Acute myeloid leukemia versus professional occupation: the profile of workers treated at the Recife Hematology Hospital*

LEUCEMIA MIELOIDE AGUDA VERSUS OCUPAÇÃO PROFISSIONAL: PERFIL DOS TRABALHADORES ATENDIDOS NO HOSPITAL DE HEMATOLOGIA DE RECIFE

LEUCEMIA MIELOIDE AGUDA VERSUS OCUPACIÓN PROFESIONAL: PERFIL DE LOS TRABAJADORES ATENDIDOS EN HOSPITAL DE HEMATOLOGÍA DE RECIFE

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ABSTRACT

The objective of this study was to learn the profile of workers in the economically active age group admitted from 1997 to 2007 to a hematology hospital, diagnosed with acute myeloid leukemia (AML); check which professions have the highest prevalence among the assisted workers who died; and identify the occupational risks compatible with the appearance of AML in the prevalent professions. This is a quantitative, exploratory study. Most profiles were characterized as originally from the agreste and the metropolitan region of the state of Pernambuco, male, white, and with incomplete primary education. The most common occupations were related to agriculture and domestic work, both of which involve the use of chemical substances that, according to literature, are possible factors involved in triggering the pathology.

DESCRIPTORS

Leucemia mieloide aguda
Riesgos laborales
Trabajadores
Salud laboral

RESUMO

O estudo objetivou conhecer o perfil dos trabalhadores em faixa etária economicamente ativa admitidos de 1997 a 2007 em hospital de hematologia com diagnóstico de leucemia mieloide aguda (LMA); verificar as profissões com maior prevalência entre os trabalhadores atendidos que foram a óbito e identificar os riscos ocupacionais compatíveis com o aparecimento da LMA nas profissões prevalentes. Estudo exploratório de natureza quantitativa. A maior parte dos perfis caracterizou-se por ser procedente do agreste e da região metropolitana do estado, do sexo masculino, pertencente à raça branca e com grau de escolaridade fundamental incompleto. As ocupações de maior destaque foram aquelas relacionadas à agricultura e ao trabalho doméstico, sendo as substâncias químicas utilizadas no processo de trabalho de ambas, de acordo com a literatura, possíveis fatores envolvidos no desencadeamento da patologia.

DESCRITORES

Leucemia mielóide aguda
Risco ocupacionais
Trabalhadores
Saúde do trabalhador

RESUMEN

Se objetivó conocer el perfil de trabajadores en faja etaria económicamente activa admitidos de 1997 a 2007 en hospital de hematología con diagnóstico de leucemia mieloide aguda (LMA); verificar las profesiones más prevalentes entre los pacientes atendidos que fallecieron e identificar los riesgos ocupacionales compatibles con la aparición de LMA en las profesiones predominantes. Estudio exploratorio, cuantitativo. Perfil encontrado: se caracterizó por la procedencia, en su mayoría de zonas agrestes y de regiones metropolitanas del estado, sexo masculino, raza blanca, fueron los más proclives a contraer la enfermedad. La enseñanza fundamental incompleta fue el grado educativo más recurrente. Las ocupaciones de prevalencia fueron aquellas relacionadas con el trabajo agrícola y el trabajo doméstico. Las substancias químicas utilizadas en el proceso de trabajo de ambas, de acuerdo a la literatura, son potenciales factores involucrados en el desencadenamiento de la patología.

DESCRIPTORES

Leucemia mieloide aguda
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*Taken from the course conclusion monograph "Leucemia mielóide aguda X ocupação profissional: perfil dos trabalhadores atendidos em hospital de hematologia de Recife no período de 1997 a 2007", Instituto Brasileiro de Pós-Graduação e Extensão, Recife, 2008.

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INTRODUCTION

Acute myeloid leukemia (AML) is a clonal disease in hematopoietic tissue, characterized by the abnormal proliferation of the myeloid line of blood cells, causing insufficient production of normal mature blood cells. Thus, neutropenia, anemia and thrombocytopenia frequently accompany the infiltration of the medulla[1].

A great increase was observed in the study of hematological diseases and the establishment of evidence for the association with environmental exposure, including occupational exposure, besides the consumption of harmful products, as from the 20th century, when these conditions came forward as a severe public health problem. Among the diseases that revealed a strong correlation with exposure to environmental risk situations, leukemia stands out, with high lethality levels[2].

In view of the fact that leukemia, and more specifically AML is the most incident type among hematological patients in the State of Pernambuco, Brazil; the high mortality rate (above 40%) of this disease, besides the fact that tumors are the primary cause of death among workers[3], some questions arise: what would be the profile of workers attended at a hematology service in Pernambuco and diagnosed with AML? Would some profession prevail among the attended workers? Would occupational risk exist, compatible with the appearance of AML in the related professions?

