Original Research Article

A study of Community Acquired Pneumonia in the Elderly

Anupa Pillai[1*], Shwet Sabnis[2], Tushar Kanti Biswas[3]

[1]Junior Resident, [2]Senior Resident, [3]Professor and HOD
Department of Geriatric Medicine, MGM Medical College, Kamothe, Navi Mumbai, India
[*]Corresponding author email: **anupapillai 123@gmail.com**

International Archives of Integrated Medicine, Vol. 6, Issue 12, December, 2019.

Available online at http://iaimjournal.com/
ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**
Received on: 09-11-2019 **Accepted on:** 15-11-2019
Source of support: Nil **Conflict of interest:** None declared.
How to cite this article: Anupa Pillai, Shwet Sabnis, Tushar Kanti Biswas. A study of Community Acquired Pneumonia in the Elderly. IAIM, 2019; 6(12): 1-9.

Abstract

Background: Elderly patients are more predisposed to pneumonia because of their impaired gag reflex, decreased mucociliary function, waning immunity, impaired febrile response, and various degrees of cardiopulmonary dysfunction. Community acquired pneumonia (CAP) in elderly patients has peculiar clinical characteristics. Clinical presentation may vary from mild alterations of patients' general condition, confusion to severe respiratory distress or decompensation of underlying illness. This may cause a delay in establishing diagnosis and consequently in starting antibiotic therapy.

Aims and objectives: To study the risk factors, clinical profile, bacterial etiologies and antibiotic sensitivity pattern for Community acquired Pneumonia in elderly.

Materials and methods: It was prospective observational study. Study population was elderly patients (age ≥60 years) detected having CAP (both in-patient and out-patient) attending MGM Hospital for treatment. Detailed history, thorough physical examination of all the systems with emphasis on respiratory system was done. Investigations including blood, sputum and radiological were done relevant to the study

Results: 56.9% (37) were in age group of 60-69 with male preponderance - 61.5% of the patients. Productive cough was the most common presentation. 46% were smokers. The most common organism in the sputum culture was Streptococcus spp at 55 % out of which S. Pneumoniae were at 22%. Maximum patients i.e. 53.8% had CURB score of 1 and PSI index showed majority at Low risk. Streptococcus was found in those having risk factors: Diabetes Mellitus, COPD, Smoking and regular alcohol consumption.

Conclusions: Patients with positive history of smoking and regular alcohol consumption are more prone to CAP. COPD, history of TB contact, recent pneumonia and Diabetes Mellitus are the main risk factors for community acquired pneumonia. Productive cough is the presentation in elderly patients. S. Pneumoniae and K. Pneumoniae were the most common pathogens. β- Lactams - amino-

penicillins, cephalosporins, macrolides and 2nd generation fluoroquinolones are commonly sensitive first line drugs.

Key words

CAP, Elderly, Cough, Smoker, Antibiotics.

Introduction

Elderly patients with community acquired pneumonia constitute a special population since they commonly have various underlying illnesses and nutritional deficits. Community acquired pneumonia (CAP) in elderly patients has peculiar clinical characteristics. For instance, not all signs and symptoms of pneumonia are present in all cases. Clinical presentation may vary from mild alterations of patients' general condition, confusion to severe respiratory distress or decompensation of underlying illness. This may cause a delay in establishing diagnosis and consequently in starting antibiotic therapy.

The ageing respiratory system is particularly exposed to risks of infection due to:

- Reduced mucociliary clearance,
- Micro aspiration,
- COPD, Asthma, sequelae of TB,
- DM, heart failure, neurological diseases, swallowing disorders,
- Use of sedative drugs,
- Long term care facilities, old age homes, institutions, demographic changes

The present study contemplates a review of clinical manifestations, risk factors & causative organisms of Community acquired pneumonia in elderly

Aim

- To study the risk factors and clinical profile of CAP in elderly
- To study the bacterial etiologies and antibiotic sensitivity pattern for Community acquired Pneumonia in elderly.

Materials and methods

It was a prospective observational study. Study population was elderly patients (age ≥60 years) detected having CAP (both in-patient and out-patient) attending MGM Hospital for treatment between between May 2016 to December 2018.

