

CHRONIC DISEASES AT WASTEWATER WORKERS FROM TIMISOARA

L. Jebereanu

Laura JEBEREANU,
PhD student University of Medicine and
Pharmacy “Victor Babes” Timisoara

Abstract: Timisoara 179 wastewater male workers activity and health were evaluated in this study. A part of results was presented and analyzed. Canal and treatment plant workers have a specific exposure, in general in external ambient and implies accident risks, shift activity, physical effort and postural demands, chemical, biological factors, noise, vibration other risks. The studied workers have similar life styles. Their medium age is 45. Chronic diseases represent the main pathology: cardiovascular problems, especially arterial hypertension, spine pathology and obesity are the first causes of health impairment and absenteeism. Respiratory and digestive symptoms occur as chronic pathology and acute episodes. The number of diabetes mellitus cases increased in the last years. Dermatitis and cancers evolution can be caused by workplace conditions. Considering that ageing brings chronic illnesses and this pathology influence and is influenced by professional activity, it is necessary to implement workplace health promotion programs for this category of workers and to maintain a good cooperation between occupational health service and family physician.

Key words: wastewater workers, chronic pathology

Introduction

Wastewater workers are key persons in maintaining proper cities.

Civilization brings an increase of quantity of wastewater, and its pollution.

Several studies analyse the quality of sewage water and the health status of maintenance workers.

This study is a part of a complex investigation of work conditions and health status of professional involved people in canal and wastewater plant activities.

The aim of this work is to put in evidence the importance of early detection of chronic diseases and the necessity of correct treatment for maintaining workers fitness for work.

Material and method

We studied working conditions and health status of canal and wastewater plant workers in Timisoara city.

Working conditions were evaluated: ergonomic study of work, microclimate, noise, chemical substances measurements, and biological risk evaluation.

On the basis of medical records analyse, clinical examination, blood pressure measuring, haematological and biochemical analysis of blood, spirometric tests and standard electrocardiographic records, the impact on health was investigated. Data were processed by means of the EPI 6 Info Program using: the Relative Risk, the Odds Ratio and the Chi Square tests (uncorrected and corrected by Mantel-Haentzel and Yates).

The study involved 179 workers (males): 109 canal workers in the exposed group C (mean age: 44.25 ± 8.51 years, length of exposure to sewage water was 11.71 ± 12.32 years) and 70 workers from wastewater plant in the group P (mean age: 47.22 ± 8.85 years). Total group had 45.41 ± 8.74 years mean age and seniority at work with exposure at wastewater was 12.81 ± 8.65 years.

Results and discussions

Workplace evaluation

Majority of work is performed outdoor, 8 hours per day for group C, respectively 12 hours per day for group P, the entire shift duration, and all the year.

Canal activity is organized in two manners: planned, maintenance works and emergency interventions (preventive and corrective maintenance). The last category implies stress, rapid reactions, distributive and attentive concentration, higher risk of accidents. Some works oblige the workers to enter in the canal. They need to have good physical condition; the musculoskeletal effort can be high, and sustained. Awkward positions are usual adopted and heavy materials must be handled, starting with manhole cover. The new technology implemented since 2009 reduced the time spent in canal, by “C” preventive maintenance group workers.

Wastewater plant workers have 12 hours shift activity, including night shift. Real problems occur in rainy days and in winter time. Professional effort is medium, including handling heavy materials and adopting awkward.

For both groups, fall into tanks and work in confined space where workers enter for maintenance operations represents high risk of accidents; acute poisoning can occur in these workplaces, where VOCs, hydrogen sulphide, ammonia methane, chlorine, sodium and calcium hypochlorite, can be inhaled [1,2,3,4].

In both workplaces chemical, biological and physical noxious were evaluated. The obtained values for chemical noxious show low values for ammonia, hydrogen sulphide, carbon oxide. Wastewater

workers are exposed by inhalation, by dermal contact or by ingestion at chemical and biological noxious [3,4,6,8].

Contact with wastewater in the treatment plant and in the canal system, possibly contaminated with pathogens and/or potential pathogens can cause: hepatitis A, acute diarrheal disease (bacillary dysentery, cholera, typhoid, and diarrhea syndrome), tetanus, leptospirosis, brucellosis, and diverse dermal sufferings, frequent skin infections, etc. [2,5,7,11].

Health status aspects

The mean age of the workers of both groups is more than 45 years, age when chronic diseases occur.

Chronic diseases are not affecting only the life of the individual but they also affect their social environment (family, social and working life).

