

# HISTOPATHOLOGICAL SCREENING FOR SILICOSIS IN AUTOPSY CASES OF THE UMTATA AREA OF THE EASTERN CAPE PROVINCE

BANWARI L. MEEL

Department of Forensic Medicine  
Faculty of Health Sciences  
University of Transkei  
Umtata, South Africa

**Abstract.** The aim of this study was to determine the distribution of lung diseases in the autopsy subjects brought for medico-legal examination in the Transkei area. Two hundred histopathological slides were examined microscopically. Of them, 46 subjects (23%) showed some kind of pathology. There were four kinds of lesions observed: dust reticulation (anthracosis), necrotizing granulomatous inflammation, tuberculosis and silicosis. Dust reticulation was observed in the lungs of 16 cases (8%), 14 of them (7%) were females and 2 males (1%), the deposition of carbon with some refractive silica particles seen in the lung fields predominated. These were the rural women aged 45-75 years. Necrotizing granulomatous inflammation of lungs that was probably tuberculosis and clear tuberculosis were found in 14 (7%) and 8 (4%) cases respectively.

**Key words:**

Autopsy, Silicosis, Tuberculosis, Hut lung, Anthracosis

## INTRODUCTION

In medical literature, there are conflicting reports on the incidence of silicosis in the former Republic of Transkei. The term “Transkein Silicosis” was coined in 1967 by Palmer [1] to report a radiological examination at the University of Cape Town, which showed a medical condition attributed to the inhalation of silica resulting from grinding corn. Palmer thus presumed that silicosis was due to the grinding of corn using the stones in the enclosed hut space. The inhalation of silica in this process by mother and child, however, does not adequately explain the high prevalence of silicosis discovered among ex-miners of the Transkei. The suspicion that this could be due to exposure of their childhood still needs broader investigations. It has

been important then to identify the prevalence of silicosis in the general population of the former Transkei, now a sub-region of the Eastern Cape Province [1]. The Transkei is the one of the former black homelands in South Africa. Subsistence farming is the main activity. There is no major industry in the area, which one can presume to be the source of silica generation and inhalation to cause Transkein lung disease.

“Transkein Silicosis” reported in radiological examinations at the University of Cape Town has been attributed to the inhalation of silica but this is known to be a disease of women, particularly above the age of 40 years. It is mentioned by Palmer that men never undertake the grinding of corn [1].

Received: April 2, 2002. Accepted: August 12, 2003.

Address reprint requests to B.L. Meel MD, FCCP, Department of Forensic Medicine, Faculty of Health Sciences, University of Transkei P/bag X1 UNITRA, Umtata 5100, South Africa (e-mail: meel@getafix.ut.ac.za).

“Hut Lung” is a domestically acquired pneumoconiosis of mixed etiology in rural women. Grobelaar et al. [2] based their study on radiological and pathophysiological changes in 25 cases. Most of the women were asymptomatic, and radiological findings ranged from a military pattern to extensive fibrosis resembling pulmonary massive fibrosis (PMF).

However, there is no lung disease condition, which has been reported by doctors in the Transkei area as a “Transkeian silicosis” or “Hut Lung”. It therefore seems that there is no substantial evidence to support these findings given by the researchers [2].

The aim of this study was to determine the distribution of lung diseases in the Transkei population based on the medico-legal autopsies.

## MATERIALS AND METHODS

This study involved 200 consecutive autopsy cases brought for medico-legal purposes in a period of one year from July 1996 to June 1997. We selected 50% of males and 50% of females, who were above the age of 40 years.

A descriptive cross-sectional histopathological study was conducted at the Umtata General Hospital (UGH). Lung samples were taken from the cases that were above 40 years old. This was because of possible comparison between two genders exposed long enough to environmental conditions before they reached 40 years. Lung samples were taken randomly from the suspected lesion of the upper parts of the lungs. The tissues were then sent to the histopathological department for routine sectioning and staining with hematoxylin and eosin. Slides were examined by the pathologist at UGH and, then sent to the National Center of Occupational Diseases (NCOH) to reconfirm the findings. The second opinion of the NCOH pathologist was considered reliable and taken into account in this study.

## RESULTS

All subjects died due to different unnatural causes. They belonged to different age groups, although we included in

**Table 1.** Pattern of lung changes on histopathological examination (n = 46)

	DR	NG	TB	SI	CA	Total No.
Male	2 (1%)	8 (4%)	4 (2%)	4 (2%)	4 (2%)	22 (11%)
Female	14 (7%)	6 (3%)	4 (2%)	0%	0%	24 (12%)

DR – dust reticulation (granulomas with carbon and silica particles).

NG – non-granulomatous granuloma.

SI – silicotic nodules.

TB – tuberculosis.

CA – carcinoma.

this study only those above 40 years of age due to the fact that the manifestations of silicosis are evident before this age. The majority of females were of rural background and were involved in grinding corn at their homes. Of the 200 autopsied cases, 46 cases (23%) showed lung pathology. The other 154 cases (77%) showed no abnormality on histopathological examination. Of the 46 subjects with lung pathology, 22 (11%) were males and 24 (12%) females. As shown in Table 1, of the 22 (11%) males, 2% of them showed silicotic nodules and carcinoma (CA) changes in the lungs, contrary to females who did not show any such pathological signs. Granulomas with carbon and silica particles (dust reticulation) were observed in 2 males (1%) and 14 females (7%), while tuberculosis and non-granulomatous granulomas (necrotising granulomatous inflammation) were almost equal in frequency in both genders.