Methods

A detailed clinical history was taken. Special attention was given to certain pre-disposing risk factors that may increase the incidence of Community Acquired Pneumonia in the elderly like: DM, Obesity, COPD, Past history of T.B., Alcohol consumption, Smoking, Immunosuppressive therapy and Spinal Deformities (Kyphosis/ Scoliosis). Thorough general examination was done with special emphasis on respiratory system. Blood investigations included Hemoglobin, Total leucocytes count, Differential leucocytes count, Erythrocyte sedimentation rate, Random blood sugar, FBS/ PPBS (if RBS was abnormal), RFT, Serum Electrolytes, LFT. Radiological evaluation was also done. Sputum was collected for microbial studies, before starting empirical antibiotic therapy. The antibiotics were subsequently changed based on clinical response and culture reports. All details of the patient were documented through a predesigned proforma.

Inclusion criteria

- Age ≥ 60yearsof both sexes
- Patients willingness to participate in the study
- Clinical signs of Pneumonia
- Radiological signs of Pneumonia
- Patients with complications of pneumonia

Exclusion criteria

- Age < 60years
- Hospital acquired pneumonia

- Tuberculosis
- Lung malignancy

Results

Distribution of patients according to age

Majority of the patients 56.9% (37) were in age group of 60-69 years, followed by 35.4% in 70-79 years and 7.7% were more than 80 years (**Table - 1**). The mean age was 68.62 ±7.29 years.

Table – 1: Distribution according to age.

Age groups	Patient Count	Percentage
60-69	37	56.9%
70-79	23	35.4%
80-89	5	7.7%

Table – 2: Distribution according to gender.

		Patient Count	%
Sex	Female	25	38.5%
	Male	40	61.5%

Table – 3: Distribution according to clinical symptoms.

Symptoms	No		Yes	
	Patient Count	Percentage	Patient Count	Percentage
Cough	0	0.0%	65	100.0%
Sputum	0	0.0%	65	100.0%
Breathlessness	37	56.9%	28	43.1%
Chest Pain	49	75.4%	16	24.6%
Fever	33	50.8%	32	49.2%
Chills/rigors	42	64.6%	23	35.4%
Wheezing	60	92.3%	5	7.7%
Hemoptysis	65	100.0%	0	0.0%
Headache	51	78.5%	14	21.5%
Sweating	60	92.3%	5	7.7%
Myalgia	42	64.6%	23	35.4%
Generalized weakness	30	46.2%	35	53.8%
Appetite Loss	35	53.8%	30	46.2%
Weight Loss	65	100.0%	0	0.0%
Confusion	53	81.5%	12	18.5%
Other symptoms	65	100.0%	0	0.0%

Table – 4: Comorbid Illness.

	No		Yes	
	Patient Count	Percentage	Patient Count	Percentage
H/O Pneumonia	46	70.8%	19	29.2%
Diabetes Mellitus	48	73.8%	17	26.2%
Hypertension	56	86.2%	9	13.8%
Bronchial Asthma	56	86.2%	9	13.8%
COPD	47	72.3%	18	27.7%
H/O TB	56	86.2%	9	13.8%
H/O TB contact	46	70.8%	19	29.2%
ESRD	65	100.0%	0	0.0%
Seizure disorder	65	100.0%	0	0.0%
Other co-morbidities	65	100.0%	0	0.0%
Smoking	35	53.8%	30	46.2%
Alcohol consumption	50	76.9%	15	23.1%

Table – 5: Organism species in Sputum Culture.

Organism	No. of cases	Percentage
Acinetobacter	3	3.409091
Candida Spp.	1	1.136364
Citrobacter Diversus	1	1.136364
Citrobacter Spp.	2	2.272727
E. Coli	3	3.409091
Enterobacter	5	5.681818
Klebsiella Pneumoniae	14	15.90909
Multi-Drug-Resistant Acinetobacter	1	1.136364
Proteus Mirabilis	2	2.272727
Pseudomonas Aeruginosa	5	5.681818
Pseudomonas spp.	2	2.272727
Streptococcus spp.	29	32.95455
Streptococcus Pneumoniae	20	22.72727

Table – 6: Pneumonia Severity CURB score.

