A STUDY OF PULMONARY TUBERCULOSIS IN THE ELDERLY POPULATION - SOCIAL, CLINICAL, RADIOLOGICAL AND MICROBIOLOGICAL ASPECTS

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CERTIFICATE

This is to certify that this dissertation titled **"A STUDY OF PULMONARY TUBERCULOSIS IN THE ELDERLY POPULATION - SOCIAL, CLINICAL, RADIOLOGICAL, MICROBIOLOGICAL ASPECTS"** submitted by ***Dr. D. DAVID PRAVEEN KUMAR*** to the faculty of General Medicine, The Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of MD degree Branch I (General Medicine) is a bonafide research work carried out by him under our direct supervision and guidance.

Place: Madurai

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DECLARATION

I, **Dr. D.DAVID PRAVEEN KUMAR**, solemnly declare that the dissertation titled ***"A STUDY OF PULMONARY TUBERCULOSIS IN THE ELDERLY POPULATION-SOCIAL, CLINICAL, RADIOLOGICAL, MICROBIOLOGICAL ASPECTS"*** has been prepared by me.

This is submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai, in partial fulfillment of the regulations for the award of MD Degree Branch I (General Medicine). It was not submitted to the award of any degree/diploma to any university either in part or in full form previously.

Place : Madurai

Date : **DR. D.DAVID PRAVEEN KUMAR**

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ABBREVIATIONS AND ACRONYMS

ATT	:	Anti Tuberculous Therapy
BMI	:	Body Mass Index
COPD	:	Chronic Obstructive Pulmonary Diseases
DOTS	:	Direct Observed Therapy Short-term
HIV	:	Human Immunodeficiency Virus
M.tuberculosis	:	Mycobacterium tuberculosis
PPD	:	Purified Protein Derivative
PAO_2	:	Alveolar oxygen concentration
RFLP	:	Restrictive Fragment Length Polymorphism
TU	:	Tuberculin Units
WHO	:	World Health Organization

CONTENTS

Introduction

The term “Geriatric” refers to the ageing human population and “Geriatrics” refers to the medical field that deals with clinical problem specific to old age. Ageing is a universal process. In the words of Senica, old age is an incurable disease. Sir James Sterley lamented, You do not heal old age, you protect it, you promote it and you extend it.

As we watch with horror, as the hairline marches backwards to the top of the head, skin wrinkles like cellophane and memory diminishes, any one will ask, what it means to grow old. The answer from scientific committee may surprise us, “we don’t know”. Neither these definition nor the medical literature specify a precise age to delineate this group (Strausburgh et al 2001).

In 1900, only 1% of earthly population i.e, 15 million was greater than 65 years of age. By 1992, 6% of global population or 342 million populations were in this category. By the year 2050 these figures will have grown to 20% and 2.5 billion respectively. In India by 2050, 21% of the Indian population will be 60+. Expectation of life also increases as it is projected to be 67 years for males and 69 years for females in 2011 – 2016 . (Maher & Raviglione 2005)

From the stand point of health care, the geriatric population is diverse. This people constitute a definable population who are at increased risk for nosocomial and other health care associated infections. Geriatric patients like transplant recipients may be compared to “Sentinel Chickens”, the first to be affected by new

or emerging infection in hospitals and other health care environments that care for adult patients.

The elderly have defective host defenses that compromise their ability to ward off infectious agents. Factors influencing immunocompetence includes immune senescence, changes in nonadaptive immunity, chronic diseases, medications, malnutrition and functional impairments. (Prakash et al 1999). Respiratory infections and gastroenteritis occur most frequently. Although no national data or frequency of occurrence are available, public health reports says that the occurrence was not uncommon.

Elderly Tuberculosis

"A forgotten germ returns revisiting the elderly with vengeance"

When today's elderly were young, tuberculosis affects greater numbers of people. According to Park, about 65% of people within the age of 55 in India are affected with tuberculosis. It was viewed as a dreadful disease. Although the cause of the illness was already understood, the cure remains elusive not to arrive for at least a decade. Tuberculosis, although predominant among the poor and underfed and rampant among those living in unsanitary surroundings, did not discriminate.

Tuberculosis attack the young and middle age, and took its toll among healthy. Many individuals young at that time and making up the elderly group now, survive this nagging epidemic. Their immune system succeeded in fighting the germs to a draw. But the invader remains, content to live quietly in his host,

temporarily encapsulated by antibodies but awaiting the opportunistic moment for return. . The majority of pulmonary tuberculosis, in older people is due to inactivated diseases. In one study by Liaw et al (1995) about 26.2% of elderly tuberculosis patients suffer previous tuberculosis disease.

This present report deals with socioclinical dimension of elderly tuberculosis.

Aim and Objectives

1) To study the socio-demographic pattern of elderly tuberculosis.
2) To analyze their clinical presentation and diagnostic aspects.{Radiological, microbiological, immunological, biochemical, hematological}, and
3) To elicit co existing illness among them.

REVIEW OF LITERATURE

Global Epidemiology of Tuberculosis

In 1993, the World Health Organization declared tuberculosis as a global emergency because of the scale of the epidemic and the urgent need to improve global tuberculosis control.

According to Tuberculosis case notification and rates by WHO in 2002, three regions dominates the world wise distribution & notification i.e., South East region 36%, African region 24% & Western Pacific region 20%. (Maher & Raviglione 2005).

In Industrialized countries, case notification of Tuberculosis, which approximated the true incidence of tuberculosis more closely than in developing countries, steadily declines throughout most of twentieth century in industrialized countries. This is because of socio economic improvement and possibly because of the isolation of the infectious cases in sanitoria. The effective application of chemotherapy in the later half of twentieth century further accelerated the decline. From the mid 1980 onwards several countries saw a expected continuous decline, with case notification increasing for the first time in many years. Factors responsible for the reversal of the previous trend include increased poverty among marginalized group in inner city areas, immigration from areas with high tuberculosis prevalence, the impact of HIV and the failure to maintain the

necessary public health infrastructure under the mistaken belief, tuberculosis was the disease of the past.

TABLE 1 TUBERCULOSIS CASE NOTIFICATION AND RATES BY WHO REGION IN 2005 .

WHO region	No. of cases notified	Proportion of global total (%)
South East Asia	1,487,985	36
Africa	992,054	24
Western Pacific	806,112	20
Americas	233,648	9
Eastern Mediterranean	188,458	6
European	373,497	5

SOURCE:CLINICS IN CHEST MEDICINE 2005

In 2002, there was an estimated 8.8 million new cases of tuberculosis world wide, with an incidence rate of 141 per 1,00,000 population.

Epidemiology of Tuberculosis in India

Tuberculosis continues to be a major public health problem in India. Since the national reporting system is defective, the only reliable source of information on the magnitude of the tuberculosis problem has been the population sample surveys.

The only authentic survey on a country wide basis, is the national sample survey (1955 – 1958) conducted by ICMR. The National Tuberculosis Institute, Bangalore undertook three longitudinal surveys at Delhi, Bangalore and Chengelpet. India ranks first in the estimated number of Tuberculosis cases i.e, 1,049,549 thousand cases. (Maher & Raviglione 2005).

The overall prevalence of infection (as judged by the standard tuberculin test) was about 30%, in males 35% and in females 25%. The prevalence was 4 cases per 1,000 population. The incidence of new cases was about 1.5 per 1000 population. According to experts it is safe to estimate that at least 50% of the population above the age of 20 years is infected and will remain at risk of disease throughout their lifetime (WHO 2002).

Gender difference in tuberculosis

Little has been written about gender differences in tuberculosis. In general, the notification rate is higher in men than women. Gender differences vary in different parts of the world. In their study, Chan-Yeung et al (2002) demonstrated that the tuberculosis rate was higher in men than in women in all age groups and the sex difference increases with age. In those aged 60 – 79 years, men are affected four times more than women.

Martinez et al(2000) reported sex differences in the rate of tuberculosis in San Francisco(USA) from 1991 – 1996, higher men : women ratio was observed. They suggested that the observed sex difference was due to differences in

transmission dynamics rather than diagnostic or reporting bias. Sutherland et al (1979) studied the risk of tuberculosis infection in the Netherlands from 1967 to 1979 and found that there was no differences in the annual rate of infection between boys and girls aged 6 – 12 years. However for those between 12 – 18 years, an excess in the annual rate of infection was found among males.

Duration of illness

There is a delay in diagnosing TB in elderly patients. They present more commonly with non-specific complaints. Therefore the tuberculosis may not be suspected initially and there maybe considerable delay before the diagnosis and may present at the advanced stage of the disease and with multiple other medical problems.

In a study by Arora & .Bedi (1989) in Himachal Pradesh, it was found that only 40% of the elderly tuberculosis patients were aware that these symptoms would be due to Tuberculosis. Another study carried out by Liaw et al (1995), in comparing clinical spectrum of tuberculosis in people less than & greater than 65 years of age, reported that diagnosis of TB in first visit was made out in 47.3% in patients less than 65 years of age against 38.6% in patients greater than 65 years of age.

Pathogenesis & immunological aspects

The principal route of entry in tuberculosis is the lung. Inhaled tubercle bacilli are engulfed by alveolar macrophages and transported to regional lymph nodes. Infected macrophages and circulating monocytes secrete proteolytic enzymes, generating an exudative lesion and granuloma formation with activation of T cells. This leads to the onset of cell mediated immunity. The characteristic Ghon complex ultimately develops, tubercle bacilli ultimately restrain within caseous necrosis with eventual healing. A study by Zhmikrobiol et al (2002) reported that there is a decreased activity of natural killer cells in tuberculosis patients. The greatest decrease in the activity of natural killer cells was observed in patients with chronic fibro cavernous form of tuberculosis.

A study by Ashkin et al (1999) showed that elderly individuals are more likely to have concomitant illness that causes varying degrees of cellular immunodeficiency. It has long been known that patients with diseases such as diabetes, malignancies and renal diseases or who were receiving medications that suppress their cellular immunity were more likely to progress from TB infection to disease.

Interestingly, while these concomitant illnesses only produce a minor cellular deficiency, it is enough to make patients more susceptible to TB disease. Thus altered immune function might predispose the elderly to potential reinfection with TB.

It is due to these defects in cellular immunity, elderly patients who present with a chronic wasting or respiratory illness may not present in the classic form.

Clinical spectrum of Tuberculosis

Tuberculosis in older patients can present atypically. Approximately 75% of elderly persons with TB disease manifest lung involvement (Rajagopalan et al (2001)). Many older patients with tuberculosis disease may not exhibit the classic features of tuberculosis. Tuberculosis in the population may present clinically with changes in functional living, chronic fatigue, cognitive impairment, anorexic or unexplained low grade fever.

According to Chan et al (1995), cough was the most common symptom in both elderly and young tuberculosis patients. However non specific symptoms occur in 25% of the elderly tuberculosis patients. According to Chan et al (2002) systemic symptoms dominates the picture in elderly tuberculosis. As against them, Arora et al (1989) reported that 'breathlessness' was the most common symptom in elderly tuberculosis patients.

Clinical features of pulmonary tuberculosis in the young and elderly patients have been compared. Symptoms of tuberculosis like fever, night sweats, weight loss, sputum production & hemoptysis were significantly in lower proportion in the elderly group as compared to the young. Abnormal mentation was more common in the elderly. Katz et al (1987) found no significant difference in the presentation with symptoms of fever and weight loss among the elderly.

They observed that the elderly significantly present with hemoptysis, have cavitatory lesions on radiographs. Elderly TB patients were more likely to present with dyspnoea as their main symptom. A reactive arthralgia has been described in some patients which can mimic a low degree, subacute rheumatoid arthritis. This is probably more common in people of Asian, African & Caribbean origin. Fever if present is usually low grade and is easily missed unless rectal temperature is measured in the late afternoon or evening (Brochlehurst et al 1992).

Smoking and elderly Tuberculosis

"*Some patients commit suicide by drowning but many by smoking*".

According to Arora et al (1989) about 68% of elderly tuberculosis patients are smokers & chronic bronchitis occurs in about 64% of elderly tuberculosis patients. This results in altered clinical presentation. The majority did not seek early medical relief as they attribute their complaints to old age and smoking.

According to a study from Udaipur about the morbidity pattern among elderly population by Prakash et al (2004), about 63.6% of elderly people are non smokers and 37% are current or ex-smokers.

Cigarette smoking is responsible for 90% of chronic obstructive pulmonary diseases. Chronic mucous hyperplasias of the larger airway results in a chronic productive cough in as much as 80% of smokers over age 60 (Harrison16th edition).Since smoking is strongly related to elderly patients, these elderly

tuberculosis patients present late and they wrongly attribute these symptoms to chronic obstructive pulmonary disease.

In patients of both sexes over the age of 30 suffering from pulmonary tuberculosis, it has been shown by Lowe et al (1956) that there is a highly significant deficiency of non smokers and light smokers compared with controls of the same as suffering from other diseases. Kahn et al (1966) shown that mortality from pulmonary tuberculosis among doctors has been shown to increase significantly with the number of cigarette smoked and the similar effect has been also shown in investigations.

Co morbid Illness

Disease associated with impaired cellular immunity such as Hodgkins' disease, leukemia, lymphoma and AIDS may predispose to reactivation. Snider et al (1985) has shown gastrectomy probably predisposes to tuberculosis, particularly in patients with low weight / height ratios or malabsorption syndrome. Morrio et al (1992) has shown diabetes mellitus may predispose to tuberculosis and also lead to a significant increase in cavitation and smear positive disease. Chan et al (1998) reported that, chronic obstructive pulmonary disease was the commonest among medical condition in the elderly. He also showed about 9% of elderly tuberculosis patients are diabetics. . Arora et al (1989) have found lower sputum conversion and cure rates in elderly TB patients as compared to those of the younger age group. One of the reason he proposed as the cause of decreased cure rate was that

about 15 – 85% of elderly patients suffer from concomitant diseases like chronic bronchitis, emphysema, diabetes, etc and their presence would complicate both the diagnosis and treatment of TB.

Diabetes & elderly tuberculosis

In most studies on this subject, persons with diabetes mellitus have two fold to four fold higher incidence of active tuberculosis than non-diabetic patients (Morse et al (1964). The predisposition of diabetes to infection that are normally controlled by cell mediated immunity may result from one or more defects of pulmonary host defense, including conditions that interfere with normal clearance mechanisms or that impair pulmonary function. The greatest difficulty in studying diabetes mellitus as an independent risk factor for the development of tuberculosis is the presence of potential confounding variables. These variables include other co-existent medical conditions (eg. malnutrition, chronic renal disease) and personal behaviors, such as smoking & alcohol that may further weaken host defenses.(Koziel et al (1998))

Henry & Stableforth (1983) described this finding from a group of diabetic TB patients living in the United Kingdom as diabetic tuberculosis patients presents with a higher incidence of cavitatory disease and sputum positive states than did a control group of Non Asian diabetic TB patients. This was presumably due to higher exposure risk of the Asians which appeared to be associated with their

living in settings that replicate and concentrate the bacilli, the social behaviour and condition of their birth communities.

