

A STUDY OF THE OCCUPATIONAL HEALTH STATUS OF SEWAGE WORKERS AT PANJAPUR IN TRICHY DISTRICT.

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ABSTRACT

The term may be used to mean raw sewage, sewage sludge, or septic tank waste. Raw sewage is mainly water containing excrement, industrial effluent and debris, such as sanitary towels, condoms, plastic etc. Excrement is the major source of harmful micro-organisms, including bacteria, viruses and parasites. Sewage treatment reduces the water content and removes debris, but does not kill or remove all the micro-organisms. Raw sewage contains various pathogenic organisms including bacteria, viruses, fungus, worms and protozoa. Workers at wastewater treatment plants (WWTPs) are exposed to these organisms

as well as to H₂S gas causing many health hazards. The frequently recorded health disorders between sewage workers includes: respiratory and skin problems as well as noise-related hearing impairment. An assessment has been done for the occupational hazard at sewage through haemoglobin concentration and total erythrocyte count. A decrement in Total Leukocyte count (TLC), Different Leukocyte count (DLC) and Haemoglobin concentration (Hb conc.) has been found in foundry workers which is alarming to take rehabilitates steps.

KEYWORDS: Waste Water treatment plants (WWTPs), Sewage Workers, Occupational Health Hazards, Haemoglobin concentration (Hb conc.).

INTRODUCTION

Over one million sewerage workers in India are involved in the sanitation and hygiene of our surroundings. They have historically been responsible for plunging bare-bodied into clogged sewers^[1] filled with fermented faeces, urine and other chronic waste flushed down by millions^[2] to clean this with their hands, without the use of safety equipment.

Raw sewage contains numerous pathogenic organisms including bacteria, viruses, fungus, worms and protozoa.^[3] Workers at wastewater treatment plants (WWTPs) are exposed to these organisms primarily by hand to-mouth contact, or the fecal-oral route during eating, drinking or smoking, or by touching the face with contaminated hands. Mucous membranes contamination (as in eyes and nose) may also exist. Inhalation of aerosols containing microorganisms is a less-common route of entry.^[4]

Urbanization has caused many hygienic and environmental problems; to solve some of these latrines and sewage systems were invented and are still being improved. These systems are used to transport the effluents of the cities to the surrounding areas to be used for fertilization or just to be dumped. An increased risk for developing air-way symptoms (as chronic bronchitis and toxic pneumonitis),^[5,7] central nervous system symptoms (headache and tiredness),^[7] acute non-specific self-limited gastrointestinal symptoms (jaundice and abdominal pain),^[7,110] and eye irritation symptoms (conjunctivitis)^[6] were reported. These symptoms may be attributed to exposure to harmful gases such as hydrogen sulfide (H₂S) and methane.^[7,10]

The exposures were mainly to human excreta and domestic wastewater. With increasing demands on the wastewater systems and new environmental regulations, the transportation and treatment of wastewater has increased in technical complexity. This development has resulted in new exposures for the sewage workers, including the multitude of chemicals used in our homes and in the industries. Pollutants emitted from foundry work cause so much damage to blood, which carries very innocently the harmful chemicals and gases to the various organs. These substances have been shown to produce harmful effects on the blood, bone marrow, spleen and lymph nodes, since blood cells. Toxic chemicals in the air are also stimulating the immune system to activate leukocytes and macrophages that can create tissue damage, especially to the cells living the blood vessels. Blood is an important factor for maintenance of better health.^[11]

Occupational dermatosis is any alteration in the skin, mucosa, and annexes, which is direct or indirectly caused, conditioned, maintained or aggravated by agents present in the occupational activity or work environment.^[11] Therefore; present investigation has been made on the assessment of some hematological parameters in Sewage workers at Panjapur in Trichy District.

MATERIALS AND METHODS

There are about 20 permanent workers employed in the Sewage Workers. Out of this, 5 Sewage workers who have been working for more than 20 years were selected for blood analysis.

The following were the “Criteria” followed for the inclusion for blood analysis.

- Those who were directly employed in rubber manufacturing operations.
- Those who have been working in the industrial units for more than ten years and above.
- Male workers in the age group of 40-60 years.

Parameters Analysed

- Total Leukocyte count (TLC)
- Differential Leukocyte count (DLC)
- Erythrocyte sedimentation rate (ESR)
- Hemoglobin levels (Hb)

Bio-Chemical Parameters

- (a) Total serum protein,
- (b) Albumin, Globulin, and
- (c) Albumin/globulin ratio.

RESULTS AND DISCUSSIONS

In order to assess the health hazards associated with chemicals used in the Sewage workers. Blood samples were collected from the persons in sewage workers in order to diagnosis diseases like lungs disorder, gastro intestinal tract infection. Hexavalent chromium causes dermatitis, allergic skin reaction and skin veneration.

Table 1: The acceptable standard level of blood Parameters for human beings as given below.