CURB score	Count	Percentage
0	14	21.5%
1	35	53.8%
2	5	7.7%
3	5	7.7%
4 and 5	6	9.2%

Table – 7: Pneumonia Severity PSI Score.

Score	Count	Percentage	Risk
< 70	26	40.0%	Low Risk
71 to 90	21	32.3%	Low risk
91 to 130	8	12.3%	Moderate risk
> 130	10	15.4%	High risk

Distribution according to gender

There was male preponderance 61.5% of the patients and 38.5% were females (**Table - 2**).

Distribution according to clinical symptoms

Cough with sputum production was the most common presentation as all the patients had it, 53% had generalized weakness and almost 50% had fever (**Table - 3**).

Comorbidities

In comorbid conditions, 29% had pneumonia in the past, 29% contact of TB and 28% had COPD. 46% of the patients were smokers and 23% were consuming alcohol (**Table - 4**).

Type of organism

The most common organism in the sputum culture was Streptococcus spp at 55 % out of which S. Pneumoniae species were at 22% (**Table - 5**).

Pneumonia severity

CURB score showed that maximum patients i.e. 53.8% had CURB score of 1, 21.5% had 0 score, 9.2% had score of 4 and 5, 7.7% had scores of 2 and 3 (**Table - 6**).

PSI score comparison showed that 40% patients had scores of less than 70 which means low risk patients that may be treated in a home-based

setting, 32.3% patients had scores between 71 to 90 meaning low risk that may be treated at home under observation, 12.3% patients had scores between 91 to 130 which shows moderate risk that may require hospitalization and 15.4% patients had scores more than 130 which implicates high risk, requiring hospitalization with or without admission to the intensive care unit. The analysis showed that maximum numbers of patients are in Low Risk group (**Table - 7**).

Table – 8: Risk Factors Comparison.

Organism Isolated	Diabetes Mellitus		COPD		Smoking		Alcoholic	
	Patient count	%	Patient count	%	Patient count	%	Patient count	%
Acinetobacter	1	3.4%	1	3.4%	1	2.4%	1	3.7%
Candida Spp.	1	3.4%	0	0.0%	1	2.4%	0	0.0%
Citrobacter Diversus	0	0.0%	0	0.0%	0	0.0%	1	3.7%
Citrobacter Spp.	0	0.0%	0	0.0%	2	4.8%	0	0.0%
E. Coli	0	0.0%	1	3.4%	1	2.4%	0	0.0%
Enterobacter	3	10.3%	1	3.4%	2	4.8%	1	3.7%
Klebsiella Pneumoniae	7	24.1%	9	31.0%	8	19.0%	9	33.3%
Multi-Drug-Resistant Acinetobacter	1	3.4%	1	3.4%	1	2.4%	1	3.7%
Proteus Mirabilis	0	0.0%	0	0.0%	2	4.8%	0	0.0%
Pseudomonas Aeruginosa	5	17.2%	3	10.3%	4	9.5%	2	7.4%
Pseudomonas Spp.	2	6.9%	0	0.0%	0	0.0%	2	7.4%
Streptococcus	8	27.6%	8	27.6%	10	23.8%	7	25.9%
Streptococcus Pneumoniae	1	3.4%	5	17.2%	10	23.8%	3	11.1%

Comparison of Risk Factors

Comparison between risk factors and organisms were analyzed and the results revealed that Streptococcus was found in maximum number of patients who have following risk factors: Diabetes Mellitus, COPD, Smoking and regular alcohol consumption. Apart from this, Streptococcus pneumoniae, Klebsiella Pneumoniae and Pseudomonas Aeruginosa were other organisms found in these patients (**Table-8**).

Antibiotic Sensitivity

Analysis of the antibiotics concluded that β-Lactams including amino-penicillins, cephalosporins, macrolides and 2nd generation fluoroquinolones are the most commonly sensitive first line drugs for the management of CAP in elderly (**Table – 9**).

Discussion

Studies have consistently shown that the incidence of CAP is higher in males as compared to females with similar findings in our study showing male preponderance [1] with a male: female ratio of 1.6:1.

