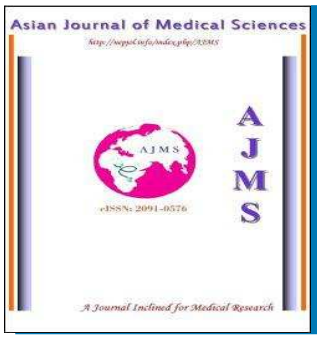


# INCIDENCE OF CARDIAC ARRHYTHMIA IN CHRONIC COR PULMONALE WITH SPECIAL REFERENCE TO ITS ETIOLOGY

ORIGINAL ARTICLE,Vol-5 No.1

Asian Journal of Medical Science, Volume-5(2014) http://nepjol.info/index.php/AJMS

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*"Cardiac irregularities are found in chronic cor pulmonale cases. The cause of arrhythmia remains obscure but the effect of a high pulmonary artery pressure on a hypoxic myocardium caused by pulmonary infection is a possibility."*

## ABSTRACT

**Objective:** to evaluate the incidence of cardiac arrhythmia in chronic cor pulmonale and to focus on the contributing etiological factors.

**Material & Methods:** 35 cases of chronic cor pulmonale were thoroughly examined for the presence of arrhythmia. After recording history & physical examination blood was collected for various investigations like serum potassium, blood urea, blood volume and ABG study before and after the development of arrhythmia. Along with this X-ray & ECG were done in every case.

**Results:** incidence of cardiac arrhythmia among all cor pulmonale patients was found to be 20% of which supraventricular ectopic beats was the most common. Respiratory infection may be thought to be the major factor in the development of congestive heart failure & different cardiac dysarrhythmia. Besides this, not a single possible factor has been found to be associated with cardiac arrhythmia.

**Conclusion:** cor pulmonale has a low incidence in this part of country. Not a single factor associated with cardiac arrhythmia could be found out except pulmonary infection. Further studies are required in this field on a larger number of patients.

**Key words: cor pulmonale, arrhythmia, atrial fibrillation.**

# INTRODUCTION

Chronic cor pulmonale is defined as right ventricular hypertrophy due to impairment of ventilatory and respiratory function of lung.[1]

It is a disease of great morbidity and mortality affecting modern civilization due to rapid progress of industrialization. Between 10% to 30% of heart failure admissions in the US are the results of cor pulmonale.[2]

Arrhythmia in chronic cor pulmonale was previously thought to be very uncommon & there has been wide variation in their reported frequency since the disturbance are usually intermittent.[3] Different types of arrhythmia found in chronic cor pulmonale are premature atrial beats to more hazardous ventricular fibrillation.[4]

Different authors specified the cause of arrhythmia is to be by different factors. The predisposing factors are like pulmonary infection, hypoxia, hypercapnia,acidosis, digitalis ,endogenous adrenalin& increased pressure in right atrium & right ventricle.[5]

The present study was undertaken to analyze the incidence of arrhythmia in patients with chronic cor pulmonlae due to different pulmonary conditions & to determine the relationships of the irregularities to arterial blood gas tension, serum potassium level, serum urea and blood volume.

This piece of work may throw some light to the factors associated with it and the management of arrhythmias which are so common and definite about their possible inherent complications.

# MATERIALS AND METHODS

One hundred fifty-five cases of chronic pulmonary diseases were studied for a period of one and half year. Every case was thoroughly studied clinically, radiologically & electrocardiographically to detect right ventricular hypertrophy. As according to definition of cor pulmonale, 35 cases of right ventricular hypertrophy were taken for study.

All cases were thoroughly examined for the presence of arrhythmia before hospitalization or during period of hospitalization from which 7 cases of arrhythmia were detected.

After recording history & physical findings, blood was taken for investigations like, Serum electrolyte, Serum Urea, blood volume and ABG Study. X-ray was done in anterior, posterior and oblique positions to know general contour of heart & to study the lung field.Along with the above investigations a standard 12 lead ECG was recorded in every case.

# RESULTS

In the present study incidence of cor pulmonale was found to be 8.75 from total cardiovascular disease admitted within this period. Maximum incidence was between 50-69 yrs & male to female ratio being 4:1.

