

Hazards in Jute Industry in India with special Reference to Jute Dermatitis.

DR. B. BHAR.

Medical Officer, Lansdowne Jute Mills, Bird & Co., Calcutta.

My association with the Jute Industry for seven years as Industrial Medical Officer in one of the Jute Mills under M/s. Bird & Co., Calcutta, gave me the opportunity of studying the hazards associated with this industry. If one were asked to name the most serious hazard in this industry. I would say it is the dust. In that respect Jute Dermatitis assumes a much less important place, but the reason for my special reference to this hazard is that I have come across quite a large number of such cases and so far as my knowledge goes, this disease has escaped description as a trade dermatitis amongst the jute workers in the tropics. This is due to the fact that the eruptions are not associated with subjective symptoms and occur in a class which is indifferent to personal appearance.

Before I go on to the subject matter proper, I think it is necessary to give a historical and economic background of the industry in general, the living conditions of the workers in this industry and the different working processes met with in the mills.

(a) Historical and Economic Background :

The manufacture of cloth from jute fibres is a very prominent Indian industry and its mention is to be found as 'Patta' in the religious code of Manu. The use of the fibre was not confined merely to the making of cloth, but paper was also manufactured from it.

As a result of the mechanical manufacture of jute fibre, the handloom industry in India for making jute cloth is practically extinct and now produces only ropes, twine, etc., for domestic and village requirements on a small scale.

The Jute industry is one of India's most flourishing and profitable industries. The export of jute goods constitutes the largest single item in India's export trade.

The first Jute Mill in India was started at Rishra in Bengal, near Calcutta in 1855. Other mills grew up very rapidly around Calcutta, with European capital and under European management, between 1877 and 1917. There are altogether 112 mills in Bengal, three in United Provinces, four in Madras and three in Bihar. The rise of the industry in these smaller centres has been of recent origin and the story of the jute mill industry in India is really the story of the jute industry in Bengal.

The first Great War (1914-1918) imparted a tremendous stimulus to the industry. The development of jute manufacturing industry has of necessity been accompanied by a corresponding expansion of jute cultivation. Beginning with the great depression of 1930, there was a dull period in this industry till 1941, when again the industry flourished on account of the Second World War. The Japanese advance to the Indian borders caused a depression, but in 1945 the industry again experienced a boom condition. The partition of India in 1947, along with various other reasons, has seriously affected the jute mill industry as 73 percent of the raw jute grown, comes from East Pakistan. The problem has fortunately been solved for the time being by means of an Indo-Pakistan agreement under which Pakistan has consented to supply to India 50 Lakhs bales of raw jute annually. The Indian Union is also trying to increase the acreage of jute cultivation.

(b) Housing Conditions of the Workers and the Welfare Services provided for them :

Though more than 90 percent of the Indian jute mills are situated in Bengal, the jute industry is largely manned by non-Bengalis, specially workers belonging to the United Provinces, Central Province, Madras and Bihar. Therefore the question of housing the workers is very important. Due to the neglect of most of the employers to provide adequate housing for their workers it was left to the "Sardars" (foremen) and the private landlords to make capital out of this situation by providing unhealthy houses at high rent.

A large majority of workers live in dark, damp, leaky huts in "bustees", an apt description of which appeared in the Administrative Report of 1868 of the Corporation of Calcutta. A "bustee" or native village generally consists of a mass of huts constructed without any plan or arrangement, without roads, without drains, ill-ventilated and never cleansed. Most of the villages are abodes of vice, misery and filth and nurseries of sickness and disease. The huts are huddled together in masses and the intervening spaces, impervious to the rays of the sun, are converted into urinals and used by both sexes. In these huts often live entire families, the members of which occupy the single apartment where they feed and sleep together on the wet and spongy floor with a mat spread over it serving as the bed for the whole family." It is deplorable that no appreciable change has taken place in these bustees during the last three-quarters of a century. The size of a room is usually 80 sq. ft. and it provides accommodation for nine persons. This shows the abnormal congestion and density of population in the bustees.

The quarters provided by the employers are usually near the places of work. The structures, mostly back to back are usually of brick walls and the floors are brick-paved or "katcha". Ventilation is generally unsatisfactory and largely through the door. The floor space available to a worker and his family is usually less than 100 sq. ft. The rooms are badly lighted. Owing to congestion the workers prefer to sleep outside on the floor or on cots, weather permitting. Sanitary arrangements are unsatisfactory—latrines and urinals are inadequate. The effectiveness of the supervision of the workers' colonies varies from mill to mill according to the type of staff entrusted with this work.

