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GACETA MÉDICA DE MÉXICO **ORIGINAL ARTICLE**

The age and sex frequencies of patients with leukemia seen in two reference centers in the metropolitan area of Mexico City

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Abstract

Introduction: *A lack of a population-based cancer registry or underreporting is common in developing countries, without knowledge of the true dimensions of the problem.* **Aim***: To describe the age and sex frequencies of the major subtypes of leukemias in two reference hospitals in the metropolitan area of Mexico City.* **Material and methods***: A descriptive and retrospective study, based on medical records of two hematology services during January 2007 to October 2014; all cases diagnosed with leukemia were included.* **Results***: A total of 1,432 cases were included, with a median age of 38 years old (2 months to 115 years). There were significant age differences between subtypes of leukemia (ANOVA test, p = 0.000); chronic lymphocytic with a mean age of 64.8 years, higher than chronic myeloid (43.4 years) and all acute leukemias (lymphoblastic: 32.6 years, myeloblastic 43.5 years). Of the patients, 51.8% (n = 742) were women, although males predominated in chronic myeloid (57.8%) and lymphocytic (60%) leukemia. Acute lymphoblastic leukemia was the more common variety, L2 subtype of the French-American-British classification, followed by myeloid leukemia M4, M2, and chronic myeloid.* **Conclusions***: it is necessary to develop inter-institutional works in order to group data of different population sectors and improve the epidemiological profile of leukemias in Mexico.* (Gac Med Mex. 2016;152:186-9)

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Introduction

Leukemias are a group of hemato-oncological neoplasms characterized by autonomous and disproportionate growth of immature forms of leukocytes (blasts) originating in a malignant clone that end up becoming the predominant lineage in the bone marrow, with a resulting decrease in the rest of hematopoietic series[1,2]. Thanks to the large cancer population-based registries, we know the epidemiological pattern of acute lymphoblastic leukemia, which usually affects especially males, with incidence peaks during childhood early stages and adolescence, whereas acute myeloid leukemia and chronic leukemia are generally expected in old age patients, mainly in those older than 70 years[3-6]. It is important to remember that age is one of the clinical variables affecting the prognosis by itself[7-9]. However,

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this pattern is largely based on data originating in developed countries. Since Mexico has no population-based registry to the present day, it imports epidemiological data from the World Health Organization or, at best, these originate in reports on experience and observations in an institution, mostly in referral hospitals located in Mexico City[10-13]. The Malignant Neoplasms Histopathological Registry exists since 1994, and it serves as a national database fed by reports on diagnosis relative frequencies at the participating hospital centers, which are susceptible to under-reporting and have the disadvantage of not allowing for incidence rates or other important data such as disease-free survival to be obtained[14-16]. Within this context, the need arises to continue developing descriptive epidemiology works on leukemia. The purpose of the present work was to describe the frequencies of age, sex and main leukemia subtypes in two tertiary care institutions located at the metropolitan area of the Valley of Mexico.

Material and methods

Patients with a leukemia diagnosis under the care of the Hematology Department of the *Hospital General de México* and the High Specialty Hospital of the *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* (ISSSTE) *Bicentenario de la Independencia,* in Tultitlán, State of Mexico, were studied. The diagnosis was established by means of bone marrow analysis and phenotyping in the case of acute leukemias; bone marrow and karyotype for chronic leukemias, and immunophenotype for chronic lymphocytic leukemia.

Study design

A descriptive, retrospective, observational study was conducted, based on medical records made in the period encompassed between January 2007 and October 2014. Sampling was made by convenience, including all those cases that met the diagnostic criteria for each leukemia subtype.

Statistical analysis

Analyses were carried out using the IBM SPSS Statistics software for Windows (version 20.0); initially, descriptive statistics was used to establish different mean values, both for age and frequency, for the different leukemia subtypes. Mean difference was established with Student's t-test and the difference between the four leukemia subgroups was calculated with a one-way ANOVA; a p-value ≤ 0.05 at a 95% confidence interval (CI) was considered to be significant.

Ethical considerations

Since this was a retrospective study based on admission medical records, obtaining an informed consent was not necessary. All medical records and data remained confidential, with exclusive access to the staff, and the inter-institutional regulations on the handling of medical records were complied with.

Results

A total of 1,432 cases attended to at the Hematology Department of the *Hospital General de Mexico* together with the Hematology Area of the ISSSTE *Hospital Bicentenario* were studied during the period from 2007 through 2014.

Age

Mean age for all patients was 38 years (range: 2 months-115 years), but it was slightly higher in the female than in the male gender (41 vs. 35 years), and this difference was statistically significant (p = 0.000; 95% CI). Mean age differences between all types of leukemia are described in figure 1.