Lifestyle factors such as alcohol consumption, smoking are established risk factors of CAP. Smoking has an adverse effect on the respiratory epithelium and the clearance of bacteria from the respiratory tract. Alcohol can cause defects in the innate and acquired immunity [2, 3, 4]. Although light to moderate intake of alcohol has shown to reduce risk of atherosclerosis and cardiovascular diseases owing to its antioxidant properties, which may be protective of CAP [5, 6]. Our study shows similar findings with 46.2% patients having positive smoking history and 23.1% patients having history of regular alcohol consumption. Ensuring that the patient has adequate lifestyle modifications like smoking &

alcohol cessation, adequate nutrition and regular health check-ups may help to reduce the overall burden of CAP amongst the elderly.

Table – 9: Sensitivity to antibiotics.

Antibiotic Abbreviation	Count	%
AK(Amikacin)	29	4.2%
AMC(Augmentin)	45	6.5%
AT(Aztreonam)	1	0.1%
AZM(Azithromycin)	23	3.3%
CAZ(Ceftazidime)	16	2.3%
CD(Clindamycin)	40	5.8%
CIP(Ciprofloxacin)	52	7.5%
CLR(Clarithromycin)	4	0.5%
COT(Cotrimazole)	13	1.9%
CPM(Cefepime)	2	0.3%
CPZ(Cefaperazone)	28	4.1%
CTX(Cefotaxime)	27	3.9%
CX(Cefoxitin)	25	3.6%
CXM(Cefuroxime)	58	8.4%
CZ(Cefazolin)	52	7.5%
ETP(Ertapenem)	1	0.1%
Fluconazole	1	0.1%
G(Gentamicin)	72	10.4%
IPM(Imipenem)	3	0.4%
Itraconazole	1	0.1%
LE(Levofloxacin)	9	1.3%
LZ(Linezolid)	2	0.3%
MRP(Meropenem)	4	0.6%
NET(Netilline)	2	0.3%
OF(Ofloxacin)	28	4.1%
P(Penicillin)	37	5.4%
PB(Polymixin B)	9	1.3%
PI(Piperacillin)	1	0.1%
RIF(Rifampicin)	2	0.3%
RO(Roxithromycin)	14	2.0%
TE(Tiecoplanin)	73	10.6%
TOB(Tobramycin)	15	2.2%
VA(Vancomycin)	2	0.3%

The review also provides evidence that the co-morbidities significantly associated with CAP include COPD, history of respiratory disease in the past (including pneumonia) and other diseases like diabetes mellitus which is an established risk factors for CAP [7, 8] and that these patients are the target population for immunization against influenza and pneumococcal pneumonia [9, 10]. Our study has consistent findings with history of previous pneumonia and COPD in 29.2% and 27.7% patients, respectively, and 26.2% patients being diabetic. Similar reports have been obtained from studies conducted by Farnandez Sabe N., et al., (2003) [11]. Additionally, history of exposure to patients with tuberculosis has proved to be an independent risk factor for CAP in 29.2% of patients. Bronchial Asthma (9%) and history of tuberculosis (9%) in the past have also been linked to CAP in 18% of the patients.

The present study revealed that productive cough was present in all patients that took part in the study followed by other symptoms suggestive of pneumonia like fever (49.2%), breathlessness (43.1%), chills (35.4%), chest pain (24.6%) and wheezing (7.7%). Other atypical symptoms or non-specific symptoms which may not be directly attributed to pneumonia like generalized weakness (53.8%), loss of appetite (46.2%), myalgia (35.4%), headache (21.5%) and confusion (18.5%) were also seen in some of the patients. Harper C and Newton P. (1989) [12] found that out of 48 patients, 17 had classical symptoms like fever and cough and 5 patients had no symptoms suggesting pneumonia. Absence of a classical pattern of pneumonia symptoms is correlated with advanced age, cognitive impairment at presentation, and baseline functional impairment. The study concluded that a characteristic group of symptoms, signs and laboratory results is frequently absent, but some suggestive symptom is usually present in this population of elderly patients with community-acquired pneumonia. Patients with advanced age, cognitive impairment at presentation, and baseline functional impairment are most likely to have an atypical presentation of pneumonia.