The study of medical records and a questionnaire shows that the two groups have similar education level, life style, eating habits, professional qualification and seniority at work, including the length in service at the actual workplace. The organization is in developing, so workplace is stable.

There is a significant difference between the two groups in smoking habit ($p < 0.0003$) that is most common in the group C (more than 57%), compared with group P (37%).

Alcohol consumers are more than 65% in both groups, but 8 (11.42) persons in the group C can be included in the alcoholic category.

Arterial hypertension was found in 32.40 % of the studied population, and in 12.84% of those with weight excess. In the group C, there were 29 (41.42%) hypertensive, 16 of them with weight excess

(55.17%). In group P, there were 29 (26.60%) hypertensive, 7 of them with weight excess (6.42%).

The prevalence of hypertension according to the grade of severity is presented in Table 1:

Table 1.
The prevalence of various types of hypertension

Type of AH	Canal group		Plant group		Both groups	
	No.	%	No.	%	No.	%
Grade I	11	15.71	18	16.51	31	17.31
Grade II	13	18.57	8	7.33	21	11.73
Grade III	5	7.14	3	2.75	8	4.47
Total	29	41.42	29	26.60	58	32.40

Chronic pathology represents real problem in establishing the fitness for work of the studied persons (Figure 1)) [5,6,10,12].

Cardiovascular problems, other than hypertension (61 cases – 34.07%) are the most frequent chronic health problem. On the second place, stays arterial hypertension (58 cases, 32.40%). They can be correlated with age, genetic factors, lifestyle and professional demands, especially occupational effort and stress ($p < 0.005$).

Hydrostatic varicose is a chronic disease possible “work related disease”, secondary to activity position and professional effort.

Spine sufferings were found at 57 (53.27%) workers, 35 canal workers (32.71%), respectively 22 wastewater plant workers (31.42%). There were 6 cases with herniated disc (3+3 cases). In the C group one was solved by surgery and for one it was necessary to change the workplace after operation.

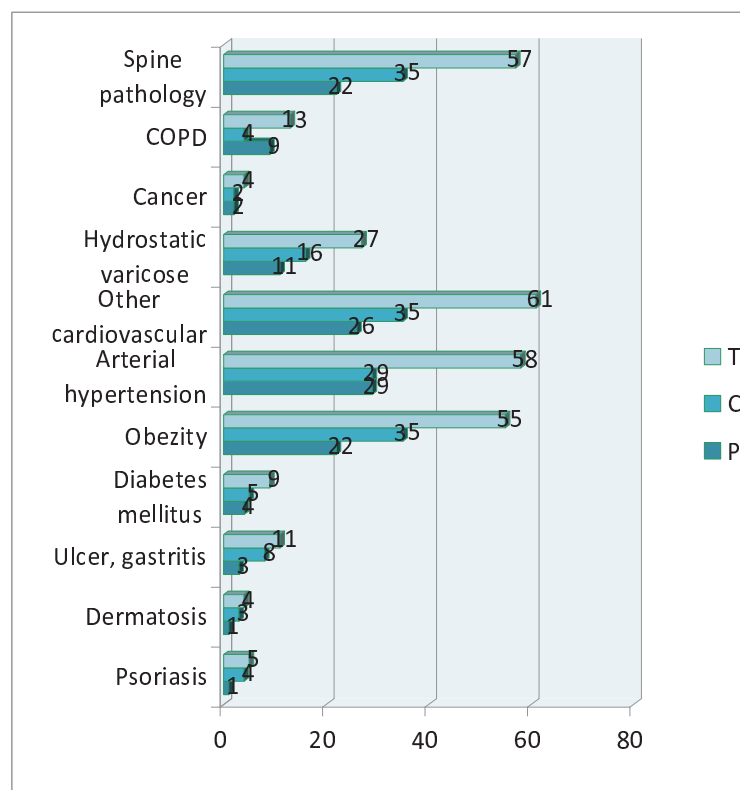


Fig.1. Chronic diseases

Obesity was the third founded health problem. Nutrition status and obesity were presented in Fig.2.

Body mass index ($BMI = \text{weight [kg]} / \text{height}^2 \text{ [m}^2\text{]}$) was determined and a weight group classification based on WHO standards was used. Overweight as an important risk factor had a high prevalence in both groups (total, 35.19%): 40% in the P group and 32.11% in C group. In both groups, the distribution of subjects with weight excess showed a maximum in the 45-50 age group (43.18%), but including older subjects (up to 55 years) their proportion amounted to 57.40%. Obesity

represents more than 30% in both groups, in non-significant report. More than 20% of workers are affected by first degree obesity.