Miliary Tuberculosis in elderly

Miliary TB is very common in the elderly. This presentation occurs in 1 in 20 cases.(Pathy 1993). It is one of the common causes of pyrexia of unknown origin in the elderly. Usually sputum will be negative for mycobacterium. According to Babrowitz et al (1982) miliary TB in the elderly can be particularly difficult to recognize. In patients over 80 years majority of military tuberculosis is undiagnosed and it is fatal. According to Robert et al (1974), the classical acute or sub acute high intermittent fever and early onset of complicating meningitis or serositis is often absent in the old. It presents as more chronic form of slowly progressing protracted, wasting illness with absent or low grade fever without any localizing symptoms or signs. Examination may reveal only a hepatosplenomegaly. Abnormal chest x-ray is quite compatible with miliary tuberculosis (Kulpati)

Hematological abnormalities in elderly tuberculosis.

Hematologic abnormalities, normocytic normochromic anemia, neutrophilia, high erythrocyte sedimentation rate & hypoalbuminia can occur & it is similar to those observed in younger patients. However anemia and lower white cell counts are more common in the elderly. A high incidence of drug induced neutropenia occurs in elderly TB. Kaltenbach et al (2001) compared the biochemical parameters

between elderly and young TB patients. He observed that the commonly observed biochemical abnormality was increased erythrocytic sedimentation rate (49 vs 65 mm/h) & lymphocytopenia (1729 vs 1059 / μl , $p < 0.01$) which was also observed by Yokayama et al (2003). Yamaguchi et al (2003) stated that hypoalbunimia and neutrophilia was higher in the elderly group. In patients with military tuberculosis there is profound bone marrow suppression.

Investigations in Tuberculosis

Tuberculin Intradermal Test

The tuberculin was discovered by Von Pirquet in 1907. A positive reaction to the test is generally accepted as evidence of present or past infection by M. tuberculosis. The tuberculin test is the only means of estimating the prevalence of infection in a population.

Tuberculin – Now purified protein derivative is used. It contains 50,000 tuberculin units per milligram. One TU is equal to 0.01 ml of O.T. or 0.0002 mg PPD (Youman et al 1980).

Dosage

a) First strength or 1 TU

b) Intermediate strength or 5 TU

c) The second strength or 250 TU.

For routine testing, the vaccinating team in India use 1TU. (Comstoch et al 980.)

Mantoux test

The mantoux test is carried out by injecting intradermally on the flexor surface of the fore arm 1 TU of PPD in 0.1 ml. The WHO advocates a preparation known as PPD – RT – 23 with Tween-80. The result of the test is read after 72 hours.

In Tuberculin reaction induration is measured.

> 10 mm	Positive
< 6 mm	Negative
6 – 9 mm	Doubtful

(Source : Park's Preventive & social medicine, 18th edn.)

A positive reaction indicates that the person is infected with M.tuberculosis, it does not prove that the person is suffering from the disease. (The Tuberculosis Association of India, New Delhi, 1981).

An excellent but inadequately noticed paper by Zybowski & Allen in 1964 documents the phenomenon of reversal of tuberculin reaction to negative over time while the role of reversal varies with age. It was shown to continue for the life span at a rate of about 5% per year.

There is data to suggest that the negative tuberculin reaction, which is often in elderly is mainly due to falling immune response to tuberculin antigen (Brande et al 1992).

According to Yokayama et al (2003) antibody to tuberculin skin test with purified protein derivative was evident in 7% of patient under 65 and 14% of those over 65 years of age.

Now the American Geriatric Society routinely recommends two step tuberculin tests as per the base line information of all institutionalized elderly. The two step test involves initial intradermal placement of 5 tuberculin units of PPD and the results are recorded at 48 – 72 hours. Patients are retested within 2 weeks after a negative response (induration of < 10 mm). The application of the second tuberculin skin test should be accompanied by dermal control antigen (i.e. candida, mumps or tetanus toxoid) diluted to a 1.5 concentration with phenol buffered diluent to assess the presence of anergy. A positive booster effect and therefore a positive tuberculin skin test reaction is a skin test of 10 mm or more and an increase of 6 mm or more over the first skin test reaction. The booster effect occurs in a person previously infected with M.tuberculosis but who has a false negative skin test, repeat test elicits a truly positive test. It is important to distinguish the booster phenomenon from a true tuberculin conversion. Conversion occurs in persons previously uninfected with M.tuberculosis and who had a true negative tuberculin test but who becomes infected within 2 years as demonstrated by a repeat skin test that is positive during this period. 15 mm or more is considered positive for a conversion activity in persons 35 years and older and in persons with no risk factors for tuberculosis (Hazzaro et al).

Chest X-ray

The chest x-ray is mandatory in the diagnosis of Tuberculosis. The radiological features of tuberculosis in the elderly patients are often similar to those in younger patients but there is a greater prevalence of mid and lower zone shadowing (Umeki et al 1989).

According to Guzman et al (2000) atypical radiological images of pulmonary tuberculosis are common in elderly and in diabetic patients. The proportion of patients with lower lung fields lesions progressively increases with age where as the frequency of cavitations steadily decreases with age.

Guzman et al proposed that a higher frequency of lower lung disease in the elderly is due to immunological abnormality or to a higher frequency of pulmonary tuberculosis. Aging leads to increased alveolar ventilation and reduced perfusion resulting in increased mismatch and increased PAO_2. These changes should affect the lower lobes more than the upper lobes because the latter have a higher ratio and higher PAO_2. Therefore age induced changes should favour multiplication of Mycobacterium tuberculosis in lower lung zones. Further more frequency of upper lung field lesion (with or without lower lung field lesion) was similar at all ages, suggesting that aging does not alter condition in upper lobes.

According to Rizvi et al (2003) radiograph in elderly patients more commonly had extensive bilateral infiltration (32.4% Vs 14.9%) $P<0.05$) when compared with young. A similar view was experienced by Umeki et al (1989).

According to Yamaguchi et al (2001) the frequency of cavitation was lower in the elderly group (59.67%) than the middle aged group (87.4%).

According to Chang et al (1998), elderly patients more frequently had extensive disease involving both lungs, particularly in the advanced age group of 75 years and over. This may be caused by delay in presentation or poorer immunity in the elderly. Interestingly cavitation is less common in elderly patients probably reflecting a diminished cellular immune response with less tissue destruction. This may also explain why hemoptysis is less common in elderly subjects.

Sputum examination

Sputum examination for M.tuberculosis using smear and culture is indicated for all patients who have pulmonary symptoms and radiographic changes compatible with tuberculosis. Sputum examination is carried out by Ziehl Neelson & Kinyoun methods which utilizes the carbolfuschin method. Otherwise auromine rhodamine dyes are used with uses flurochrome methods.

For suspected tuberculosis, it is recommended that 3 fresh consecutive sputum specimen obtained in the morning be used for routine mycobacteriological study (American thoracic society, Diagnostic standards of classification of TB, 2000).

For elderly patients who are unable to expectorate, flexible fibroptic bronchoscopy to obtain bronchial washings & bronchial biopsy specimens is

clearly feasible and is a valuable diagnostic option (Patel et al 1983). Patients who cannot produce sputum despite these measures may require gastric aspiration. Smear test for M.tuberculosis may require a minimum of 10^{4-5} AFB per milliliter to be seen by light microscopy (Rajagopalan et al (2001)).

Arora et al (2003) compared sputum profile of tuberculosis between younger and geriatric patients. He demonstrated that the ratio smear positive to smear negative patients was almost similar in the two age groups. Further the treatment outcomes of new smear positive geriatric TB patients in comparison to younger patients showed lower sputum conversion (75.3% to 85.7%). This same view was endorsed by a study in Hong Kong where the bacteriologically confirmed pulmonary tuberculosis cases increases with age from 59.8% in those < 20 years to 76.2% in those $\geq$ 80 years. As against this Gaur et al (2004) showed that the percentage of elderly tuberculosis patients found to be bacteriologically positive by direct smear was 59.6% as compared to 65.8% among the comparison group (35 – 50 years).

Culture

Routine mycobacterial culture methods which use Lowenstein – Jensen medium may require up to 6 weeks for growth of mycobacterium tuberculosis. A recent Bactec System which utilizes liquid broth media containing the 14 C labelled palmitic acid specific for mycobateria allows culture in 2 weeks are an addition to

our armamentarium for the diagnosis of tuberculosis. These are not yet available for routine clinical practice (Kulpati).

Immunoassay for mycobacterial antigen, serological tests for tuberculosis and detection of mycobacterial components or products by high performance liquid chromatography, gas chromatography and mass spectrometry are also important.

Henn et al (2001) evaluated the sensitivity and specificity of anti Lipoarabinomannan IgG antibodies for diagnosis of tuberculosis in cases of pulmonary, extra pulmonary or associated forms. She concluded that the test is easy and ideal for use in diagnosis of active tuberculosis in specific cases in conjugation with the other methods and permit to evaluate the humoral immunity. Rapid radiometric detection makes out mycobacterial growth (detection of 14 CO_2 released) in 10 – 12 days. A further advantage is that the DNA probe identification and antibiotic susceptibility tests can also be performed rapidly (Rajagopalan et al).

Other tests

Molecular techniques extend knowledge about TB. Genetic finger printing using restriction fragment length polymorphism patterns to identify isolates, have proved that HIV seropositive individuals and presumably other people as well can be re-infected by TB. Molecular epidemiology again using RFLP pattern has helped identifying transmission network that the traditional epidemiology failed to

identify. Early detection of drug resistance by rapid identification of genetic mutation and by chemiluminescent methods so called as “Fire fly”.

Management of Elderly Tuberculosis.

TABLE 2 Treatment categories in DOTS chemotherapy in India.

Diagnostic Category	Tuberculosis Patients	Tuberculosis Treatment Regimen*	
		Initial Phase	Continuation Phase
Category I	a) New sputum smear positive b) Seriously ill – smear negative c) Seriously ill – extra pulmonary	2 $(HRZE)_3$	4 $(HR)_3$
Category II	a) Sputum smear positive relapse** b) Sputum smear positive failure** c) Sputum smear positive after default.	2 $(HRZES)_3$ 1 $(HRZE)_3$	5 $(HRE)_3$
Category III	a) Sputum smear negative not seriously ill b) Extra pulmonary not seriously ill.	2 $(HRZ)_3$	4 $(HR)_3$

* The number before the letter refers to the number of months of treatment. The subscript after the letter refers to the number of doses per week.

** In rare and exceptional cases, patients who are sputum smear negative or who have extra pulmonary disease can have relapse or failure. This

diagnosis in all such cases should be made by a medical officer and should be supported by culture and histological evidence of current, active tuberculosis. In these cases the patient should be categorized as others and given category II treatment. (Source : Park's Preventive and social medicine 18th edition).

	Drug	***Adverse Reactions***
1.	INH	GIT irritation, peripheral neuropathy*, blood dyscrasias, hyperglycemia & liver damage**.
2.	Rifampicin	Hepatotoxicity, Gastritis, Influenza like illness, purpuric thrombocytopenia & nephrotoxicity.
3.	Streptomycin	Vestibular damage, nephrotoxicity.
4.	Pyrazinamide	Hepatotoxicity, Hyper uricemia
5.	Ethambutol	Retro bulbar neuritis.

(Source : Park's Preventive & social medicine, 18th edition)

* Peripheral neuropathy can be prevented by pyridoxine 10 – 20 mg daily.

** A transient rise in serum enzymes to three times the normal may occur during INH therapy.

Therapeutic difficulties in elderly patients

Whatever the age, the main cause of treatment failure is the lack of compliance especially among elderly patients. Old age dementia, mental confusion, depression, lack of eye sight fails them in taking particular drug at right time in right dosages. Elderly people due to the absence of effective reinforcement, they lack the determination required to complete course and treatment (Ritasood 2003). Older people are more prone for drug reaction when compared with young people. This same hypothesis also applies to elderly tuberculous patients. Tealc et.al (1993) stated that the elderly people are 3 times more likely to have reaction to antituberculous drugs as compared to young patients. Pande et al 1996 reported that hepatotoxicity due to INH and rifampicin was very common in elderly tuberculosis patients. Rifampicin combined with 1NH has additional hepatotoxic effects. As renal function, hearing acuity, vestibular function declines with aging, ototoxicity and nephrotoxicity due to streptomycin is more in elderly patients when compared with younger patients. Since some visual impairment is common in the elderly, a careful examination that includes visual acuity and color discrimination should be performed before initiating ethambutol therapy. Drug interactions must also be considered. Patients may be taking other drugs for other illness which may interact with antituberculosis drugs.

Other social factors, like lack of transport facility, inability of the service provider to visit regularly, lack of financial support, loneliness are also other reasons for increased default rate.

Materials and Methods

Study Design	:	Cross Sectional Study
Setting	:	Govt. Rajaji Hospital, Madurai
Period of study	:	January 2005 to December 2005
Ethical clearance	:	Ethical committee approved the methodology of the study and copy enclosed in annexure I
Consent	:	Consent was obtained from all the patients considered for the current study.
Financial support	:	Nil
Conflict of interest	:	Nil

Inclusion Criteria

Patients who satisfied the following were included in the study.

1) Elderly patients (above 60 years of age) who were sputum smear positive, or with clinical and radiological profile suggestive of tuberculosis were included in the study.
2) Both sexes.
3) HIV negative status.
4) Willing & Co-operative individuals.

Exclusion Criteria

Patients who had any one of the following or a combination of them were excluded.

1) More seriously sick individuals.

2) HIV co-infection.

3) On immunosuppressive therapy.

4) Associated malignancy

5) Major abdominal / thoracic surgery.

6) Un-cooperative / unwilling patients

7) Major cardiac illness

8) Collagen vascular diseases

9) Occupational diseases

10) Extra pulmonary tuberculosis.

METHODS

Selected socio-demographic, clinical and laboratory data were elicited from the patients and recorded in a proforma (enclosed in annexure II).

I.Socio demographic data:

a) Age b) Sex c) Address d) Contacts e) Number of family members

II. Clinical data

a) Body weight b) Height c) Pulse rate d) Blood pressure e) Clinical examination

III. Laboratory data

a) Hemoglobin: measured using Sahli's hemoglobinometer.

b) Total count & Differential count using Leishmann stain.

c) Blood urea done manually by using Diacetyl monoxime technique.

d) Serum creatinine: estimation done using COBAS auto analyzer.

e) Blood glucose: estimation done using glucose oxidase method

f) putum AFB: 3 early morning specimens collected and stained by Ziehl – Neelson technique

g) X-ray Chest: PA view was taken in a radiation dosage of 0.02mSv.

The following definitions were used in this study.

Ex-Smoker: Patient who ceases smoking for 2 years.(Changes in the small airways of smokers will reverse after 1- 2 years of cessation) (Harrison 16^{th} edition)

Diabetes Mellitus:

a) Fasting plasma glucose ≥126 mg/dl

b) Two hour plasma glucose ≥200 mg/dl in oral glucose tolerance test.

c) Symptoms of diabetes plus random blood glucose concentration ≥ 200 mg/dl

Hypertension: Systolic ≥ 140

Diastolic ≥ 90

Based on the average of ≥ 3 reading, when any one of the value (systolic or diastolic BP) is less than the above given value but the other value is higher, the higher value is taken into consideration.

