PLEURAL EFFUSION AND HUMAN IMMUNODEFICIENCY VIRUS INFECTION IN ADULT ZAMBIANS: A CLINICAL AND LABORATORY STUDY.

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CONTENTS

SUMMARY

A Clinical and laboratory study was carried out on 80 adult Zambian patients with pleural effusion in order to determine common features and to establish any association with human immunodeficiency virus (HIV) infection at the University Teaching Hospital, Lusaka. No such a study had been done before in Zambia (before or after the advent of the HIV epidemic).

Of those patients with pleural effusion tested for retroviral infection 53/64 (82.81%) were found to be HIV-seropositive, aged between 15 and 50 years and about equally distributed between both sexes. They all had a poor socioeconomic background coming from crowded highdensity residential areas. No history of tuberculosis contact was available in 61/80 (76.25%) patients suggesting endogenous reactivation of dormant infection in these cases.

Lympadenopathy, nail changes, hair changes, dermatoses, atypical Kaposis Sarcoma, Herpes Zoster and Oral Candidiasis had a high predictive value (over 80%) for HIV infection, and 29/80 (36.25%) actually fulfilled the WHO clinical criteria for the diagnosis of AIDS/ARC in developing countries.

1. INTRODUCTION

1.1 DEFINITION OF PLEURAL EFFUSION

A pleural effusion can be defined as an accumulation of serous fluid within the pleural cavity as a result of excessive transudation or exudation across the pleural membrane (Hay J.G. 1985). It occurs following different pathological processes, both pulmonary and extrapulmonary, and usually to establish a diagnosis laboratory investigations, especially an aspiration and pleural biopsy, are required (Hampson F. et al 1961; Light R.W. et al 1972).

The term pleural effusion, is generally applied only to serous effusions and usually the fluid appears clear and of light straw colour. However, depending on the underlying pathological process and complications that might be present a clear effusion may become purulent (empyema), bloodstained (Haemothorax) or even opalescent (chylothorax).

A pleural fluid as pointed out already can be separated into an exudate or a transudate and this separation is determined by many factors including the specific gravity, protein concentration and lactate dehydrogenase levels of the fluid (Light R.W. et al, 1972). However, although the specific gravity determination (exudate: specific gravity of greater than 1.016) was extensively used in the past, it is

now of limited usefulness except when a quick answer is needed. It should be measured immediately since the hydrometer is adversely affected by temperature of the fluid which may change the specific gravity by as much as 0.008 to 0.010. This method has been abandoned only because there are more accurate tests now available.

A pleural effusion is defined as exudate when it has a total protein concentration of greater than 30g/L. Various conditions may affect this concentration and these should always be looked for and excluded. For example long term diuretic therapy via rapid mobilisation of water and electrolytes may lead to a rise in the pleural fluid protein content (Pillay V.K. 1965). Hypoalbuminaemia conversely, may also affect the protein content of the fluid. Therefore the separation of an exudate from a transudate on the protein criteria alone carries a 10 to 15% error. In order to enhance the accuracy of the separation, measurements of pleural fluid as well as serum concentrations of protein and lactate dehydrogenase are performed simultaneously. When pleural fluid lactate dehydrogenase levels are coupled with serum levels, a ratio of more than 0.6 indicates an exudate. Similarly, a fluid to plasma protein ratio of greater than 0.5 suggests an exudate (Pillay V.K. 1965, Light R.W. et al, 1972).

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In developing countries most rural health centres do not have sound laboratory back up and clinical recognition of a pleural effusion including needle aspiration to confirm clinical suspicion is of vital importance; usually a clue to the underlying cause may be apparent from the signs and symptoms that the patient presents with. It is therefore equally important to fully examine not only the respiratory system for the presence of a pleural effusion but also the other systems for evidence of extrapulmonary disease. This should be coupled with a good history.

However, facilities allowing, clinical suspicion of apleural effusion should always be supported by a chest radiograph and a diagnositic thoracocentesis together with a peural biopsy. Most cases with extrapulmonary aetiology such as cardiac failure or hypoproteinaemic states do not require a pleural biopsy, and in these cases the effusion is transudate and is managed on specific lines according to the extrapulmonary cause.

1.2 PATHOPHYSIOLOGY

A pleural effusion can be more than one to 2 litres of fluid in the pleural cavity. Normally, only a few millilitres (5 to 20 ml) are present between the parietal and visceral pleural layers, a potential space bound by the two layers constantly kept in apposition to each other by this small amount of fluid

under subatmospheric pressure. This fluid is low in protein content and has an electrolyte composition of the interstitial fluid and is constantly being resorbed and replenished (Hay J.G. 1985). It is thought that this fluid is formed by the parietal pleura and absorbed by the visceral pleura, and the exact amount of fluid at any time in the pleural space is maintained by a balance between the hydrostatic and oncotic forces which create a negative intrapleural pressure to overcome the elasticity of the lungs and recoil of the chest wall (Crofton J.W. 1981; Emerson P. 1981). The lymphatics especially those located in the lower mediastinum may be responsible for the removal of the proteinaceous components of pleural fluid under normal circumstances, (Nakamura T. et al 1988).

In disease therefore this balance between hydrostatic and oncotic forces is deranged and this may take four different mechanisms:-

a. Increased pulmonary capillary pressure (i.e hydrostatic pressure)
b. Decreased plasma oncotic pressure
c. Increased capillary permeability
d. Lymphatic obstruction.

The first two mechanisms above (increased pulmonary capillary pressure and decreased plasma oncotic pressure) are due to haemodynamic imbalances such as

occur in heart failure and hypoalbuminaemic states and give rise to transudates, traditionally in which the total protein is less than 30g./L. On the other hand, irritative lesions of the pleura and lymphatic obstruction are responsible for exudative pleural effusions. These are locally reactive lesions within the pleura and the majority of pleural effusions in this setting are related to changes in capillary permeability following an inflammatory process which may be infective, ischaemic or neoplastic in nature (Crompton G.K. et al 1987; Emerson P. 1981: Crofton J.W. 1981).

Common causes of pleural transudates are shown in table 1.2a. Efussions due to these tend to be bilateral and their cause is usually straight forward on clinical examination of the patient and usually resolve when the underlying problem is corrected.

TABLE 1.2a: PLEURAL TRANSUDATES (HAY J.G. 1985)

CONGESTIVE CARDIAC FAILURE
NEPRHOTIC SYNDROME
HEPATIC CIRRHOSIS
PERICARDIAL RESTRICTION
MEIGS SYNDROME
MYXOEDEMA
PERITONEAL DIALYSIS

TABLE 1.2b: PLEURAL EXUDATES (HAY J.G. 1985)

TUBERCULOSIS
BACTERIAL PNEUMONIA
PLEURAL MALIGNANCY
PULMONARY INFARCTION
COLLAGEN DISORDERS
ACUTE PANCREATITIS
SUBPHRENIC INFECTION
FUNGAL INFECTION
VIRAL PNEUMONIA
SARCOIDOSIS
POST MYOCARDIAL INFARCTION SYND.
LYMPHANGITIS CARCINOMATOSIS
YELLOW NAIL SYNDROME
DRUGS - METHYSERGIDE, PRACTOLOL
ASBESTOS EXPOSURE
FAMILIAL MEDITERRANEAN FEVER

Table 1.2b on the other hand shows a list of causes of pleural exudates. Blood-stained effusion in an elderly patient may be due to malignancy but other possible rare causes such as tuberculosis and pulmonary infarction must be considered. Metastatic tumours may be lymphomatous. Such pleural effusions commonly recur rapidly following aspiration and pleurodesis is indicated in their management.

Other, but less common, causes of pleural exudates include subphrenic infections, collagen disorders, rheumatoid arthritis, systemic lupus erythromatosus, acute rheumatic fever etc.) and fungal infections (actinomycosis and coccidomycosis). Pencreatitis may cause an effusion high in amylase levels and usually on the left side. A pleural effusion may follow myocardial infarction days or weeks later together with a pericarditis.

Rare causes of pleural transudates include Meig's syndrome (ovarian fibroma with peritoneal effusion) and peritoneal dialysis in which peritoneal fluid is thought to traverse the diaphragm through defects or lymph channels. Uterine fibroids, overian carcinoma and endometriosis may also give rise to pleural effusions (Hay J.G. 1985).

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1.3 STATEMENT OF THE PROBLEM

Pleural effusion is not an uncommon presentation in adult Zambians with respiratory disease. In 1983 there were about 114 cases of pleural effusion admitted to the University Teaching Hospital, Lusaka, and 521 reported cases of pulmonary tuberculosis were admitted in the same year (University Teaching Hospital (UTH) Medical Records Department 1990). Six years later, in 1989, there were 265 cases of pleural effusion and 664 cases of pulmonary tuberculosis admitted. Although not quite significant, these figures show an upward trend in the numbers of patients presenting with pleural effusion and pulmonary tuberculosis at hospital. Table 1.3a is a summary of admissions for pleural effusion and pulmonary tuberculosis at the University Teaching Hospital. There was a sudden increase in total hospital admissions from 1986 to 1987/88. This however, cannot be explained by an increase in the cases of pleural effusion or pulmonary tuberculosis during the same period. poor record keeping by the records department was very evident and further data analysis was therefore not possible at national level; although cases of pleural effusion have not been recorded separately, data show that incidence of tuberculosis has increased greatly since 1986/87 as shown in figure 1.3b. A large proportion of new cases are said to be due to endogenous reactivation of dormant tuberculosis in patients infected with human

immunodeficiency virus (HIV) and that this has contributed to an increase of the infectious reservoir and related increased rates of transmission (Bulletin on Health Statistics 1987-88, Ministry of Health, December, 1990).

In Zambia, data collection on the acquired immunodeficiency syndrome (AIDS) and aids-related complex (ARC) disorders began in 1986 with a confidential disease notification system.

YEAR	TOTAL ANNUAL ADMISSIONS (ALL DISEASES)	TOTAL SUSPECTED PTB (%) ADMISSIONS	PTB (%)	PLEURAL EFFUSIONS %
1983	?	635	521	114
1986	10529	956(9.10%)	7917.51%)	165(1.57%)
1987	17985	867(5.00%)	701(3.90%)	166(1.10%)
1988	18931	1044(5.51%)	940(4.96%)	104(0.55%)
1989	?	929	664	265
TOTALS	47445	2867(6.0%)	2432(5.13%)	435(0.87%)

TABLE 1.3a : Cases of pulmonary tuberculosis (PTB) and Pleural Effusions from 1983-1989 admitted to E Block, University Teaching Hospital (UTH), Lusaka. (Source: Medical Records Dept. UTH, 1990).

Totals were for the years 1986-1988 only. There is a big jump in total annual admissions from 1986 to 1987/88 although this is not so with the cases of PTB or Pleural Effusions.