The welfare services for the workers are provided partly by the Govt. and partly by the employers' organisation, Indian Jute Mills Association. The Government of Bengal has established 17 welfare centres in the industrial areas of the province. The main objects are :—(1) education of the workers in trade unionism and labour problems ; (2) providing facilities for primary education for children as well as adults ; (3) providing opportunities for recreation.

The Indian Jute Mills Association undertakes direct responsibility for organising welfare work for its member units. It has organised six Labour Welfare Centres which provide both indoor and outdoor recreational facilities for workers. Each centre has a wireless set, newspapers and books. Primary Schools are attached to each centre, where considerable attention is paid to the physical development of children by encouraging outdoor games. There are also arrangements of "socials" for women and a baby show every year. Other activities of the association include regular vaccination and inoculation against epidemic diseases and financing two V. D. clinics started by the Government.

Besides the activities undertaken by the association, the individual member-mills are also devoting attention to the welfare of the workers. Out of 68 member-mills, 67 have dispensaries with whole-time medical officers, passed compounders and dressers ; four of these maintain hospitals as well. Thirteen mills have maternity clinics and 25 maintain creches. There are canteens in 28 mills and schools are run in 22.

(c) Working Processes in Jute Mills :

Before describing the processes in the mills, let me describe how raw jute comes to the mills.

Jute is a plant which grows in the rainy season from June to September, Seventy-five percent of it grows in Bengal and 25 percent in other parts of the world. The host of this plant is taken out and used as fibre.

Nature of the jute plant is lignocellulose—the cellulose percentage is 60—65. Cross-section of jute plant is pith at the centre, surrounded by wood, then fibre, which is covered by cuticle or epidermis or skin. The way of taking the fibre from the plant is called *retting*. When the plant is ripe, it is cut and put under water for about 15 days, where fermentation takes place and the fibre becomes separated from the stem of the plant. In the process of retting the workers are obliged to wade into the tanks of water which is often stagnant. By the time the bundles are taken out, the water has generally become putrefied, containing sulphuretted hydrogen and giving off a nauseating odour. Maceration of the skin of the legs and feet leads to many small traumatic injuries, which result in eczema, often accompanied by deep, painful wounds, onycholysis and loss of toe nails.

When the fibre is taken out, it is kept in the sun for drying; then the fibre is taken for baling, that is, it is made into bundles for transport. When these bales are brought to the jute mill, the bales are opened with the help of a machine called a bale opener or bale breaker. The fibre then goes to the *Softener*, which turns the hard jute into a soft one by putting it into oil and water. In this process the jute fibres are sorted according to quality and it is called *Batching*. Oil and water are mixed up with the help of a small percentage of soft soap. This mixture gives rise to Jute Acne or Jute Dermatitis.

Then comes the *Breaker Card*; the soft jute goes through this machine, which converts the long strips of jute fibre into a continuous broad ribbon of fine fibres of comparatively uniform size and texture with a definite weight for a definite length and containing the different kinds of jute in the batching, uniformly mixed.

Roving: Is further drawing out or attenuation of the ribbon to a suitable sliver for spinning. As a result of this drawing the sliver becomes delicate, so a slight twist is imparted which not only strengthens it, but enables it to be drawn out evenly and uniformly when being spun. The twisted sliver is called 'rove'.

Spinning: On this machine the rove is drawn out to a final size, twisted to the degree required for the purpose for which the yarn is intended and then wound up on a suitable bobbin. Every time the machine is stopped and started, the worker has to use the hypothenar eminence of the hand and the web between the toes, and corns are developed at these sites.

Warp Winding: The object is to obtain a greater length of yarn in one thread than would be possible in a spinning bobbin and minimise the weak places of the yarn.

Weft Winding : Function is to wind yarn from spinning bobbin into a solid cop upon the bare copping spindle of the machine used in the shuttle while weaving.

Warping or Beaming : Consists in the obtaining of a definite number of ends arranged in a particular order of a given length of an even tension.

Weaving : The operation which forms a fabric by interlacing warp and weft thread at right angles to each other. Woven cloths are comprised of longitudinal or warp threads and transverse or weft threads which in weaving are interlaced according to the desired structure and design.