This study is relevant to the extent that it provides support with a view to greater attention to the possible occupational risks involved in the triggering and development of AML, thus attempting to heed the preservation of workers' health.

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The following objectives were proposed: get to know the epidemiological profile of workers in the economically active age range and admitted to a Hematology Hospital in Recife between 1997 and 2007, diagnosed with AML; verify the most prevalent professions among workers attended who passed away and identify the occupational risks compatible with the appearance of AML in the most prevalent professions.

LITERATURE REVIEW

AML is a disease characterized by clonal proliferation and aberrant maturing of one of its hematopoietic precursors of the myeloid line. The neoplastic alteration can occur in any of the different hematopoietic cell lines, thus permitting the classification of various acute myeloid leukemia types, which are: M0, M1, M2, M3, M4, M5, M6, M7[4].

Leukemia represents 2.5% of all cancers and about 3.5% of cancer-related mortality in the United States[5]. The prognosis for AML is obscure and it represents 1.2 % of all cancers in most Western countries[5]. It can even be considered a rare disease, but it representative for research purposes because it progresses rapidly and is fatal in about 40% or more of cases[5].

In the State of Pernambuco, the estimated incidence level of AML corresponded to 4.4 for every 100,000 inhabitants and 3.8 for every 100,000 women in 2008[6].

At the hematology hospital under analysis, AML represents about 41% of all leukemia cases received during the study period (1997 till 2007). This represents a considerable percentage of the total hospital sample in the same period.

The etiological factors of AML vary and range from genetic translocations and mutations of genes responsible for correcting inherited genetic errors to extrinsic factors that can trigger these alterations, including exposure to ionizing, non ionizing radiations, organophosphates, among other myelotoxic and carcinogenic agents[7].

The disease is generally diagnosed through a complete blood count and bone marrow examination. In specific cases, bone biopsy is also necessary. It is through the initial diagnosis and classification of the type of leukemia that the decision will be made as to what chemotherapeutics scheme to start, always adapting the doses according to the patient's organism. Treatment aims to eliminate or control the proliferation of leukemic clones, is based on polychemotherapy, as this offers the best remission prognosis, and can be divided in two phases: remission induction treatment and post-induction treatment[8].

The analysis of the health-disease process should be articulated with the analysis of the work process. Workers' illnesses and health problems express their exhaustion, due to their exposure to different occupational risks inherent in the capitalist production process[9].

Work-related diseases strongly affect not only the individual's life, but society as a whole. In professional illnesses, work or the conditions in which it is performed represent a direct cause for the triggering of some kind of disease. The causal relation or nexus is direct and immediate. The elimination of the causal agent, through control or replacement measures, can guarantee prevention, i.e. its elimination or eradication[10].

The etiological characterization or causal nexus will be essentially epidemiological, whether through the observation of excessive frequency levels in certain occupational groups or professions, or through the quantitative

or qualitative expansion of the spectrum of causal determinants, which can be known better through the study of the work environments. The elimination of these risk factors reduces the incidence or modifies the evolutionary course of the disease or health problem[11].

To recognize the risk conditions, investigation is needed about the possible production and dispersion of harmful agents or factors associated with different work processes, operations, machines and other equipment, as well as different raw materials, chemical products used, occasional sub-products and residues[11].

Data by the World Health Organization (WHO) show that about 200 thousand people die each year due to some kind of cancer related to the work environment[12].

The following etiological agents and occupational risk factors should be taken into account when investigating the etiology of leukemia in workers: benzene; ionizing radiations; ethylene oxide; antineoplastic agents; electromagnetic fields (still under study); chlorinated pesticides (chlordane and heptachlor), among others[11].

Leukemia in general, but mainly AMI can be classified as work-related diseases, in Group II of the Schilling Classification, in which occupational activities are considered a risk factor within the set of risk factors associated with the multicausal etiology of these neoplasms[11].

METHOD

A cross-sectional, exploratory and quantitative study was developed. It was accomplished at a Hematology and Hemotherapy Hospital in Recife: HEMOPE, a referral center for Hematology and Hemotherapy in the State of Pernambuco.

The study population comprised patients admitted and diagnosed with AML between 1997 and 2007.

The sample consisted of patients who died during this period and were in the economically active age range (16 to 65 years), according to decree-law No 5.452, issued on May 1st 1943, which approves the consolidation of labor laws and apprentice law 10.097/00[13], totaling 241 patients under analysis. These patients' admission form from their electronic file (Sistema Vida) was used, characterizing a retrospective study.

The obtained results will be expressed as percentages and absolute figures, between parentheses, with a view to a better understanding of the data.

The research took into account the ethical aspects of research involving human beings, according to National Health Council resolution 196/96. A copy of this paper was forwarded to the institutional review board, which issued a release for the data needed to accomplish this scientific study.