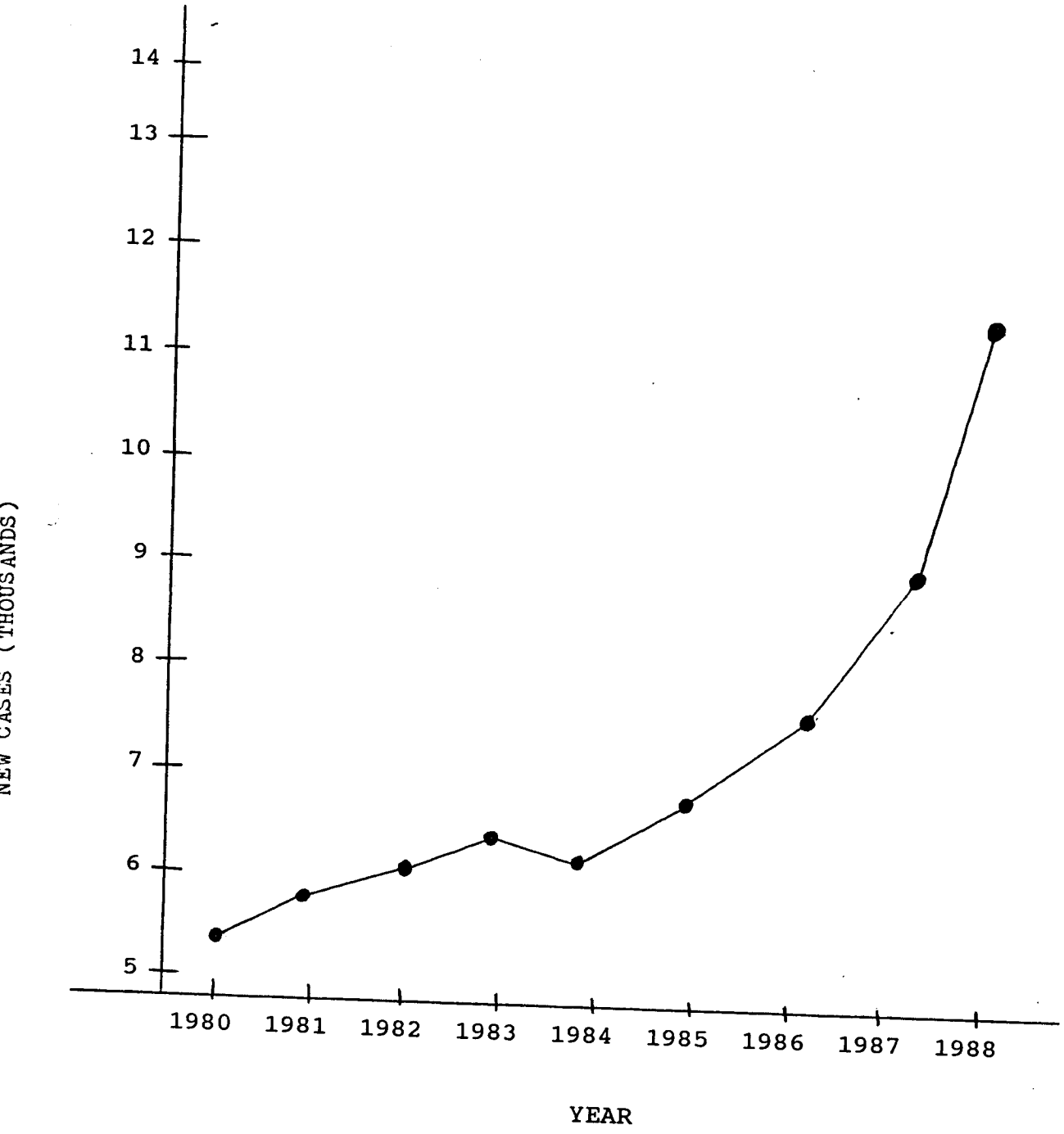

FIG 1.3b: Tuberculosis trend 1980-1988:
Pulmonary tuberculosis (PTB) and non-PTB new cases per year. Incidence of tuberculosis has increased greatly since 1986/87 in Zambia. (BULLETIN ON HEALTH STATISTICS 1987-88, MINISTRY OF HEALTH, DEC. 1990).

cont....

So far (1989) it has been found that AIDS/ARC is more prevalent in the more urbanised provinces according to the Ministry of Health records (December 1990) with Lusaka, Copperbelt and Southern Provinces having rates of more than 131.3 per 100 000 as at 1989, compared with Central, Luapula, Western, Northern and Eastern Provinces (rates of less than 99.4 per 100 00). It has also been reported that the male to female ratio is 1:1, predominant mode of transmission being heterosexual contact and that over 60% of AIDS cases fall within the age group 21-39 years in Zambia. Six percent of cases occur in young children (0-4 years) due to acquiring HIV infection in utero or at birth.

As at 1987 topten causes of admission and deaths in hospitals were identified in Zambia in patients aged 15 years and over. See table 1.3c. It can be seen that most of the admissions were due to malaria (20.1%) with a death rate of 9.7%. Tuberculosis was reponsible for the least number of admissions (3.1%) but had the highest death rate of 13.0%. This increased case fatality rate is due to the poor prognosis of HIV/TB patients as a result of other complications of AIDS. At present more than 60% of patients with pulmonary tuberculosis are said to be HIV-infected (Bull. on Health Statistics December 1990).

Onadeko (1977) analysed a ten-year study of pleural effusion in Nigerians and found that tuberculosis was the commonest cause followed by neoplasm and then bacterial

DISEASE	ADMISSIONS	%	DEATHS %
MALARIA	54071	20.1	9.7
ACCIDENTS	27177	10.1	5.8
MATERNAL COMPLICATIONS	22818	8.5	—
GENITAL URINARY TRACT	19972	7.4	3.4
ABORTION	14231	5.3	—
SKIN DISEASES	13806	5.1	—
DIARRHOEA	11870	4.4	6.8
PNEUMONIA	9997	3.7	7.7
TUBERCULOSIS	8210	3.1	13.0
ALL OTHERS	86411	32.2	35.8

TABLE 1.3c : Top 10 causes of admission and death in Zambian hospitals in 1987 (15 years and over). Tuberculosis had the least number of admissions but the highest death rate. (BULLETIN ON HEALTH STATISTICS 1987-88, MIN OF HEALTH, DEC. 1990).

pneumonia in a total of 188 patients admitted to the University College Hospital, Ibadan, over a period of ten years. Similarly Elegbeleye (1975) reviewed 65 cases of pleural effusion over a period of five years at Lagos University Teaching Hospital and found that bacterial pneumonia was responsible in 45% (930 patients), tuberculosis in 34% (22) and only 7% (5) were due to neoplasm in Nigerian Africans.

Cont....

In both studies less than 200 cases of pleural effusion appear to have been admitted to hospital over a period of 5 to 10 years, whereas at the University Teaching Hospital, Lusaka, more than 100 cases are being admitted to hospital annually from 1983. This implies that in Zambia we are probably seeing more cases at present than 10 years ago although background information concerning pleural effusion is lacking in this country.

In the majority of patients with pleural effusion in Zambia the underlying aetiology remains unknown, although it is assumed to be infective in nature and it is not uncommon to find these patients being managed accordingly in most hospitals. This is because of poor laboratory back up. Furthermore research done in other countries (Onadeko 1977, 1981; Sinzobahamvya et al 1989) has shown that most patients with pleural effusion have tuberculosis and that in unconfirmed cases there is usually a good response following a trial of antituberculosis chemotherapy. This empirical approach to the management of pleural effusion of undetermined aetiology has become the mainstay of treatment in Zambia and many cases of pleural effusion are notified to the Ministry of Health as being tuberculosis on this assumption.

While it is true that tuberculosis has largely been incriminated in the past it is important to define various patterns of pleural effusions considering that in recent years there has been a changing trend in the immunological status of the community due to human immunodeficiency virus (HIV) infection. Do the present cases of pleural effusion indeed parallel the prevalence of HIV infection, tuberculosis and other opportunistic infections?

Could the general pattern of social behaviour in our society be permissive and therefore an important contributing factor to the transmission of HIV infection which could then increase the prevalance of tuberculosis and other opportunistic pathogens?

On the other hand it is well known that severe economic adjustments taking place in most developing countries have become a great burden on the economy and standards of living of the poor. Invevitably, malnutrition and communicable disease have taken an upward swing and these are not unimportant contributing factors to tuberculosis and the development of pleural effusion in such communities.

This study therefore is an attempt to look into the epidemiological, clinical and laboratory features of pleural effusions in adult Zambians in an effort to establish some that might be amenable to treatment or

prevention.

1.4 BRIEF DESCRIPTION OF HUMAN IMMUNODEFICIENCY VIRUS (HIV) INFECTION: PARASITIC AND OTHER INFECTIONS IN AIDS.

Cases of acquired immunodeficiency syndrome (AIDS) were first recognised in the United States in 1981 and the responsible virus was later identified in 1983 at the Institute Pasteur in Paris. It was not until 1984 that confirmation of the virus as the cause f AIDS came to light at the National Cancer Institute, Bethesda, USA.

The virus, which belongs to the retrovirus family known for many years to cause disease in animals like cats (feline leukaemia), sheep (CNS degeneration) and horses (anaemia), is now known as HIV-1. It contains RNA in its core surrounded by a lipid envelope containing glycoproteins called gp120 and gp41. The core RNA coexists with an enzyme, reverse transcriptase.

The immunodeficiency state is initiated by attachment of the virus to CD 4 receptors of helper T-lymphocytes and macrophages, in the body and renders them ineffective. Other cells that support the growth of HIV include the intestinal epithelium and microglial cells

of the brain. Persistent replication of the virus inevitably leads to the development of full-brown AIDS with an impotent immune system to fight off infection with other pathogens. Herein is a point with firm scientific basis to encourage these patients to lead as near a healthy life style as possible (Jeffries D, 1988).

As Fleming A.F. (1990) points out, the acquired immune deficiency syndrome is fundamentally the same disease in all parts of the world.

What is different is the prevalence of micro-organisms in the environment that determines the patterns of disease. Various infections arise as a result of reactivation of latent pathogens and also invasion of newones.

In Africa Pneumocystis carinii is rare but is the major cause of fatal penumonia in patients with AIDS in Europe and the USA (WAKEFIELD A.E. et al 1990). Tuberculosis is instead the major complicating disease in Africa (FLEMING AF 1990).

According to Mann (1988) transmission of HIV infection in the west is mostly through male homosexual contact (but heterosexual transmission is also becoming important) and sharing of unsterile needles by intravenous drug abusers. In the subsaharan Africa

and the Caribbean transmission is predominantly by heterosexual contact, vertically from mothers to infants, and blood transfusion.

1.5 OBJECTIVES OF THE STUDY

The following are the objectives of the study:

1. To determine epidemiological, clinical and laboratory features of pleural effusion in a hospital-based study in adult Zambians.
2. To establish any association between the prevalence of pleural effusions and human immunodefiency virus (HIV) infection.

2. MATERIALS AND METHODS

2.1 PLACE OF STUDY, GEOGRAPHY OF THE COUNTRY

This study was carried out at the University Teaching Hospital, Lusaka. It is the largest hospital and the national reference center in Zambia, having a capacity of almost 1800 beds. The population of Lusaka is over one million.

Zambia covers an area of 752620 square kilometers the equivalent of Great Britain, Germany, Holland, Switzerland and Belgium combined. It is in Central Africa South of the equator with a population of 8 million. The country is well within the tropics and much of the land lies on a plateau ranging from 1067-2350 meters above sea levels. It has a hot summer season from October to March, and a cool dry winter

from May to August. Day time temperatures vary from 26.7°c to 32°c dropping to as low as 13.4°c at times (BULLETIN ON HEALTH STATISTICS, MINISTRY OF HEALTH, DECEMBER 1990).

Zambia's economy is dependent almost entirely on its mineral wealth notably copper (and it is one of the world's leading producers) and cobalt. Other important minerals include coal, zinc, lead and manganese. However, most of the population is engaged in subsistence farming of maize, groundnuts, tobacco and cattle. More than half of the country's population has migrated from rural to urban or periurban settlements mainly in search of employment (Briggs A. 1989).

As at 1985 Zambia's Gross National product (GNP) was 2593m US dollars with a GNP per capita of 390 dollars, but since then the economy of the country has been adversely affected and there has been a marked increase in inflation rate. The GNP has dropped to its lowest ever and it would not be an exaggeration to state that the per capita income is now less than 15 US dollars. The country since 1985 has been going through a programme of structural adjustment and has seen many devaluations of its local currency. Infectious diseases including tuberculosis are on the increase, malnutrition both in children and adults is a common manifestation. Madical facilities have been

deteriorating and primary health care programmes are proving difficult to implement.