Most patients that took part in our study were affected with only a single organism (69.2%), some with two organisms (26.15%) and only three patients (4.62%) had three different

causative pathogens. Amongst these Streptococcus species was found to be the commonest causative pathogen (55.68% of cases) to cause pneumonia in the elderly; of which nearly half were due to streptococcus pneumonia (22.72% of cases). Disease severity was increased in those with triple pathogens owing to increased possibility of multidrug resistant pathogens or decreased immunity or increased susceptibility to infections, however those with single pathogens were just as susceptible to developing severe pneumonia. The increased mortality risk in such patients can be assessed by their CURB-65 scores and the pneumonia severity index (PSI). The present study reports that as per the CURB-65 score, 21.5% of patients had a CURB-65 score of 0 and majority (53.8%) had a score of 1 signifying a 30-day mortality risk of 0.60% and 2.70% respectively. 7.7% each with a score of 2 and 3, with a 30-day mortality risk of 6.8% and 14% respectively and requiring hospitalization. 9.2% of patients had a score of 4 or 5, with a 30-day mortality risk of 27.8% and requiring admission to the intensive care unit as evidenced by the primary study conducted by W Lim, M M van der Eerden, et al. [13] and validated by several other studies [14, 15, 16, 17]. Similarly, as per the PSI, 40% patients had a score <70, Risk Class II (i.e. low risk); 32.3% patients had a score between 71 to 90, Risk Class III (low risk); 12.3% patients had a score between 91 to 130, Risk Class IV (moderate risk); and 15.4% patients with a score >130 belonging to Risk Class V with a high risk of mortality requiring careful monitoring and management in the intensive care setting. In comparison to the PSI score, CURB-65 offers equal sensitivity of mortality prediction due to community acquired pneumonia. Notably, CURB-65 (74.6%) has a higher specificity than PSI (52.2%). However, CURB-65 had a lower sensitivity than PSI in predicting ICU admission [16].

Torres A., et al. (2014) [18] generated up-to-date information on the etiology of community-acquired pneumonia (CAP) and its antibiotic management in adults across Europe. The study identified that Streptococcus pneumoniae was the most commonly isolated pathogen in patients with CAP. Study also found that Antibiotic monotherapy was more frequent than combination therapy, and beta-lactams were the most commonly prescribed antibiotics. Hospitalized patients were more likely than outpatients to receive combination antibiotic therapy [19]. Limited data on antibiotic resistance were available in the studies.

Syrjala H. et. al. (1998) [14] compared high-resolution computed tomography (HRCT) with chest radiography (CR) to determine if there is any advantage to using HRCT in the diagnosis of community-acquired pneumonia (CAP). CR did not show changes particularly affecting the upper and lower lung lobes and the lingula. The use of HRCT seems to increase the number of CAP cases confirmed by imaging and to improve the accuracy of diagnosing and typing of CAP.

Conclusion

The study concluded that patients with positive history of smoking and regular alcohol consumption are more prone to community acquired pneumonia. COPD, history of TB contact, history of recent pneumonia and Diabetes Mellitus are the main risk factors for community acquired pneumonia. Apart from these, respiratory diseases like bronchial asthma and underlying bronchiectasis are also risk factors for community acquired pneumonia, and are important predisposing factors for severe pneumonia in the elderly. Hypertension and overt cardiovascular disease have shown some co-relation to development of CAP in elderly. The study concluded that productive cough is the most likely presentation in elderly patients with community acquired pneumonia. Fever, chills and rigors, breathlessness, chest pain, wheezing were other common presenting symptoms suggestive of pneumonia. Some atypical symptoms like loss of appetite, myalgia, headache, confusion, sweating can also present as CAP, and the possibility must always be taken into consideration.

Study also concluded that Streptococcus spp. especially Streptococcus Pneumoniae and Klebsiella Pneumoniae were found to be the most common pathogens responsible for CAP in the elderly, and is likely to cause more severe disease in elderly smokers and regular alcohol consumers or those with COPD and Diabetes Mellitus, hence the empirical antibiotics must always cover these two pathogens.