Finishing : Under this term are included all processes through which the cloth passes from the time it leaves the loom until it is ready for despatch. Finishing improves fabric appearance, that is, gives, glaze, smooths and enhances the weave of the cloth and renders it more fit for ultimate use. Finishing consists of calendering, stitching, folding, baling, etc.

Two other processes may sometimes be found in the jute industry. They are :—

Dyeing : Sometimes it takes place before weaving, generally when the yarn is to be dyed ; but when the cloth is to be dyed, it takes place after weaving. Different systems are adopted in different places. Dyestuffs or colouring matters sometimes give rise to folliculitis.

Woollenising : Jute fibre is sometimes woollenised for the purpose of making blankets. This is done by preliminary treatment of the fibre in caustic soda solution and drying. Workers coming in contact with the caustic soda solution may contract dermatitis and may get alkali burns of the eye.

These, in short, are the different processes which one usually comes across in the jute mill industry.

Working Conditions in the Mills :

Most of the jute mills are well laid out and planned. Some of them are, however, not as properly lighted as they should be and artificial lighting has to be resorted to even in day time. Most of the mills are fairly well ventilated, but no exhaust fans and dust extractors have been installed as yet in them. There is enough moving space in the departments of the mills for the workers, although in some cases there is room for improvement in the layout of the machinery.

HAZARDS :

1. *Due to Dusts* : The jute dusts are the worst hazard in a Jute Mill in India. These are vegetable dusts and though they are less important than mineral dusts, yet their ability to produce respiratory disease is by no means small. The study of their effects has been largely neglected and their importance underrated. This is partly, at least, due to the fact that the condition of chronic bronchitis, which results from prolonged inhalation, is not accompanied by any characteristic X-ray picture indicative of dust inhalation, as in the case of pneumoconiosis due to mineral dusts. The chronic effects are thus less easily distinguished from non-occupational bronchitis.

These dusts lead to acute and chronic pulmonary conditions. Their mode of action is obscure and in many cases it is not known whether the noxious agent lies in the dust itself for instance, some protein, alkaloid or other active principle which is irritating or toxic, or whether it lies in the impurities. In regard to chronic condition, silica has been considered, for free silica derived from soil is a universal contaminant. The amount present, however, is very small, generally two per cent or less, and most of it is present in relatively coarse grains, so that it is not generally thought likely that silica plays any part in the production of lung disease from these dusts. The biological contaminants are more important. The dusts almost always contain a high content of bacteria and spores and mycelia of fungi, some of which are known to be pathogenic. Another possibility is that the biological contaminants may act indirectly, not by themselves infecting the respiratory tract, but by their digestive action in cellulose of the dust, altering it to form toxic substances. Again some conditions produced are obviously allergic in character.

(a) Acute condition—e. g., Mill fever

This is an acute, transient and slight illness, occurring only in certain new workers. It usually comes on after one or two days in the mill, lasts for a day or two, and does not reappear; one attack confers immunity. It usually takes the form of a chill with fever, headache, lassitude and malaise, and occasionally there may be respiratory symptoms such as sneezing, coughing and dryness of throat. Often malaria and influenza are wrongly diagnosed for the condition. The cause of the condition is unknown—some suggest foreign protein, histamine, bacterial endotoxin and allergy. Doig has made an interesting observation: he found that several workers, who experienced Mill Fever from jute, were found to have developed immunity against flax fibres.

(b) Chronic Condition, e. g., Chronic Bronchitis with Emphysema and Asthma :

Due to inhalation of jute dusts, some irritation of the mucous membrane of the respiratory tract starts. Owing to this irritation the worker suffers from frequent attacks of coughing; there may be also bronchial catarrh. The particles of dust which irritate the respiratory passages are made up of bits of fibres, the jagged edges of which set up marked irritation of the mucous membrane of the respiratory tract. Some are of the opinion that they produce at the terminal bronchioles some substance of histamine in nature, which is responsible for the large number of bronchial asthmatics among the jute mill workers in India. It is to be noted that the proportion of bronchial asthma cases is greater in the batching and preparing and spinning departments, as these departments are more full of dusts.