About 98% of the country's inhabitants are Bantu-speaking and of black ethnicity. English, however, is the official language. More than 50% of the population is Christian equally divided between Roman Catholics and Protestants. Literacy rate stands at 60% for women and 84% for men. Life expectancy at birth now stands at 55 years (BULLETIN ON HEALTH STATISTICS, MINISTRY OF HEALTH, DEC. 1990). Children below 15 years comprise an estimated 49.18% of the population.

2.2 PATINENT SELECTION AND EXCLUSION

a. Inclusion Criteria:

- Above 15 years of age. Coming from Lusaka area.
- In-Patient.
- not already on medication (antibiotics and anti-tuberculosis drugs).
- duration of symptoms of more than two weeks.
- clinical evidence of pleural effusion.
- radiological evidence of pleural effusion.
- Positive diagnostic aspiration.

b. Exclusion Criteria:

- Under 15 years
- Very ill or Pregnancy
- Already on medication
- Clinical evidence of extra-pulmonary cause of pleural effusion (cardiac failure, cirrhosis, nephrotic syndrome).

2.3 EPIDEMIOLOGICAL FEATURES

A specially designed questionaire was used to collect epidemiological data on patients with pleural effusion. The following variables were recorded:-

1. Age (last birthday), sex and weight were recorded. Weight was recorded again at each review although different scales were being used at each instance.
2. Nationality, ethnicity and religion were entered next on the questionaire.
3. Marital Status.

   Marital status was recorded as married, single or widowed. Extramarital sexual activities were recorded in terms of number of partners in previous five years or so in order to determine the possibility of permissiveness and heterosexual transmission of HIV infection.
4. Smoking and alcohol. smoking was recorded as number of cigarettes per day and for how long. Alcohol intake as type of brew and an average amount taken per day. The staple diet of an

individual was also taken note of.

5. Level of education attained. This was classified as illiterate (cannot read or write), semi-literate (grade seven and below) and literate (grade 8 and above including college education).
6. Employment status. Recorded as unemployed or employed (including self-help schemes, subsistance farming). Amount of income earned per household (wife and husband combined).
7. Residential area and size of household. Residential areas was divided into high density areas (highly populated areas usually crowded with low standard of living e.g. Matero, Chilenje), and low density areas (not highly populated areas, not crowded with a relatively better standard of living e.g. Kabulonga, Woodlands).
8. Contact with tuberculosis or chronic cough. Family history of tuberculosis, or chronic cough at place of work or at home.

2.4 SYMPTOMS AND SIGNS

1. SYMPTOMS. These were recorded at presentation including their duration. They included chest pains, breathlessness, haemoptysis, chronic cough (more than 2 weeks duration), sputum (as mucoid, purulent, yellowish, greenish or bloodstained), fever, weight loss and recurrent diarrhoea (as watery, blood-stained, etc).

2. SIGNS. Patients were fully examined clinically and a record of signs included pallor, jaundice, oral thrush, Kaposis sarcoma lesions, lymphadenopathy, clubbing of fingers and toes, nail changes (yellow nail, fungal infections), Herpes Zoster rash or evidence of scars, molluscum contagiosum, pruritus, hair changes (light, brown straight hair) and edema. Evidence of splenomegaly, hepatomegaly, heart failure, renal disease and cirrhosis was looked for.

3. Some of these signs and symptoms could meet the WHO criteria for the diagnosis of AIDS in developing countries.

2.5 LABORATORY METHODS

1. CHEST RADIOGRAPH

Taken to confirm and establish the extent and location of the effusion. It was recorded as follows:-

- Side of effusion: left, right or bilateral
- Extent of pleural effusion according to the zones of the lung:
- Zone 1 (involving whole lung up to zone 1 i.e. upper third of the lung), zone 2 (involving the lower two thirds) and zone 3 (involving the lower third only).

Cardiac size and the presence of pulmonary infiltrates or hilar enlargement were looked for. Post thoracocentesis check X-Rays were

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done only in a few patients because of costs (except where therapeutic aspiration was done).

2. THORACOCENTESIS

Done with Abram's biopsy needle to confirm presence of fluid in the pleural cavity as well as for diagnostic analysis and to relieve symptoms (respiratory distress) in some cases. A sample of 20mls was sent to the laboratory on the same day. Plain Sterile 20ml bottles were used and specimens were sent to the laboratory immediately.

a. APPEARANCE. The colour of the fluid was noted as straw coloured and clear, pyogenic (tubid) or haemorrhagic, etc.

b. BIOCHEMICAL ANALYSIS. A laboratory request was made to determine sugar levels (done by the oxidase method, clark 1964) and Protein levels (Biuret method, clark 1964).

c. BACTERIOLOGICAL STUDIES. The following were requested for on the pleural fluid:-

- Gramstain
- Ziehl - Neelson Stain
- Bacterial culture (Blood agar, McConkey and Thioglycolate broth)
- Acid fast bacilli (AFB) culture at the chest laboratory at National Council

for Scientific Research (Lowesten-Jensen media).

d. CELL COUNT AND CYTOLOGY. Submitted for total white cell count and differential as well as detection of red blood cells. A cytological analysis of the fluid was done at the WHO cytology laboratory at UTH to detect malignant and mesothelial cells.

e. SPUTUM. Sputum from patients who could produce it was sent for tubercle bacilli isolation by Ziehl-Neelsen stain and culture.

f. PLEURAL BIOPSY. This was taken on thirty-three patients using Abrams biopsy needle. The needle was not available for use in the initial stages of the study. A three quadrant tap technique was used in order to increase the diagnostic yield (Gorabed 1981). This was done at the time of thoracocentesis. Specimens were collected and preserved in formalin and sent to laboratory on the same day.

g. HIV TEST. Was done on 64 patients in the study after explaining and requesting for consent. Two tests were usually carried out on each sample in the laboratory: The WELLCOZYME HIV RECOMBINANT test (ELISA)(VK 56/57 wellcome diagnostic 1989) and the DUPONT HIVCHEK test (Dupont med. products

1989). This was because individually these tests are non-specific and manufacturers recommend that positive tests be confirmed by other techniques to avoid occasional false positive results. The new LAV-BLOT I test (Western Blot) was also occasionally used for confirmation, (Code 722-51 Diagnostics Pasteur 1988).

3. STATISTICS

The CHI-SQUARED (x2) one sample test and the student t-test were used to compare results where appropriate at a level of 5% or less. The percentage comparison method was used in most cases because of small samples.

3. RESULTS

a. EPIDEMIOLOGICAL FINDINGS AND HUMAN IMMUNODEFICIENCY VIRUS INFECTION (HIV)

Eighty patients with pleural effusion were seen during the period of study from April to September, 1990. None was on treatment at presentation.

As shown in table 3a. HIV serotesting was carried out on 64 patients of whom 53 (82.82%) were seropositive and 11(17.19%) were seronegative ($P<0.05$). HIV Status of 16 patients was not known.

3.1 AGE, SEX AND WEIGHT DISTRIBUTION

Of the eighty (80) patients 45 (56.25%) were males and 35 (43.75%) females ($P>0.05$). As shown in table 3.1, 32/64 (50.00%) were seropositive male patients as compared to 7/64 (10.9%) males who were HIV seronegative. $P<0.05$. Twenty-one (32.81%) and 4(6.25%) females were HIV seropositive and negative respectively. No significant statistical difference in the HIV status between the two sexes ($P>0.05$)

TOTAL NUMBER OF PATIENTS	PATIENTS TESTED FOR HIV	HIV STATUS		
		POSITIVE(%)	NEGATIVE %)	NOT KNOWN
80	64	53 (82.81)	11 (17.19)	16

TABLE 3a: HUMAN IMMUNODEFICIENCY VIRUS (HIV) STATUS OF 64 PATIENTS ACTUALLY SEROTESTED.

SEX (%)	HIV STATUS	
	POSITIVE (%)	NEGATIVE (%)
MALES: 39 (60.94)	32/64 (50.00)	7/64 (10.94) P<0.05
FEMALES: 25 (39.06)	21/64 (32.81)	4/64 (6.25) P<0.05
TOTAL: 64	53 (82.81)	11 (17.19) P<0.05

TABLE 3.1: 64 Patients with Pleural effusion who were tested for antibodies to human immunodeficiency Virus (HIV).

Age of the 80 patients with pleural effusion ranged from 16 to 72 years (mean 33), the male and female mean ages were almost equal, 34 and 33 respectively. It can be seen from table 3.1a that more than 80% (69) of the patients were aged below 45 years. Table 3.1b on the other hand shows that 50/64 (78.13%) who were aged below 45 years were HIV seropositive as compared to 8/64 (12.50%) that were HIV seronegative. ($P<0.05$). Three patients between the ages of 56 and 65 years were all HIV seronegative.

The mean weight of the 80 patients was 55 kilogrammes (range 40-76). Table 3.1c shows weight distribution and more than 60% (56) of the patients presented with a weight of more than 50 kg. Nearly all the patients physically appeared no more malnourished than the other patients on the same wards. Table 3.1d shows weight distribution and HIV status of the 64 patients tested for HIV infection. 46/64 (71.88%) patients weighted between 40 and 60 kg and were all HIV seropositive compared to 11/64 (17.19%) who were HIV seronegative. Only 7/74 (10.94) patients above the weight of 60kg were HIV seropositive. ($P<0.05$).

3.2 NATIONALITY, ETHNICITY AND RELIGION

All the 80 patients were Zambians of black ethnicity (that is Bantu Speaking). They were all christians belonging to different church organisations.

3.3 HISTORY OF CONTACT WITH TUBERCULOSIS

Patients were asked whether they had been in contact with someone with a chronic cough or tuberculosis at home or place of work. Nineteen (23.75%) patients said yes. No such history was available in 61 (76.25%) patients with pleural effusion.

AGE (YEARS)	NUMBER	DISTRIBUTION (%)
15-25	20	25.00
26-35	34	42.50
36-45	15	18.75
46-55	7	8.75
56-65	3	3.75
66-75	1	1.25
	n = 80	100%

TABLE 3.1a: Patients by age distribution.

Mean age 33.64 years (range 16-72)

SD 11.31 More than 80% aged below 45 years.

AGE (YEARS)	NUMBER TESTED FOR HIV	HIV STATUS		
		POSITIVE(%)	NEGATIVE(%)	NOT KNOWN
15 - 25	19	16 (25.00)	3 (4.69)	1 P<0.05
26 - 35	27	24 (37.50)	3 (4.69)	7 P<0.05
36 - 45	12	10 (15.63)	2 (3.13)	3 P<0.05
46 - 55	3	3 (4.69)	0	4
56 - 65	3	0	3 (4.69)	0
66 - 75	0	0	0	1
	64	53	11	16

TABLE 3.1b: Age distribution and HIV Status of the 64 patients with pleural effusion. 50/64 (78.13%) who were aged below 45 years were HIV Seropositive. All the 3 patients between 56 - 65 years of age were HIV Seronegative.

WEIGHT (KG)	NUMBER	PERCENTAGE (%)
40 - 50	24	30.00
51 - 60	46	57.50
61 - 70	8	10.00
71 - 80	2	2.50

TABLE 3.1c: Patients with pleural effusion by weight distribution.

WEIGHT(KG)	NUMBER TESTED FOR HIV	HIV STATUS		
		POSITIVE(%)	NEGATIVE (%)	NOT KNOWN
40 - 50	19	15 (23.44)	4 (6.25)	5
51 - 60	38	31 (48.44)	7 (10.24)	8
61 - 70	5	5 (7.81)	0	3
71 - 80	2	2 (3.13)	0	0
	64	53	11	16

TABLE 3.1d: Weight distribution and HIV status of the 64 Patients who were tested for HIV.