Analysis of the antibiotics concluded that β-Lactams including amino-penicillins, cephalosporins, macrolides and 2nd generation fluoroquinolones are the most commonly sensitive first line drugs for the management of CAP in elderly. Aminoglycosides, 3rd generation fluoroquinolones and carbapenems are the most effective second line drugs and are usually required for severe pneumonia.

Acknowledgment

The Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors /publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

References

1. Vila-Corcoles A, Ochoa-Gondar O, Rodriguez-Blanco T, et al. Epidemiology of community-acquired pneumonia in older adults: a population-based study. Respir Med., 2009; 103: 309–16.
2. Baik I, Curhan GC, Rimm EB, et al. A prospective study of age and lifestyle factors in relation to community-acquired pneumonia in US men and women. Arch Intern Med., 2000; 160: 3082–8.
3. Koivalu I, Sten M, Makela PH. Risk factors for pneumonia in the elderly. Am J Med., 1994; 96: 313–20.
4. Almirall J, Gonzalez CA, Balanzó X, et al. Proportion of community-acquired pneumonia cases attributable to tobacco smoking. Chest, 1999; 116: 375–9.
5. Arranz S, Chiva-Blanch G, Valderas-Martínez P, et al. Wine, beer, alcohol and polyphenols on cardiovascular disease and cancer. Nutrients, 2012; 4: 759–81.
6. Ronksley PE, Brien SE, Turner BJ, et al. Association of alcohol consumption with selected cardiovascular disease outcomes: a systematic review and meta-analysis. BMJ, 2011; 342: d671.
7. Mannino DM, Davis KJ, Kiri VA. Chronic obstructive pulmonary disease and hospitalizations for pneumonia in a US cohort. Respir Med., 2009; 103: 224–9.
8. Polverino E, Torres Marti A. Community-acquired pneumonia. Minerva Anestesiol., 2011; 77: 196–211.
9. Gaillat J. Should patients with chronic obstructive pulmonary disease be vaccinated against pneumococcal diseases? Expert Rev Respir Med., 2009; 3: 585–96.
10. World Health Organization. Vaccines against influenza. WHO position paper—November, 2012. WklyEpidemiol Rec., 2012; 87: 461–76
11. Fernández-Sabé N, Carratalà J, Rosón B, Dorca J, Verdaguer R, Manresa F, Gudiol F. Community-acquired pneumonia in very elderly patients: causative organisms, clinical characteristics, and outcomes. Medicine, 2003 May 1; 82(3): 159-69.
12. Harper C, Newton P. Clinical aspects of pneumonia in the elderly veteran. Journal of the American Geriatrics Society, 1989 Sep; 37(9): 867-72.
13. Lim WS, van der Eerden MM, Laing R, et al. Defining community acquired pneumonia severity on presentation to hospital: an international derivation and validation study. Thorax, 2003; 58(5): 377-82.
14. Syrjälä H, Broas M, Suramo I, Ojala A, Lähde S. High-resolution computed tomography for the diagnosis of community-acquired pneumonia. Clinical Infectious Diseases, 1998 Aug 1; 27(2): 358-63.
15. Shah BA, et al. Validity of Pneumonia Severity Index and CURB-65 Severity Scoring Systems in Community Acquired Pneuomonia in an Indian Setting. The Indian

Journal of Chest Diseases & Allied Sciences, 2010; Vol 52.

16. Aujesky D, Auble TE, Yealy DM, et al. Prospective comparison of three validated prediction rules for prognosis in community-acquired pneumonia. Am. J. Med., 2005; 118(4): 384-92.
17. Myint PK, Kamath AV, Vowler SL, Maisey DN, Harrison BD. Severity assessment criteria recommended by the British Thoracic Society (BTS) for community-acquired pneumonia (CAP) and older patients. Should SOAR (systolic blood pressure, oxygenation, age and respiratory rate) criteria be used in older people? A compilation study of two prospective cohorts. Age Ageing, 2006; 35(3): 286-91.
18. Torres, et al. Risk factors for community-acquired pneumonia in adults in Europe: a literature review. Thorax, 2013 Nov; 68(11): 1057-65.
19. Capelastegui A, España PP, Quintana JM, et al. Validation of a predictive rule for the management of community-acquired pneumonia. Eur Respir J., 2006; 27(1): 151-7.