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Diseases among Sewage Workers

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Abstract

Urbanization has caused many health and environmental problems; to solve some of these problems, latrines and sewage systems were invented and are still being improved. This development has resulted in exposures of the sewage workers to the multitude of chemicals used in our homes and in the industries. With increasing demands on the sewage systems and new environmental regulations, the transportation and treatment of wastewater has increased in technical complexity. There are about 340,000 sewage workers in India. There is inappropriate use of safety measures and unhealthy environment of sewage workers. These unchanged conditions made them prone to develop health problems by virtue of their occupation. In spite of modern mechanization sewage workers come in the contact with pathogens in sewage and this exposure can occur in both way through wastewater contact or aerosol of disease producing organisms. Exposure to various disease producing agents leads to health hazards include exposure to harmful gases such as methane and hydrogen sulfide, cardiovascular degeneration, musculoskeletal disorders like osteoarthritis changes and Intervertebral disc herniation. This exposure may also results infections like hepatitis, leptospirosis and helicobacter, skin problems, respiratory system problems and altered pulmonary functions. Prevention is an essential component for the interruption of disease occurrence. Periodic education & adequate use of preventive measures can help to reduce morbidity and mortality of sewage workers. It is primary responsibility of Municipality or any other employer to conduct monthly health check up of sewage workers to diagnose and treat the disease at early stage and on other hand appropriate insistence on safety gears on work also required.

Keywords: *Sewage, Sewage workers, health problems, diseases, occupation, waste water.*

Key Message: *Sewage workers are the primary victims of the infections and diseases associated with human excreta and waste water. Chemical complex of sewage water is an invitation to various kinds of skin, respiratory, musculoskeletal system and liver diseases like hepatitis etc. A regular health check up by employer is necessary to diagnose disease at early stage and to ensure healthy life among all workers. Health education regarding the usage of safety measures can also play a vital role in reduction morbidity and mortality among sewage workers.*

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INTRODUCTION

"Study of Disease is really the Study of Man and His Environment"

The term 'sewage' describes raw sewage, sewage sludge, or septic tank waste. Sewage is mainly water containing excreta, industrial release and debris such as sanitary towels, condoms and plastic. Excrement is the major source of harmful microorganisms, including bacteria, viruses and parasites. Urbanization has caused many hygienic and environmental problems; to solve some of these problems latrines and sewage systems were invented and are still being improved. In developing country like India sewage system is developing progressively [1]. Sewage workers confront a variety of potentially hazardous conditions including exposure to toxic gases, chemicals, and physical hazards. An obvious possible job hazard is contact with waterborne infectious

pathogens. A sample of raw sewage from a municipal sewage treatment plant could potentially include representatives of all the pathogenic microorganisms present. Sewage and wastewater contain bacteria, fungi, parasites, and viruses that can cause intestinal, lung, and other infections. Bacteria may cause diarrhea, fever, cramps, and sometimes vomiting, headache, weakness, or loss of appetite. Some bacteria and diseases carried by sewage and wastewater are E. coli, shigellosis, typhoid fever, salmonella, and cholera [2]. Sewage workers are exposed to diseases by hand-to-mouth contact during eating, drinking and smoking, by wiping the face with contaminated hands, gloves & through body contact with sewage waste in manual cleaning and repair. Exposure can also occur by skin contact, through cuts, scratches, or penetrating wounds, and from discarded hypodermic needles. Certain organisms can enter the body through the surfaces of the eyes, nose and mouth and by breathing them in as dust, aerosol or mist. India is a developing nation and it has shown big growth on the graph of industrialization and technical advancement. However, globalization and rapid industrial growth in the last few years has resulted in emergence of health related issues among sewage workers. Sewage workers comprise 35% of total population. Although India has discovered modern methods of sewer waste disposal but 80% manual work is involved in cleaning and maintaining the sewer system. These unchanged practices cause diseases among 15–20 workers per 1000. The exposure is mainly by human excreta, domestic wastewater and industrial chemicals. Everyday increasing demands of wastewater systems and new environmental regulations regarding the transportation and treatment of wastewater has increased the technical complexity [3]. These developments have resulted in new exposures for the sewage workers to the multitude of chemicals used in our homes and in the industries.

Health Problems/Diseases

Leptospirasis

Leptospirosis (Leptospira icterohemorragica, Weil's disease) is transmitted by animal and their urine. The urine of rodents and other animals present in that area is likely to contaminate these sewers. Thus sewer workers are at a potential risk of leptospirosis [4]. A study revealed that 78 sewer workers from five different municipal wards in Pune to determine the evidence of past infection with leptospira using a micro agglutination test. The prevalence rate was found to be 16.6%. Evidence of leptospiral infection was found maximum in sewer workers in the areas of the city that were infested with rodents and stray animals. It is found that sewer workers had a greater prevalence of antibodies against leptospirosis than controls (12%, P = 0.003) [5].