S. No	Blood Parameters	Standard level
1.	Total leukocyte count (TC) No. of cells/mm ³	4000-10000
2.	Differential count (DC)% P	40-60%
	L	20-40%
	E	Up to 6%
	M	2-10%
	B	Up to 2%
3.	Erythrocyte sedimentation rate (mm/hr)	5-20 (mm/hr)
4.	Hemoglobin (gms%)	14-16 gms%
5.	A/G ratio	1.2:1-2.5:1

TC: Total Count -

L: Lymphocytes

B: Basophile

DC: Differential Count -

E: Eosinophiles

P: Polymorphous

M: Monocyte

Table 2: The Collected values of Blood Parameters of the Sewage workers as given below.

Blood Parameters	Standard Value	Blood samples from the Iron Industry Workers					
		S1	S2	S3	S4	S5	
Age Groups	40-60	40	55	40	50	47	
TC (No of cells/mm ³)	4000-10000	8600	6500	9000	9500	9600	
DC(%)	P	40-60%	68	59	64	66	70
	L	20-40%	32	30	40	33	37
	E	Up to 6%	3	2	5	4	6
	M	2-10 %	2	2	3	5	3
	B	Up to 2%	2	1	2	1	1
ESR(mm/hr)	5-20	25/50	15/30	10/20	10/20	10/20	
Hemoglobin	14-16% gms	11.8	10.5	12.9	13.0	11.5	
Protein		6.5	7.4	6.9	7.1	7.1	
Albumin		4.1	4.0	4.4	4.5	4.0	
Globulin		2.3	3.3	2.8	2.6	3.5	
A/G Ratio		1.5	1.1	1.6	1.7	1.8	

Sample-1 (S1) - Mrs. Rajamani

Sample-2 (S2) - Mrs. Ponnuthai

Sample-3 (S3) - Mr. Murugesan

Sample-4 (S4) - Mr. Arockiasamy

Sample-5 (S5) - Mr. Ramar

TC: Total Count -

L: Lymphocytes

B: Basophile

DC: Differential Count -

E: Eosinophiles

P: Polymorphous

M: Monocyte

• Polymorphs

The polymorphs counts of the five samples are varied from 64 to 70 but the normal value are 40-60%. Here there is an increase of polymorphs from 64-70% the indicating infection of the lungs to workers.

• Lymphocytes

The Lymphocytes counts of selected samples are varied from 28 to 40% and the normal values range from 28 to 40% and the normal values range from 20 to 40% indicating infective disease.

• Eosinophiles

The Eosinophile counts of the selected samples varied from 2 to 6% but the normal values up to 6% The result of the various blood samples of the Foundry workers with age group of 40-46 are presented and discussed. From the Table 1 the following results obtained for various blood samples are discussed.

• Tc (Total Leucocyte Count)

The TC values for selected five samples varied from 8500 to 9800 cells/mm³. Whereas the normal values range from 4000 to 10000. There results come under normal values.

• Differential Count (DC)

Differential count includes the percentage of polymorphs, lymphocytes, eosinophiles, monocytes and basophils.

• Hemoglobin (HB)

The Hb values of the given samples are varied from 7 to 10 gms. But the normal values range from 14 to 16 gms. The deviation is due to Anaemia of the Sewage workers.

Biochemical Investigation**• Total Protein**

The normal values of control samples is 6 to 8 gms/dl but the observed values for five samples are in the range of 6.8 to 7 gms indicating the normal values of the workers.

These results are not within the standard limit. The deviation is due to allergic and asthma condition of the workers.

Monocytes

The Monocytes of the selected samples are varied from 1 to 2% and the normal values are 2 to 10% and there is a decrease in monocytes due to T.B infection.

Erythro Sedimentation Rate (ESR)

The ESR values of five samples are varied from 15mm/hr to 60mm/hr but the normal values in 5 to 20. The deviation indicates the presence of T.B among Foundry workers.

Albumin

The normal albumin values range from 3.2 to 5 gms/dl but the observed values for five samples range from 3.4 gms/dl to 4.5. The values are within the normal limit.

Globulin

The normal globulin values range from 2.3 to 3.6 gms/dl but the experimental values for the five samples from 2.4 to 3.5 indicating the values are within the normal limit.

A/G Ratio

The normal value of A/G ratio is 1 to 1.38 gms/dl. But the observed values are 0.9 to 1.8 indicating there is a deviation from the normal values indicating malnutrition of the Foundry workers.





Fig: 1-A Close View of Occupational Health Status of the Sewage Workers.

CONCLUSION

Exposure to multiple health hazards and the poor use of protective equipments are related to skin diseases in Sewage workers. Working in Sewage treatment plant may be associated with higher prevalence of chest manifestations hearing impairment and other occupational diseases. The nature of the toxic chemicals handled within the Sewage itself is not good for the health of the workers bare handling of chemicals like metal dusts, acids, bases and other inorganic chemicals. Dust during various processes and chemical dust inhaled by the workers leading to bronchitis. Workers are also exposed to various types of skin disease lung diseases, nausea, respiratory tract diseases, skin allergies and dermatitis. Sewage toxic chemicals can attack mucous membrane of nose, throat, liver and kidney. They also cause asthma bladder cancer and tumors as per the ESI report concentrated gases from pits are poisonous and cause respiratory tract problems and damage to lung diseases. The study reveals that the following findings which will be very much useful for the abatement methods for the Sewage workers.

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