In order to identify age differences between the leukemia subtypes, the ANOVA test was executed, with significant differences being obtained at the intra-group and inter-group levels [F (134.576, 650.862) = 2.844; p = 0.000; 95% CI)]. As for the time of clinical evolution (acute vs. chronic leukemias) a significant difference was recorded (p = 0.000; 95% CI): mean age was higher in the chronic than in the acute leukemias group (48.6 vs. 36.9 years). Taking into account only myeloid and lymphoid chronic leukemia, a difference of nearly 20 years was obtained: 45.8 versus 64.8 years, respectively (p = 0.000; 95% CI). When the same comparison was made between acute leukemias, a significant difference of slightly over 10 years between lymphoblastic and myeloblastic leukemia was also identified (32.6 vs. 43.5; p = 0.000; 95% CI). Age averages were also compared between the same morphological variant sub-classified by clinical evolution, and the result was that chronic lymphoid almost doubled acute myeloid leukemias mean (64.8 vs. 32.6; p = 0.000), and myeloid variants, both acute and chronic, occurred in the fifth decade of life with barely a few years non-significant difference (43.4 vs. 45.8; p = 0.193).

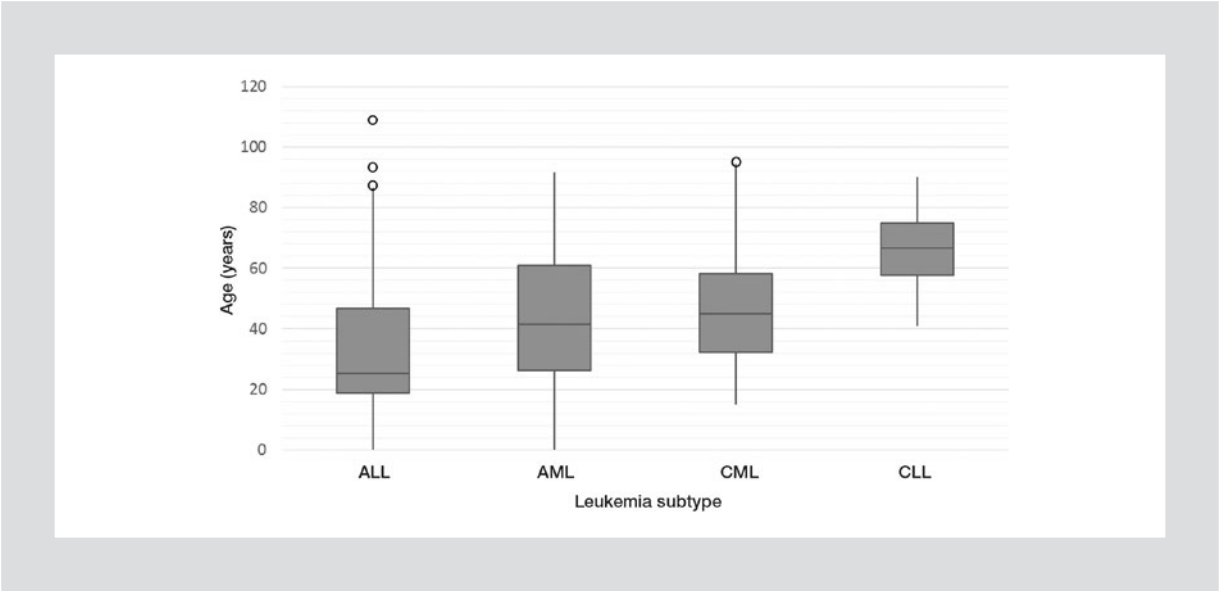

Figure 1. *Age range between the different leukemia subtypes. ALL: acute lymphoblastic leukemia; AML: acute myeloblastic leukemia; CML: chronic myeloid leukemia; CLL: chronic lymphoid leukemia.*

Gender

Of a total of 1,432 patients, 51.8% belonged to the female gender (n = 742). Overall, chronic leukemias were predominant in the male gender (chronic myeloid leukemia: 57.8%; chronic lymphocytic leukemia: 60%); the distribution was more homogeneous for acute leukemias: 51.5% for acute myeloid leukemia and 50.6% for acute lymphoid leukemia. Globally, when the types of leukemia were combined, chronic leukemias occurred more frequently in the male than in the female gender (58.1 vs. 41.9%), with this difference being more balanced in patients with acute leukemias (49 vs. 51%).

Types of leukemia

Acute lymphoblastic leukemia was the most commonly treated leukemia (n = 759), with the most frequent morphological variant being FABL2. The most common variety of myeloid leukemia was M4 (myelomonocytic leukemia). The frequency of the different morphological variants is depicted in figure 2.

