

**“LUCIAN BLAGA” UNIVERSITY OF SIBIU  
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**ABSTRACT OF THE PhD THESIS**

**RESEARCH ON SOME CONSEQUENCES OF EXPOSURE  
TO GAS, IRRITATING VAPOURS, DUST AND  
UNFAVOURABLE MICROCLIMATE IN OCCUPATIONAL  
ENVIRONMENTS**

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## ABSTRACT

*Keywords:* occupational hazards, occupational diseases, chronic poisoning, prophylaxis – prevention

Upper respiratory tract is an important gateway to toxic substances in the human body. At this level, changes of homeostasis occur which influence the health status of the entire organism in conditions of prolonged exposure to professional risk factors of various types. The processes of the modern industrialization in recent decades have made that the impact of occupational risk factors on the human body to be lower than in last century but, because toxic substances cannot be excluded from the various technological processes, the health of the body is still influenced.

The current paper is structured in two parts: the first part contains general considerations of the effects of occupational risk factors on the mucous membranes on the airways, and in the second part, there is highlighted the research on the effects of occupational hazards at ENT level.

In Chapter 1, we detailed the morbidity through the chronic irritative effects of occupational hazards at the level of airways mucosa.

Chapter 2 refers to the etiology of occupational diseases of the respiratory tract.

Chapter 3 refers to the pathogenesis of some occupational poisoning and details the gateway and the elimination pathways of occupational hazards with regards to the human body and their mechanism of action.

Chapters 4 and 5 tackle the positive diagnosis of occupational diseases and the differential diagnosis thereof.

Chapter 6 refers to the treatment of morbidity through the irritative and toxic effects of some occupational hazards.

Chapter 7 outlines preventive measures in occupational medicine (risk treating).

In the second part of the work, the personal research, we detailed the working hypothesis, the study material and the working methodology, followed by the explanation of the results obtained from each working method applied, of the results obtained after the statistical analysis of data by associating previously published results after analyzing

each working methods, discussions and conclusions and the presentation of some representative personal clinical cases encountered within the study. This PhD thesis also includes an intervention plan: prophylaxis of ENT occupational or work-related diseases issued based on the needs assessment to improve the working environment.

The work comprises 263 pages and is divided into 13 chapters of which the first 7 chapters belong to the general part of the paper and the last chapter, the personal research, describes the intervention-prevention plan developed following the results we obtained. The paper also comprises a rich iconographic material containing 123 figures and 34 tables, complemented by 5 annexes and 207 bibliographic references. In the research conducted under the thesis, two articles have already been published and the third one is approved for publication in *Acta Medica Transilvanica* medical research journal. This journal is registered in the Nomenclature of the Medical Journals accredited by the Romanian College of Physicians, indexed in international databases: Index Copernicus and EBSCOhost, classified by the National Council for Scientific Research in Higher Education (CNCSIS) in the B+ category between 2010 and 2011. The articles in extenso are attached to the end of the work.

Regarding the working hypothesis, we started from the premise that human body's exposure to the toxic working environment can cause occupational or work-related diseases.

In this study, we aimed at presenting specific effects and detailing the clinical picture of the ENT diseases as a result of exposure to risk factors, such as vapours of hydrochloric acid, vapours of sulphuric acid, chromium, cadmium, zinc, nickel, arsenic and toxic compounds, cyanide, pollutants that can be encountered in the complex technological processes.

Regarding the study material, from the clinical and statistical point of view, the material used in this research to evaluate occupational exposure to specific occupational hazards comprises two distinct groups of workers. The groups include a total number of 200 subjects and are structured as follows:

- I. A study group represented by 100 male subjects exposed to occupational risk factors, such as cyanides, acid mist, which can harm the ENT health status, as well as to a warm microclimate.

- II. The second group, the control group is also made up of 100 subjects, who are exclusively men who work as labourers in a factory producing sheets of wafers within a private company in Sibiu.

The working methodology includes the characterization of the studied companies and the analysis of the studied occupational risk factors. The study workers were clinically analyzed within the context of their exposure to occupational risk factors and were evaluated through specific methodologies that include the ENT health status analysis, the study on chronic and occupational diseases prevalence.

