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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: *In developing countries, there is commonly a lack of population-based cancer registries or underreporting, thus not recognizing the true dimensions of the problem.* **Aim:** *To describe the age and sex frequencies of the major subtypes of leukemias in two hospitals of reference in the metropolitan area of Mexico City.* **Material and methods:** *This is 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 (range, two 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, FABL2 subtype, 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 leukemia in Mexico.* (Gac Med Mex. 2017;153:40-4)

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Introduction

Leukemias are a group of hemato-oncologic neoplasms characterized by autonomous and disproportionate growth of leukocyte immature forms (blasts) originating in a malignant clone that end up turning into the predominating lineage in the bone marrow, with the ensuing decrease of the rest of hematopoietic series[1,2]. Thanks to the large population-based cancer registries, we know acute lymphocytic leukemia (ALL) epidemiological pattern, which usually affects mainly males, with incidence peaks at early stages of childhood and adolescence, whereas acute myeloid leukemia (AML) and chronic leukemia are generally expected in advanced age patients, mainly in those older

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than 70 years[8-11]. It should be remembered that age is one of the clinical variables that affects the prognosis by itself[6,12,13]. This pattern is mainly based on data originating in developed countries. Since Mexico lacks a population registry till the present day, it imports epidemiological data of the World Health Organization (WHO) or, in the best case scenario, data originate from reports on experience and observations in an institution, mostly reference hospitals located in Mexico City[15-18]. The Malignant Neoplasms Histopathological Registry exists since 1994 and serves as a national database fed by reports on diagnosis relative frequencies in participant health centers;but it is susceptible to under-reporting and has the disadvantage that no incidence rates or other important data such as disease-free survival can be obtained[2,19-21]. In this context, the necessity arises to continue developing descriptive epidemiology works on leukemia. The purpose of the present work was to describe age, gender and main leukemia subtypes frequencies in two tertiary care institutions located in the metropolitan area of the Valley of Mexico.

Material and methods

Patients diagnosed with leukemia, and who were under the care of the Hematology Departments of the *Hospital General de México* and the ISSTE *Hospital de Alta Especialidad Bicentenario de la Independencia* in Tultitlán (State of Mexico), were studied. The diagnosis was established by bone marrow study and immunophenotype for acute leukemia, by bone marrow study and karyotype in the case of chronic leukemia and by means of immunophenotype in the case of chronic lymphocytic leukemia.

Study design

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

Statistical analysis

The analysis was performed using the IBM SPSS statistical software for Windows (version 20.0), and descriptive statistics was initially used to establish different mean ages and different leukemia subtypes frequencies. Mean differences were established with Student's t-test, and differences between the four leukemia subgroup with a one-way ANOVA. The difference was considered to be significant at a p-value ≤ 5 with a 95% confidence interval (CI).

Ethical considerations

Since this was a retrospective study based on admission medical records, asking for informed consent was not necessary. All medical records and data were kept confidential with exclusive access for the personnel and in compliance with inter-institutional regulations on clinical record management.

Results

A total of 1,432 cases attended to during the 2007-2014 period at the Hematology Department of the *Hospital General de México* in combination with the ISSSTE *Hospital Bicentenario* Hematology Area were studied.

Age

Patient mean age was 38 years (range: 2 months-115 years) and was slightly higher in the female than in the male gender (41 vs. 35 years), with this difference being 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 leukemia subtypes, the ANOVA test was applied, with significant differences within-group and between-group being obtained (F [134.576, 650.862] = 2.844; p = 0.000*; 95% CI). As for leukemia clinical evolution time (acute vs. chronic), there was significant difference (p = 0.000*; 95% CI), and mean age was higher in the chronic leukemia group than in the acute leukemia group (48.6 vs. 36.9 years). Considering only CML and CLL, a difference of nearly 20 years was obtained: 45.8 versus 64.8 years (p = 0.000*; 95% CI). When the same comparison was made between acute leukemias, a significant difference of little more than 10 years was also identified between lymphoblastic and myeloblastic leukemia: 32.6 versus 43.5 years (p = 0.000*; 95% CI). Age means were also compared within the same morphological variant subclassified by clinical evolution, with CLL almost doubling acute lymphoid leukemia mean (64.8 vs. 32.6 years; p = 0.000*) and both acute and chronic myeloid variants occurring