Some cases of pulmonary tuberculosis are found in jute mills, but these are cases of superimposed infection of tuberculosis in already devitalised lungs due to chronic irritation by jute dusts. Here it should be added that the combination of dust, high temperature and humidity inside the mill, explains the frequency of respiratory illness amongst jute workers in India.

(c) *Tetanus* : Fatal cases are reported amongst the jute mill workers of Dundee. The spores were found in the dust collected under the breaker-feeder. Enquiry revealed that they had come over with the earth attached to the raw jute exported from India. But during the last seven years of my connection with jute mills I have not seen or heard of a case of Tetanus due to the conditions stated above.

2. Constant standing :

(a) Skeletal deformity : Skeletal deformities of the inferior extremities were seen formerly when children were employed in the mills; this was the result of standing almost for the whole period of work on a constantly vibrating floor due to the movement of heavy machinery.

In the sack-sewing process of the finishing department cases of spinal deformity are met with, which is due to improper sitting which leads to malformation of the cage of the chest.

(b) Varicose veins : Many cases are found due to long continued standing during the whole period of work for years together. Standing for a long time is also dangerous for women workers in their last few months of pregnancy.

3. Noise :

Due to excessive noise and diffusion of dust in ear, many mill hands

are found to be suffering from wax in ear and deafness. As the noise is maximum in the weaving department, the maximum number of cases of deafness are found there. Owing to constant great noise inside the mill, the workers have to speak very loudly, which leads to chronic pharyngitis.

4. Due to heavy weight lifting :

Cases of sprain and strain of back are met with in the workers who are engaged in lifting heavy bales of raw jute and finished products.

5. Skin affections :

Mention has already been made of the different skin affections and alkali burns of the eye while I described the different working processes. Now I shall come to 'Jute Dermatitis' in detail.

The occurrence of this dermatitis amongst jute workers was noted by me accidentally when I was in Clive Mills, Bird & Co., Ltd., in 1943, and since then I have seen many such cases. Since the disease does not give rise to any irritation or itching it is not brought to the notice of the Mill Doctor and, as long as it does not incapacitate the worker from attending the mill, it does not assume any importance in the eye of the manager. The majority of the cases were seen in the batching department, where jute is oiled before being teased into fibres and perhaps this oil had something to do with the condition. Amongst the mill workers the idea was concurrent that the oil used in the manufacture gave rise to dermatitis.

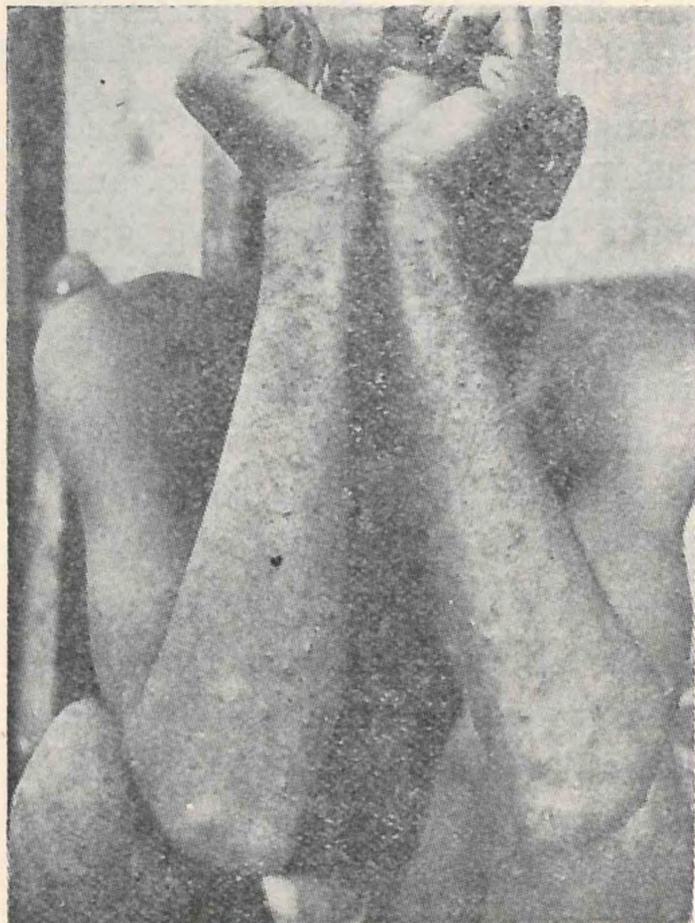
Caste Distribution : Chiefly amongst the Hindus and that amongst Oriyas and Beharis. The difference in the castes was largely due to the custom of washing. The Mohamedans generally use soap, whereas the Hindus use mud or 'Saji Mati'—consequently the oil is not properly removed from the skin and blocks the mouth of the sebaceous glands.