Table I. Causes of chronic cor pulmonale

| Pulmonary disease | No. of patients | Percentage |
|---|---|---|
| **Chronic bronchitis with or without emphysema** | 25 | 71.4 |
| **Bronchial asthma** | 4 | 11.4 |
| **bronciectasis** | 3 | 8.5 |
| **Pulmonary fibrosis** | 2 | 5.7 |
| **kyphoscoliosis** | 1 | 2.8 |

On focusing the different etiological factors, the cause of chronic cor pulmonale in majority of patients were found to be chronic bronchitis with or without emphysema accounting for 71.4% of cases. (Table – I)

Table II. Presenting symptoms of chronic cor pulmonale

| symptoms | No. | Percentage |
|---|---|---|
| **Cough** | 35 | 100 |
| **Sputum-mucopurulent** | 23 | 65.7 |
| **Purulent** | 5 | 4.2 |
| **Dyspnoea Grade -II** | 5 | 14.2 |
| **Grade – III** | 9 | 25.8 |
| **Grade -IV** | 21 | 60.0 |
| **Drowsiness** | 10 | 28.5 |
| **Headache** | 6 | 17.1 |
| **Weakness** | 5 | 14.2 |

On analyzing the various presenting symptoms, cough was found in all cases whereas dyspnoea of grade – IV was present in 60% of cases. (Table -II)

Table -III shows most cases (57.1%) presented primarily with gross congestive cardiac failure, with edema, hepatic enlargement, raised venous pressure with few special cardiac signs. There was evidence of gross

pulmonary disease in all cases. No special cardiac signs were found. On examining the radiological features, emphysema was seen in all cases. Right ventricular enlargement was seen in 50% of cases. Markings of pulmonary arteries at both hilars were pronounced in all cases.

Table III. Physical signs

| Physical signs | No. | Percentage |
|---|---|---|
| **Squatting posture** | 10 | 28.5 |
| **Kyphoscoliosis** | 1 | 2.8 |
| **Barrel chest** | 28 | 80.0 |
| **Cyanosis** | 7 | 20.0 |
| **Clubbing fingers** | 3 | 8.5 |
| **Impalpable apical impulse** | 30 | 85.7 |
| **Epigastric impulse** | 18 | 51.4 |
| **Engorged neck veins** | 25 | 71.3 |
| **Accentuated p-2** | 28 | 80.0 |
| **Enlaged tender liver** | | 57.1 |
| **C.C.F** | | 57.1 |
| **Cardiac irregularities:** | | |
| **Atrial fibrillation** | 1 | 20.0 |
| **Supraventricular Ectopic beats(atrial&nodal)** | 4 = 7 | |
| **Ventricular ectopic beats** | 2 | |
| **Functional TI** | 5 | 14.2 |

Table IV. ECG findings of chronic cor pulmonale

| Electrocardiographic changes | No. | Percentage |
|---|---|---|
| **Tall or widened P waves in II,III** | 18 | 51.4 |
| **R3 is more than R1 and S1 greater than R1** | 25 | 71.4 |
| **Late R wave in aVR (qR pattern)** | 12 | 34.2 |
| **R/S is greater than 1 in V1 Deep S in V5 and V6** | 15 | 42.8 |

When incidence of arrhythmia among 35 cases of cor pulmonale were studied, 7 cases showed cardiac irregularities which contribute to 20% of all cases.

Types of arrhythmia: No of patients

Atrial fibrillation – 1

Supraventricular ectopic beats:

Atrial - 2

Nodal - 2

Ventricular ectopic beats - 2

Table V. Etiological factors of arrhythmia

| | Mean Serum potassium | Mean PCo2 mm of Hg | Mean PO2 mm of Hg | Mean Blood volume | Mean Blood urea |
|---|---|---|---|---|---|
| **Cases before Arrhythmia** | 3.8 | 40.1 | 60.5 | 4 lit | 37.3 |
| **Cases after Arrhythmia** | 3.2 | 40.2 | 60.2 | 4 lit | 38.5 |
| **Cases without arrhythmia** | 3.6 | 40.3 | 62.1 | 4.5 lit | 37.2 |

# DISCUSSION

The term cor pulmonale is still very popular in medical literature. Its association with cardiac arrhythmia is reported to be associated with high mortality particularly during hospitalization.