Nutrition is specific for western part of Romania, bread, fats, salt in excess, low amount of fruit and vegetables, use of concentrated sugar. In general, the workers have an unbalanced diet. Work schedule conduct at irregular meals and high consumption of food late in the night. That aspect influences the nutritional status.

There were find 9 diabetes mellitus cases, all type two; four cases were found with high values of basic glycaemia, as recent diagnosed cases.

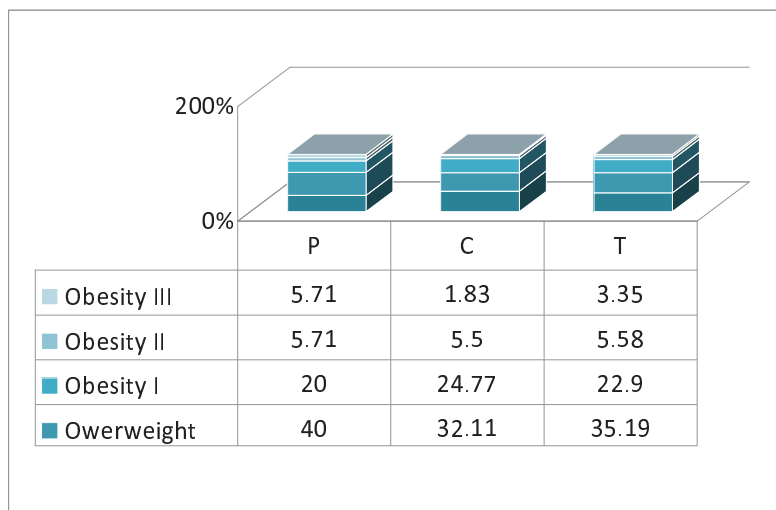


Fig.2. Nutrition status and obesity

Helicobacter Pylori was found at 84.61% of canal workers, similar values with other countries [9,12] and at one half of wastewater plant workers (50%), no statistical signification. Comparing with Romanian asymptomatic population data, which the infection prevalence is 74.3 our study values are similar. It must be mentioned that 11 persons (8 in C group and 3 in P group) were symptomatic for stomach suffering.

Giardiasis [12]. is the most common parasitosis in general population of Romania; we put it in evidence at wastewater workers, too. We did not find evidence based data on the prevalence of it, in our region. No statistical significant values found.

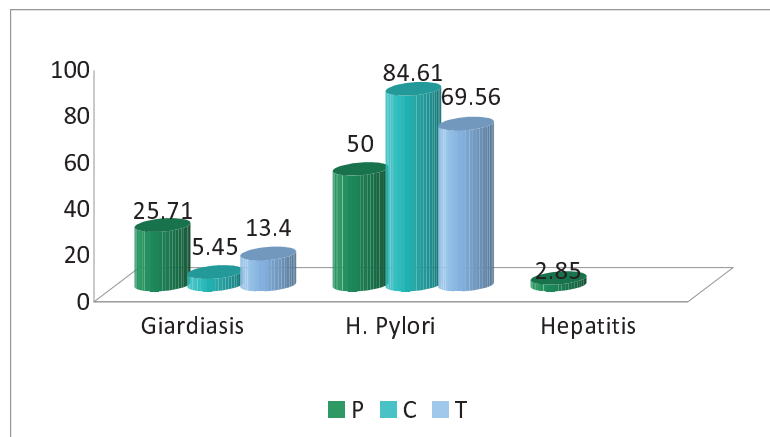


Fig.3. Common infection

Eight workers of the C group and three from P group accuse digestive symptoms and were diagnosed with gastric/duodenal ulcer, gastritis.

There were find four cases with chronic hepatitis B (2 cases) and C (2 cases) without symptoms.

Respiratory pathology consists in 13 COPD cases. Spirometry tests show alterations in 42 of the workers in both groups, as minor abnormalities. Mild restriction (24 cases, 13.4%) and obstruction of small airways (18 cases, 10.05%) were present in non-significant proportion. Obesity can be an important favorable factor. Most frequent acute pathology consists in cold and low back pain, in both groups.

Smoking was a common habit in the studied community with a prevalence of 32.4 %, with a number of 22.3 cigarettes per day. The canal

group workers, 42 persons (38.53), smoked 2 - 50 cigarettes daily (medium consume 21.82) and the plant workers, 13 (18.57%) smoked 23.8 cigarettes daily (8 – 30 pieces).

No significant differences between the two groups were found in the levels of blood tests, the results were similar with general population values.

Chronic dermatological pathology consists in five cases of psoriasis (four at canal workers) and four cases of staphylococcal dermatitis, all at canal workers. Terrain improper hygiene conditions can be considered like a favorable factor) [12].

