

A STUDY OF THE OCCUPATIONAL HEALTH STATUS OF SEWAGE AND SANITARY WORKERS IN AVANIYAPURAM AT MADURAI 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. 2 of 3 pages Health and Safety Executive Working with sewage 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. The working conditions of the Sewage and sanitary workers have remained virtually unchanged for over a century. Using only a stick broom and a small tin plate, the sanitary workers clear feces from public and private latrines onto baskets or other containers, which they then carry on their heads to dumping grounds and disposal sites. Apart from the social atrocities that these workers face, they are also exposed to certain health problems by virtue of their occupation. These health hazards include exposure to harmful gases, cardiovascular degeneration, musculoskeletal disorders, infections, skin problems and respiratory system problems. 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 Sewage and sanitary workers which is alarming to take rehabilitates steps.

Key Words: Sewage and Sanitary Workers, Occupational Health Hazards, Haemoglobin concentration (Hb conc.), Total Leukocyte count (TLC), Different Leukocyte count (DLC).

INTRODUCTION:

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. 2 of 3 pages Health and Safety Executive Working with sewage 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.

The workers are commonly exposed to gases like hydrogen disulfide, methane, ammonia and carbon monoxide. (Watt *et al.* 1997) studied 26 sewer workers exposed to smell and found that 53.8% developed sub-acute symptoms including sore throat, cough, chest tightness, breathlessness, thirst, sweating, irritability and loss of libido. Severity of symptoms seemed to be dose related. (Richardson *et al.* 1995) studied exposure to hydrogen sulfide in 68 sewer workers and found that the FEV₁/FVC values were lower in sewer workers who had a high H₂S exposure.

Mostly, the dermatitis is a non-infective one. It results from irritation to mineral oil and tar. An outbreak of cases of airborne irritant contact dermatitis has been reported among incinerator workers employed in a sewage treatment facility (Nethercott *et al.* 1981).

Several studies have been carried out to study the respiratory function of sewage workers, with all of them reporting that respiratory symptoms are common (Thorn *et al.* 2002, Rylander *et al.* 1999, Nethercott *et al.* 1988) among this group of workers. The respiratory function studies also revealed abnormal respiratory functions in these workers. These symptoms may be due to exposure to endotoxins and airborne bacteria by way of bioaerosols (Zuskin *et al.* 1990). reported that the baseline ventilatory capacity was significantly decreased compared with the predicted values in sewage workers. In particular, the values for FEF₂₅₋₅₀ were reduced, (Zuskin *et al.* 1990), suggesting obstructive changes in smaller airways. They mentioned that

sewage workers are exposed to different occupational noxious agents, which may lead to the development of chronic lung function changes (Zuskin *et al.* 1993).

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 (Pandia Rajan *et al.*, 2015).

The frequently recorded health disorders between Sewage workers includes: respiratory (66%), skin problems (31%) (American Thoracic Society 1987; Chandran Achutan D *et al.*, 2007) and noise-related hearing impairment (Bies DA *et al.* 1996). 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 (Diepgen TL *et al.*, 2000).

MATERIALS AND METHODS:

There are about 10 permanent workers employed in the Sewage Plant. Sewage and sanitary workers were working for more than 10 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:

- Total serum protein,
- Albumin, Globulin, and
- Albumin/globulin ratio.

RESULTS AND DISCUSSIONS:

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

Table 1 - The Collected values of Blood Parameters of the sewage and sanitary workers as given below

Sample-1 (S1) - Mrs. Nagamuthu

Sample-2 (S2) - Mr. Karthikayan

Sample-3 (S3) - Mrs. Palanisamy

Sample-4 (S4) - Mr. Marikannan

Sample-5 (S5) - Mr. Rangasamy

Blood Parameters		Standard Value	Blood samples from the Sewage Workers				
			S1	S2	S3	S4	S5
Age Groups		40-60	57	55	43	50	44
TC (No of cells/mm ³)		4000-10000	9300	7600	9600	9500	10300
DC(%)	P	40-60%	62	59	57	69	72
	L	20-40%	35	40	40	32	27
	E	Up to 6%	3	2	5	1	5
	M	2-10 %	2	3	1	4	2
	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	10.5	12.8	11.9	13.0	12.5
Protein			6.5	7.4	6.9	7.1	7.1
Albumin			4.1	4.0	4.4	4.5	4.0

Globulin	2.4	3.4	2.5	2.6	3.1
A/G Ratio	1.7	1.2	1.8	1.7	1.3

TC: Total Count -

L: Lymphocytes

B: Basophile

DC: Differential Count - E: Eosinophiles P: Polymorphous M: Monocyte

PATHOLOGICAL INVESTIGATION:**• 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 Foundry 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.

CONCLUSION:

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 plant 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 Plant 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 and sanitary workers.

REFERENCES:

1. American Thoracic Society (1987), Standardization of spirometry update. American review of respiratory disease, 136:1285-98.
2. Bies DA and Hansen CH (1996) " Engineering noise control: theory and practice". J. of the Iron and Steel Institute; 190, Pp: 1907- 13.
3. Chandran Achutan D and Jeffrey Nemhauser M D (2007) "Health hazard evaluation report 2003-0175- 3033 COL-FIN specialty steel Fallston, Pennsylvania ". Pp: 3-9.
4. Diepgen TL, Coenrads PJ (2000). The epidemiology of occupational contact dermatitis. In: Kanerva L, Elsner P, Wahlberg JE, Maibach HI, ed. Handbook of occupational dermatology. Heidelberg: Springer- Verlag, 1.
5. Nethercott JR. Airborne irritant contact dermatitis due to sewage sludge. J Occup Med. 1981;23:771-4.
6. Nethercott JR, Holness DL. Health status of a group of sewage treatment workers in Toronto, Canada. Am Ind Hyg Assoc J. 1988;49:346-50.
7. Pandia Rajan A, Dheenadayalan M S (2015) "Assessment of the Work-Related Health Status of Iron Industry Workers in Kulathur at Dindigul ", Eur. Chem. Bull., 4(6), 303-305.
8. Richardson DB. (1995) Respiratory effects of chronic hydrogen sulfide exposure. Am J Ind Med. 28:99-108.
9. Rylander R. (1999) Health effects among workers in sewage treatment plants. Occup Environ Med. 56:354-7.
10. Thorn J, Beijer L, Rylander R.(2002) Work related symptoms among sewage workers: A nationwide survey in Sweden. Occup Environ Med. 59:562-6.
11. Watt MM, Watt SJ, Seaton A. (1997) Episode of toxic gas exposure in sewer workers. Occup Environ Med. 54:277-80.
12. Zuskin E, Mustajbegovic J, Lukenda-Simovic D, Ivankovic D. (1990) Respiratory symptoms and ventilatory capacity of sewage canal workers. Lijec Vjesn. 112:353-7.
13. Zuskin E, Mustajbegovic J, Schachter EN. (1993) Respiratory function in sewage workers. Am J Ind Med.23:751-61.