Sex : More amongst men, but that is because more men are employed than females.

Character of the skin of these cases : The cases of folliculitis are more common amongst workers with coarse skins. It is easy to understand how an excess of oil on the skin gets into the sebaceous passages and prevents the sebum from being excreted.

Clinical Character : The disease is commonly seen on the exposed parts of the body, i.e., forearms, arms up to shoulder, the front of the legs and thighs. In these situations the sebaceous gland mouths are generally much larger than in other parts of the body. The condition is a folliculitis which is usually non-suppurative in character and is due to mechanical blocking by oil and dusts of the sebaceous gland orifices. The lesions seen are small elevated follicles which have their origin in sebaceous glands.

The centre of the follicle contains a small black plug, or sometimes the plug is elevated into a little spicule. Before retention the sebaceous gland mouths are filled with black plugs which are on a level with the skin surface. The lesions, therefore, consist of a thick, coarse skin with numerous black points on a level with the skin and here and there, especially about the back of the forearm and the front of the thigh, numerous raised follicles are seen, some of them capped with a black spicula. The disease has all the characteristics of a chronic process and is non-suppurative and suppuration is not seen unless there are scabies about the body. The general condition of these workers is usually not good and their bodies are often greasy and not kept clean. (Please see attached photos.)

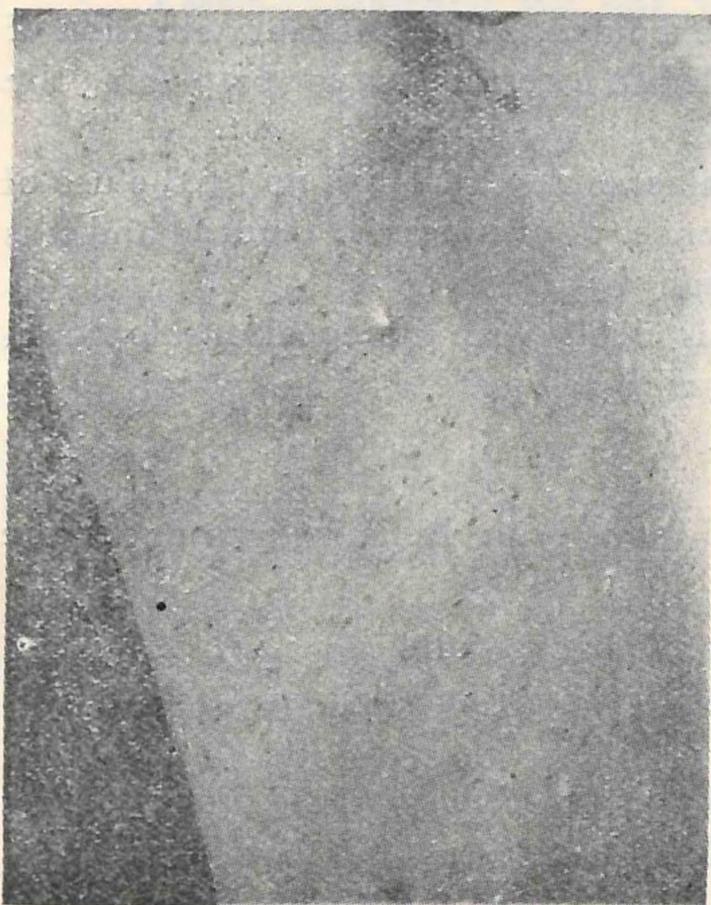


Jute Dermatitis showing involvement of Forearms and Knees.



Jute Dermatitis showing involvement of Thigh.

Histopathology: Sections made through one of the follicles showed a large, heavy plug, consisting of flattened horn cells distending the follicle and projecting upwards above the level of the epidermis in the form of a spine. The stratum corneum is arranged in concentric layers to form this blackened plug. No hair bulbs are seen, showing that they were probably atrophied by pressure, the lumen filled with sebum. The fibroblasts in corneum were increased in number at the neck of the follicle and in the neighbourhood of the fine capillaries supplying the adjacent papillae. The histological appearance shows that the lesion is non-inflammatory



Jute Dermatitis showing involvement of Chest.

in nature and that the primary change is one of blockage by oil and dirt of the sebaceous orifice. The oil probably prevents exfoliation of the stratum corneum inside the follicle mouths which, in turn, is allowed to accumulate still further by not being removed by sufficient washing.

