 16). 16(30%) patient had recently received or were on Chemo or Radiotherapy. 6 patients were on dialysis.

TABLE 1. Demographic, characteristics, treatment, complication of 53 (HIV-negative patients with Pneumocystis pneumonia)









	Survivors	Nonsurvivors,
Age (years)	55 ± 10	64 ± 15
Gender, male	38 (71.2)	6(86)
BMI, median (IQR)	22.3 (20.4–23.8)	21.83 (20.3–23.2)
APACHE II first day in ICU	17.4 ± 5.7	20.3 ± 5.7
Underlying disease		
Interstitial lung disease	10 (19.0)	1 (1.8)
Malignancy	16 (30)	5 (12.9)
CKD	9 (17)	-
Organ Transplant	5(9.3)	-
Psoriasis	2 (3.6)	1(1.8)
Initial symptom		
Dyspnea	51(94.3)	7 (100)
Fever	51 (94,3)	5 (84.2)
Cough	34 (74.2)	4 (60.4)
Laboratory test		
White blood cell counts, cells/μl	9180 ± 4431	8369 ± 3827
Lymphocyte counts, cells/μl, median (IQR)	570 (345–840)	430 (240–645)
C-reactive protein(CRP), mg/L, median (IQR)	14.5 (7.4–26.2)	15.6 (3.5–39.5)
Lactate dehydrogenase(LDH), U/L, median (IQR)	473.5 (353.3–795.5)	657.0 (524.0–886.0)

	Survivors	Nonsurvivors,
Albumin, g/dl, median (IQR)	29.8 (25.0–33.2)	30.0 (26.6–32.9)
Respiratory samples		
Sputum	6 (11.3)	-
BAL	47 (89.7)	7 (100)
Diagnostics:		
PCR	49 (94.30)	6 (86.)
Methnamine silver stain	4(13.20)	1 (4)
Treatment		
Duration from symptom onset to treatment, days,	5–14	3–13
Previous use of corticosteroid	28 (52.8)	3 (43)
Caspofungin	15 (28.31)	45 (44.62)
TMP-SMX as initial regimen	53 (100.)	7 (100)
Mechanical ventilation	25 (47.2)	84 (83.2)

• **Abbreviations:** APACHE, Acute Physiology and Chronic Health Evaluation; BAL, bronchoalveolar lavage fluid; BMI, body mass index; PCR, polymerase chain reaction; TMP-SMX, trimethoprim-sulfamethoxazole.

Comparisons of clinical parameters of survivors and nonsurvivors

During the hospital stay, 53 out of the 7 patients passed away. As indicated in Table 1, nonsurvivors with PCP were older, had a greater likelihood of using high-dose steroids, underwent recent chemotherapy and radiotherapy, were on dialysis, needed invasive ventilation, and exhibited higher APACHE II scores upon ICU admission.

No notable variations were observed in sex, white blood cell counts, respiratory samples, diagnostic approaches, time from symptom onset to treatment, use of steroids, or TMP-SMX as the initial treatment regimen between survivors and nonsurvivors.

4 DISCUSSION

Our hospital is among the leaders in the diagnosis and treatment of autoimmune diseases, leading to many patients using steroids and immunosuppressants seeking medical care for PCP infection. As a result, the rates of autoimmune diseases and steroid exposure exceeded those found in other studies. There are relatively high cancer rates, particularly breast cancer, and CKD patients becoming affected by PCP.

The mortality rate among patients in this research was 13.86%, significantly lower than the 33.3%–69.3% mortality rates seen in earlier studies.8-14 CMV coinfection is relatively rare compared to prior findings. Our hospital is renowned for its care of respiratory illnesses, attracting many well-off patients seeking treatment. We think that empirical therapy is crucial for reducing the death rate in non-HIV-infected individuals with PCP. Prophylactic measures for PCP are advised for HIV patients, but effectiveness of such measures for non-HIV PCP is not clearly defined, particularly for those on corticosteroids and immunosuppressive medications.

We discovered that advanced age was associated with an increased inhospital mortality rate in non-HIV-infected patients suffering from PCP. Age is commonly utilized for risk stratification, with advanced age linked to poorer PCP outcomes in both HIV--positive and HIV–negative individuals.[17, 27-32]

A lower oxygenation index at admission was recognized as an indicator of in–hospital mortality. This indicates the severity of the illness, encompassing a deteriorated overall state and the requirement for intensive care, which increases patients' vulnerability to hospital-acquired infections and various complications. Furthermore, invasive ventilation typically signifies that the patient is experiencing severe hypoxemia, which can lead to multiple organ failure, including acute respiratory distress syndrome(ARDS).

This research found that high-dose steroid use was a risk factor for in-hospital mortality. Two earlier studies25, 40 examined the impact of corticosteroids on non-HIV individuals with severe PCP, revealing that additional corticosteroid treatment did not lower in-hospital mortality rates. In line with our research, Lemiale et al conducted a pooled analysis of 139 non-HIV ICU patients suffering from severe PCP and discovered that high-dose steroid therapy (≥1 mg/kg/day prednisone equivalent) was an independent predictor of mortality in the ICU.[41]

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4.1 Limitations

Our research faced certain limitations, as it was a retrospective study without any follow-up. Consequently, drawing definitive conclusions is not feasible.

The patient numbers in the subgroups categorized by underlying disease were limited; thus, variations in prognoses among patients receiving different forms of immunosuppression could not be identified. Consequently, larger sample size prospective studies are essential.

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