In the last three years four cases of cancer were diagnosed: in the C group one colon and a pancreatic cancer were found and in the group P a lung and a larynx cancer were diagnosed. Both respiratory cancers occurred at hard smoker persons, at 49 and 52 years old. Three persons retired for health reasons. The lung cancer was treated after surgery and restarted the professional activity like electrician in the wastewater plant. He stopped smoking. It is difficult to prove the link of cancers with the workplace, but a possible association must be considered, too.

Conclusions

Timisoara wastewater workers activity and health were evaluated in this study. A part of results was presented and analyzed. Canal and treatment plant workers have a specific exposure, at a sum of occupational risks. Protective measures are limited, especially at canal activities.

All the studied workers have similar life styles. Their medium age is 45. Chronic diseases represent the main pathology: cardiovascular problems, especially arterial hypertension, spine pathology and obesity

are the first causes of health impairment and absenteeism. Respiratory and digestive symptoms occur as chronic pathology and acute episodes. The number of diabetes mellitus cases increased in the last years. Dermatitis and cancers evolution can be influenced by the workplace, too.

Considering that ageing brings chronic illnesses and this pathology influence and is influenced by professional activity, it is necessary to implement workplace health promotion programs for this category of workers and to maintain a good cooperation between occupational health service and family physician.

Acknowledgements

I would like to acknowledge the company management and case employees for their co-operation and for providing consent for publication of this paper. I also wish to thank Professor Dr. Brigitha Vlaicu and Professor Dr. Elena-Ana Pauncu for providing expert help with the environmental and occupational study. The skillful laboratory assistance of Biodim Laboratory Timisoara personnel is gratefully acknowledged.

This study was funded by “Parteneriat Interuniversitar pentru Creșterea Calității și Interdisciplinarității Cercetării Doctorale Medicale prin Acordarea de Burse Doctorale – DOCMEDNET”, Contract Code: POSDRU 88/1.5/S/78702.

Bibliography:

Al-Batanony MA, El-Shafie MK, (2011), *Work-Related Health Effects among Wastewater Treatment Plants Workers*, www.theijoem.com, Vol 2 Number 4; October, 237-244;

Divizia M., Cencioni B., Palombi L., Panà A., (2008), Sewage workers: risk of acquiring enteric virus infections including Hepatitis A, *New Microbiologica*, 31:337-341;

Fakhrul-Razi A, Alam MZ, Idris A et all, (2002), Filamentous fungi in Indah Water Konsortium (IWK) sewage treatment plant for biological treatment of domestic wastewater sludge. *J Environ Sci Health Part A Tox Hazard Subst Environ Eng*; 37:309–20;

Hansen E.S, Hilden J, Klausen H, Rosdahl N, (2003), Wastewater exposure and health—a comparative study of two occupational groups, *Occup. Environ Med*; 60:595–598;

Jebereanu, L., (2011), Biological Risk in exposure to Waste Waters in a Regional Operating Company, *Acta Medica Transilvanica*, Supl, II, 3:96-99;

Jebereanu, L., Jebereanu S.A, Vlaicu B., Păuncu E-A, (2013), Risk Factors and Health Status of a Group of Workers Exposed at Waste Water in Timisoara City, *Studia Universitatis “Vasile Goldis” Seria Stiintele Vietii (Life Sciences Series)* , Volume 23, issue 2, Apr.-Jun.; 165-170;

Korzeniewska, E., (2011), *Emission of bacteria and fungi in the air from wastewater treatment plants - a review*, *Front Biosci (Schol Ed)*. Jan, 1; 3:393-407;

Milczarek, M., Kosk-Bienko, J., Muylaert, K., et all., (2010), *Maintenance and Occupational Safety and Health – A Statistical Picture*, European Agency for Safety and Health at Work;

Nilufer, O., Turkyilmaz S.A., and Cali, S., (2013), Prevalence and risk factors of helicobacter pylori in Turkey: a nationally-representative, cross-sectional, screening with the 13C-Urea breath test, *BMC Public Health*, 13: 1215;

Păuncu, E.-A., (2008), *Medicina muncii, teorie și practică*, Editura Orizonturi Universitare, Timișoara, 309-324;

Smit L A, Spaan S., Heederick D., (2005), Endotoxin exposure and symptoms in wastewater treatment workers, *American Journal of Industrial Medicine*, 48.1:30-39;

Rajnarayan, T.R., (2008), Occupational health hazards in sewage and sanitary workers, *Indian J Occup Environ Med*. December; 12(3): 112–115.