Table 3.3 shows HIV status in relation to history of contact with tuberculosis (or chronic cough) in 64 patients. 16/64 (25.00%) had been in contact: 15/64 (23.44%) of whom were HIV seropositive. 48/64 (75.00%) had not been in contact with tuberculosis and 38/64 (59.38%) of whom were HIV seropositive as compared to 10/64 (15.63%) who were HIV seronegative. $P<0.05$.

3.4 MARITAL STATUS

Forty-seven (58.75%) patients were married and of these, 28 (35%) were males and 19 (23.75%) females. Single patients numbered 33 (42%) of whom 17 (21%) were males and 16 (20%) females. See table 3.4a. There was no significant statistical difference between married and single groups. $P>0.05$. Table 3.4b shows HIV status and marital status of the 64 patients tested for HIV antibodies. There was no significant statistical difference in HIV status between married, 29/64 (45.31%) and single, 24/64 (37.50%), patients who were HIV seropositive. $P>0.05$. HIV seronegative married and single individuals were 7/64 (10.94) and 4/64 (6.25%) respectively.

3.5 SOCIAL AND EMPLOYMENT STATUS.

Forty-one (51.25%) patients out of 80 took alcohol on a regular basis (mosi or chibuku local brew) over a period of 5 years. More males, 37/80 (46.25%), than females, 4/80 (5.00%) indulged in this. Twenty-six

(32.50%) patients smoked cigarettes over the same period. There were more males, 23 (28.75%) than females, 3 (3.75%) who smoked an average of seven cigarettes per day. $P<0.05$. More than 50% of the patients who took alcohol also smoked cigarettes.

HISTORY OF CONTACT WITH TB/CHRONIC COUGH (%)	HIV STATUS	
	POSITIVE (%)	NEGATIVE (%)
YES: 16 (25.00)	15 (23.44)	1 (1.56)
NO: 48 (75.00)	38 (59.38)	10 (17.19)
TOTAL: 64	53 (82.81)	11 (17.19)

TABLE 3.3: HIV status in relation to history of contact with tuberculosis (TB) or chronic cough. Over 59% of those who were HIV seropositive denied any contact.

SEX	MARITAL STATUS		
	MARRIED (%)	SINGLE (%)	
MALE: 45 (56.25%) FEMALE: 35 (43.75%)	28 (35.00) 19 (23.75)	17 (21.25) 16 (20.00)	P>0.05
n = 80	45 (58.75)	33 (41.25)	

TABLE 3.4a: Sex and marital status of the 80 patients with pleural effusion.

MARITAL STATUS (%)	HIV STATUS	
	POSITIVE (%)	NEGATIVE (%)
MARRIED 36 (56.25)	29/64 (45.31)	7/64 (10.94)
SINGLE: 28 (43.75)	24/64 (37.50)	4/64 (6.25)
TOTAL: 64	53 (82.81)	11 (17.19)

TABLE 3.4b: Marital status of the 64 patients with Pleural Effusion tested for HIV infection. There is is no significant statistical difference in HIV Status between married and single patients in this study; $P>0.05$; although these were significantly higher than those who were seronegative.

Table 3.5a shows distribution of the 80 patients according to hteir residential areas. Seventy-seven (96.25%) resided in high density areas and only 3 (3.75%) in low density areas. $P<0.05$. Twenty-nine (36.25%) patients could be classified as literate: 20 (25%) males and 9 (11.25%) females. Thirty-nine ((48,75%) were semi-literate: 24 (30%) males and 15 (18.75%) females, and 12 (15%) patients were illiterate the majority of whom were females, 11 (13.75%). See table 3.5b. The HIV status and educational background of 64 of these patients is shown in table 3.5c. A significantly larger number of the educated (literate and semi-literate combined), 46/64 (76.56%) were HIV seropositive as compared to 10/64 (15.62%) who were seronegative. Only 4/64 (6.25%) seropositive patients were illiterate. One was seronegative.

Employment status and monthly income are shown in tables 3.5d and 3.5e. There were 43/80 (53.75%) in gainful employment as compared to 37/80 (46.75%) unemployed, most of whom were housewives. The majority in employment were: general workers 9 (11.25%), self-employed and street vendors 7 (8.75%), drivers 6 (7.50%), subsistent farmers 5 (6.25%), automechanics 3 (3.75%) and cooks or waiters 2 (2.50%). The others were an accountant, a computer operator, an accounts clerk and a school girl. This breakdown shows that 36 (45%) patients were public workers.

Combined income per household per month ranged from K500 to K7000 (mean 1888), that is 10 - 140 US dollars per month. More than 75% of the patients earned less than K1500 and only 7.5% of than earned more than K3000.

Table 3.5f shows employment and HIV status of 64 patients with pleural effusion. 31/64 (48.44%) employed and 22/64 (34.88%) unemployed were HIV seropositive respectively and 11 were HIV seronegative.

RESIDENTIAL AREA	DISTRIBUTION OF PATIENTS (%)
HIGH DENSITY	77 (96.25)
LOW DENSITY	3 (3.75)
	n = 80

TABLE 3.5a: Distribution of 80 patients with pleural effusion into high density and low density residential areas. Over 96% resided in high density areas.

SEX	EDUCATIONAL STATUS		
	LITERATE (%)	SEMILITERATE (%)	ILLITERATE (%)
MALE	20 (25.00)	25 (30.00)	1 (1.25)
FEMALE	9 (11.25)	15 (18.75)	11 (13.75)
n = 80	29 (36.25)	39 (48.75)	12 (15.00)

TABLE 3.5b: Educational status and sex distribution. More males 44/80 (55%) can read and write than females 24/80 (30%).

EDUCATIONAL STATUS	HIV STATUS	
	POSITIVE (%)	NEGATIVE (%)
-LITERATE: 25 (39.06)	20 (31.25)	5 (7.81) P<0.05
-SEMI-LITERATE: 34 (53.13)	29 (45.31)	5 (7.81) P<0.05
-ILLITERATE: 5	4 (6.25)	1 (1.56)
TOTAL: 64	53 (82.81)	11 (17.19)

TABLE 3.5c: Educational background and HIV status of the educated were HIV seropositive in this study: 49/64 (76%) were Literate or Semi-literate.

EMPLOYMENT STATUS	NUMBER (%)
General Workers	9 (11.25
Self-employed	7 (8.75%)
Drivers	6 (7.50%)
Subsistent farmers	5 (6.25%)
Automechanics	3 (3.75%)
Cooks/Waiters	2 (2.50%)
Student (Sec. Sch)	1 (1.22%)
Accounts Clerk	1 (1.25%)
Accountant	1 (1.25%)
Credit Controller	1 (1.25%)
Computer Operator	1 (1.25%)
Police Officer	1 (1.25%)
Telephone Superint.	1 (1.25%)
Tailor	1.(1.25%)
Plumbers	1 (1.25%)
Beam Wheeler	1 (1.25%)
Asst. Reg. Manager	1 (1.25%)
Unemployed	37 (46.25%)
TOTAL IN EMPLOYMENT	43 (53.75%)

TABLE 3.5d: Category of employment of the 43 patients. 37 (46.25%) were unemployed.

PAY KWACHA/MONTH	NUMBER OF WORKERS	PERCENTAGE (%)
0-500	37	46.25
501-1000	15	18.75
1001-1500	6	7.50
1501-2000	9	11.25
2001-2500	5	1.25
2501-3000	1	1.25
3001-3500	1	1.25
3501-4000	2	2.50
4001-4500	0	0.00
4501-5000	2	2.50
ABOVE 5001	2	2.50
	80 = n	100%

TABLE 3.5e: Monthly income and patient distribution. Range 500 to 7000 Kwacha (mean 1888). 72% (62 patients) earned less than1500 kwacha per month and only 7.5% earned more than K3,500.

EMPLOYEMENT STATUS (%)	HIV STATUS	
	POSITIVE (%)	NEGATIVE (%)
EMPLOYED: 37 (57.81)	31/64 (48.44)	06/64(9.38)
UNEMPLOYED: 27 (42.19)	22/64(34.38)	05/64 (7.81)
TOTAL 64	53 (82.81)	11 (17.19)

TABLE 3.5f: Employment and HIV status of the 64 patients with Pleural Effusion. There was no statistical difference of significance between the two groups. P>0.05.

B. CLINICAL FINDINGS

3.6 SYMPTOMS AT PRESENTATION

Table 3.6a shows results of symptoms of the 80 patients with pleural effusion. The commonest symptoms at presentation were:

- Weight loss 80 (100%), fever 77 (96.25%), cough 77(96.25%), breathlessness 76 ((5.00%), productive cough 53 (66.25%) and chest pains 49 (61.25%). Overall, duration of symptoms ranged from 67 to 97 days (mean 80). Cough was dry (non-productive) in 24 (30.00%) and was productive and mucoid in 40 (50.00%)
- with haemoptysis in 7 (8.75%), with yellow sputum in 5 (6.25%) and with greenish sputum in one patient. Patients admitted having lost weight on admission, fever was described as low grade occuring mainly in the evenings with occasional nightsweats. Breathlessness was experienced mostly on exertion in the majority of patients and chest pains, piercing in nature, were felt especially at the onset of illness.

Table 3.6b on the other hand, shows HIV status of those tested in relation to the presenting symptoms. It can clearly be seen that in each group of symptoms more than 70% of patients were HIV seropositive as compared to less than 30% of those that were seronegative.

3.7 *SIGNS AT PRESENTATION*

Features presented in table 3.7a were all extrapulmonary. pulmonary signs of pleural effusion (shift of the trachea, reduced chest movement, reduced vocal fremitus, percussion dullness, reduced breathsounds, etc) were demonstrated on physical examination and only varied with regard to the size

SYMPTOM	NO (%)	YES (%)	DURATION (DAYS)
CHEST PAINS	31 (38.75)	49 (61.25)	97(14-730)
BREATHLESS-NESS	4 (5.00)	76 (95.00)	70 (7-365
COUGH	3 (3.75)	77 (96.25)	67 (7-365)
SPUTUM	27 (33.75)	53 (66.25)	67
-HAEMOPTYSIS		7 (8.75)	
- MUCOID		40 (50.00)	
- YELLOW		5 (6.25)	
- GREEN		1 (1.25)	
FEVER	3 (3.75)	77 (96.25)	67
WEIGHT LOSS	0	80 (100.00)	67
CHRONIC DIARRHOEA	75 (93.75)	5 (6.25)	72 (30-150

TABLE 3.6a: Common symptoms and distribution of patients with pleural effusion.

SYMPTOMS	HIV STATUS		TOTAL
	POSITIVE (%)	NEGATIVE(%)	
- CHEST PAINS	30 (78.95)	8 (21.05)	38 (P<0.05
- BREATHLESSNESS	52 (82.54)	11 (17.46)	63 P<0.05
- CHRONIC COUGH	53 (82.81)	11 (17.19)	64 P<0.05
- SPUTUM	28 (70.00)	12 (30.00)	40 P<0.05
- WEIGHT LOSS	53 (82.81)	11 (17.19)	64 P<0.05
- FEVER	53 (82.81)	11 (17.19)	64 P<0.05

TABLE 3.6b: HIV status with respect to symptoms in patients with Pleural Effusion at presentation. More than 70% of patients with the above symptoms were HIV seropositive. P<0.05.