Anemia: Anemia is defined as a decrease in the circulating RBC mass, the usual criteria are a hemoglobin of less than 12 g/dl in women and less than 14 g/dl in men.

Body Mass Index: Weight in kilogram / Height in m^2.

X-ray zones: The chest x-ray was divided into three zones.

Upper zone: 1st and 2nd intercostal space.

Middle zone: 3rd and 4th intercostal spaces.

. Lower zone: Rest of the intercostal spaces.

Limitations of the study

1) Age and sex matched control was not attempted since only one disease was taken into consideration.
2) Over all outcome is not measured since all subjects living outside Madurai were referred to concerned DOTS centre for drug treatment.
3) Pulmonary function test was not done.
4) Induced sputum was not attempted, as it was not approved by the institutional ethical committee.
5) Since single group of patients were analyzed, complex statistical analysis was not done.
6) Therapeutic aspects, drug toxicity and follow up of these aspects were not considered as they were beyond the scope of the objectives.

RESULTS

A total of 90 patients were studied. The distribution of cases in relation to age and gender is furnished in table 3.

TABLE 3: DISTRIBUTION OF SUBJECTS ACCORDING TO AGE & GENDER

AGE (in years)	MALE		FEMALE		TOTAL
	No.	%	No.	%	
60 – 69	54 (56)	75	18 (16)	25	72
70 and above	16 (14)	89	2 (4)	11	18
Total	70	78	20	22	90

The numbers in the brackets indicates expected values.

Using chi-square test, it was found the difference between age and sex was not significant. Thus, the distribution of age and sex are independent in this study. The details are given in figure 1.

The distribution of subjects according to duration of illness and gender is provided in table 4.

TABLE – 4 DURATION OF ILLNESS AND GENDER.

DURATION OF ILLNESS	MALE		FEMALE		TOTAL	
	No.	%	No.	%	No.	%
< 3 Months	39 (56)	55	9 (45)	45	48	53
3 – 6 Months	12 (57)	17	6 (30)	30	18	20
> 6 Months	19 (27)	27	5 (25)	25	24	27

The numbers in the bracket indicates expected values.

This table number 4 shows that majority of the male subjects (55%) presented with duration of illness for < 3 months, followed by 27% for > 6 months and 17% presented with in 3 to 6 months. In contrast, about 45% female subjects had the illness for < 3 months, 30% for 3 to 6 months and 25% for > 6 months before they sought treatment. The distribution of cases in those with symptoms less than 3 or more than 3 months was almost similar irrespective of gender. The details are provided in pictorial manner in figure 2.

The distribution of subjects according to clinical symptoms and gender is furnished in table 5 given below.

TABLE – 5 CLINICAL SYMPTOMS AND GENDER

SYMPTOMS	MALE		FEMALE		TOTAL	
	No.★	%	No. ★	%	No. ★	%
Cough with sputum	59(62)	84	20(17)	100	79	88
Fever	40(46)	57	18(12)	90	58	64
Hemoptysis	18(17)	25	3(4)	15	21	23
Breathlessness	60(58)	85	13(15)	65	73	81
Chest Pain	17(16)	24	3(4)	15	20	22
Fatigue	24(21)	34	3(6)	15	27	30
Weight Loss	36(37)	51	11(10)	55	47	52
Anorexia	32(29)	45	5(8)	25	38	42

★ Numbers does not tally with total due to more than one symptom. Figures in brackets indicate expected values.

In this study, cough was the most common symptom observed in females (100%) whereas breathlessness was the commonest symptom in males (85%). In males the next common symptom was cough with sputum (84%), followed by fever (57%) whereas females presented more commonly with fever and breathlessness. Almost more than half of the study subjects complained of weight loss.

The difference between the observed and expected values was not significant and hence clinical symptoms are independent of each other. Also the calculated probability value of chi-square was much less than the observed value of the chi-square at 5% level of significance with which it could be concluded that clinical symptoms among the subjects were independent of gender. The details are provided in figure 3.

The smoking status of the study population is given in table 6.

TABLE – 6 SMOKING STATUS OF THE STUDY SUBJECTS

SMOKING STATUS	**NO. OF CASES**	**PERCENTAGE**
Current Smokers	37	41
Ex-Smokers	25	28
Non-Smokers	28	31

In this study population all the female subjects were non-smokers as smoking tobacco is considered a taboo in this part of the country. Among the males 40% were current smokers, 28% were Ex-smokers and 31% were non smokers. The details are shown in figure 4.

These elderly patients have one or more co morbid illness. The distribution of cases in relation to co morbid illness is given below in table 7.

In this study population, diabetes was the most commonly observed co morbid illness affecting about 21% of the study population. Hypertension was found in 13% of patients followed by chronic obstructive pulmonary disease in 9% and ischemic heart disease in 6% of study subjects. Other co morbid illnesses were found in 23% of the population. No subject presented with malignancy. The details are depicted in figure 5.

TABLE – 7 COMORBID ILLNESSESS AMONG THE STUDY SUBJECTS

COMORBID ILLNESS	**NO. OF CASES**	**PERCENTAGE**
Diabetes	19	21
Hypertension	12	13
Ischemic Heart Disease	5	6
Chronic obstructive pulmonary disease	8	9
Malignancy	0	0
Others	21	23

Details of anemia, clubbing and lymphadenopathy observed in the study population are provided in the table 8 given below.

TABLE – 8 GENERAL EXAMINATION FINDINGS IN STUDY SUBJECTS

GENERAL EXAMINATION FINDINGS	**NO. OF CASES**	**PERCENTAGE**
Anemia	67	74
Clubbing	44	49
Lymphadenopathy	4	5

Anemia is the most common finding present in about 74% cases followed by clubbing in 49% of subjects. Only 5% of the study subjects presented with Lymphadenopathy. Details are provided in figure 6.

The biochemical and hematological profile in the study subjects is provided in table 9 given below.

TABLE – 9 BIOCHEMICAL & HEMATOLOGICAL PROFILE IN STUDY SUBJECTS

CATEGORY	**RANGE**	**MEAN**
Hemoglobin (gm %)	6 – 11.6	8.9 ± 0.54
Total count (cells / cu mm)	5500 – 12500	9088 ± 272
Polymorphs (%)	59 – 83	72 ± 0.95
Lymphocytes (%)	15 – 35	25 ± 2
Eosinophils (%)	0 – 6	2
Monocytes (%)	0 – 2	-
Blood Sugar (mg %)	55 – 372	121.7 ± 17.4
Blood Urea (mg %)	17 – 92	33.8 ± 4.1
Serum Creatinine	0.5 – 3.3	0.93 ± 0.78

The body mass index of the study subject vary from 12.7 to 29 and the mean ± SD was 17.4 ± 1.3.

RADIOLOGICAL PROFILE OF STUDY SUBJECTS

Majority of the subjects (53%) had involvement of both lungs followed by 26.6% with involvement of the right lung and only about 3.33% had involvement of the left lung. The details are furnished in 10provided below as well as in figure 7 A.

TABLE – 10 LUNG INVOLVEMENT AMONG STUDY SUBJECTS

X-RAY CHEST	**No. OF SUBJECTS AFFECTED**	**%**
Right Lung	24	26.6
Left Lung	3	3.33
Both Lungs	48	53

Infiltration was a common observation in the x-ray chest in 45.5% of the subjects while cavitations were found only in 2.22% of subjects. In 34% of subjects both cavitations and infiltration was found. The details are furnished in table 11 A given below as well as in figure 7 B.

TABLE – 11A PATTERN OF LESIONS IN THE LUNG AMONG THE STUDY SUBJECTS

X-RAY CHEST	**No. OF SUBJECTS AFFECTED**	**%**
Cavitations	2	2.22
Infiltration	41	45.5
Both	31	34
Pleural Effusion	12	13.33
Pneumothorax	5	5.55
Miliary Tuberculosis	4	4.44

Involvement of upper and lower zone was found to be equally distributed in 46% of the study subjects where as middle zone involvement was seen in 39% of the subjects.34% of the subjects all the zones involved. The details are furnished in table 11 B.

TABLE – 11B INVOLVEMENT OF ZONES OF LUNG IN STUDY SUBJECTS

X-RAY CHEST	No. OF SUBJECTS AFFECTED	%
Upper zone	41	46
Middle zone	35	39
Lower zone	41	46
All zones	31	34

The following table 12 gives the distribution of radiological findings according to gender in the study population.

TABLE – 12 RADIOLOGICAL FINDINGS ACCORDING TO GENDER IN THE STUDY POPULATION

SEX	RADIOLOGICAL FINDINGS			
	CAVITATIONS	INFILTRATION	UPPER ZONE	LOWER ZONE
Male	25	52	47	42
Female	7	16	14	7

In assessing the radiological findings in the x-ray chest of the study subjects, it was seen that in males 25 of them had cavitations, 52 had infiltrations 47 had upper zone involvement and 42 had lower zone involvement. Similar observation was seen among females as 7 of them had cavitations, 16 had infiltration, 14 had upper zone involvement and 7 had lower zone involvement.

As the observed and expected values are almost equal, in both sexes, it is clear that cavitation (p = 0.99), infiltration(p = 0.6) and involvement of zones of the lung were independent of gender.

The table 13 gives the radiological presentation of tuberculosis in elderly diabetic patients.

TABLE – 13 : THE RADIOLOGICAL PRESENTATION IN ELDERLY TUBERCULOSIS PATIENTS WITH DIABETIC STATUS.

STATUS OF DIABETES	LUNG INVOLVEMENT				
	Infiltration	**Cavitation**	**Upper Zone**	**Middle Zone**	**Lower Zone**
Diabetic	9	8	8	21	18
Non-Diabetic	59	24	23	37	31

Among the diabetic patients in the study population 9 presented with infiltration and 8 had cavitations in the lung which was evident from the x-ray chest. The middle zone involvement was found in 21 subjects, closely followed by lower zone involvement (18 subjects) while the upper zone is less affected among diabetics. (8 subjects).Among the non-diabetic subjects infiltration was seen in 59 subjects, cavitations in 24 subjects, upper zone involvement in 23 subjects, middle zone involvement in 37 subjects and lower zone involvement in 31 subjects.

In the study population, it was observed that 9 diabetic patients had infiltration of the lung while 59 non diabetic subjects had infiltration. The details are furnished in table 13A given below.

TABLE – 13A INFLUENCE OF DIABETES ON THE PRESENCE OF INFILTRATION IN THE LUNG.

STATUS OF DIABETES	**INFILTRATION**	**NO INFILTRATON**	**TOTAL**
Diabetic	9(14)	10(5)	19
Non Diabetic	59(54)	12(17)	71
Total	68	22	90

The numbers in the bracket indicates the expected value.

Using Chi-Square test, we observed that the evaluated chi-square probability value is deviated far away from the chi-square table value. So, we conclude that diabetes significantly influences the presence of infiltration of the lung. ($p = 0.0035$)

Among the 32 subjects with cavitations in the lung 8 of them had diabetes while 24 subjects were non diabetic. The details are furnished below in table 13 B.

TABLE – 13B INFLUENCE OF DIABETES ON THE PRESENCE OF CAVITATION IN THE LUNG.

STATUS OF DIABETES	**CAVITATION**	**NO CAVITATION**	**TOTAL**
Diabetic	8(7)	11(12)	19
Non Diabetic	24(25)	47(46)	71
Total	32	58	90

The numbers in the bracket indicates the expected value.

The observed and expected values almost coincide with each other and hence the difference is not significant at 5% level of significance. Thus it can be concluded that cavitations in the lung was independent of diabetic status ($p = 0.40$).

In this study population 18 diabetic subjects had lower zone involvement while 31 non diabetic had involvement of the lower zone. The details are furnished below.

TABLE – 13C : INVOLVEMENT OF THE LOWER ZONE OF THE LUNG: DIABETES Vs NON DIABETES

STATUS OF DIABETES	**LOWER ZONE INVOLVEMENT**	**LOWER ZONE NON INVOLVEMENT**	**TOTAL**
Diabetic	18(10)	1(9)	19
Non Diabetic	31(39)	40(32)	71
Total	49	41	90

The numbers in the bracket indicates the expected values. It was observed that the probability value of the calculated chi-square value deviated far away from the table value of the chi-square. Hence, we conclude that diabetes influences the involvement of the lower zone of the lungs in the study population ($p = 0.001$).

Smoking status and clinical symptoms as well as radiological presentation is furnished in table 14 below.

TABLE – 14 : INFLUENCE OF SMOKING ON THE CLINCIAL SYMPTOMS AND THE RADIOLOGICAL PRESENTATION IN THE STUDY SUBJECTS

STATUS OF SMOKING	CLINICAL SYMPTOMS			RADIOLOGICAL PRESENTATION			
	BREATH-LESSNESS	COUGH	HEMOP-TYSIS	INFIL-TRATION	CAVI-TATION	UPPER ZONE INVOL-VEMENT	LOWER ZONE INVOL-VEMENT
SMOKERS	54	60	19	46	18	50	36
NON-SMOKERS	15	21	3	20	12	15	13

Among the subjects with the habit of smoking 54 presented with breathlessness, 60 with cough and 19 with hemoptysis. The radiological findings in x-ray chest revealed that 46 of them had infiltration, 18 had cavitations, 50 had upper zone involvement and 36 had lower zone involvement. Among the non-smoking subjects 15 of them had breathlessness, 21 had cough, 3 had hemoptysis, 20 presented with infiltration,12 with cavtation,15 with upper zone and 13 with lower zone involvement of the lung.

In this study 54 subjects who had smoking habit presented with breathlessness while 15 non smoking subjects had breathlessness. The details are furnished below.

TABLE – 14A : SMOKING AND BREATHLESSNESS IN STUDY SUBJECTS

STATUS OF SMOKING	BREATHLESSNESS	NO BREATHLESNESS	TOTAL
Smoker	54(48)	8(14)	62
Non Smoker	15(21)	13(7)	28
Total	69	21	90

The numbers in the bracket indicates the expected values.

Using chi-square test, the significance of difference between smoking and breathlessness was calculated. It was inferred that smoking influenced breathlessness significantly (p = 0.001).

In this study 19 smokers had hemoptysis while only 3 subjects with no smoking habit had hemoptysis.

TABLE – 14 B SMOKING AND HEMOPTYSIS IN STUDY SUBJECTS

STATUS OF SMOKING	**HEMOPTYSIS**	**NO HEMOPTYSIS**	**TOTAL**
Smoker	19(15)	43(47)	62
Non Smoker	3(7)	25(21)	28
Total	22	68	90

The numbers in the bracket indicates the expected values.

However, the difference between the expected and observed values was not significant at 2% level of significance using chi-square test. Thus it can be concluded that hemoptysis was independent of smoking status.

In this study about 46 subjects with the habit of smoking had infiltration of the lung while 20 subjects with no smoking habit had infiltration (p = 0.225).

TABLE – 14 C : SMOKING AND INFILTRATION OF THE LUNG IN STUDY SUBJECTS

STATUS OF SMOKING	**INFILTRATION**	**NO INFILTRATON**	**TOTAL**
Smoker	46(45)	16(17)	62
Non Smoker	20(21)	8(7)	28
Total	66	24	90

The numbers in the bracket indicates the expected values.