Among the methods we used, we mention the following:

- a) characterization of enterprises the study group workers are working in, having as main activity the coating of metal parts with various corrosion solutions;
- b) characterization of enterprises the control group workers are working in, especially the wafer department;
- c) occupational risk factors, professional risk assessment, providing job security;
- d) declared determinations of the noxious chemicals in the workplace (alkali hydroxides, hydrochloric acid, nitric acid, sulphuric acid, total dust, noisy microclimate);
- e) questionnaire of symptoms and syndromes;
- f) clinical examination of the nasal cavity, pharynx, larynx and the external ear canal;
- g) spirometry
- h) anterior sinuses radiologic examination;
- i) statistical processing of the obtained data (SPSS software, 19 version)
- j) outstanding cases reports as a result of working in coating metals departments.

Following the research on the influence of risk factors on oral health, statistically significant differences between the two groups were noticed.

The two groups can be considered homogeneous and there is no significant difference ( $p = 0.653 > 0.050$ ) between the mean age in the study group ( $M = 41.48$ ,  $SD = 7.705$ ) and the mean age in the control group ( $M = 41.99$ ,  $SD = 8.301$ ).

There is no significant difference ( $p = 0.195 > 0.050$ ) between the average total seniority in the study group ( $M = 20.85$ ,  $SD = 7.567$ ) and the total average seniority in the control group ( $M = 22.37$ ,  $SD = 8.916$ ).

After statistical processing of data collected by the questionnaire, we obtained results that were statistically significant, such as:

Nosebleeds occur “sometimes” in over half (57.1%) of the subjects within the study group and “never or rarely” in 73.2% of control group patients.

50% of the subjects in the research group say that “sometimes”, they feel pain in the head compared with the majority of subjects in the control group (78%) who feel the pain “rarely or never”.

Decrease of labour efficiency is “often” met in the investigated subjects (87.1%) compared with the control group subjects who “never or rarely” felt any decrease in their work efficiency (74.4%).

Dryness of the nasal mucosa is very frequently declared in a percentage of 88.6% of the study group, while 91.7% of the control group declare it as being “sometimes”.

Lack of smell is a very frequent complaint for about 89% of the study group, while 91.8% of the control group mention it as being “sometimes”.

Dry throat often occurs in 86.8% of the investigated subjects, while in 75.35% of the control group this sign is rarely seen.

A significant percentage of the subjects in the investigated group (86%) were treated for pharynx, nasal or respiratory diseases compared with 80% in the control group who have not received treatment for any of the above-mentioned diseases.

Statistically comparing the clinical data, we found that 65.6% of subjects in group 1 present nasal secretions compared with 34.4% of subjects in group 2 ( $p = 0.000 < 0.050$ ). Nasal discharge with increased consistency is found in 73.9% of the patients in the research group as compared with 26.1% of those in the control group ( $p = 0.000 < 0.050$ ).

The descriptive and graphical analysis show that 33% - 36% of subjects in the study group present, on the clinical examination, irritations at nose level, nasal septum, nasal turbinates, oropharynx and vocal cords compared to 16% - 21% of the control

group, who present irritation of the mucous membranes at the same levels ( $p = 0.000 < 0.050$ ).

By analyzing the data, there is a percentage of 34.5% of the study subjects presenting dysphonia, while in the control group, there is a percentage of 16% of subjects with dysphonia ( $p = 0.000 < 0.050$ ).

The paper also emphasizes the importance of a prevention plan which should exist at the level of each enterprise in order to reduce occupational or work-related diseases. Prevention of occupational or work-related illness is achieved through certain technical, organizational and medical measures.

The technical and organizational measures include prevention phases and organizational measures to be taken in order to achieve them. Prophylaxis phases are primary, secondary, tertiary and aim at controlling the risk factors through measures of labour safety, health education, hygiene etc.

The medical prophylactic measures aim at the following aspects: rigorous medical examination upon employment, applying high individual risk strategy for protecting people susceptible to a particular disease, applying population strategies (screening) to identify high-risk groups, early detection of diseases in order to correct deviations from the health status through the treatment of first symptoms, adverse measures and risk factors, complex, preventive, curative and recovery treatment in order to prevent aggravation, complications, recurrence, disability and even death.

In terms of health education measures, at the end of the paper, we suggested a series of measures to protect the nasal, oral and pharyngeal mucosa from the action of pollutants in the production process.

We also pointed out the importance of social marketing, which is the systematic application of marketing principles and techniques to influence the target audience in terms of voluntary acceptance, rejection or quitting a certain behaviour for the benefit of individuals, groups or society as a whole.