SIGN	NUMBER OF PATIENTS (%)
PALLOR	47 (58.75)
LYMPHADENOPATHY	36 (45.00)
NAIL CHANGES	16 (20.00)
OEDEMA	16 (20.00)
HAIR CHANGES	13 (16.25)
OTHER RASHES (PRURITUS, H. GENITALIS, M. CONTAGIOSUM)	13 (16.25)
HERPES ZOSTER	11 (13.75)
CLUBBING	11 (13.75)
ORAL THRUCH	9 (11.25)
KAPOSIS SARCOMA	7 (8.75)
SPLENOMEGALY	5 (6.25)
ASCITES	3 (3.75)

TABLE 3.7a: Extrapulmonary physical signs in 80 patients with pleural effusion at presentation.

of the pleural effusion. Pallor was detected in 47 (58.75%), lymphadenopathy (cervical and axillary) in 36 (45.00%). The nodes in all were small (less than 1cm), mobile, rubbery and not tender. peripheral oedema in 16 (20.00%), and Herpes Zoster rash or scars on the trunk or thighs in 11 (13.75%) patients. Eleven (13.75%) patients had clubbing of fingers (grades 1-3), 9 (11.25%) had oral candidiasis and 7 (8.75%) had aggressive Kaposis Sarcoma with dark plaques in the mouth (tongue or palate), trunk and lower limbs with or without oedema. Hair changes (straight, sparse and brown) were found in 13 (16.25%) patients. Other findings were splenomegaly 5(6.25%), hepatomegaly 8 (10.00%), ascites 3 (3.75%) and various skin rashes (pruritus, molluscum contagiosum, herpes genitalis and superficial fungal infections) in 13 (16.25%).

Table 3.7b shows HIV status according to signs. Over 80% of patients in each group of signs were HIV seropositive as compared to those that were seronegative (less than 21%). $P<0.05$. All the patients with Kaposis Sarcoma and those with Herpes Zoster were HIV seropositive. However, all the signs in these patients seemed to be strongly associated with HIV seropositivity; peripheral oedema in 9 patients was not associated with Kaposis Sarcoma and the cause of clubbing in the 9 patients remained unknown. Oral thrush, hair changes and nail changes seemed to be reliable pointers to HIV infections.

SIGNS	HIV STATUS		TOTAL
	POSITIVE (%)	NEGATIVE (%)	
- PALLOR	32 (78.05)	9 (21.96)	41 P<0.05
- L/ADENOPATHY	25 (83.33)	5 (16.67)	30 (P<0.05
- NAIL CHANGES	9 (90.00)	1 (10.00)	10 P<0.05
- OEDEMA	12 (80.00)	3 (20.00)	15*P<0.05
- HAIR CHANGES	8 (80.00)	2 (20.00)	10 P<0.05
- OTHER RASHES	8 (88.89)	1 (11.11)	9 P<0.05
-HERPES ZOSTER	9 (100.00)	0 (0.00)	9 P<0.05
- CLUBBING	7 (87.50)	1 (12.50)	8 P<0.05
- ORAL THRUSH	7 (87.50)	1 (12.50)	8 P<0.05
- HEPATOMEGALY	5 (83.33)	1 (16.67)	6*P<0.05
- KAPOSIS SARCOMA	6 (100.00)	0 (0.00)	6*P<0.05
- SPLENOMEGALY	3 (100.00)	0 (0.00)	3 P<0.05

TABLE 3.7b: HIV Status according to Signs at the time of Presentation. Over 80% of the Patients of Pleural effusion with the above signs were Seropositive p<0.05

* NB 6/12 patients with edema had Kaposis Sarcoma

* Other rashes: Pruritus, M. countagiosum, H. genitalis.

C LABORATORY FINDINGS

3.8 RADIOLOGICAL FEATURES

Radiological examination of the chest was carried out on every patient. Table 3.8a shows that 44 (55.00%) patients had a right -sided pleural effusion; 34 (42.50%) left-sided and 2 (2.50%) bilateral effusion. The size of pleural effusion in individual patients was determined and classified as involving zones 1,2 or 3 (see methods). As shown in table 3.8b, 11 (14%) patients had pleural effusions confined to zone 3; in 56 (70.00%) the effusion involved zone 2, and in 13 (16.00%) patients zone 1 was involved and most of this group needed a therapeutic tap to relieve dyspnoea.

Table 3.8c, on the other hand, shows HIV Status in relation to the degree or severity of pleural effusion in 64 patients. It can be seen that the majority of patients, 46/64 (71.88%), who were HIV seropositive had modrate (zone 2) to severe (zone 1) pleural effusion as compared to 8/64 (12.25%) with moderate effusion (zone 2) who were HIV seronegative. $P<0.05$. There was statistically no significant difference between HIV seropositive patients, 7/64 (10.94%) and those Seronegative 3/64 (4.67%), with pleural effusion confined to zone 3. $P>0.05$.

Other radiological findings were as follows: Patients with cardiomegaly 2/80 (2.50%), those with pulmonary infiltrates on the side without effusion were 25/80 (31.25%), and those with hilar enlargement were 6/80 (7.50%).

SIDE OF PLEURAL EFFUSION	NUMBER OF PATIENTS (%)
RIGHT	44 (55.00)
LEFT	34 (42.50)
BILATERAL	2 (2.50)
	n= 80

TABLE 3.8a: Showing distribution of pleural effusion in 80 patients. No statistical difference between RIGHT and LEFT (P>0.05). 25/80 (31.25%) had Pulmonary Infiltrates.

DEGREE OF PLEURAL EFFUSION	NUMBER OF PATIENTS (%)
ZONE 1	13 (16.25)
ZONE 2	56 (70.00)
ZONE 3	11 (13.75)
	n = 80

TABLE 3.8b: Degree of pleural effusions in 80 patients.

DEGREE OF PLEURAL EFFUSION (ZONE AND NUMBER OF PATIENTS	HIV STATUS		
	POSITIVE(%)	NEGATIVE(%)	NOT KNOWN
ZONE 1: 13 PATIENTS	10/64(15.61)	0	3
ZONE 2: 56 PATIENTS	36/64(56.25)	8/64(12.50)	12
ZONE 3: 11 PATIENTS	7/64 (10.94)	3/64 (4.67)	1
TOTAL PATIENTS TESTED FOR HIV = 64	53(82.81)	11(17.19)	16

TABLE 3.8c: The majority of patients who were HIV seropositive had moderate to severe pleural effusion involving zones 1 and 2: 46/64 (71.88%) as compared to 3/64 (12.50%) who were HIV seronegative. $P<0.05$.

3.9 PLEURAL ASPIRATE RESULTS

The appearance of pleural fluid as shown in table 3.9a was straw coloured (yellowish) in 63 (78.75%), haemorrhagic in 14 (17.50%) and turbid in 3 (3.75%) patients. Some associated underlying disease is also inidcated. Straw-coloured fluid: 17/63 (26.98%) tuberculosis, 4/663 (6.35%) Kaposis Sarcoma 1/63 (1.59%) adenocarcinoma, and 41/63 (65.08%) cause not known although tuberculosis could not be excluded. Haemorrhagic fluid: 5/14 (35.71%) tuberculosis, 3/14 (21.43%) Kaposis Sarcoma and 6/14 (42.86%) cause not known. Turbid fluid: cause not known in all the three samples, gram stain and culture were negative and no tubercle bacilli were isolated from the fluid (but no pleural biopsy was taken).

Table 3.9b shows HIV status in relation to the appearance of pleural fluid in 64 patients. Over 80% (53/64) were HIV seropositive irrespective of the appearance of the fluid (straw or haemorrhagic) and the associated underlying cause (Kaposis Sarcoma, tuberculosis or adenocarcinoma). Only one out of the three turbid samples was the patient HIV Seropositive.

Biochemical analysis of pleural fluid was carried out in 60 patients as shown in table 3.9c. The mean sugar level was 4.48mmol/L (range 15-89.9). Of this the mean albumin level was 38.49g/L (range 8.1-55.2).

Albumin fraction was 54.47% of the total protein. Four samples of pleural fluid (6.66%) had less than 30g/L total protein.

APPEARANCE OF PLEURAL FLUID	NUMBER OF SAMPLES (%)
STRAW COLOUR:	63 (78.75)
-TB	17
-KAPOSIS SARCOMA (KS) (CLINICAL)	4
-ADENOCARCINOMA	1
-OTHERS (NOT KNOWN)	41
HAEMORRHAGIC:	14 (17.50)
-TB	5
-KAPOSIS SARCOMA (CLINICAL)	3
-OTHERS (NOT KNOWN)	6
TUBRID (PYOGENIC):	3 (3.75)
-TB	0
-KAPOSIS SARCOMA (CLINICAL)	0
-OTHERS (NOT KNOWN)	3
	n = 80

TABLE 3.9a Naked eye appearance of pleural fluid in 80 patients. It was straw coloured in 63 (78.75%). The fluid was haemorrhagic in 14 14 (17.50%). Pyogenic fluid was obtained in 3 (3.75%) patients.

APPEARANCE OF PLEURAL FLUID	NUMBER TESTED FOR HIV(%)	HIV STATUS		
		POSITIVE(%)	NEGATIVE(%)	NOT KNOWN
STRAW COLOUR: 63	/50 (78.13)	43/50 (86.00)	7/50(14.00)	13
-TB: 17	13	12/13 (92.30)	1	4
-KS: 4	3	3/3 (100.00)	0	0
-ADENO-CARCINOMA: 1	1	1/1 (100.00)	0	0
- OTHERS: 41	33	27/33 (81.81)		
HAEMORRHAGIC: 14	11 (17.19)	10/11 (90.90)	1	3
- TB: 5	3	2	1	2
- KS: 3	3	3	0	0
- OTHERS: 6	5	5	0	1
TURBID: 3	3(4.69)	1/3 (33.33%)	2/3 (66.67)	0
- TB: 0	0	0	0	0
- KS: 0	0	0	0	0
- OTHERS: 3	3	1/3 (33.33)	2/3 (66.66)	0 0
80	64	53(82.81)	11(17.19)	16

TABLE 3.9b: Appearance of pleural fluid and HIV status of the 80 patients. 64 patients were tested for HIV serology. Over 80% (53/64) were HIV seropositive irrespective of the appearance of the fluid (straw or haemorrhagic). (TB: tuberculosis, KS: Kaposis Sarcoma, Others: underlying cause undetermined, HIV: Human Immunodeficiency Virus)

BIOCHEMICAL TEST	RESULT	
	MEAN	RANGE
SUGAR (MMOL/L)	4.48	0.3-9.1
PROTEIN (g/L), TOTAL (4 SAMPLES<30g/L)	70.66	15-89.9
ALBUMIN(g/L)	38.49	8.1-55.2
n = 60		

TABLE 3.9c: Pleural fluid sugar and protein levels in 60 patients.

All 4 patients had no organisms isolated from their pleural fluid and had moderate pleural effusions (zone 2). No malignant cells or lymphocytosis observed in the fluid. One had Kaposis Sarcoma and was HIV Seropositive, had lung infiltrates but she had no cardiomegaly. Another one was HIV Seropositive and she had no cardiomegaly or Kaposis Sarcoma. Pleural biopsy was not done on her and she had no pulmonary infiltrates radiologically. She had lymphadenopathy, however. The third patient was a male, HIV seronegative, and no pleural biopsy was done on him. The last patient was female, HIV status not known, had cardiomegaly but no pulmonary infiltrates or lymphadenopahy. Her pleural biopsy got lost.

Table 3.9d shows HIV Status in relation to type of pleural fluid (i.e. exudate or transudate) in 51 patients tested for HIV infection. 38/51 (74.50%) with exudate pleural effusion were HIV seropositive compared to 10/51 (19.61%) who were Seronegative. There were 3 patients with a transudate effusion tested and 2 were HIV seropositive.

Table 3.9e shows Gramstain results of pleural fluid from 77 patients. HIV serotesting was done on 50 of them. In 4/77 (5.19%) patients Gram positive Cocci were seen and turned to be staphylococcus epidermidis on culture in one patient. Culture was negative in the other 3 patients. Of the 4 patients 3 were HIV seropositive including the one in whom Staphylococcus epidermidis was sultured. In 73/77 (94.80%) patients no organisms were seen on Gram stain of pleural fluid, 47 of these were HIV Seropositive.