In this study about 18 smokers had cavitations and 12 non smokers had cavitations in the lungs (p = 0.15). The details are furnished below in table 14 D.

TABLE – 14D : SMOKING AND CAVITATION OF THE LUNG IN STUDY SUBJECTS

STATUS OF SMOKING	CAVITATION	NO CAVITATION	TOTAL
Smoker	18(21)	44(41)	62
Non Smoker	12(9)	16(19)	28
Total	30	60	90

The numbers in the bracket indicates the expected values.

Using chi-square test, it was found that smoking has no influence on the presence of infiltrations and cavitations in the lung .

In this study about 50 subjects with the habit of smoking had upper zone involvement while 15 subjects with no smoking habit had upper zone involvement of the lung.

TABLE – 14E : SMOKING AND THE INVOLVEMENT OF THE UPPER ZONE OF THE LUNG

STATUS OF SMOKING	INVOLVEMENT OF UPPER ZONE	NON INVOLVEMENT OF UPPER ZONE	TOTAL
Smoker	50(45)	12(17)	62
Non Smoker	15(20)	13(8)	28
Total	65	25	90

The numbers in the bracket indicates the expected values.

It was observed that smoking influences the involvement of the upper zone of the lungs among the study subjects in contrast to the involvement of the lower zone in diabetic patients in the study population.

Sputum positivity was observed in 47 subjects out of 90 elderly tuberculosis patients studied.

DISCUSSION

In most Gerontological literature people aged above 60 years are considered as old and constitutes elderly segment of the population. The Indian aged population is currently the second largest in the World. The absolute number of the over 60 population in India will increase from 76 million in 2001 to 137 million by 2021. From 5.4% in 1951, the proportion of 60+ people grew to 6.4% in 1981 and it was close to 8.1% in 2001.The decadal percent growth in the elderly for the population for the period 1997 – 2001 would be close to 40, more than double the rate of increase for the general population (Prakash et al 1999).

This study was intended to find out the Socio demographic patterns, signs, symptoms and diagnostic aspects of tuberculosis in the elderly. 90 people who satisfied the inclusion criteria were subjected for study. After getting history, all the patients were clinically examined and relevant investigations were carried out.

The mean age of the study population was 63.8. It was 63.6 in males and 64.1 in females respectively. A study from Hong Kong by Chan et al (1994) showed mean age was 73.9 years. Another study by Rizvi. et al (2003) from Pakistan had a mean age of 65.92 years where it was 71 years by Van den Brande et al. (1991) from USA. All these indicate the mean age is close to the longevity of the respective country.

In the present study the male, to female ratio was 4.5 :1 in elderly. Analysis of sex ratio in WHO region for tuberculosis was found to be approximately 0.3 in

South East Asia (SEARO), approximately 0.5 in the Western Pacific region (WPRO) and approximately 1 in Sub Sahara Africa. (Borgdorff et al 2000)

TABLE 15 Comparison of sex differences in the tuberculosis in WHO region

Study population	0.22
SEARO Region	0.3
WPRO Region	0.5
AFRO Region	1
Chan et al (2002)	0.25

According to Chan et al (2002) tuberculosis rate was higher in men than women of all age groups and the sex differences increase with age. In those aged 60-79 years, men had four times the rate of tuberculosis than women. The high rate of tuberculosis observed in women of reproductive age in the past had been attributed to the stress of pregnancy. However, studies by Snider et al (1984) and Hamedah et al (1992) failed to support such hypothesis. There was also high degree of unreporting by females in our set up.

Immunologically when compared with males, women were said to have high proportion of CD4 Lymphocytes (Prince et al 1985).Older men tended to have high rate of progression to disease. Alcohol abuse and smoking which depresses immune function have been blamed for disease progression or reactivation in men (Brown et al 1961). Chan et al also demonstrated that women were more adherent to treatment when compared with men. The over all rate of

cure and treatment completion at 12 months was 80.4% and it was higher in women than men especially for those with extra pulmonary disease, when treatment was usually more prolonged.

In this study greater than 50% of patients present within 3 months after the beginning of symptoms. Also, tuberculosis was not suspected initially in 13 out of 31 (42%) patients with active disease. Eleven of the thirteen patients were older than 65 years. These patients also had longer hospitalization and higher mortality than did those in whom the diagnosis was suspected early. Arora and Bedi et al showed only 40% of the elderly tuberculosis patients were aware that their symptom could be due to tuberculosis. The elderly are more likely to have chronic cardiac and/or pulmonary disease, malignancy and immunosuppression than younger patients. Therefore symptoms may be over looked, or attributed to some other ailment common among the elderly. Although the classic symptoms of fever, weight loss, chronic cough and hemoptysis were present in the elderly they were often attributed to chronic bronchitis or malignancy .Therefore, tuberculosis a treatable condition was less considered. Non specific symptoms of anorexia and weight loss were more common in the older patients. The diagnosis was frequently missed in the elderly because the patient also suffers from a more acute condition which preoccupied the attention of the doctor.

TABLE 16 Frequency of symptoms in Elderly Tuberculosis in various studies

Clinical symptoms	Present study	Chan et al (1994)	Korzeniewska et al (2000)
Breathlessness	81 %	18.5 %	21 %
Fever	64 %	13.5 %	19.7 %
Cough	88 %	4.3 %	40.7 %
Chest pain	22 %	4.9 %	13.15 %
Weight loss	52 %	7.4 %	31 %
Anorexia	42 %	7.4 %	17 %
Hemoptysis	23 %	7.4 %	5.2 %

In our present study, the most common presenting complaint was cough (88%) which was also the commonest symptom in the series of Chan et al (1994). Korzeniewska et al (2000) and Arora et al (1989) noted breathlessness was the main symptom (Table 16). According to Ritasood (1993) presentation of patients with fever and hemoptysis was significantly low. It was 64% and 23% respectively in our population. Brande et al (1990) stated that prevalence of cough, dyspnoea, anorexia & weight loss was higher in tuberculosis the elderly.

In our study population Diabetes was the commonest co morbid illness (21%). Next was hypertension which was present in 13% of cases. Comparative analysis of co morbid illness among the elderly tuberculosis is furnished in table 17.

TABLE 17 Comorbid illness in various studies in Tuberculosis in the elderly

Comorbid illness	Present study	Vats et al (2003)	Chan et al (1994)
Diabetes	21 %	14 %	7.5%
Hypertension	13 %	12 %	-
Ischaemic heart disease	6 %	0%	7.5%
COPD / Asthma	9 %	21%	15%
Malignancy	01%	5%	3.2%
Cerebro vascular accident	--	--	8.6%
Cirrhosis of liver	--	--	2.15%
Renal failure	--	--	1%

TABLE 18 Prevalence of Diabetes in tuberculosis among the elderly

Present study	21%
Claw et al (1995)	14.3%
Vats et al (2003)	14%
Chan et al (1994)	7.5%
Villarino et al (2001)	22%
Yamaguchi et al (2001)	12.7%

TABLE 19 Incidence of Pulmonary tuberculosis in Diabetic population

Windke et al (1883)	50%
Root et al (1984)	2.8%
Philadelphia Survey (1952)	8.4%
Korean study	8.3%

TABLE 20 Prevalence of Diabetes in Pulmonary tuberculosis population

Nicholas et al (1957)	5%
Muticentric study in India (1957)	9.7%
TANZANIA study	9%
OG TT Surrey (1990)	4%
Japan study (1987)	13.2%

Diabetes mellitus is recognized as an independent risk factor for developing lower respiratory tact infections. Tuberculosis occurs with increase frequency in diabetes and causes a significant mortality (Konda et al 1996). Root (1994) postulated that the association between two diseases was one sided i.e. diabetic patients tended to contract tuberculosis but the reverse was rare.

The Philadelphia population survey revealed that 8.4% of 3,106 diabetics had pulmonary tuberculosis as compared to 4.3% of the 71,767 presumably healthy industrial workers. Tuberculosis was present in 17% of the diabetics who had the disease for more than 10 years compared to 5% in the diabetics with less than 10 years of the disease. Diabetes mellitus was present in 8.3% of the cases

of reactivation tuberculosis in New York City. (Basach et al 1928). The prevalence of diabetes in pulmonary tuberculosis and pulmonary tuberculosis among diabetes are provided in table 18 & 19 and table 20 respectively.

A probable cause of increased incidence of pulmonary tuberculosis in diabetics could be defect in host defense mechanism and immune cell function. The immune derangements predominantly involve the cell mediator arm of the immune system (Mamahon et al.1995). The degree of hyperglycemia had been found to have a distinct influence on the microbiological function of macrophages, with even brief exposure to blood sugar level of 200 mg %. This was borne out by observation that in poorly controlled diabetic, with high levels of glycosylated hemoglobin, tuberculosis follows a more destructive course and associated with higher mortality. (Noziet et al 1995). Infection with tubercle bacilli leads to further alteration of cytokines, monocytes, macrophages and CD 4 / CD 8 T cell population. The balance of the T-lymphocyte subsets CD 4 & CD8 plays a central role in the modulation of host defenses against mycobacteria and has a profound influence on the rate of regression of active Pulmonary Tuberculosis (Wang et al 1995).

TABLE 21 Frequency of smokers in Tuberculosis in the elderly patients

Present study (Madurai – Tamilnadu)	69%
Chennai survey (1995 – 97) (Urban)(Northern Tamilnadu)	72.2%
Villupuram survey (1997-98) (Rural)(Tamilnadu)	58.62%

From this table, it became clear there is a high prevalence of smokers in elderly tuberculosis population. The mechanism for the development of TB among smokers are furnished below.

The prevalence of tuberculosis increases with the number of cigarettes smoked. In smokers airway was compromised. Smoke induces oxidative damage along with recruitment of inflammatory cells resulting in damage to the respiratory passages. Alveoli and airway secretions are increased through goblet cell metaplasia. Peribronchial fibrosis leads to air flow obstruction causing irreversible anatomical changes in the lungs. Lung defence mechanism is further affected by declining mucocilliary clearance. Now the lung becomes the fertile ground for Mycobacterium tuberculosis (Stephen et al 1998). Smokers usually suffer from chronic bronchitis with constant coughing which leads to increase chances of droplet infection. Besides smoke itself may act as a carrier. Smoking has become a risk factor for development of active disease in family contacts of pulmonary tuberculosis cases with a close relationship to the number of cigarettes smoked per day (Al Caide et al 1996).

The mean body mass index in our population was 17.4. Chan et al (1994) showed that the body weight of the elderly patients was significantly lower than that of the young patients (44.2 ± 14.6 Kg. Vs 48.3 ± 8.84 Kg, $p < 0.05$). Umeki et al (1989) also made out that weight loss was significantly higher in elderly tuberculosis patients (43%).

The reasons for the weight loss in elderly tuberculosis may be

a) Coexisting medical illness
b) Malnutrition
c) Cytokines (TNFα , IL-2, 1 IFN γ) Produced by Fibroblasts, macrophages also contributes to cachexia. (Ashrun et al 1999) and
d) Smoking and alcohol abuse

Anemia was diagnosed in about 75% of study population.The mean Hemoglobin observed in our study was 8.1 mg .Chan et. al (1994) observed that 52% of elderly tuberculosis patients were anemic.

The causes for anemia in tuberculosis in the elderly are

a) Appetite loss
b) Hemoptysis
c) Anemia of chronic disease
d) Disseminated tuberculosis which have depressive effect on bone marrow
e) Co morbid medical illness and
f) Malnutrition

In this study 5% of patients had military tuberculosis. According to Korzeniewska et al (2000) 6.7% of elderly tuberculosis had miliary pattern whereas it was 0.7 % in the younger patients. As against this Brande et al (1989) showed that miliary pattern in 2 out of 55 patients. “Miliary tuberculosis seems common in the elderly, this presentation occurring in up to 1 in 20 cases”. This statement was made out by John Pathy in Geriatric Medicine (3rd edition).

In this study infiltrative pattern was observed in 46% whereas cavitation was made out in 2.22% of the chest x-rays. Rizvi et al (2003) also made out extensive infiltrative lesions in their study of “Clinical presentation of pulmonary tuberculosis in association with age” when compared with younger patients. Perez-Guzman et al (2000) also noted declining frequency of cavitations with age. Chan et al (1995) stated that elderly tuberculosis patients had extensive infiltrative lesions involving both the lungs.

Lower and upper zone involvement was found to be equally distributed (46%) among the study subjects. This result was similar to the study by Perez-Guzman et al (2000).As age advances there will be reduced perfusion and increased alveolar ventilation. This results in ventilation perfusion mismatch. These changes were more observed in the lower lung fields. They have higher alveolar oxygen concentration and ventilation perfusion ratio. Therefore age induced changes favors multiplication of tubercle bacilli in lower lung fields. Rizvi et al (2003) and Umeki et al (1989) also made out lower lung field lesions in elderly patients when compared with young. In contrast to the above Brande et al (1989) concluded that the radiological manifestations of pulmonary tuberculosis in elderly patients do not differ in frequency or distribution from those seen in the young adults.

When the radiological manifestations of elderly tuberculosis in diabetic population were studied it was found that there was a significant involvement of lower zone and more infiltrative pattern when compared with non diabetic

population. Perez – Guzman et al (2000) also demonstrated similar type of findings. Marias (1980) observed lower lung field tuberculosis in 29% patient with diabetes as compared to 4.5% in non diabetic population.Cavitation was less common because diabetes mellitus itself is an immunodeficiency state which decreases cell mediated immunity and it results in less tissue destruction.

In this study, infiltration and cavitation was observed in 46 and 18 patients respectively among smokers. Upper zone and lower zone was almost equally involved.Cavitation and infiltration was noted in 35% and 70% in males where as it was 35% and 80% in females respectively. It was found statistically that smoking and gender has no influence on the radiological patterns in tuberculosis in the elderly.

In the study sputum was positive in 54% of elderly tuberculosis patients. Gaur et al (2004) had shown previously bacteriologically positive cases were more in younger people when compared with elderly people (59.6% Vs 63.8%). In contrast the bacteriologically confirmed TB cases increased with age from 59.8% in those less than 20 years to 76.2% in those greater than 80 years in a study from Hong Kong by Chan-Yeung et al (2002).

AREAS OF RESEARCH IN ELDERLY PULMONARY TUBERCULOSIS

1. Response to DOTS schedule.
2. Drug toxicity.
3. Pharmacodynamics status.
4. Compliance pattern.
5. Microbiological and genetic studies of isolate of pulmonary tuberculosis.