Data were collected according to a pre-established timetable, using a previously elaborated form, with a view to reaching the intended study goal, and analyzed from a quantitative focus, in the light of the relevant literature.

RESULTS AND DISCUSSION

After data analysis, a predominance of AML cases was observed coming from the *agreste* 30.3% (73) and metropolitan region 25.7% (62) of the State of Pernambuco. Percentages for the other regions of the state are as follows: São Francisco 7% (17), *Zona da mata* 15% (36), *Sertão* 5% (12), not found 12% (29), other states 5% (12).

The *agreste* is characterized by a diversified economy, in which agriculture and cattle raising stand out. In the metropolitan region, the tertiary sector stands out (commerce, industry and services)[14]. These findings will be ratified in the discussion.

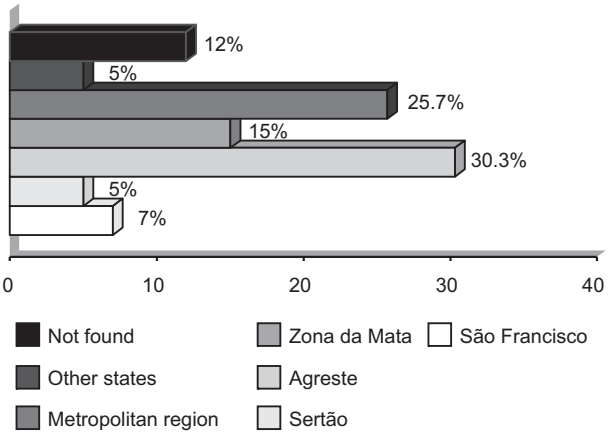

Figure 1 – Origin of AML cases according to mesoregions of the State of Pernambuco.

AML is the most common myeloid leukemia. Prevalence levels correspond to 3.8 cases per 100,000 in the United States, reaching 17.9 cases per 100,000 in adults aged 65 years or older. In children younger than 15 years, it is responsible for 20% to 25% of leukemia cases. In elderly patients, it is the most prevalent disease, with 70 years as the median presentation age and men as the most affected gender[15-17].

Literature data appoint that the incidence of AML varies according to gender and ethnic origin, with white as the prevalent ethnic origin in most studies[18-19]. Regarding gender, in the global population, the disease is more frequent in the male gender[15-16], with a ratio of 1.3 men for every diagnosed woman[4,8,14]. In the present study sample, the predominance of white ethnic origin 52.3% (126) and the male gender 55% (133) was verified, in line with literature findings. To reinforce this idea, it is known that, among the general population in the State of Pernambuco, mulatto ethnic origin is predominant, repre-

senting about 59.5% of the state population. The same is true for women 53%[20], which demonstrates a possible association among the disease, ethnic origin and the most affected gender.

As for the age factor, a similar study developed with a time interval (1990-1999) found a predominance of cases in the interval from 13 to 69 years, to the detriment of extreme ages, with a mean age of 27 to 29 years[21]. The results found in the present study are similar to that research. Also, very similar percentages for affected age intervals were observed, that is: 16-25 years: 24% (58), 26-35 years: 17.8% (43), 36-45 years: 23.2% (56), 46-55 years: 15.4% (37), 56-65 years: 19.5% (47).

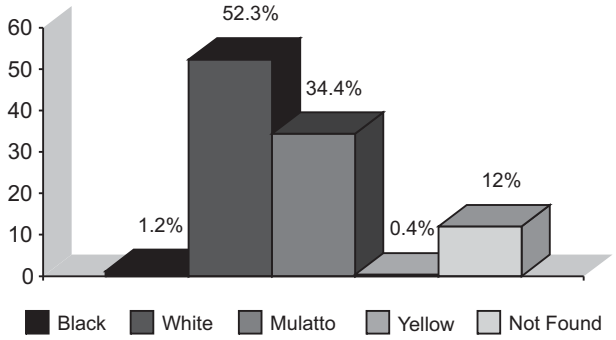

Figure 2 – AML incidence according to ethnic origin

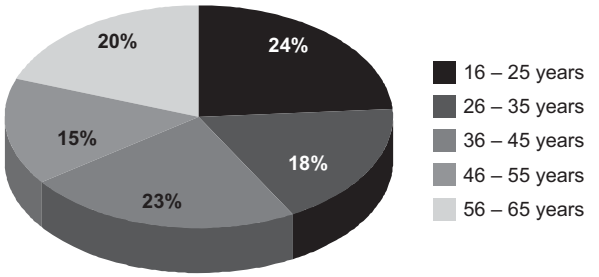

Figure 3 – AML incidence according to affected age range

As for the education level, unfinished primary education stood out 47.7% (115). In the State of Pernambuco, the population's predominant education level is primary education (finished and unfinished, 55%[20]), which cannot be considered inconsistent and significant in comparison with the present sample data. No studies were found that associated education level with AML disease.