## DISCUSSION

The idea to carry out this preliminary study was to identify the problems of silicosis in the general population (i.e., autopsy) of the former Republic of the Transkei. Having studied the literature, the author found various conditions similar to “Transkeian Silicosis” and “Hut Lung” which could probably mislead the accuracy of silicosis prevalence and therefore could be regarded as a confounding factor in the study of mine workers. This inspired the author to carry out a histopathological study on the population of Transkei.

Furthermore in 1996, there were three reports published in the South African Medical Journal (SAMJ) [3,4], which divided the medical fraternity into two groups on the issue of occupational mining lung diseases (tuberculosis and

silicosis) in the region of the Transkei, now a part of the Eastern Cape Province.

Trapido et al. [3] mention that the levels of occupational lung diseases in ex-miners in the Libode district of the Eastern Cape are far higher than has been thought. They conclude in their preliminary study that 32% of the ex-miners have no pneumoconiosis (Pn) or pulmonary tuberculosis (PTB), 36% have PTB (with or without Pn), and 55% have Pn (with or without PTB).

La Grange [4], an advisor to the Chamber of Mines provoked by the Libode study, declared that the scientific research on occupational lung disease in ex-miners is misleading, and cautioned against the way the researchers presented their research. He mentioned in the letter to the editor of SAMJ that tuberculosis should be conceptualized as an infective condition, as 80% of the adult population of the Transkei is infected.

Our study of 200 consecutive autopsy cases indicates that 22 subjects (11%) were suffering from tuberculosis, in which only 8 cases (4%) were suffering from clear tuberculosis and 14 cases (7%) were suspected to be tuberculosis infected (histological changes diagnosed as non-granulomatous granuloma). Therefore, La Grange's claim of 80% tuberculosis-infected population seems to be illegitimate.

In the present study silicosis was found only in 2 male subjects (1%). They were probably former gold miners. This finding was not confirmed by White's [5] enunciation that migrant miners from Southern Africa's rural areas to the Transkei region carry a heavy burden of mining-related health disorders.

The Transkeian women are not suffering from silicosis induced by inhalation of silica during corn grinding process, but there is a problem of carbon particles inhalation known as coal worker's lungs. This happens due to exposure to smoke, probably while cooking, they are exposed to smoke from burning wood or coal. In the literature published earlier, "Transkeian silicosis" recorded in radiological examinations at the University of Cape Town, was attributed to the inhalation of silica [1]. It was concluded that grinding of corn is responsible for this disease in women, particularly in those above the age of 40 years.

It makes some sense according to this study, in which 14 women (7%) were found to have anthracotic lung disease proved by dust reticulation on microscopy. Histologically, anthracosis [5], anthracosis with macules [6], and mixed dust fibrosis [3] cases were detected. It is surprising that none of the women in Palmer's study [1] revealed silicosis on histopathological examination. In the present study refractive silica particles with carbon were observed in the lungs of 14 women (7%).

Silicosis is considered as a disease of the mining sector, but there are very few epidemiological studies on the prevalence of occupation-related diseases in black miners. They comprise 85-90% of the work force in the gold-mining industry [7]. The degree of underreporting of occupational diseases like silicosis can be inferred from the fact that hardly any claim was made by black miners at the Medical Bureau of Occupational Diseases (MBOD) in Johannesburg, in areas where abundant black ex-miners reside [8]. Tuberculosis is usually associated with silicosis. It means that a history of long exposure to silica dust in miners who suffer from tuberculosis, should be considered as a case of silicosis, until or unless proven otherwise. The 1991 study conducted by the Human Science Development Council [9] stated that the Eastern Cape province has one of the highest concentrations of laborers who migrate to the goldmines. More than half of them is employed in the most hazardous sectors of mining according to the 1996 report of the Committee on Occupational Health.

## CONCLUSIONS

This study revealed that tuberculosis is still a problem among the Transkeian population. Higher prevalence of dust reticulosis (anthracosis) in women than in men suggests that exposure to smoke and grinding of corn may cause this kind of lung changes.

Silicosis is not a serious problem among the Transkeian population.

One limitation in our study should be mentioned that the tissue for histopathological examination was taken from the apex of lungs, and thus it could be a selection bias.

**ACKNOWLEDGEMENT**

The author acknowledges the contribution of Doctor J. Murray, NCOH for her expert opinion on the histopathological slides.

**REFERENCES**

1. Palmer PES. *Transkei Silicosis*. SAMJ 1967; 41: 1182–8.
2. Grobbelaar JP, Bateman ED. *Hut Lung: A domestically acquired pneumoconiosis of mixed etiology in rural women*. Thorax 1991; 46: 334–40.
3. Trapido ASM, Mqoqi NP, Macheke CM, Williams BG, Davies JCA. *Occupational lung disease in ex-miners – Sound a further alarm!* SAMJ 1996; 86: 559.
4. La Grange MAC. *Occupational lung disease in ex-miners – who answer the alarm?* SAMJ 1996; 86: 1127.
5. White N. *Occupational lung diseases in the ex-miners – who answer the alarm?* SAMJ 1996; 86:1127.
6. Bernadou JM, Fréour P, Monmayou R, Cloteau JP. *Silicosis in occupations handling concrete*. Arch Mal Prof 1970; 31: 617–24.
7. Murry J, Kielkowski D, Reid P. *Occupational disease trends in black South African gold miners*. Am J Resp Crit Care Med 1996; 153(2): 706–10
8. Leger JP. *Occupational disease in South African mines – a neglected epidemic?* SAMJ 1992; 81: 197–201.
9. *Human Science Research Council Report 1991*. South Africa: Human Science Development Council; 1996.