Parasitical Infections

Workers exposed to sewage sludge have risk to develop parasitical infections including Cryptosporidium and Giardia lamblia may cause diarrhea and stomach cramps, and even nausea or a slight fever. Most people have no symptoms to roundworm (Ascariasis). Roundworms cause coughing, trouble breathing and/or pain in your belly and blocked intestines [6]. A significant positive correlation between the finding of protozoa in faeces from sewage workers and the duration of exposure to sewage has been reported and the prevalence of infestation with intestinal parasites decreases with improved compliance with hygienic rules.

Respiratory System Disorders

Since sanitation workers and particularly manhole workers are exposed to highly toxic and poisonous substances and gases, they are prone to health hazards and diseases. They spend about 25% of their income on medical expenses. Since their work includes intense exposure to harmful gases and chemicals, they are prone to various diseases such as TB, asthma, cough, backache and infections of the respiratory tract [7]. Legionella pneumophilia is known to be spread by water aerosols, causing either pneumonia or a non pneumonic disease (Pontiac fever). The clinical manifestation of Legionnaires' disease is quite varied and typically appears after 2 to 10 day incubation period. There is an abrupt onset of a nonproductive cough (90%) (Benin et al., 2002), malaise, myalgia, anorexia, and headache typically occur within 48 h. These symptoms are usually accompanied by a rapidly rising fever that frequently reaches 39 or 40°C. Chills may also occur with the fever.

A study shown that the workers exposed to aerosols from sewage are prone to get an infestation of legionella. A study by the Occupational Health and Safety Centre in Mumbai revealed that 60.0% of sewage workers had respiratory morbidities. Due to respiratory illness 15 deaths were recorded in sewage workers. The major cause of death was suffocation from poisonous gases inside the manhole that also caused blindness in others. Respiratory morbidities included chest symptomatic like cough (44.3%), breathlessness (39.2%), bronchitis (34.1%) and tightness (32.9%). Nine persons died of poisonous gases, three during accidents, and two because of tuberculosis [8].

Gastro-intestinal System

Gastrointestinal troubles are frequently reported by sewage workers, there are few systematic studies shown that sewer workers are tend to develop gastro intestinal disorder during their job.

Gastro intestinal complaints include stomach complaints or peptic ulcers, diarrhea, indigestion, flatulence, worm infestation, typhus or para-typhus fever during employment. There are about 30% workers complain about gastroenteritis characterized by cramping stomach pains, diarrhea and vomiting. Sewage water may also contain enteric bacilli which cause typhus and paratyphus fever [9]. A significant number of disease producing salmonella and shegella also found in sewage water of India. It can be caused by number of different microorganisms that may be present in sewage. Many cases of Gastroenteritis are caused due to poor hygiene and bad practices whilst working with sewage. In gastrointestinal disorders, worm infestation was most common (74.7%) followed by indigestion (71.2%), Flatulence (57.4%) and diarrhea (48.2%) [10].

Genotoxicity and Carcinogenicity

Various mutagenic responses have been observed in wastewater and in sewage sludge. It seems that sewage sludge may be mutagenic, but there are both geographical and temporal variations. Sludge from plants processing only domestic wastewater seems to have a lower mutagenic potential than those with industrial influents. According to a study Sewage workers at 14 treatment plants in New York State had a significantly higher risk of excreting urinary mutagens determined with Ames test, both with and without *in vitro* metabolic activation, when compared with workers from drinking water plants [11]. In 18.8% of sewage workers cancer is cause of death in India. There are also a few animal studies about carcinogenicity of sewage. Helicobacter pylori is a bacterium associated with peptic ulcer disease, gastric cancer, and mucosa associated lymphoid tissue (MALT) lymphoma. Faeces and waste water are possible routes of transmission. Several studies have shown that helicobacter pylori are a potential risk of cancer among sewage workers. During the last decade, the bacterium Helicobacter pylori has emerged as one important risk factor for gastric cancer and is now considered a class I carcinogen by the International Agency for Research on Cancer [12]. Hepatitis A requires serological (antibody) analysis since most infections are subclinical and are not manifested as overt disease. Hepatitis B is a major unconquered disease: some 200 million people are chronic carriers of the virus and a significantly minorities of these go on to develop cirrhosis or cancer of the liver. Mortality rates from cancers of the larynx were identifiably statistically significant. A retrospective study of Swedish sewer workers revealed significant association between sewage water exposure and larynx cancer [13].