CONCLUSIONS

1. Elderly men more likely to suffer from tuberculosis when compared with elderly women (M:F = 4.5:1).
2. Irrespective of gender, elderly patients were diagnosed to have tuberculosis only 3 months after the onset of symptoms.
3. The commonest presenting symptoms were cough and breathlessness.
4. About 70% of elderly male tuberculosis patients were smokers. (All females were non smokers).
5. Body Mass Index was lower than the Indian standards.
6. Anemia was observed in about three fourths of the study population.
7. Involvement of both lungs (53%) was more common than the isolated involvement of the right (26%) or left lung (3.3%).
8. Infiltrative pattern was observed more than the cavitatory pattern on the chest x-ray of the study population. 5% of the study population has miliary tuberculosis.
9. Radiological findings were not influenced by smoking or gender.
10. Diabetes mellitus was observed in about 21% of the study population. These patients had significantly lower lobe and infiltrative pattern of involvement
11. Sputum positivity was observed in 53% of elderly subjects.

SUMMARY

Studies on pulmonary tuberculosis in elderly are gaining importance globally, in view of increase in the longevity and their immunological susceptibility to tuberculosis. The present report deals with pulmonary tuberculosis in elderly with special emphasis on the socio-demographic, clinical and laboratory aspects. A total of ninety elderly (Males = 70 & Females = 20, mean age 63.7 years) subjects who satisfied a rigid set of inclusion and exclusion criteria were analyzed with respect to the objectives after obtaining institutional ethical clearance and informed consent. Data were analyzed statistically.

It was observed from this study that elderly men suffered from tuberculosis more than the elderly women and about 90% of them were smokers. Most of the subjects were diagnosed to have tuberculosis only three months after the onset of illness with the commonest symptoms, being cough and breathlessness. About 75% of the study population had anemia with body mass index lower than the Indian standards.

Involvement of both lungs was common with infiltrative pattern more frequently observed than cavitatory pattern in the X-ray chest. 5% of the study population had military tuberculosis. 21% of the study population had diabetes mellitus where these patients had significantly involvement of lower lobe of lung and infiltrative pattern. Radiological findings were not influenced by gender and smoking. Sputum positive status was observed in 53 % of cases.

In view of the increased prevalence of pulmonary tuberculosis in the elderly and multiple reasons for the susceptibility, clinicians should suspect pulmonary tuberculosis in the elderly with cough and breathlessness and treat them accordingly after identifying associated co morbid status.

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APPENDIX-I

K. Dis.No. 27144/E4/1/2005. Govt. Rajaji Hospital,
Madurai – 625 020. Dt. 06.04.06.

Sub: Establishment – Govt. Rajaji Hospital, Madurai – Ethical Committee Projects approved by the Committee – Intimation – Sent – Reg.

The Ethical Committee of the Govt. Rajaji Hospital, Madurai was held at 12 Noon on 01.04.2006 at the Dean's Chamber, Govt. Rajaji Hospital, Madurai, and the following Projects were approved unanimously by the Committee Members.

S.No.	Name of the Student	Name of the Project approved
01)	Dr.G.Madhusudhanan, CRRI,Govt. Rajaji Hospital.	Diabetic Foot Syndrome.
02)	Dr. G, Ramesh, PG in MD (Gen.Med.) Madurai Medical College.	Micro albumin Urea in HIV/AIDS patients.
03)	Dr. P. Thirumalaikolundu Subramanian, Professor & HOD of Medicine.	Autonomic Neuropathy among AIDS cases
04)	-do-	Lidovudine level in AIDS cases
05)	-do-	Lactic acid levels among AIDS cases
06)	-do-	Post Traumatic stress disorder among AIDS patients.
07)	-do-	Computer knowledge and lifestyle among HCWS
08)	Dr. D. Babu Vinish, PG in MD(Gen. Med.) Madurai Medical College.	Target organ damage in hypertension.
09)	Dr. K. Sidharthan, PG in MD.(Gen. Med.) Madurai Medical College.	Serum Sodium Potassium profile in hypertensives.
10)	Dr. Revathy Janakiraman, Addl.Prof.of Obst.& Gyn. Madurai Medical College.	Changing trends in Caesarean sections
11)	-do-	Awareness of contraceptives and HIV among unwed pregnant teenagers.
12)	Dr. V. Pavanasakumar, PG in MD(Gen. Medi.) Madurai Medical College.	Echocardiographic assessment of Cardiac dysfunction in patients of Chronic renal failure.
13)	Dr. M. Rajkumar, PG in MD (Gen.Med.) Madurai Medical College.	Optimal use of Anti-Snake venom in snake-bite envenomation.
14)	Dr.O.Chandran, PG in MD(Gen.Med.)	Socio demographic and Clinical aspects of acute diarrhoeal disease among adults.

S.No.	Name of the Student	Name of the Project approved
15)	Dr. P. Thirumalaikolundu Subramanian, Professor & HOD of Medicine, .	Injection practices among CRRIs.
16)	-do-	Specific learning disorders among HIV positive children.
17)	Dr. D. David Praveen Kumar, PG in MD(Gen.Med.)	Elderly Tuberculosis.
18)	Dr. Vipindas.C. PG in MD (Gen.Med.)	Music and Memory.
19)	Dr.M. Srinivasan, MBBS Student, Madurai Medical College.	Prevalance of Lipodystrophy among HIV/AIDS patients.
20)	Dr.E. Manivannan, PG in Pharmacology.	Cutaneous drug eruptions with special reference to non steroidal anti-inflammatory drugs.
21)	Dr. K. Baskaran, PG in Pharmacology.	Prescriptions and Doctors.
22)	Dr. S. Murugesan, PG in MD (Gen.Med.)	Congestive Cardiac failure.

Please note that the investigator should adhere the following:-

01) She/He should get a detailed informed consent from the patients/participants and maintain confidentially.
02) She/He should carry out the work without detrimental to regular activities as well as without extra expenditure to the Institution or Government.
03) She/He should inform the Institution Ethical Committee in case of any change of study procedure site and investigation or guide.
04) She/He should not deviate for the area of the work for which applied for Ethical clearance.
05) She/He should inform the IEC immediately, in case of any adverse events or serious adverse reactions.
06) She/He should abide to the rules and regulations of the Institution.
07) She/He should complete the work within the specific period and apply for, if any extension of time is required, She/He should apply for permission again and do the work.
08) She/He should submit the summary of the work to the Ethical Committee on completion of the work.
09) She/He should not claim any funds from the Institution while doing the work or on completion.
10) She/He should understand that the members of IEC have the right to monitor the work with prior intimation.

Dean/Chairman,
Ethical Committee, Govt. Rajaji Hospital, Madurai.

Appendix II

PROFORMA

A STUDY ON ELDERLY TUBERCULOSIS: SOCIAL, CLINICAL, RADIOLOGICAL & MICROBIOLOGICAL ASPECTS

Name : **Age:** **Sex:**

Address: **IP No:** **Ward / Unit:**

Chief Complaints:

History of Present Illness: **Duration of Illness:**

1) Cough with Expectoration
2) Breathlessness
3) Fever
4) Chest Pain
5) Hemoptysis
6) Anorexia
7) Weight loss
8) Fatigue
9) Others

a) less than 3 months
b) 3 to 6 months
c) more than 6 months

History of Past Illness:

1) Diabetes mellitus
2) Hypertension
3) Chronic Obstructive Pulmonary Diseases
4) Asthma
5) Ischemic Heart Diseases
6) Malignancy
7) Others

Personal History:

1) A) Smoker B) Non- Smoker C) Ex – Smoker
2) A) Alcoholic B) Non – Alcoholic C) Ex – Alcoholic

Contact History:

Treatment History:

General Examination:

a) Anemia b) Clubbing c) Lymphadenopathy

Vitals:

Pulse Rate:

Respiratory Rate:

Blood Pressure:

Height:

Weight:

Body Mass Index:

System Examination:

Cardiovascular System:

Respiratory System:

Abdomen:

Central Nervous System:

Investigations:

1) Hemogram
   a) Total Count
   b) Differential Count
   c) Hemoglobin
   d) Erythrocyte Sedimentation Rate
2) Blood Urea
3) Blood Sugar

4) Serum Creatinine

5) X-Ray Chest:

I) a) Right Lung b) Left Lung c) Both

II) a) Cavitation b) Infiltration c) Both d) Miliary Pattern

III) a) Upper zone b) Middle Zone c) Lower zone d) All Zones

IV) Pleural Effusion

V) Pneumothorax

VI) Pyothorax

6) Sputum AFB

a) 1+ b) 2+ c) 3+

Category of ATT Started:

a) Category I

b) Category II

c) Category III

FIGURE – 1

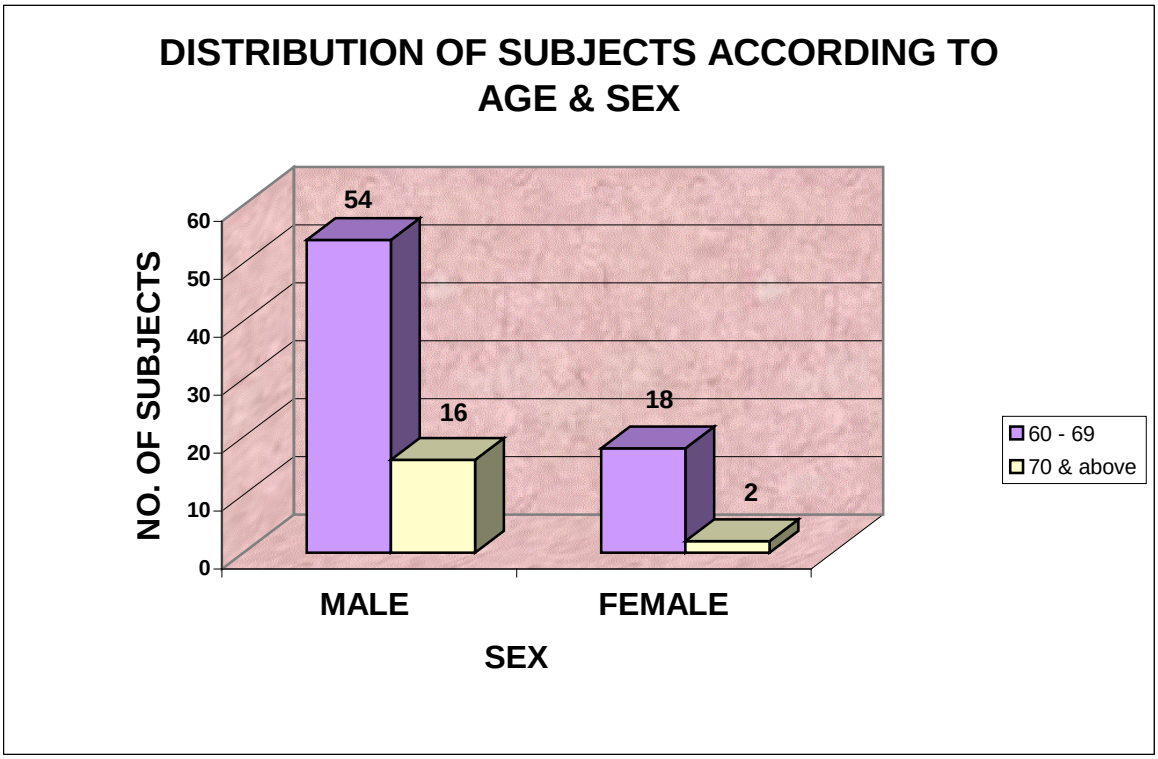


FIGURE – 2

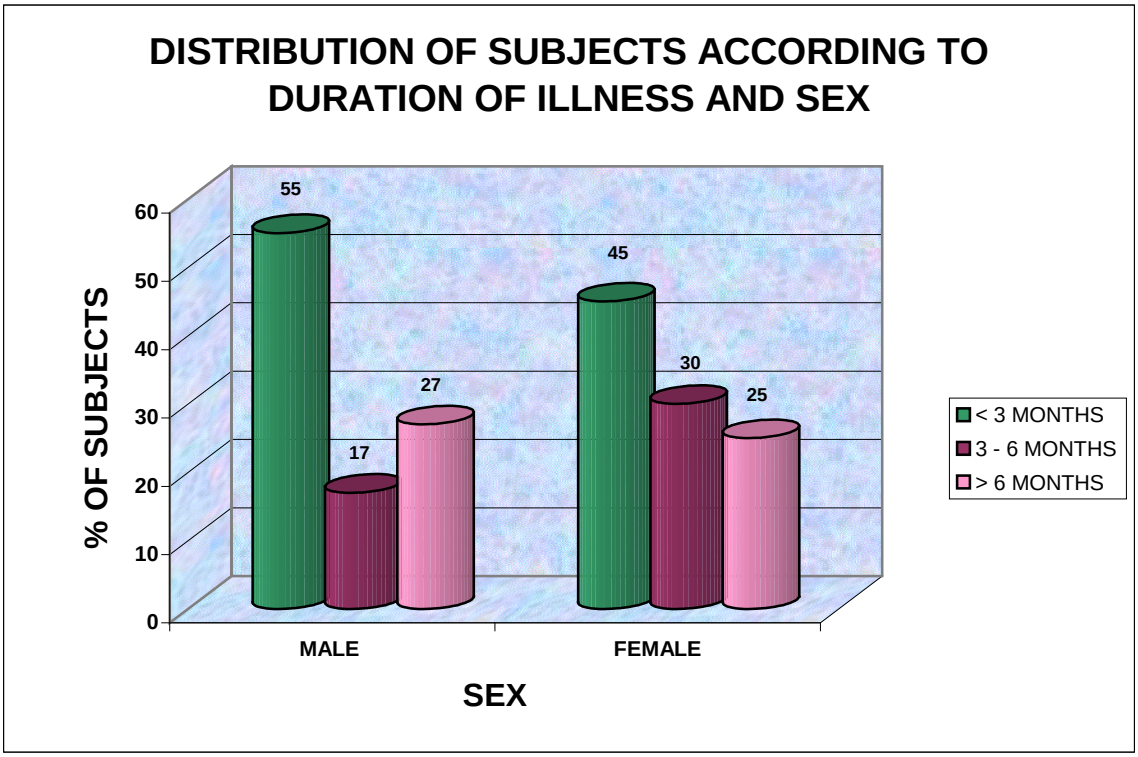


FIGURE – 3

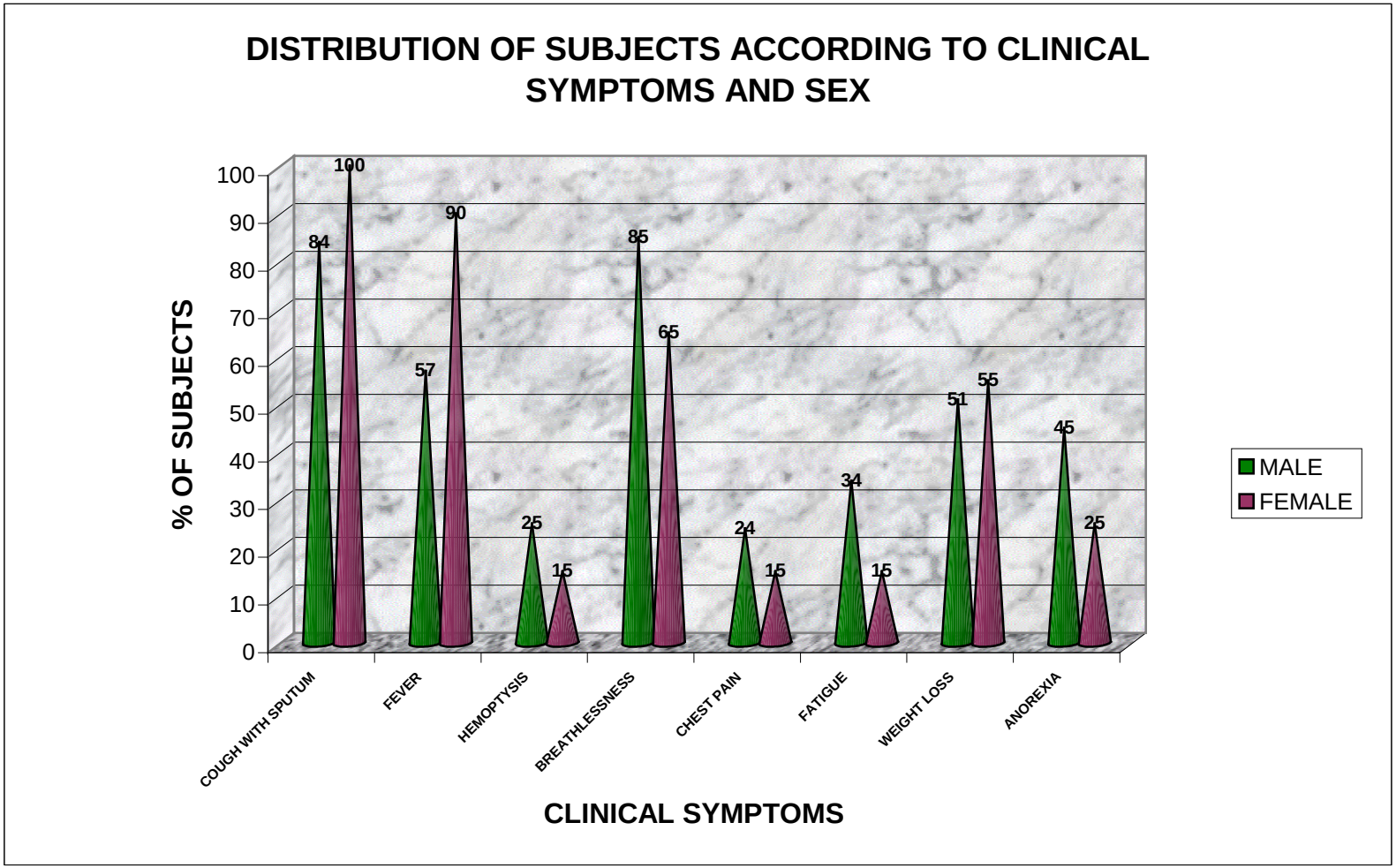

DISTRIBUTION OF SUBJECTS ACCORDING TO CLINICAL SYMPTOMS AND SEX
% OF SUBJECTS
100
90
80
70
60
50
40
30
20
10
0
84
100
57
90
25
15
85
65
24
15
34
15
51
55
45
25
COUGH WITH SPUTUM
FEVER
HEMOPTYSIS
BREATHLESSNESS
CHEST PAIN
FATIGUE
WEIGHT LOSS
ANOREXIA
CLINICAL SYMPTOMS
MALE
FEMALE

FIGURE – 4

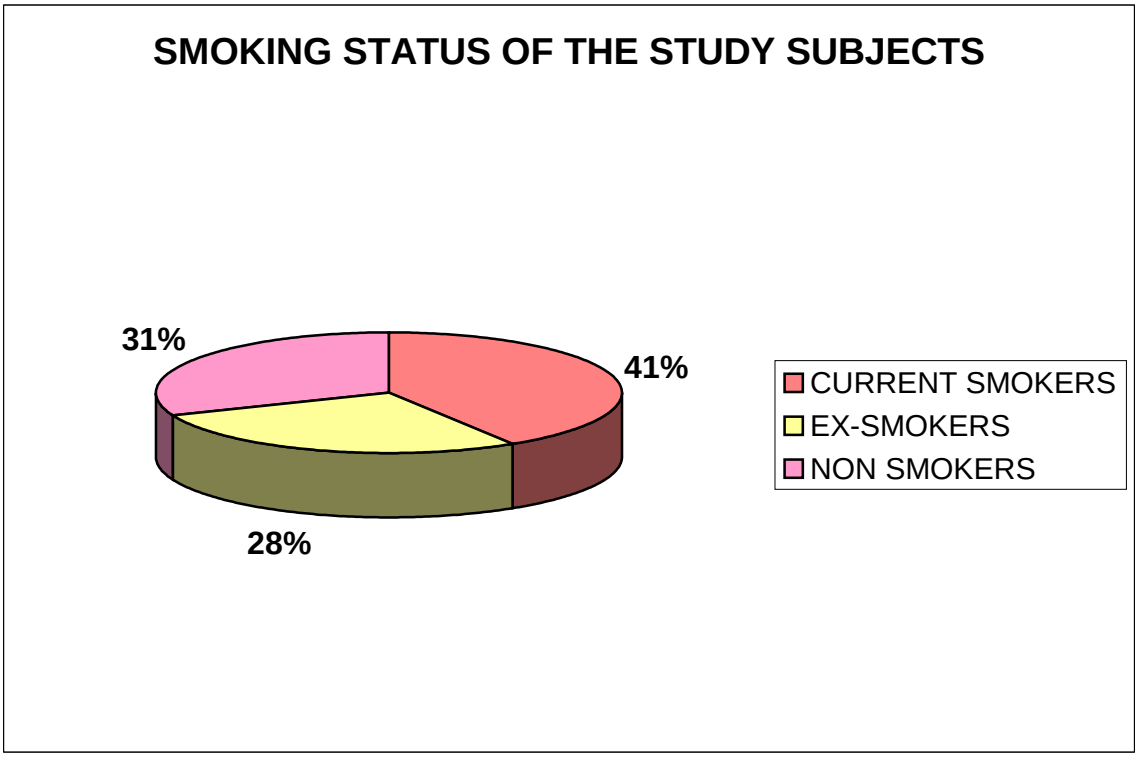

SMOKING STATUS OF THE STUDY SUBJECTS
31%
41%
28%
CURRENT SMOKERS
EX-SMOKERS
NON SMOKERS

FIGURE – 5

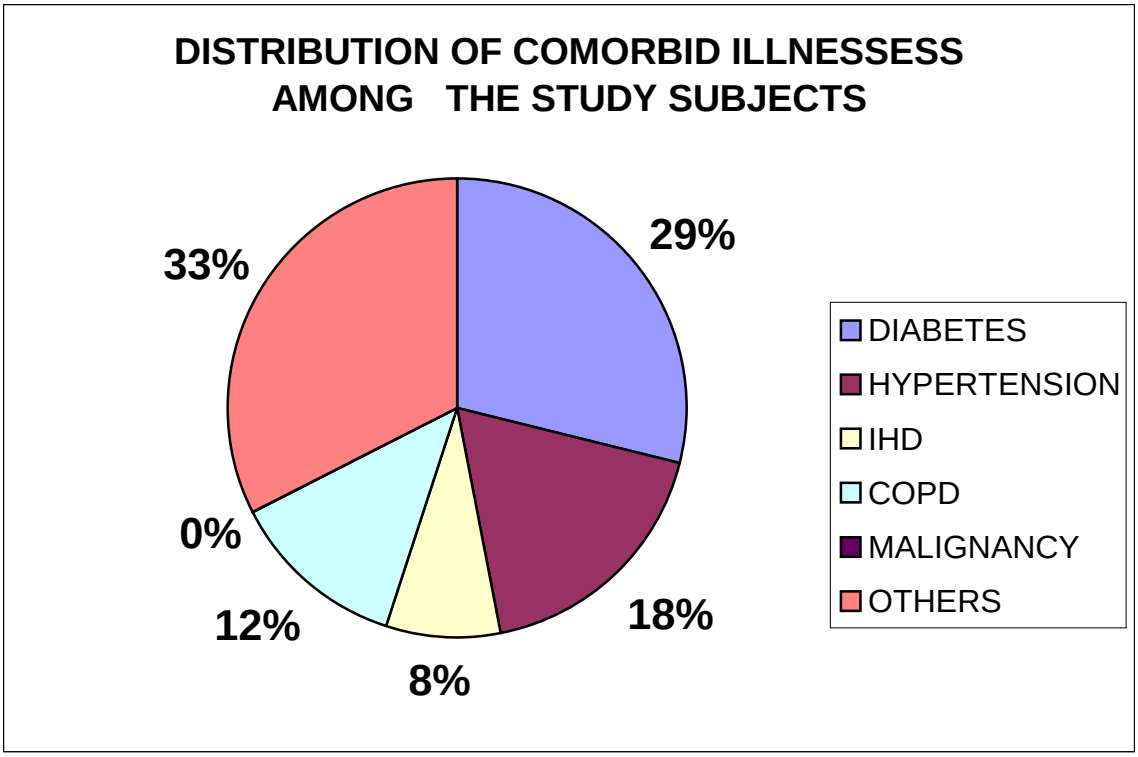


FIGURE – 6

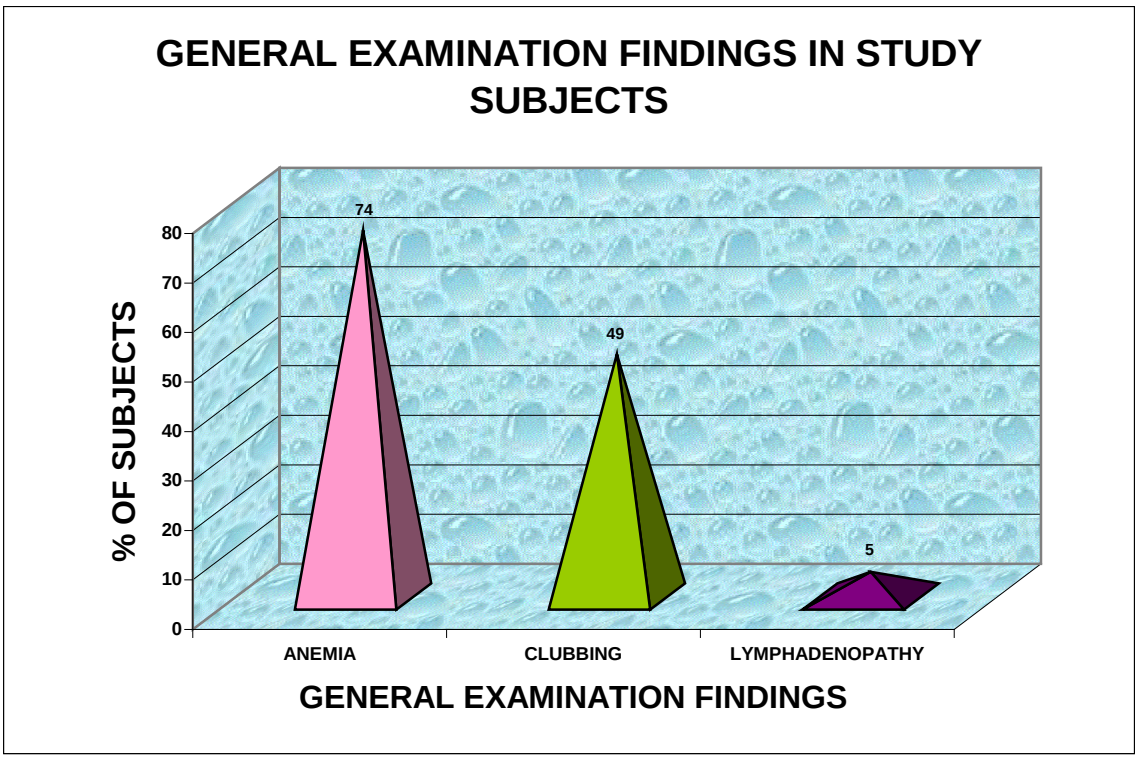


FIGURE – 7 A

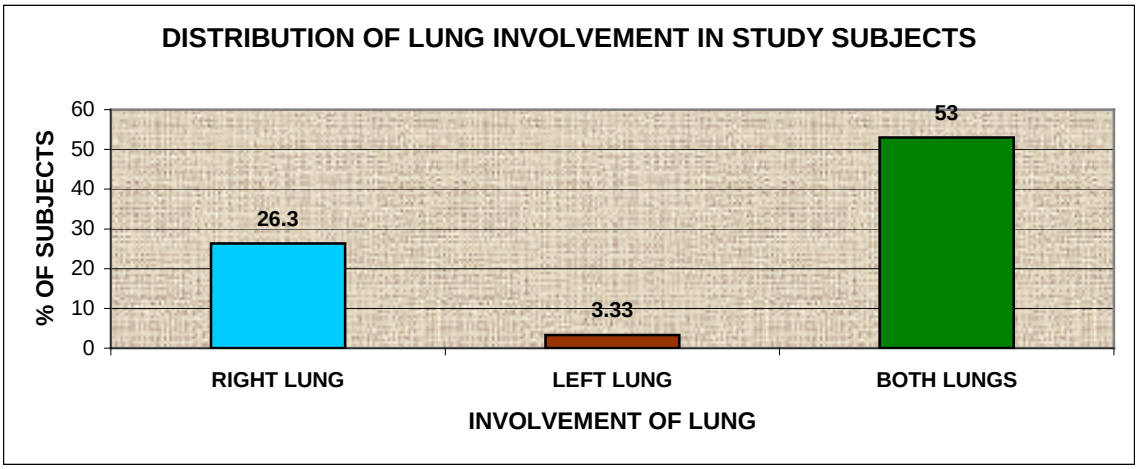


FIGURE – 7B

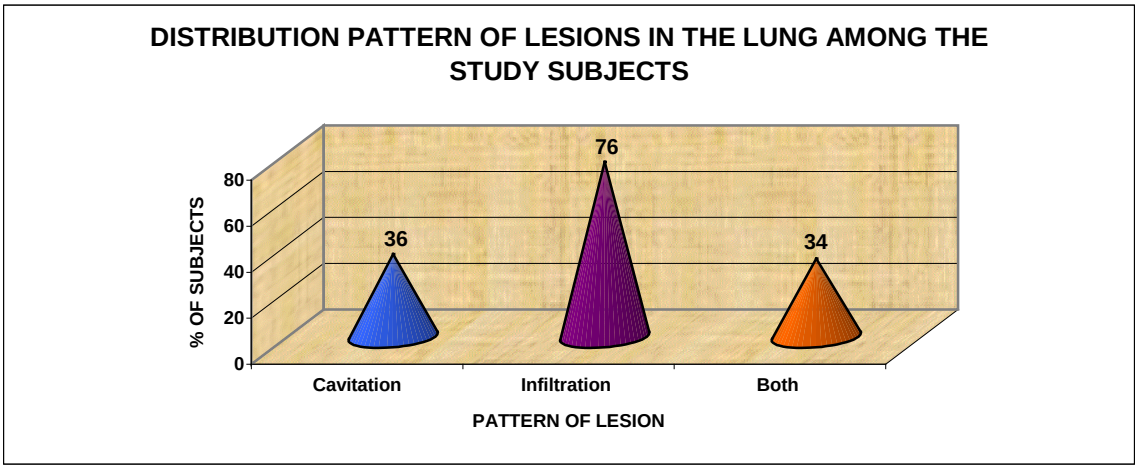
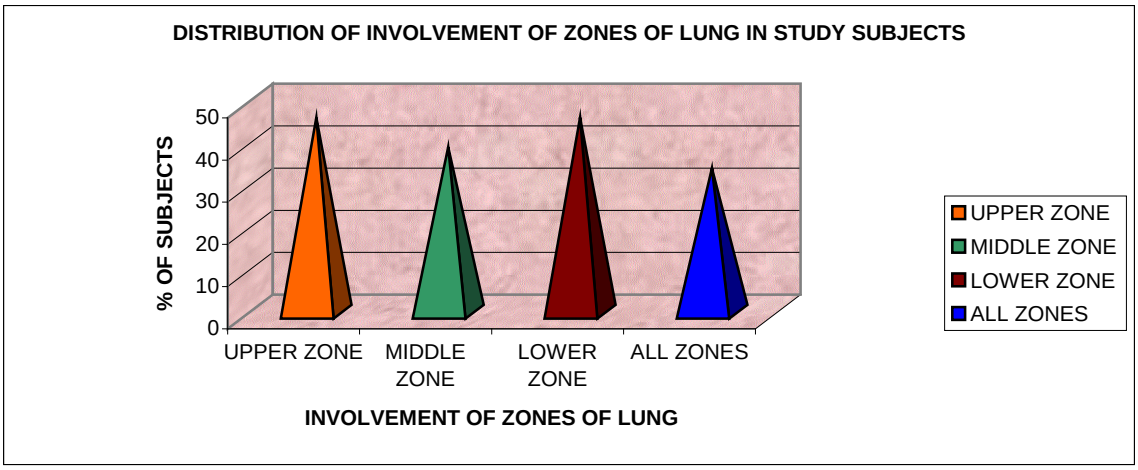