Incidence of chronic cor pulmonale in this study was found to be 8.7% which is similar to the figure given by Limbu Y R et all (8%).[6] This might be due to less number of industry in this area or could also be due to poverty & ignorance of people preventing them seeking hospital admission for treatment. In comparison, figures given by various other workers are 19.42% (Padmabati et al)[7]& 22% (Viswanathan R).[8]

Chronic bronchitis with or without emphysema was registered, to be the commonest etiological factor accounting 71.4% of cases which is in agreement to the analysis of Viswanathan R (74.4)[8] ,Wang et al(84%)[9] and Zhang Lepin (77%).[10]

Considering the different clinical features, most of the patients in this series were in the advanced stage of cardiac involvement & as many as 57.1% were admitted with gross signs of congestive cardiac failure. Presence of systolic epigastric thrust in 51.4% of cases suggested right ventricular hypertrophy. Loud and split P2 was

seen in 80% cases and engorged neck veins in 71.3% cases. Padmavathi et al[11] reported loud P2 in 65% of cases whereas it was of 57% according to Guptha et al.[12]

Most important symptom of our study was cough with sputum which reveals the fact that chronic bronchitis with emphysema, bronchiectasis and pulmonary tuberculosis constituted the primary cause in most of the cases. Dyspnoea of grade IV was observed in 60% of cases. Padmavathi et al[11] reported dyspnea in 100% of group. Cyanosis of central origin was present only in 20% of our cases but it was 80% in Viswanathan series[8], 83.2% in Padmavathi series[11] and 50 % in Guptha series.[12]

In the present study the commonest ECG abnormality was P-pulmonale in patients presenting with congestive cardiac failure. This indirectly proves the view of John E. Madias that the development of P pulmonale indicates the imminence of heart failure.[13] The outstanding electrocardiographic picture in this series were the demonstration of arrhythmia in the form of supraventricular ectopic beats, ventricular ectopic beats & atrial fibrillation in 20% of cases.

Incidence of arrhythmia of current study was 20% out of which 57.4% cases were having supraventricular ectopic beats and 28.5% cases were reported of having ventricular ectopic beats. According to one study by Holford & Mithoefer[14] frequent association of arrhythmia upto 89% was reported out of which premature ventricular beats were most common followed by premature atrial beats, but in this study low incidence of arrhythmia might be due to its transient nature & difficulty in detecting every patient of chronic corpulmonale by monitoring. Probably some arrhythmia cases remained undetected.

The exact mechanisms of production of arrhythmias are still unclear. Respiratory infection has been thought to be the major factor in the development of congestive heart failure & different cardiac dysarrhythmia. In the present series invariably each & every case had respiratory infection. Following treatment with conventional measures like appropriate antibiotics, bronchodilators, expectorant & oxygen therapy, the attacks of 2 cases of supraventricular arrhythmia were aborted, thus confirming respiratory infection as the fore runner of development of cardiac arrhythmias.

The partial pressure of carbon dioxide and oxygen tension remained almost same with or without arrhythmia similar to the study of T.W, Astin.[15] Perhaps the development of arrhythmia was of multifactorial origin. Similarly in the present study, the role of hypokalemia in the production of arrhythmia could not be correlated as the difference of serum potassium level before & after development of arrhythmia was not found to be statistically significant. It has been postulated that adrenal stimulation resulting from hypoxia may result in reduced serum potassium levels predisposing patients to the arrhythmias of digitalis toxicity.[16]

Current study didn't show any role of blood urea in the development of arrhythmia similar to the observation of A.J Thomas & P. Valabhji's series.[17] Blood volume study was done to see whether it had any influence over the production of arrhythmia by stretching the right atrium. But it didn't show any relationship with the development of arrhythmia.

# CONCLUSION

This study registered a low association of cardiac arrhythmia with cor pulmonale in comparison to previous studies. This may be due to less number of cases and difficulty in monitoring every patient for a quite lengh of time to detect the slightest change in sinus rhythm as most of the arrhythmias were of transient in nature. So further studies including higher number of cases are required.

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**Authors Contributions:**
**JN: Study design and guide**
**MN: Data collection and analysis**
**SRP: Data collection and analysis**
**SB: Manuscript writing and proof reading**

**Conflict of Interest: Nil**

**Date of Submission: 10.8.2013**
**Date of Peer review: 12.8.2013**
**Date of Acceptance: 18.8.2013**
**Date of Publication: 9.9.2013**