TYPE OF PLEURAL FLUID	HIV STATUS		
	POSITIVE (%)	NEGATIVE (%)	NOT KNOWN
- EXUDATE: 56(93%)	38/51(74.50)	10/51(19.61)	8
- TRANSUDATE:4(7%)	2/51 (3.92)	1/51(1.96)	1
TESTED: 51	40	11	9

TABLE 3.9d: Type of pleural fluid and HIV status of 51 patients. 38/51 patients had exudate pleural effusion and were HIV seropositive as compared with 10/51 that were exudate but HIV seronegative.

PLEURAL FLUID GRAM STAIN RESULTS	NUMBER OF SAMPLES (%)	HIV (%) POSITIVE
GRAM POSITIVE COCCI	4(5.19)	3(3.9)
NO ORGANISMS SEEN	73(94.80)	47 (61.00)
n = 77		

TABLE 3.9e: Gram stain results in 77 patients with pleural effusion.

ZEEL-NIELSEN STAIN RESULTS	NUMBER OF SAMPLES (%)
POSITIVE (AAFB)	0
NEGATIVE	77 100.00)
n = 77	52/62 (83.87): HIV POSITIVE

TABLE 3.9f: ZIEHL NIELSEN stain for tubercle bacilli in 77 samples of pleural fluid. 62 patients were tested for HIV,

Zeel - Nielsen stain was carried out on 77 samples of pleural fluid and no tubercle bacilli were seen in all of them. 52/62 (83.87%) of these patients were HIV seropositive. See table 3.9f.

Table 3.9g shows bacterial culture results of pleural fluid from 67 patients. 5/67 (7.46%) were culture positive; Salmonella species 1 (1.49%) patient who was HIV seropositive, staphylococcus 2 (3.00%) one of whom was HIV seropositive; enterobacter species 2 (3.00%) both were HIV seropositive. 62/67 (92.54%) all had a negative bacterial culture and 44 (70.09%) of them were HIV seropositive.

Lowensten - Jensen (L-J) culture results of pleural fluid from 51 patients are shown in table 3.9h. Ten (19.61%) grew tubercle bacilli after 6 weeks and 9 of them were HIV Seropositive. 41/51 (80.39%) were culutre negative after 6 weeks and 32 (62.75%) were HIV Seropositive.

Forty-six patients had a cytologic examination of their pleural fluid. Malignant cells - atypical mucus - producing glandular cells (adenocarcinoma) - were found in one patient (2.17%). Unfortunately her pleural biopsy got lost in the histopathology laboratory before the specimen could be examined. Mesothelial cells were present in 5 (10.87%) and numerous lymphocytes were reported in all the 16 (100%) specimens. See table 3.9i. Table 3.9j shows cytological results and HIV Status of the 46 patients with pleural effusion.

PLEURAL FLUID BACTERIAL CULTURE RESULTS	NUMBER OF SAMPLES %	HIV POSITIVE
POSITIVE CULUTURE		
- SALMONELIA SP	5 (7.46%)	4
- STAPHYLOCOCCUS	1	1
- ENTEROBACTER SP	2	2
NEGATIVE CULTURE	62 (92.54%)	44
n = 67		

TABLE 3.9g: Bacterial culture results of pleural fluid 62 (92%) were negative.

L - J CULTURE RESUTS (AAFB)	NUMBER OF SAMPLES (%)	HIV POSITIVE
POSITIVE	10 (19.61)	9 (17.64)
NEGATIVE	41 (80.39%)	32 (62.75)
	51	41(80.40)

TABLE 3.9h: Lowensten -Jensen (L-J) Culture results of pleural fluid for tubercle bacilli in 51 patients with pleural effusion.

	RESULTS (%)		
	POSITIVE	NEGATIVE	
MALIGNANT CELLS	1(2.17)	45 (97.83)	
MESOTHELIAL CELLS	5(10.87)	41 (89.13)	
LYMPHOCYTES (NUMEROUS)	46(100.00)	0 -	
n = 46			

TABLE 3.9i: Cytologic results in 46 patients with pleural effusion.

CYTOLOGY (%)	HIV RESULTS		
	POSITIVE (%)	NEGATIVE (%)	NOT KNOWN
- MALIGNANT CELLS 1/46(2.17)	1	0	0
- MESOTHELIAL CELLS 5/46(10.87)	4/5(80.00)	1/5(20.00	0
- LYMPHOCYTOSIS 46/46(100)	34/40	6/40	6

TABLE 3.9j: Cytological results and HIV status of the 46 patients with Pleural Effusion.

The patient with malignant cells was HIV seropositive; 4/5 (80.00%) patients with mesothelial cells and 34/40 (85.00%) patients with lymphocytosis were also HIV seropositive.

3.10 PLEURAL BIOPSY RESULTS

Table 3.10a shows results of pleural biopsy of 33 patients with pleural effusion. Biopsies were taken with the Abram biopsy needle at the time of pleural aspiration. Two results got lost in the histopathology laboratory. No pleural tissue was found in 7(23.00%) specimens. Therefore only 24 specimens contained pleural tissue; 20/24 (83.33%) showed caseating granulomata, and 4/24 (16.67%) showed non-specific inflammation of the pleura. On the other hand, table 3.10b shows HIV status of these patients: 12/14 (85.71%) of the patients with caseating granulomata were HIV seropositive compared to 2/14 (14.30%), with caseating granilomata but seronegative. 3/4 (75.00%) with non-specific inflammation of the pleural were also HIV seropositive. No repeat pleural biopsy was done on these patients.

3.11 SPUTUM RESULTS

Fifty-three patients out of 80 with pleural effusion had their sputum samples collected for Ziehl-Nielson (Z-N) stain and Lowesten-Jensen culture for tubercle bacilli. Only one sample was positive for tubercle bacilli on Z-N Stain. This patient was HIV positive, pleural fluid was straw-coloured, no pleural biopsy

was done on her, she had lymphadenopahy, spenomegaly and hepatomegaly and on chest X-Ray there were pulmonary infiltrates and prominent hilar shadows. Hear pleural fluid was culture negative on Lowenstein-Jensen media. Culture for tubercle bacilli was negative on all the 53 samples.

RESULTS OF PLEURAL BIOPSY	NUMBER OF PATIENTS (%)
NORMAL PLEURA	0
CASEATING GRANULOMATA	20 (83.33 } Actual Pleural Biopsies
NON-SPECIFIC INFLAMMATION	4 (16.66 }
NO PLEURA IN BIOPSY	7 (22.58
LOST BIOPSIES	2 (22.58)
	n = 33. ACTUAL BIOPSIES = 24

TABLE 3.10a: Pleural biopsy results in 33 patients with pleural effusion. Twenty (83.33%) showed caseating granulomata.

RESULTS OF PLEURAL BIOPSY	NUMBER OF PATIENTS (%)	HIV STATUS		
		POSITIVE (%)	NEGATIVE (%)	NOT KNOWN
- NORMAL PLEURA	0	0	0	0
- CASEQTING GRADULOMATA	20	12/14 (85.00)	2/14 (14.3)	6
- NON-SPECIFIC INFLAMMATION	4	3/4 (75.00)	1/14 (25.00)	0
- NO PLEURAL IN BIOPSY	7	5/6 (83.00)	1/6 (16.7)	1
- LOST BIOPSIES	2	1	0	1

TABLE 3.10b: Pleural biopsy results and HIV Status of the 33 patients with Pleural Effusion. More than 85% of patients with Caseating Granulomata were HIV Seropositive.

4. DISCUSSION

Laboratory investigations are paramount in the management of pleural effusion in any hospital. However, in this study it was not possible to cary out all investigations on all the 80 patients recruited. This was largely due to the fact that the University Teaching Hospital (UTH) at the time was experiencing a difficult economic situation and laboratory services had almost ground to a halt for a period close to a year. Full blood counts and erythrocyte sedimentation rates (ESR) couldnot be performed, microscopes, culture media, and various reagents were not available in the country; and the radiological department was running at half its capacity whenever possible; otherwise it was closed most of the time. These are just a few of the many difficulties encountered during this study. Understandably, therefore, it was not a deliberate omission that some of the investigations could not be carried out on every patient and worse still there are those that could not even be performed at all at the hospital at the time. It was only possible to take pleural biopsies on 33 patients towards the end of the study owing to non-availability of the Abrams biopsy needle in the initial stages.

As shown in table 3.1a 80% (69/80) of the patients were aged below 45 years (range 16 - 72), with mean age for males at 34 years and females 33 years. There were 45 (56.25%) male patients and 35 (43.75%)

females. This young adult age group may not necessarily reflect a predilection of pleural effusions for the young age but the pattern of age distribution in the general population of Zambia where the majority of people are aged below 50 years with a life expectancy at birth of 54 years, and comprise more than an estimated 49.18% of the population (Bulletion on Health Statistics, Ministry of Health, Zambia, December, 1990).

However, tuberculosis is one of the major diseases associated with human immunodeficiency virus (HIV) Infection in developing countries in East and Central Africa with up to 60% of patients with pulmonary tuberculosis being HIV-1 seropositive (FLEMING A.F. 1988). Assuming that most cases of pleural effusion are due to tuberculosis in Africa, the young adult age group in this study is therefore in agreement with other workers' findings that the 20-49 years age group currently accounts for more than 50% of all cases of tuberculosis that are HIV-infected (NUNN P. et. al 1990; STANAERT B. et al 1989). This is because HIV infection tends to affect the sexually active young age group. Considering, therefore, the association of HIV infection with tuberculosis, in this study more than 82% (53/64) of patients with pleural effusion were HIV-seropositive as compared to 17% (11/64) who were seronegative. $P<0.05$. See table 3a. Fifty percent (32/64) were HIV-seropositive male patients

and 32.81% (21/64) were HIV-seropositive females, as shown in table 3.1. Age distribution of the patients tested for HIV infection is shown in table 3.1b: 78.13% (50/64) of the patients were HIV-seropositive and aged below 45 years, three between 46 and 55 years, and none above the age of 56 years. Table 3.4a and 3.4b show marital and HIV status of patients with pleural effusion. There was no significant statistical difference in HIV Status between married and single patients in this study, although the numbers of HIV-seropositive patients in both these groups were much higher than those who were HIV-negative.

So far data in this study show that female and male patients (table 3.1) on one hand and married and single patients (table 3.4b) on the other are equally affected by HIV infection probably reflecting the herterosexual mode of transmission of HIV infection (MANN, 1988) and overall sexual permissiveness of the society.

Zambia is one of the most urbanised countries in the region with about 50% of the population residing in urban areas, mainly in high density residential settlements with poor housing and low standards of hygiene (Bulletin on Health Statistics, Ministry of Health, December, 1990). Table 3.5a shows distribution of the 80 patients in this study

according to residential areas: over 96% (77/80) resided in high-density areas around Lusaka. These areas are highly populated, houses have small rooms with poor ventilation and lighting and therefore conducive to transmission of infectious diseases including tuberculosis. However, 61/80 (76.25%) patients denied any contact with someone with pulmonary tuberculosis or chronic cough. Only (23.75%) patients with pleural effusion admitted a history of such contact. Furthermore, as shown in table 3.3, 38/64 (59.38%) HIV-seropositive patients denied any contact compared to 15.64 (23.44%) HIV-seropositive patients who had such contact. $P<0.05$. Of those who were HIV-seronegative 10/64 (15.63%) denied any contact and 1/64 admitted a history of contact. Although the numbers are small, in this study there was a significant number of HIV-seropositive patients (59.38%) who had denied a history of contact with tuberculosis. This observation is shared by others (NUNN P. et al 1990; STANDART B. et al 1989): That large proportion of new cases are due to endogenous reactivation of dormant tuberculosis in HIV-infected patients and that HIV infection tends to be more prevalent in the sexually active young adults and predictably influences the development of tuberculosis in this age group.