Skin Disorders

Exposure to dust from dried sewage sludge may cause an irritant dermatitis. An outbreak of irritant dermatitis in sewage treatment workers in India occurred when the worker became contaminated with dust from sewage sludge during the repair of a malfunctioning of sewerage system. These workers suffered from an erythematous, scaly dermatitis on their exposed skin. Some workers also complained of eye irritation [14]. Some organisms can infect open wounds causing local wound infection. These infections are usually of a minor nature, but infection can spread through the tissues and cause more serious illnesses. People contract the infection through contaminated fluids, tissues, or waters. Skin

contact with sewage can be direct or in-direct through cuts, scratches or penetrating wounds. Cracked skin and open wounds are particularly susceptible to infection. Contamination can also occur by touching the eye surface. Skin morbidities included itching (57.6%), tineasis (34.6%), followed by rash/pigmentation (25.6%) and dermatitis (19.2%) in all sewage workers [15].

Musculoskeletal Disorders

Occupational diseases/morbidity of concern in India are: silicosis, musculo-skeletal injuries & like fatigue/weakness and backache. Osteoarthritic changes and intervertebral disc herniation are the common spinal abnormalities reported in these workers. Friedrich studied 255 sewage workers to determine the prevalence of spinal troubles, (i.e., neck, upper back and lower back pain. He reported that the 12 month prevalence rates of neck, upper back and lower back pain were 52.4, 54.8 and 72.8%, respectively. Skeletal problems like fatigue/weakness and low backache among 68.0% sewage workers [5].

Sewer Worker's Syndrome

The term sewer worker's syndrome was coined in 1976 to describe the fevers, chills, fatigue, purulent ocular discharge, and skin irritation in Swedish sewage treatment plant workers.67 In another Swedish study, 30 to 50% of sewage workers suffered from attacks of fever or a purulent ocular discharge, and 13% reported episodes of diarrhea. Compared to workers in other occupations, sewage workers appear to suffer more often from eye and skin irritation, as well as nonspecific gastrointestinal, respiratory, and constitutional symptoms. Fever, chills, headache, fatigue, and malaise are commonly reported constitutional symptoms in these workers. Purulent ocular discharge and skin irritation are often reported, as are gastrointestinal symptoms including abdominal pain and diarrhea. Cough, purulent sputum, and throat irritation are also common respiratory symptoms. All these symptoms were related to periods of heavy dust & sewage waste exposure at work [16].

Summary

Sewage workers are the most prone people to develop severe complication associated with certain disease results from sewage waste exposure. Sewage water contain multiload of disease producing microorganisms. These organisms consist of bacteria, fungi, parasites, and viruses that can cause intestinal, lung, and other infections. Bacteria may cause diarrhea, fever, cramps, and sometimes vomiting, headache, weakness, or loss of appetite. Some bacteria and diseases carried by sewage and wastewater are E. coli, shigellosis, typhoid fever, salmonella, and cholera. These health hazards include exposure to harmful gases such as methane and hydrogen sulfide, cardiovascular degeneration, musculoskeletal disorders like osteoarthritis and Intervertebral disc herniation, infections like hepatitis, leptospirosis and helicobacter, skin problems, respiratory system problems and altered pulmonary function parameters. According to a study 80% had eye problems, 73% had respiratory ailments, 51% had G I ailments, 40% had skin infections/allergies and 22% had orthopedic ailments. Based on clinical examination, 90% had decreased visual acuity. Most workers complained of eye burning, diminished vision, redness, itching, watering. 27% had skin lesions. While the engineering measures will help in protecting against exposures, the medical measures will help in early detection of the effects of these exposures. This can be partly achieved by developing an effective occupational health service for this group of workers. Also, regular awareness programs should be conducted to impart education regarding safer work procedures and use of personal protective devices.

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METHOD

Review was undertaken using the following databases, pub med, CINAHL, MEDLINE, Newspaper, National, International Journals, and Magazines of Punjab regarding Diseases among sewage workers. Data sources and

searches: data collected from the pub med, CINAHL, MEDLINE.

CONFLICT OF INTEREST STATEMENT

All contributors of this review articles did not have any financial difficulty to carry out this review of Diseases among Sewage Workers. There was not any hindrance to write & publish an article.

Source of Funding Statement: Self

Ethical clearance: Since it is a self review paper, ethical; clearance not needed.

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