Epidemiological studies suggest that genetic, environmental and occupational factors influence the pathogenesis of AML[22].

Studies appoint the association between exposure to organic solvents like benzene and oil derivatives and AML, demonstrating 2 to 4.5 times higher risks in exposed individuals[23].

Pesticides figure among the important risk factors for workers' health and for the environment. Various production sectors use them on a large scale, with greater intensity in the agriculture and cattle-raising sector. They are also used in road construction and maintenance, construction wood treatment, grain and seed storage, flower production, endemic and epidemic treatment, domestic use, among others[24].

In the Brazilian Northeast, the use of these substances is important, characterized by the totally chemical-dependent agriculture, whose risks are aggravated by the low knowledge level on the correct handling and health problems deriving from the manipulation of these products[25].

The tertiary sector stood out, representing 60% (144) of all cases, against 22% (52), 3% (8) and 15% (38) for the primary, secondary and non-determined sectors, respectively. The greater representativeness of the tertiary sector is due to the range of occupations found. When this is related with the most prevalent occupations per sector, the primary sector stands out, in which farmers represent 96% (50) of its universe, followed by the tertiary sector, in which the *domestic* occupation represents 35% (50). These two occupations represent 21% (50 individuals each) of the total sample.

Today, among the most frequent occupations, domestic and agricultural activities are considered involved in exposure to different risks, mainly chemical risks (solvents, insecticides, other pesticides etc.). A causal link can be established between these risks and harm to the hematopoietic system[7].

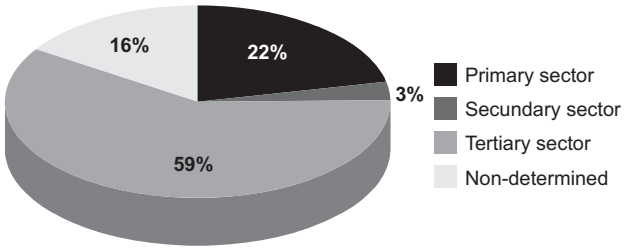

Figure 4 – AML incidence per economic sector

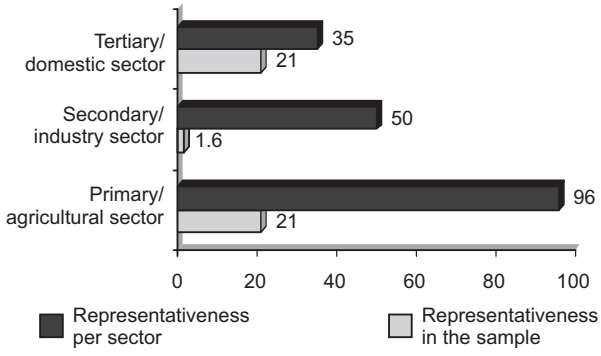

Figure 5 – Representativeness of occupations per sector and in the sample

It is known that household workers deal with multiple chemical products in their tasks. Detergents, waxes, disinfectants, laundry soap, among others, comprising a wide range of substances, which exposes this occupation to health risks[26].

In agriculture, chemical substances are widely used to combat blights and control vegetation growth. The little knowledge on the correct use and storage of these substances, as well as prolonged exposure to these agents, entails agricultural workers exposure to risks for acute and chronical poisoning, which can trigger myelotoxic, neurodegenerative processes and symptoms[27].

CONCLUSION

Based on the obtained results, it could be concluded that patients who passed away due to acute myeloid leukemia at the study hospital between 1997 and 2007 mosty came from the *agreste* and metropolitan region of the state, which is closely related with primary and tertiary-sector activities, which were the most significant in the study population.

Men and white individuals were the most affected; these data are in line with global epidemiological data, but differ from general population characteristics in the state of Pernambuco, demonstrating the association between the disease, ethnic origin and gender.

The most noteworthy occupations were agricultural and domestic workers, revealing the need for notification and studies with a view to clarifying the possibility of a causal link between the activities and the respective work environments, exposure time and substances used in their productive processes. It is fundamental to advise on the correct use of protection equipments, products used during labor activities and possibilities of replacing them by others less harmful to health.

It is clearly important for health professionals to know about the possible relation between certain diseases and the work environment, occupations and background history, as well as the notification and correct and full completion of these patients' admission and monitoring forms, reducing the number of imprecise and incomplete data that can hide realities.

Prospective studies and the elaboration of welcoming and monitoring worksheets are important and essential in view of the large number of cases of this disease in young individuals and people in the economically active age range. The importance of enhancing health professionals' preventive and educative function in this area should also be highlighted, besides their role as reference and sentry points at the institution for this type of population and occupational health problem.

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