FIGURE – 7 C



Key To Master Chart

Age: 1) 60-70 years 2) > 70 years

Sex: 1) Male 2) Female

Duration Of Illness: 1) < 3 months 2) 3 – 6 months 3) > 6 months

Symptoms: 1) Present 2) Absent

Co morbid Illness: 1) Present 2) Absent

Smoking / Alcoholism : 1) Current Smoker / Alcoholic

2) Non- Smoker / Alcoholic

3) Ex- Smoker / Alcoholic

X-Ray Chest: 1) Present 2) Absent

Sputum AFB: 1) Present 2) Absent

S.I. No.	Age	Sex	Contacts	No. of family Members	Duration of Illness	SYMPTOMS								Smoking	Alcoholism	Comorbid Illness					
						Cough with Sputum	Fever	Hemoptysis	Breathlessness	Chest Pain	Fatigue	Weight Loss	Anorexia			Diabetes	Hypertension	A I H	C O P D	Malignancy	Others
1	1	1	2	7	3	1	2	2	1	1	2	1	1	2	2	2	2	2	1	2	PT
2	1	1	2	5	1	2	2	2	1	2	2	1	1	1	1	2	2	2	2	2	PT
3	1	1	2	2	1	1	1	2	2	2	2	2	2	3	3	1	2	2	2	2	2
4	1	1	2	6	1	2	2	1	2	2	2	2	2	2	3	2	2	2	2	2	2
5	1	1	2	3	1	2	2	2	1	1	2	2	2	1	1	2	1	2	1	2	2
6	2	2	2	6	1	1	1	2	2	2	2	2	2	3	3	2	2	2	2	2	2
7	1	1	2	6	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	PT
8	1	1	2	6	1	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2
9	1	1	2	0	1	2	1	2	1	2	1	1	1	3	2	1	2	2	2	2	2
10	1	2	2	5	1	1	1	2	2	2	1	1	1	3	3	2	2	2	2	2	2
11	1	1	2	4	1	1	1	2	2	1	2	2	2	3	3	1	2	2	2	2	2
12	1	1	2	3	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	2	2
13	2	1	2	11	2	1	1	1	1	2	2	2	2	1	2	2	2	2	2	2	2
14	1	2	2	5	1	1	1	2	1	2	2	2	2	1	1	1	2	2	2	2	2
15	2	1	2	3	2	1	2	2	1	2	2	1	1	3	3	1	2	2	2	2	2
16	2	1	2	5	3	1	1	1	2	2	1	1	1	1	3	2	2	2	2	2	2
17	1	1	2	4	1	1	2	2	1	2	1	1	1	1	1	2	2	2	2	2	2
18	1	2	2	2	3	1	1	1	1	2	2	1	1	1	1	2	2	2	2	2	2
19	2	1	2	4	2	1	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2
20	1	1	2	6	3	1	1	2	1	1	1	1	1	1	1	2	2	2	2	2	2

S.I. No.	Age	Sex	Contacts	No. of family Members	Duration of Illness	SYMPTOMS								Smoking	Alcoholism	Comorbid Illness					
						Cough with Sputum	Fever	Hemoptysis	Breathlessness	Chest Pain	Fatigue	Weight Loss	Anorexia			Diabetes	Hypertension	A I H	C O P D	Malignancy	Others
21	1	1	2	4	2	1	1	1	1	2	2	1	1	1	1	2	2	2	2	2	PT
22	1	1	2	6	3	1	1	1	1	2	1	2	2	1	1	2	2	2	2	2	PT
23	1	1	2	7	1	1	2	2	1	2	1	2	2	1	1	2	2	2	2	2	2
24	1	1	2	6	3	1	2	1	1	1	2	2	2	1	1	2	2	2	2	2	PT
25	2	1	2	4	1	1	2	2	1	1	2	2	2	2	3	2	1	2	2	2	2
26	1	1	2	0	1	1	1	2	1	2	2	1	2	3	3	2	2	2	2	2	2
27	1	1	2	5	1	1	1	2	1	2	2	2	2	3	3	1	2	2	2	2	2
28	1	1	2	6	1	1	1	2	1	2	2	1	2	1	3	2	2	2	2	2	2
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31	1	2	2	17	1	1	1	2	2	2	2	2	3	3	1	2	2	2	2	2	2
32	1	1	2	5	1	1	1	2	2	2	1	1	1	1	2	2	2	2	2	2	2
33	1	2	2	3	2	1	1	2	1	2	1	1	2	2	2	2	2	2	2	2	PT
34	1	2	2	6	2	1	1	2	1	2	2	2	2	2	1	1	1	2	2	2	2
35	1	2	2	6	2	1	1	2	1	2	2	1	2	2	2	2	2	2	2	2	PT
36	1	2	2	5	3	1	1	2	1	1	2	1	2	2	2	1	1	2	2	2	
37	1	2	2	8	3	1	1	1	1	2	2	1	2	2	2	2	2	2	2	2	2
38	1	1	2	2	3	2	2	2	1	2	2	2	3	3	2	2	2	2	2	2	PT
39	1	1	2	7	2	1	1	2	1	2	1	1	1	3	2	2	2	2	2	2	2

S.I. No.	Age	Sex	Contacts	No. of family Members	Duration of Illness	SYMPTOMS								Smoking	Alcoholism	Comorbid Illness					
						Cough with Sputum	Fever	Hemoptysis	Breathlessness	Chest Pain	Fatigue	Weight Loss	Anorexia			Diabetes	Hypertension	A I H	C O P D	Malignancy	Others
40	1	1	2	4	3	1	1	2	2	2	1	1	3	3	2	2	2	2	2	2	2
41	1	2	1	8	2	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2
42	1	2	2	4	1	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	2
43	1	2	2	4	1	1	2	2	1	2	2	1	2	2	2	2	2	2	2	2	PT
44	1	1	2	1	1	1	1	1	1	2	2	1	3	3	2	2	2	2	2	2	PT
45	1	1	2	3	3	1	1	2	1	2	2	2	1	3	2	2	2	2	2	2	PT
46	1	1	2	4	3	1	1	2	1	2	2	1	1	2	1	2	2	2	2	2	2
47	1	2	2	2	2	1	1	2	1	2	2	1	2	2	2	2	2	2	2	2	2
48	1	1	2	6	3	1	2	1	1	2	1	1	1	1	3	2	1	2	2	2	2
49	2	1	1	3	1	1	2	2	1	2	1	2	2	3	3	2	2	2	2	2	PT
50	1	2	2	1	3	1	1	1	1	2	2	1	1	3	3	2	1	1	2	2	CRF
51	1	1	2	6	3	1	2	2	1	2	2	1	1	1	1	2	2	2	1	2	2
52	1	1	1	4	3	1	2	2	1	2	1	1	1	1	1	2	2	2	1	2	2
53	1	1	2	3	1	1	1	2	2	2	2	1	1	1	3	2	2	2	2	2	2
54	2	1	2	1	3	1	2	2	1	2	2	1	1	2	3	2	2	2	1	2	2
55	2	1	2	4	2	1	2	2	1	2	2	2	2	1	2	2	2	2	1	2	2
56	1	1	2	5	3	1	1	2	1	2	2	1	1	1	1	2	2	2	2	2	2
57	1	1	2	6	1	1	1	2	1	2	1	1	1	3	1	2	2	2	2	2	2
58	1	1	2	0	2	1	2	2	1	2	2	2	2	2	3	2	2	2	2	2	1

S.I. No.	Age	Sex	Contacts	No. of family Members	Duration of Illness	SYMPTOMS								Smoking	Alcoholism	Comorbid Illness					
						Cough with Sputum	Fever	Hemoptysis	Breathlessness	Chest Pain	Fatigue	Weight Loss	Anorexia			Diabetes	Hypertension	A I H	C O P D	Malignancy	Others
59	1	2	2	8	2	1	1	2	1	1	1	2	2	3	3	2	2	2	2	2	2
60	2	1	2	0	2	1	2	2	1	2	2	2	2	2	3	2	2	2	2	2	1
61	1	1	2	7	3	1	2	2	1	1	2	1	1	2	2	2	2	2	1	2	PT
62	1	1	2	5	1	2	2	2	1	2	2	1	1	1	1	2	2	2	2	2	PT
63	1	1	2	2	1	1	1	2	2	2	2	2	2	3	3	1	2	2	2	2	2
64	1	1	2	6	1	2	2	1	2	2	2	2	2	2	3	2	2	2	2	2	2
65	1	1	2	3	1	2	2	2	1	1	2	2	2	1	1	2	1	2	1	2	2
66	2	2	2	6	1	1	1	2	2	2	2	2	2	3	3	2	2	2	2	2	2
67	1	1	2	6	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	PT
68	1	1	2	6	1	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2
69	1	1	2	0	1	2	1	2	1	2	1	1	1	3	2	1	2	2	2	2	2
70	1	2	2	5	1	1	1	2	2	2	1	1	1	3	3	2	2	2	2	2	2
71	1	1	2	4	1	1	1	2	2	1	2	2	2	3	3	1	2	2	2	2	2
72	1	1	2	3	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	2	2
73	2	1	2	11	2	1	1	1	1	2	2	2	2	1	2	2	2	2	2	2	2
74	1	2	2	5	1	1	1	2	1	2	2	2	2	1	1	1	2	2	2	2	2
75	2	1	2	3	2	1	2	2	1	2	2	1	1	3	3	1	2	2	2	2	2
76	2	1	2	5	3	1	1	1	2	2	1	1	1	1	3	2	2	2	2	2	2
77	1	1	2	4	1	1	2	2	1	2	1	1	1	1	1	2	2	2	2	2	2

S.I. No.	Age	Sex	Contacts	No. of family Members	Duration of Illness	SYMPTOMS								Smoking	Alcoholism	Comorbid Illness					
						Cough with Sputum	Fever	Hemoptysis	Breathlessness	Chest Pain	Fatigue	Weight Loss	Anorexia			Diabetes	Hypertension	A I H	C O P D	Malignancy	Others
78	1	2	2	2	3	1	1	1	1	2	2	1	1	1	1	2	2	2	2	2	2
79	2	1	2	4	2	1	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2
80	1	1	2	6	3	1	1	2	1	1	1	1	1	1	1	2	2	2	2	2	2
81	1	1	2	4	2	1	1	1	1	2	2	1	1	1	1	2	2	2	2	2	PT
82	1	1	2	6	3	1	1	1	1	2	1	2	2	1	1	2	2	2	2	2	PT
83	1	1	2	7	1	1	2	2	1	2	1	2	2	1	1	2	2	2	2	2	2
84	1	1	2	6	3	1	2	1	1	1	2	2	2	1	1	2	2	2	2	2	PT
85	2	1	2	4	1	1	2	2	1	1	2	2	2	2	3	2	1	2	2	2	2
86	1	1	2	0	1	1	1	2	1	2	2	1	2	3	3	2	2	2	2	2	2
87	1	1	2	5	1	1	1	2	1	2	2	2	2	3	3	1	2	2	2	2	2
88	1	1	2	6	1	1	1	2	1	2	2	1	2	1	3	2	2	2	2	2	2
89	2	1	2	2	1	1	1	2	1	2	2	2	2	3	3	2	1	1	2	2	2
90	2	1	2	4	1	2	2	2	1	1	2	2	2	3	3	1	2	2	2	2	2

SL.NO.	PREVIOUS DRUG INTAKE	GENERAL EXAMINATION			BODY MASS INDEX	HEMOGLOBIN	TOTAL COUNT	D C				BLOOD SUGAR	UREA	CREATININE	X-RAY CHEST												1 +	2 +	3 +	CAT EGO RY OF TRE ATM ENT STAR TED
		ANE MIA	CLUB BING	LYM PHADENOPATHY				POLYMORPHS	LYMPHOCYTES	EOSINOPHILS	MONOCYTES				RIGHT	LEFT	BOTH	CAVITATION	NODULES INFILTRATION	BOTH	UPPER ZONE	MIDDLE ZONE	LOWER ZONE	PNEUMOTHORAX	PYOTHORAX	PLEURAL EFFUSION				
1	ATT	1	1	2	19.14	7	8400	72	26	2	0	105	26	0.9	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	II
2	ATT	2	2	2	14.56	8	8200	64	28	6	2	114	60	1.3	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	II
3	OH A	1	2	2	19.10	9.3	8600	76	22	2	0	310	31	1.2	1	2	2	2	2	2	2	2	1	2	2	1	2	2	2	I
4	---	2	1	2	18.70	10.2	9900	75	23	2	0	82	32	0.8	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	I
5	ATT	1	2	2	16.79	10.40	7600	70	30	0	0	81	48	1.7	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	II
6	---	1	2	2	16.00	8.2	5500	68	30	2	0	88	44	1.2	1	2	2	1	1	1	1	2	2	2	2	2	1	2	2	I
7	ATT	2	1	2	19.50	10.2	12500	82	16	2	0	116	41	1	1	1	1	2	1	2	1	2	1	2	2	2	2	1	2	II
8	---	2	1	2	18.00	11.0	7600	68	30	2	0	72	54	1.3	1	2	2	2	2	2	2	2	1	2	2	1	1	2	2	I
9	OH A	1	2	2	29.00	7.80	7200	73	25	2	0	100	92	1.9	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	I
10	---	1	2	2	14.10	8.00	11000	76	22	2	0	100	22	0.8	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	I
11	---	2	2	2	17.90	11.00	10000	82	16	2	0	35	50	1.1	2	2	2	2	2	2	2	2	1	2	1	2	2	2	2	I
12	ASA B block	2	2	2	18.80	10.80	11700	80	18	2	0	60	27	1.0	2	1	2	2	1	2	2	2	1	2	2	2	2	2	2	I
13	---	1	2	2	17.70	10.20	8800	76	22	2	0	105	17	0.6	1	1	1	2	1	2	1	1	1	2	2	2	2	2	2	I
14	OHA	1	2	2	19.50	8.0	7500	75	25	1	0	365	22	0.9	1	1	1	2	1	2	1	1	1	2	1	2	2	2	2	I
15	OHA	1	2	2	22.60	7.0	7500	69	30	1	0	214	33	0.8	1	1	1	1	1	1	1	2	1	2	2	2	2	1	2	I
16	---	1	2	2	17.50	8	7600	82	18	0	0	90	27	0.7	1	1	1	2	2	1	1	1	1	2	2	2	1	2	2	I
17	---	1	2	2	12.70	9.2	8900	66	32	2	0	90	56	1.5	1	1	1	2	1	2	1	1	2	2	2	2	1	2	2	I
18	---	2	1	2	17.0	9.6	8600	59	35	6	0	69	43	0.7	1	2	2	2	1	2	1	2	2	2	2	2	2	2	2	I