Eighty-five percent (68/80) of the patients could be classified as semiliterate or literate. More males

44/80 (55%) than females 24/80 (30%) could read and write. There were 12/80 (15%) illiterates 11 of whom were females. Literacyrate in Zambia is reported at 84% for men and 66% for women (Bulletin on Health Statistics, Ministry of Health, December, 1990). Considering HIV Status of these patients, a significant number of the "educated" (Literate and semiliterate) 49/64 (76%) were HIV-seropositive as compared to 10/64 (15.62%) who were seronegative. $P<0.05$. See tables 3.5b and 3.5c.

Forty-three (53.75%) patients were in regular employment of low status ranging from general workers, drivers, subsistent farmers, cooks, automechanics to self-employment. There were only two patients in highly paying jobs, an accountant and an assistant regional manager. Salary per month ranged from 500 to 7000 Kwacha (mean 1888). 72% (62 patients) earned less tha 1500 kwacha per month and only 7.5% earned more than 3,500 Kwacha. This simply reflects poor state of theeconomy the country was enjoying compounded by structural adjustments and frequent devaluation of the local currency. HIV Status among the employed and unemployed was almost equal: 31/64 (48.44%) and 22/64 (34.38%) respectively.
Sexual permissiveness among the young adults is a big problem especially among the poor, semiliterates and young women with illegitimate children in an attempt to raise money and also due to the fact that health

education may mean very little to these people, that is if it ever reaches them! (Personal observation).

As mentioned above according to FLEMING (1988) patients with pulmonary tuberculosis in sub-saharan Africa have HIV positivity rate of up to 60%. In this study patients with pleural effusion had an even higher HIV positivity rate of 82%. Similar high positivity rates were found by other workers when they looked at patients with extrapulmonary tuberculosis including lymphadenitis, meningitis, pleural effusions, pericardial effusion and miliary tuberculosis (Piot et al 1987); SONNET et al 1987: FLEMING 1988).

Table 3.6a shows pattern of symptoms at presentation. The commonest symptoms were weight loss 80 (100%), fever 77 (96%) especially in the evenings, cough 77 (96%) and this was productive in 53 (66.25%) patients, breathlessness 76 (95)% and chest pains in 49 (61%) patients. HIV Status with respect to the above symptoms of pleural effusion shows that more than 70% of patients with the above complaints were HIV-seropositive see table 3.6b. Notably, patients who presented with breathlessness, chronic cough, weight loss and fever had a higher HIV-positivity rate of 82%.

Physical findings on examination are shown in table 3.7a. The commonest extrapulamonary signs were pallor (47(58.75%), lymphadenopathy 36(45%), nail changes 16(20%) and hair changes 13(16%). Other interesting findings were Herpes Zoster 11 (13%) and aggressive Kaposis Sarcoma 7(8.75%). HIV Status of these patients is reflected in table 3.7b. Over 80% of the patients with these physical findings were HIV-seropositive, and especially to those who presented with pallor 32(78%), lymphadenopathy 25(83.33%), nail changes 9(90%),oedema 12 (80%) (see below), hair changes 8(80%), Herpes Zoster (9 (100%), oral thrush 7(87.50%) and Kaposis Sarcoma 6 (100%).

Six patients with oedema had Kaposis Sarcoma. The above clinical signs and symptoms form a basis for clinical diagnosis of AIDS/arc according to the World Health organisations (WHO) Criteria (WHO Report, issue 10(1990): 6 patients had atypical Kaposis Sarcoma (all HIV-Seropositive, had addition cough in all, fever in 5, lymphadenopahyin 4 and Herpes Zoster in 1); 8 patients had Herpes Zoster, lymphadenopathy, weight loss, fever and cough; 15 patients had fever, cough, oral thrush (in 5) , weight loss and lymphadenopathy (12 HIV-Seropositve and HIV Status not known in 3). See table 3.b and 3.7b. In all there were 29/80 (36.25%) who fulfilled the WHO criteria for the clinical diagnosis of AIDS/ARC . The commonest major signs were weight loss and prolonged fever

although the amount of weight loss was not specifically quantified by the patients. Common minor signs were generalised lymphadenopathy and chronic cough.

Radiological examination of pleural effusion played an important role in the investigation of patients. it made it possible to classify pleural effusion according to the side of the chest affected and to the degree of effusion. Table 3.8a shows the distribution of pleural effusion in the 80 patients in the study. Although there was no significant statistical difference, pleural effusion tended to occur more on the right side 44/80 (55%0 than on the left side 34/80 (42.50%) of the chest. It was bilateral in 2(2.50%) patients. Similar observations have been recorded by Onadeko (1977) and others. In a review of 188 cases of pleural effusion he found that 96 (51%) were right-sided, 72(38%) left sided and bilateral in 20(10.62%) patients.

The higher occurence of right-sided pleural effusion has been attributed to the shorter and more vertical right main bronchus which easily admits exogenous infective agents.

Table 3.8b on the hand shows that the degree of pleural effusions was most severe (Zone 1) in 13 (16%) patients requiring a therapeutic tap to relieve

dyspnoea. However, the majority of patients had less severe effusions (Zone 2): 56 (70%). Eleven (13%) patients had an effusion confined to Zone 3.

Pulomonary infiltrations and intrathoracic lymphadenopathy (hilar and mediastinal) were not commonly observed at presentation, part of the reason being that no repeat chest radiographs were taken following a course of chemotherapy for economic reasons. However, lack of radiological evidence of parenchymal disease on the side of the chest without pleural effusion in most patients in table 3.8a could, at least in part, explain the low sputum yield of tubercle bacilli both on Ziehl - Neelsen (Z-N) stain and the Lowenstein-Jensen (L-J) culture medium. It has been shown (NUNN P. et al 1990) that sputum examination of patients with pleural effusion is generally less helpful and that in HIV-infected patients with pulmonary tuberculosis there is low excretion of bacilli in their sputum. In this study 77 patients had submitted pleural fluid for Z-N Stain and none was positive for tubercle bacilli: 62 of these were tested for HIV infection and 52/62 (83.87) were HIV - Seropositive (TABLE 3.9f). Those who had submitted pleural fluid for L-J culture were 51 of which 10 (19.61%) were culture positive for tubercle bacilli (9 of them HIV Seropositive), and 41 (80.39%) were culture negative 932 of them HIV - Seropositive), See table 39h. These results show that the majority

of patients who had a low pleural fluid yield for tubercle bacilli on Z-N Stain and L-J culture were HIV-seropositive a common factor that also seems to be in operation in the case of sputum results. Culture and gramstain of pleural fluid was equally of very low yield for bacterial organisms with a 92-94% negative result. Here again the majority of patients (61%) were HIV-seropositive. See tables 3.9e and 3.9g. Despite, however, the low yield tests on every patient with a pleural effusion (Samuels 1958; APESTEIN 1987).

A description of naked eye appearance of pleural fluid at theracocentesis should always be made. In this study (table 3.9a) 63 (78.75%) patients had a straw-coloured effusion in which 17 were associated with tuberculosis, 4 with atypical Kaposis Sarcoma one with an adenocarcinoma and no cause was identified in 41 cases. Haemorrhagic fluid was found in 14 (17.50%): tuberculosis in 5, atypical Kaposis Sarcoma in 3 and cause not known in 6. Turbid pleural fluid was found in 3 (3.75%) patients and no cause was identified in all of them. Table 3.9b on the other hand shows appearance of pleural fluid and HIV Status of the 80 patients. Over 80% (53/64) were HIV-Seropositive irrespective of the appearance of the pleural fluid. Generally, straw coloured aspirates are a common finding in tuberculous pleural effusions although rarely the effusion may be haemorrhagic (Farabed 1981). Martensson (19890 looked at colour of pleural

fluid and found a bloody effusion to be the strongest predictive variable for malignancy, others being age, sex, smoking asbestosexposure, size of effusion and presence of oesinophils. One 55 year old female patient with adenocarcinoma on cytological examination of her pleural fluid which was straw coloured, weighted 50kg andsmoked regularly. She complained of chest pains, unproductive cough, dyspnoea and fever for two months prior to admission. Further investigations showed that she had a severe pleural effusion (Zone 1) with a pleural fluid sugar of 6.7mmol/L, protein 46g/L, lymphocytes 40% and polymorphs got lost within the histopathology laboratory.

Biochemical analysis of pleural fluid in 60 patients (table 3.9c) showed a mean protein level of 70.66g/L (range 15-90). Four (7% patients had a protein level of less than 30g/L (i.e. transudate) in whom no apparent cause was known. The mean sugar level was 4.48mmol/L (range o.3-9.1). Table 3.9d shows biochemical type of fluid and HIV Status of 51 patients tested: 38/51 patients had an exudate pleural fluid and all were HIV-Seropositive as compared to 10.51 with anexudate effusion but were HIV-Seronegative. The majority of patients with exudate pleural effusion were therefore HIV-seropositive.

In this study 56/60 (93%) patients had an exudate pleural fluid according to protein levels. Exudate pleural effusions are consistent with tuberculosis, pyogenic infection and malignancy. Light (1972) recommends that in order to enhance the accuracy of the separation between a transudate and an exudate simultaneous measurements of pleural fluid and serum protein and lactate delydrogenase should be performed and compared. This is because measurements of pleural fluid alone carry a 10 - 15% error.

This recommendation, though cost effective, may not be feasible in developing countries with limited resources. Protein levels therefore, in these circumstances, remain the best means of differentiating between a transudate and an exudate especially when simultaneous pleural fluid and blood estimations are carried out (ratio of greater than 0.6 favours an exudate). This together with fluid cytology should be considered routinely with additional investigations being ordered only when necessary (Storey 1976).

Normally, glucose level of pleural fluid parallels that of blood. As a rule the importance of a low fluid glucose level is not that it is diagnostic but that it implies primary pleural disease demanding further investigation. It is only moderately low in tuberculosis, and low (by 15%) in neoplastic effusions

(around 1.39mmol/L) and considerably very low (below1.4mmol/L) in rheumatoid disease, collagen disorders and complicated parapneumonic effusions (Garabed 1981; Rodriguez - Panadero 1989).

Cytologic results in this study showed numerous lymphocytes in nearly every sample of pleural fluid from 46 patients. In addition 5 (10.87%) patients had mesothelial cells and one had atypical mucus producing adenocarcinoma. No cosinophils were reported. Normal cell of pleural fluid is the lymphocyte with only a few neutrophils present; when pleura is inflammed mesothelial cells exfoliate into the effusion and most exudates therefore have more than 5% mesothelial cells. A cellular effusion characterised by heavy lymphocytosis (70 - 90%) and the absence of mesothelial cells (less than 1%) should be considered tuberculous and only rarely neoplastic (Garabed 1981). The presence of immature lymphocytes favour lymphoma.

In this study the mean total white cell count of pleural fluids was 3.27 x 10^9/L (range 1 - 10 x 10^9 /L), and the mean differential counts were: lymphocytes 30.89% (range 5 - 90). Most samples were reported simply as having numerous lymphocytes without a comment on other cells. This lymphocytic predominance over other cells may indicate, therefore, a probably tuberculous actology in most patients. Light (1973) looked at the value of cells counts in

differential diagnosis of pleural effusion and in 30/31 (96.8%) exudate effusions with lymphocytic predominance the cause was tuberculous or neoplastic. No tuberculous effusion had more than 1% mesothelial cells. Over 9% of lymphocytes in pleural fluid are null cells with no surface receptors of either T or B cells but in tuberculous effusions both the percentage and absolute numbers of T cells are higher than in blood (Petterson 1978). In this study blood counts could not be done for reasons already given. The fluid lymphocyte counts (30.89% mean) seem to be lower than those reported by Garabed (1981). This could probably be attributed to HIV infection causing immunosuppression in these patients as more than 80% of them were HIV-seropositive. See table 3.9i and 3.9j. As already mentioned above there were no eosinophils found in any sample of pleural fluid, the presence of which would speak against tuberculosis (Bower 1967; Curran 1963).