Analysis of Oil:—The oil consists largely of mineral oils with a small admixture of animal fats.

Diagnosis:—The non-suppurative character of the lesion at once distinguishes it from scabies and from the various pyogenic folliculitis seen in the tropics and from phrynoderma by its character of distribution.

Treatment:—The disease occurs amongst the lower class of Hindus who are indifferent as to whether or not they are clean and, as the lesions cause no symptoms, they rarely seek medical advice. As a rule they come for treatment when scabies or a septic folliculitis is superadded. The treatment consists of a liberal use of soap so as to remove thoroughly all the grease from the surface of the body and the employment of 2% resorcin spirit lotion or salicylic acid ointment. As these patients frequently suffer from weak general health, suitable constitutional treatment is necessary.

Preventive Measures :

Jute dust is at the top of the list of hazards in a jute mill in India. The effect of the jute dust would have been worse if water and oil had not been used during the batching process. The water and oil do not allow the dust to create the contamination of air to the full extent. If sweeping of the floor, cleaning of the machinery parts, belts, etc. are properly done three times a day at regular intervals, the dust nuisance can be controlled to a reasonable limit. It is suggested that the vacuum cleaning of the dusts is worth a trial and may improve the condition further. As the batching, preparing and spinning departments of jute mills are the worst affected places, the isolation of these departments with efficient exhaust ventilation is probably the best method to tackle the dust problem.

The next hazard is due to constant standing. Seats can easily be provided and correct postures can be trained. The constant vibration of the heavy machinery can be controlled to a certain extent by placing the machines on thick rubber sheets.

The noise hazard is greatly eliminated in Great Britain by the use of Armstrong Ear-defenders; the incidence of deafness is reduced and it is found that the weavers gain in efficiency by it.

The hazard of skin affection is dealt with in considerable detail and prevention lies in proper washing with adequate soap and water.

Summary :

1. An introduction of the Jute Mill Industry in India is given under the following headings :
 - (a) Historical and economic background
 - (b) Living conditions of workers and the welfare services provided for them.
 - (c) Getting of jute and the different working processes met with in the jute mill.
2. Hazards met with are described under the following :
 - I. Due to Dusts—A. Respiratory conditions :
 - (a) Acute—Mill Fever
 - (b) Chronic—Bronchitis, Asthma.
 - B. Tetanus.
 - II. Due to constant standing—(a) Skeletal Deformity
(b) Varicose Veins.
 - III. Due to noise—Deafness and Chronic Pharyngitis.
 - IV. Due to heavy weight-lifting—Sprains and Strain of the back.
 - V. Due to oil—Skin affection—Jute Dermatitis.
3. Preventive measures against the hazards are suggested.

Bibliography :

1. British Continental Press, London. Jute Annual, 1936.
2. Curjel and Acton—Indian Medical Research, October, 1924.
3. Chatterjee, R. N.—Indian Economics, 1948. p. 141.
4. Choudhury, N. C.—Jute and Substitute. p. 156-7.
5. Despandey, S. R.—Report of an enquiry into conditions of labour in the Jute Mills Industry in India. New Delhi. 1946.
6. Doig, A. T.—Post-Graduate Medical Journal, London. December, 1949.
7. Government of India—The Indian Labour Year Book, 1948-49. pp. 160, 232, 237.
8. do do —Labour Investigation Committee—Main Report 1946. p. 72.
9. H. M. S. O.—Final Report of the Jute Industry Factory Advisory Committee, 1946. p. 12.
10. H. M. S. O.—Industrial Fibre Commonwealth Economic Committee, 1948. p. 100.
11. H. M. S. O.—Working Party Report—Jute, 1948. p. 104.
12. Industrial Labour Office, Occupational Health, II, 1938. p. 86. Geneva.
13. Mukerjee, Radhakamal—The Indian Working Class, 1948. p. 141.
14. Schawtz, Tulipan and Peck—Occupational Diseases of the Skin, 1947. pp. 247-256.