SL.NO.	PREVIOUS DRUG INTAKE	GENERAL EXAMINATION			BODY MASS INDEX	HEMOGLOBIN	TOTAL COUNT	D C				BLOOD SUGAR	UREA	CREATININE	X-RAY CHEST												1 +	2 +	3 +	CAT EGO RY OF TRE ATM ENT STAR TED
		ANE MIA	CLUB BING	LYM PHADENOPATHY				POLYMORPHS	LYMPHOCYTES	EOSINOPHILS	MONOCYTES				RIGHT	LEFT	BOTH	CAVITATION	NODULES INFILTRATION	BOTH	UPPER ZONE	MIDDLE ZONE	LOWER ZONE	PNEUMOTHORAX	PYOTHORAX	PLEURAL EFFUSION				
19	OH A	1	2	2	16.1	9.6	10500	71	26	3	0	310	22	0.9	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	I
20	---	1	2	2	21.0	8.8	10000	83	15	2	0	86	24	0.8	1	2	2	1	1	1	1	1	1	2	2	2	1	2	2	I
21	ATT	2	2	2	22.0	11.6	7600	76	22	2	0	90	20	0.9	1	2	2	2	1	2	1	2	2	2	2	2	2	2	1	I
22	ATT	1	1	2	19.1	10.6	11000	82	17	1	0	144	28	0.8	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	II
23	---	1	1	2	19.0	7.0	8600	66	32	2	0	93	28	0.8	1	1	1	2	1	2	1	1	1	2	2	2	1	2	2	I
24	---	1	1	2	18.0	8.2	9200	77	21	1	0	83	38	0.1	1	2	2	1	2	2	1	1	1	1	2	2	2	2	2	II
25	---	2	1	1	16.1	10	8500	60	38	2	0	120	75	1.3	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	III
26	---	1	1	2	16.4	9	9000	67	30	3	0	90	20	0.6	1	1	1	2	1	2	2	1	2	2	1	2	2	2	2	I
27	OH A	2	1	2	19.5	9.6	10200	78	20	2	0	179	25	0.7	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	I
28	---	1	2	2	16.2	10.2	10500	80	17	2	0	90	20	0.7	1	1	1	2	1	2	1	1	1	2	2	2	2	2	2	I
29	Anti. H7	1	1	1	21.2	8.4	8900	78	20	2	0	78	18	0.8	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	III
30	OH A	2	1	2	21.0	11.2	9600	67	22	1	0	375	29	0.9	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	I
31	OH A	1	2	2	17.7	10.6	9900	81	17	2	0	300	25	0.8	1	2	2	1	1	1	1	2	2	2	2	2	1	2	2	I
32	---	1	2	2	15.5	9.2	9600	69	30	1	0	75	30	1.9	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	III
33	ATT	1	2	2	17.0	6.8	10500	85	13	2	0	137	18	0.9	1	2	1	1	1	1	1	2	2	2	2	2	2	1	2	II
34	OH A	1	2	2	18.6	8.6	9600	70	28	2	0	261	31	0.8	1	1	1	1	1	1	1	2	2	2	2	2	2	1	2	I
35	ATT	1	1	2	15.5	8.6	9000	73	27	0	0	76	32	0.8	1	1	1	1	1	1	2	1	1	2	2	2	1	2	2	II
36	+	1	2	2	17.36	7.2	8800	61	37	2	0	84	36	0.7	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	III

SL.NO.	PREVIOUS DRUG INTAKE	GENERAL EXAMINATION			BODY MASS INDEX	HEMOGLOBIN	TOTAL COUNT	D C				BLOOD SUGAR	UREA	CREATININE	X-RAY CHEST												1 +	2 +	3 +	CAT EGO RY OF TRE ATM ENT STAR TED
		ANE MIA	CLU BBING	LYM PHADENOPATHY				POLYMORPHS	LYMPHOCYTES	EOSINOPHILS	MONOCYTES				RIGHT	LEFT	BOTH	CAVITATION	NODULES INFILTRATION	BOTH	UPPER ZONE	MIDDLE ZONE	LOWER ZONE	PNEUMOTHORAX	PYOTHORAX	PLEURAL EFFUSION				
37	+	1	2	2	14.5	8.0	8800	70	28	2	0	72	26	0.8	2	2	2	2	1	2	2	2	2	2	2	2	2	2	1	I
38	ATT	1	1	2	13.20	7.0	9800	71	27	2	0	76	31	0.9	1	2	2	2	1	2	1	2	2	2	2	2	1	2	2	I
39		1	1	2	15.00	8.2	9800	72	26	2	0	84	26	0.7	1	1	1	2	1	2	1	1	2	2	2	2	2	1	2	I
40		1	1	2	14.5	9.6	9800	71	27	2	0	76	32	0.5	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	I
41	+	1	1	2	12.0	6.0	10000	71	26	3	0	91	26	0.8	1	2	2	2	1	2	1	2	2	2	2	2	2	2	1	I
42	+	1	1	2	16.0	7.0	8900	69	27	4	0	74	29	0.7	1	2	2	2	1	2	1	2	2	2	2	2	1	2	2	I
43	+	1	1	2	17.0	7.6	7600	72	26	2	0	77	32	0.9	1	1	1	2	1	2	2	1	1	2	2	2	1	2	2	I
44		1	1	2	18.5	8.6	9900	79	19	2	0	82	26	0.7	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	I
45		1	1	2	16.0	7.2	9000	70	27	3	0	75	27	0.9	1	1	1	2	1	2	1	1	1	2	2	2	2	2	2	I
46		1	2	2	13.2	7.2	8800	65	33	2	0	76	29	0.6	1	2	2	2	1	2	1	2	2	2	2	2	1	2	2	I
47		1	2	2	20.4	8.6	8600	69	29	2	0	84	22	0.8	1	2	2	2	1	2	1	2	1	2	2	2	2	1	2	I
48		1	1	2	19.2	9.2	9800	77	20	3	0	94	26	0.7	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	I
49	ATT	2	1	2	16.8	11.2	8900	66	32	2	0	100	39	1.9	1	2	2	1	1	1	1	1	1	2	2	2	1	2	2	I
50		1	2	2	17.3	8.3	8900	67	29	2	0	76	89	3.3	1	1	1	2	1	2	1	1	2	2	2	2	2	2	2	I
51		1	1	2	13.2	7.2	8800	67	30	3	0	84	22	0.8	1	1	1	2	1	2	1	2	2	2	2	2	2	2	2	I
52		1	1	2	11.9	7.6	8900	67	30	3	0	96	26	0.7	1	1	1	2	1	2	2	1	1	2	2	2	2	2	2	I
53		1	1	2	17.6	8.4	7900	66	32	2	0	102	28	0.9	2	1	2	2	1	2	2	2	1	2	2	2	2	2	1	I
54		1	1	2	17.6	8.6	8980	67	30	3	0	76	32	0.9	1	1	1	2	1	2	1	2	2	2	2	2	2	2	2	I

SL.NO.	PREVIOUS DRUG INTAKE	GENERAL EXAMINATION			BODY MASS INDEX	HEMOGLOBIN	TOTAL COUNT	D C				BLOOD SUGAR	UREA	CREATININE	X-RAY CHEST												1 +	2 +	3 +	CAT EGO RY OF TRE ATM ENT STAR TED
		ANE MIA	CLU BBING	LYM PHADENOPATHY				POLYMORPHS	LYMPHOCYTES	EOSINOPHILS	MONOCYTES				RIGHT	LEFT	BOTH	CAVITATION	NODULES INFILTRATION	BOTH	UPPER ZONE	MIDDLE ZONE	LOWER ZONE	PNEUMOTHORAX	PYOTHORAX	PLEURAL EFFUSION				
55		1	1	2	15.20	7.6	8900	70	30	3	0	96	28	1.1	1	2	2	2	1	2	1	2	2	2	2	2	2	2	2	I
56		1	2	2	16.00	8.4	9200	70	28	2	0	100	32	1.2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	I
57		1	2	2	16.0	8.6	8600	63	33	4	0	76	24	0.8	1	1	1	2	1	2	1	1	1	2	2	2	2	2	1	I
58		1	2	2	18.0	7.6	8000	61	30	3	0	97	18	0.9	1	2	2	2	1	2	1	2	2	2	2	2	1	2	2	I
59		1	1	2	11.5	7.8	10000	71	26	3	0	88	20	0.8	1	2	2	2	1	2	2	1	2	2	2	2	2	2	2	I
60		1	1	2	16.0	8.4	9200	70	28	2	0	70	32	0.9	0	1	1	1	1	2	2	2	1	2	2	2	2	2	2	I
61	ATT	1	1	2	19.14	7	8400	72	26	2	0	105	26	0.9	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	II
62	ATT	2	2	2	14.56	8	8200	64	28	6	2	114	60	1.3	1	1	1	1	1	1	1	2	2	1	2	2	2	2	2	II
63	OH A	1	2	2	19.10	9.3	8600	76	22	2	0	310	31	1.2	1	2	2	2	2	2	2	2	1	2	2	1	2	2	2	I
64	---	2	1	2	18.70	10.2	9900	75	23	2	0	82	32	0.8	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	I
65	ATT	1	2	2	16.79	10.40	7600	70	30	0	0	81	48	1.7	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2	II
66	---	1	2	2	16.00	8.2	5500	68	30	2	0	88	44	1.2	1	2	2	1	1	1	1	2	2	2	2	2	1	2	2	I
67	ATT	2	1	2	19.50	10.2	12500	82	16	2	0	116	41	1	1	1	1	2	1	2	1	2	1	2	2	2	2	1	2	II
68	---	2	1	2	18.00	11.0	7600	68	30	2	0	72	54	1.3	1	2	2	2	2	2	2	2	1	2	2	1	1	2	2	I
69	OH A	1	2	2	29.00	7.80	7200	73	25	2	0	100	92	1.9	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	I
70	---	1	2	2	14.10	8.00	11000	76	22	2	0	100	22	0.8	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	I
71	---	2	2	2	17.90	11.00	10000	82	16	2	0	35	50	1.1	2	2	2	2	2	2	2	2	1	2	1	2	2	2	2	I
72	ASA B block	2	2	2	18.80	10.80	11700	80	18	2	0	60	27	1.0	2	1	2	2	1	2	2	2	1	2	2	2	2	2	2	I

SL.NO.	PREVIOUS DRUG INTAKE	GENERAL EXAMINATION			BODY MASS INDEX	HEMOGLOBIN	TOTAL COUNT	D C				BLOOD SUGAR	UREA	CREATININE	X-RAY CHEST														CAT EGO RY OF TRE ATM ENT STAR TED
		ANE MIA	CLUB BING	LYM PHADENOPATHY				POLYMORPHS	LYMPHOCYTES	EOSINOPHILS	MONOCYTES				RIGHT	LEFT	BOTH	CAVITATION	NODULES INFILTRATION	BOTH	UPPER ZONE	MIDDLE ZONE	LOWER ZONE	PNEUMOTHORAX	PYOTHORAX	PLEURAL EFFUSION	1 +	2 +	3 +	
73	---	1	2	2	17.70	10.20	8800	76	22	2	0	105	17	0.6	1	1	1	2	1	2	1	1	1	2	2	2	2	2	2	I
74	OHA	1	2	2	19.50	8.0	7500	75	25	1	0	365	22	0.9	1	1	1	2	1	2	1	1	1	2	1	2	2	2	2	I
75	OHA	1	2	2	22.60	7.0	7500	69	30	1	0	214	33	0.8	1	1	1	1	1	1	1	2	1	2	2	2	2	1	2	I
76	---	1	2	2	17.50	8	7600	82	18	0	0	90	27	0.7	1	1	1	2	2	1	1	1	1	2	2	2	1	2	2	I
77	---	1	2	2	10.70	9.2	8900	66	32	2	0	90	56	1.5	1	1	1	2	1	2	1	1	2	2	2	2	1	2	2	I
78	---	2	1	2	17.0	9.6	8600	59	35	6	0	69	43	0.7	1	2	2	2	1	2	1	2	2	2	2	2	2	2	2	I
79	OHA	1	2	2	16.1	9.6	10500	71	26	3	0	310	22	0.9	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	I
80	---	1	2	2	21.0	8.8	10000	83	15	2	0	86	24	0.8	1	2	2	1	1	1	1	1	1	2	2	2	1	2	2	I
81	ATT	2	2	2	22.0	11.6	7600	76	22	2	0	90	20	0.9	1	2	2	2	1	2	1	2	2	2	2	2	2	1	2	I
82	ATT	1	1	2	19.1	10.6	11000	82	17	1	0	144	28	0.8	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	II
83	---	1	1	2	19.0	7.0	8600	66	32	2	0	93	28	0.8	1	1	1	2	1	2	1	1	1	1	2	2	1	2	2	I
84	---	1	1	2	18.0	8.2	9200	77	21	1	0	83	38	0.1	1	2	2	1	2	2	1	1	1	1	2	2	2	2	2	II
85	---	2	1	1	16.1	10	8500	60	38	2	0	120	75	1.3	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	III
86	---	1	1	2	16.4	9	9000	67	30	3	0	90	20	0.6	1	1	1	2	1	2	2	1	2	2	1	2	2	2	2	I
87	OHA	2	1	2	19.5	9.6	10200	78	20	2	0	179	25	0.7	1	1	1	1	1	1	1	1	1	2	2	2	22	2	1	I
88	---	1	2	2	16.2	10.2	10500	80	17	2	0	90	20	0.7	1	1	1	2	1	2	1	1	1	2	2	2	2	2	2	I
89	Anti. H7	1	1	1	21.2	8.4	8900	78	20	2	0	78	18	0.8	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	III
90	OHA	2	1	2	21.0	11.2	9600	67	22	1	0	375	29	0.9	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	I