Pleural fluid cell count, however, is of limited diagnostic value as it has no specificity in differential diagnosis of effusions. Consideration should therefore be given to the qualitative examination of a smear of the fluid sediment as the finging of tumour cells in the only useful information in the management of patients (Yam 1967; Dines 1975).

Tissue diagnosis is a recommended procedure in every

patient with a pleural effusion especially if the nature of underlying cause is obscure. Pleural biopsy examination in this study was found to be a very helpful procedure in making a diagnosis of tuberculo effusion. Of the 33 biopsies taken (two got lost) 20/31 (64%) showed caseating granulomata virtually confirming a diagnosis of tuberculosis. 4/31 (13%) showed a non-specific inflammation of the pleura. There was no pleural tissue in 7(22.58). Actual biopsies taken (with pleural tissue) were 24 out of which 20 (83.33%) showed caseation and 4(16.66%) non-specific inflammation. ¦it can be seen that the pick up rate (83.33%) positive yield was very high and pleural biopsy procedure could have been an excellent tool to to use on all the patients in the study. See table 3.10a. Pleural biopsy results and HIV Status of the 33 patients are shown in table 3.10b. More than 85% (12/20) of patients with caseating granulomata were HIV-seropostive; and the majority of those with non-specific inflammation 3/4 (75%) and those with no pleural tissue in the biopsy 5/7 (83%) were also HIV-Seropositive. Although the numbers were small there is a general trend toward HIV-seropositivity in all these patients with pleural effusion. Apart from tuberculosis and malignancy other causes of non-specific pleurisy include pulmonary infarction, pneumonia, empyema and bronchiectasis. A second biopsy in these cases will yield a correct diagnosis in about 30% of cases and a third yield a diagnosis in

10-15% (Garabed 1981). Mestitz (1958) carried out pleural biopsies on 200 cases of pleural effusion and established a diagnosis in 104 (52%): 71 (35.5%) tuberculosis and 33 (16.5%) neoplasia. Pleural biopsy in 92 (46%) was not diagnostic and was inadequate in 4 (2%). Hempson (1961) in a similar study found a pleural biopsy positive yield for tuberculosis in 75% of his patients but when combined with culture of the biopsy tissue a definitive diagnosis was possible in 95%.

In his later study he found that biopsy was diagnostic of cancer in 62.5% but when combined with cytologic study and bronchoscopy a correct diagnosis was improved to 85%. In 65 specimens a non-specific inflammation was noted but on repeat, final diagnosis of tuberculosis was made in 5, malignancy in 14, ampyema in 13, rheumatoid arthritis in 3, pneumonia in 12, heart failure in 14, pulmonary infarction in 7 and miscellaneous in 7. Thus both tuberculosis and cancer may be present and yet the pleural biopsy specimen demonstrates non-specific changes. Similar findings have been shown by other workers (Samuels 1958, Scharer 1968, Garabed 1981).

Reports by these and other workers indicate that in tuberculous pleural effusion where the disease process is diffuse, a pleural biopsy procefure gives a high diagnostic yield of 70-80% and in malignancy 40 - 60%

positivity rate which is more or less comparable to fluid cytology yield which is often positive when biopsy specimen is negative in 20% of cases. A report of non-specific inflammation is usually recorded in 33% of cases on first biopsy, and 20% of biopsy specimens will be normal or contain no pleura depending on the skill and experience of the operator, on the amount of free fluid present and on the thickness of the pleura. Persistent failure to make a diagnosis should lead to consideration of an open biopsy procedure at thoracotomy (Sinzobahamvya 1989).

5. CONCLUSIONS

5.1 In this study epidemiological evidence suggests that pleural effusion in HIV infected patients was a problem of young adults aged below 50 years, almost equally distributed between males and females and with a background of poor socio-economic status.

5.2 The majority of patients (82%) in this study were HIV-seropositive and HIV infection has been found by other workers to be more prevalent in young adults in whom it predictably may influence the development of pulmonary tuberculosis mainly by reactivation of dormant infection.

5.3 More than 90% of patients complained of chronic symptoms such as fever, weight loss, cough, breathlessness and chest pains at presentation. Although common, these symptoms are not specific for pleural effusion but suggestive of a tuberculous infection.

5.4 Common extrapulmonary physical signs were pallor, lymphadenopathy, nail changes, hair changes, and rashes (pruritus, Herpes Zoster, molluscums contagiosum, oral thrush and atypical Kaposis Sarcoma). More than 80% of patients with the above findings were HIV-seropositive. Kaposis Sarcoma, Herpes Zoster, Lymphadenopathy and Oral

thrush had a high predictive value for HIV infection.

5.5 Twenty-nine (36.25%) patients fulfilled the WHO clinical criteria for the diagnosis of AIDS/ARC in developing countries.

5.6 Of the 60 sample of pleural fluid tested for protein concentration 56 (93%) were exudates. In another 46 samples submitted for cytology all (100%) showed a high lymphocytosis confirming further the exudative nature of pleural effusions in the majority of these patients.

5.7 Examination of sputum and pleural fluid specimens for tubercle bacilli showed a very low positive yield; cytology examination of pleural fluid did not give a specific diagnosis in all samples except in one with adenocarcinoma. Hwever, despite the poor outcome these investigations have been recommended as routine procedures in patients with pleural effusion.

5.8 Pleural biopsy was performed on 33 patients. Actual tissue biopsies were obtained in 24 patients of whom 20 (83.33%) showed caseating

granulomata confirming tuberculosis. The other 4 (16.66%) showed non-specific inflammation. Pleural biopsy is therefore an examination of choice if the diagnosis is obscure. It is recommended to combine this with procedures like pleural tissue culture, pleural fluid and sputum culutre in order to increase the diagnostic yield. In non-specific inflammation a repeat biopsy is recommended.

5.9 This study was carried out under difficult conditions due to economic problems such that it was not possible to carry out all recommended investigations on all the patients. The number of patients in the study was rather small to make any meaningful statistical conclusions in some areas of the study.

6. ACKNOWLEGEMENTS

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Last but not least may I thank house officer's who looked after the pleural effusion patients at the time, Miss V. Malashya for her good secretarial assistance in typing of my dissertation and my family for their patience and encouragement.

7.

APPENDIX I

STUDY NUMBER:.....

FORMAT FOR COLLECTING EPIDEMIOLOGY, CLINICAL LABORATORY DATA ON PLEURAL EFFUSION.

PART A - IDENTIFICATION AND PERSONAL VARIABLES

1. NAME: .....HOSP. NO.....WARD:.....
2. DATE FIRST SEEN: .....
3. AGE: .....SEX: ..... WEIGHT:.....HEIGHT.....
4. NATIONALITY:.....ZAZAMBIAN:.....YES:.....NO..
5. ETHINICITY:.....
6. RELIGION (STATE): .....
7. RESIDENTIAL AREAS: .....HIGH(STATE):.....
8. SIZE OF HOUSEHOLD (OCCUPANTS):.....
9. MARITAL STATUS: .....SINGLE:.....
   MARRIED:.....
   WIDOWED(CAUSE OF DEATH).....
10. EXTRAMARITAL SEXUAL ACTIVITIES:
    - NO. OF PARTNERS:.....
    - PERMANENT:.....
    - CASUAL: .....
11. SOCIAL HABITS:
    - SMOKE:.....NO:.....YES:.....CIG/DAY:.....
    - DRINKS:.....NO:.....YES:...BEER BOTTLES/DAY:....
      TOTS/DAY:.....
      CHIBUKU/DAY:.....
      KACHASU/DAY:.....
    - MAIN DIET:.....

12. LEVEL OF EDUCATION:-

- ILLITERATE (CANNOT READ OR WRITE) .....
- SEMI-ILLITERATE(GRADE 7 AND BELOW).....
- LITERATE (GRADE 8 TO 12).....
- INSTITUTE/COLLEGE/UNIVERSITY LEVEL:.....

13. OCCUPATION/EMPLOYMENT(STATE):.....

14. PRESENT MONTHLY INCOME (STATE):.....

15. CONTACT WITH TB OR CHRONIC COUGH:.....YES:.....NO:..

16. ANY OTHER: .....

PART B - CLINICAL DATA

17. CHESTPAINS:.....NO:.....YES:.....DURATION:.....

18. BREATHLESSNESS:.....NO:.....YES:.....DURATION:.....

19. HAEMOPTYSIS:.....NO:.....YES:.....DURATION:.....

20. SPUTUM:.....NO:.....YES:.....DURATION:.....

YELLOW:.....MUCOID:.....GREEN:.....

PURULENT:.....

21. CHRONIC COUGH: NO:.....YES:.....DURATION:.....

22. FEVER: NO:.....YES:.....DURATION:.....TIMING.....

23. WEIGHT LOSS: NO:.....YES:.....APPEARANCE:.....

AMOUNT LOST:.....

24. PALPITATIONS: NO:.....YES:.....DURATION:.....

25. RECURRENT/RELAPSING DIARRHOEA: NO:... YES:... DURATION:..

26. PALLOR: NO:.....YES:.....DURATION:.....

27. LYMPHADENOPATHY: NO:.....YES:.....SITES:.....

DESCRIPTION:.....

28. AAKS LESIONS: NO:....YES:.....SITES:.....

29. HERPES ZOSTER: NO:.....YES:.....SITES:.....

30. OTHER SKIN LESIONS (STATE):.....

31. NAIL CHANGES (YELLOW): NO:.....YES:.....

32. CLUBBING: NO:.....YES:.....

33. HAIR CHANGES: NO:.....YES:.....

34. ORAL THRUSH: NO: .....YES:.....

35. OEDEMA: NO:.....YES:.....

36. SPLENOMEGALLY:NO:.....YES:.....SIZE:.....

37. HEPATOMEGALLY:NO:.....YES:.....SIZE:.....

38. OTHER:.....

PART C - LABORATORY DATA

39. CHEST X-RAY - PE: .....ZONE 1.....2.....3.....

- RIGHT.....LEFT.....BILATERAL:.....
- CARDIOMEGALY: NO:.....YES:.....
- INFILTRATES: NO:.....YES:.....

DESCRIBE: .....

- HILAR SHADOW:.....
- OTHER: .....

40. PLEURAL BIOPSY RESULTS: .....

41. PLEURAL ASPIRATE RESULTS:-

- APPEARANCE:.....
- SUGAR: .....
- PROTEIN: .....
- CHOLESTEROL: .....
- PH: .....
- C/S (LJ): .....
- GRAMSTAIN: .....
- AAFB: .....
- MALIGNANT/MESOTHELIAL CELLS:.....

- WBC - TOTAL: .....
  - POLYS: .....
  - LYMP:.....
  - EOS: .....
  - OTHER: .....
  - RBC: .....

42. SPUTUM - COLOUR: .....
  - AAFB .....
  - GRAMSTAIN: .....
  - L-J CULTURE: .....
  - MALIGNANT CELLS: .....

43. HEAF TEST: .....

44. HIV TEST: .....POSITIVE: .....NEGATIVE: .....

45. FULL BLOOD COUNT - HB.....ESR.....
  - WBC .....TOTAL: .....
    - POLYS: .....
    - LYMP: .....
    - EOS .....

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