Discussion

The *Hospital General de México* provides care to patients without social security from the entire national territory, mainly to inhabitants of the metropolitan area of the Valley of Mexico (Mexico City, States of Mexico and Hidalgo)[17]. Over the past decades, there has been a pronounced increase in the number of leukemia cases[10,18], a situation shared with other institutions exclusively focused on pediatric care[2,12,13,19]. In turn, the High Specialty Hospital *Bicentenario de la Independencia,* which belongs to the ISSSTE, over the 4 years it has been operating, has recorded 174 cases among its affiliated population, which, added to the 1,258 cases of the *Hospital General de México,* make up a series comprised by a group mostly without social security (young, low socio-economic status individuals), complemented with data of people at the opposite socio-demographic end (mostly insured, mature-aged, professional individuals)[20,21].

Although leukemias were initially classified into acute and chronic according to their time of onset, currently, thanks to the knowledge on molecular biology, we know that they are distinct entities originating in a malignant hematopoietic cell. Something in which most series all over the world concur is the presentation pattern, since lymphoid-origin leukemias are predominant in the extremes of life: acute lymphoblastic leukemia is the most common cause of cancer in the pediatric population, and chronic lymphocytic leukemia is characteristic of the elderly.

Internationally, myeloid leukemias reported age of onset is during the seventh decade of life (69 years in the case of acute and 64 for chronic leukemia)[22,23]; in our series, the margin between both was also rather short, but the fact stands out that they occurred in the fifth decade of life.

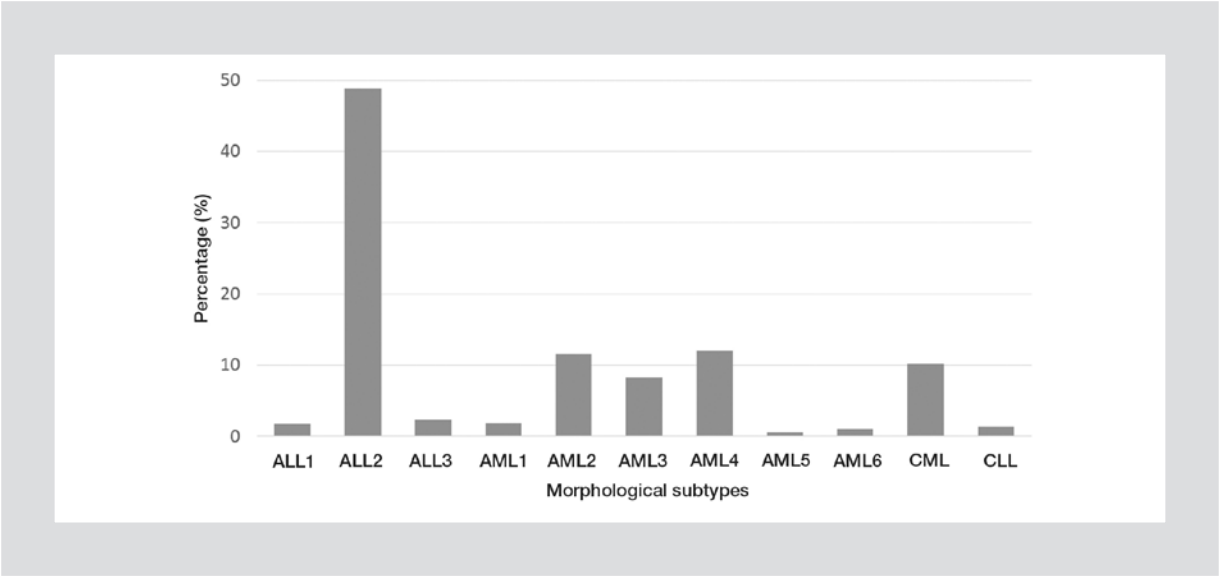

Figure 2. *Percentage frequency of the main leukemia morphological subtypes. ALL: acute lymphoblastic leukemia; AML: acute myeloblastic leukemia; CML: chronic myeloid leukemia; CLL: chronic lymphoid leukemia.*

As to the chronic lymphocytic variant, the male gender was shown to be predominantly affected (60% of cases); these data, which are constant in most records of patients with chronic lymphocytic leukemia, are highly relevant since, according to different population-based studies, both the response and severity of the disease are lower in female than in male patients (83 vs. 71%)[24].

In conclusion, this is one of the largest population-based studies of our country, which combines data on age and gender from two reference institutions. These data are highly useful for the planning of different population-oriented policies and therapeutic trials and even for daily medical practice when differential diagnoses are generated by age group.

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