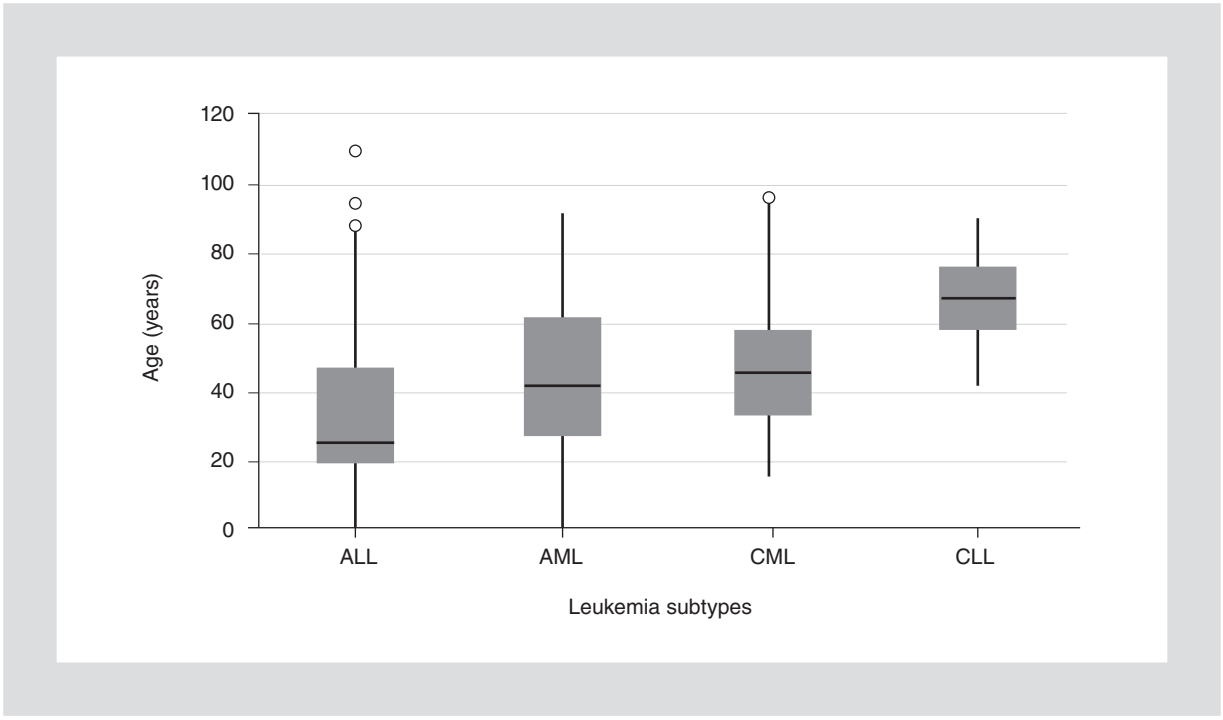

Figure 1. *Age range among the different leukemia subtypes.*

at the fifth decade of life with barely a few years of non-significant difference (43.4 vs. 45.8 years; p = 0.193).

Gender

Of the entire sample of 1,432 patients, 51.8% corresponded to the female gender (n = 742). In general, chronic leukemias were predominant in the male gender (57.8% for CML and 60% for chronic lymphocytic leukemia); conversely, acute leukemias showed a more homogeneous distribution: 51.5% for acute myeloid leukemia and 50.6% for acute lymphoid leukemia. Overall, when all types of leukemia were combined, chronic leukemias occurred more commonly 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

The most commonly treated leukemia was ALL (n = 759), and the FABL2 morphologic variant was the most common. The most common variety of myeloid leukemia was the M4 variant (myelomonocytic leukemia). The frequency of the different morphologic variants is depicted in figure 2.

Discussion

The *Hospital General de Mexico* provides care to patients without social security coming from the entire national territory, mainly inhabitants of the metropolitan zone of the Valley of Mexico (Mexico City, State of Mexico and Hidalgo)[22] Over the past few decades there has been a pronounced increase in the number of leukemia cases[15,23], a situation shared with other institutions exclusively focused on pediatric care[2,17,18,24]. In turn, the *Hospital de Alta Especialidad Bicentenario de la Independencia*, which belongs to the ISSSTE, in the four years it has been operating, has recorded 174 cases among its affiliates, which, added to the *Hospital General de Mexico* 1,258 cases, form a series integrated by a group mostly without social security (young subjects of limited means), complemented with data of people at the opposite socio-demographic extreme (insured, middle-aged and mostly professionals)[25,26].

Although leukemia initially was classified as acute and chronic based on its time of onset, currently, thanks to the knowledge on the molecular biology of each one of them, we know that they are different entities, each one deriving from a hematopoietic tumor cell. One observation on which most series around the world concur is the pattern of occurrence, since

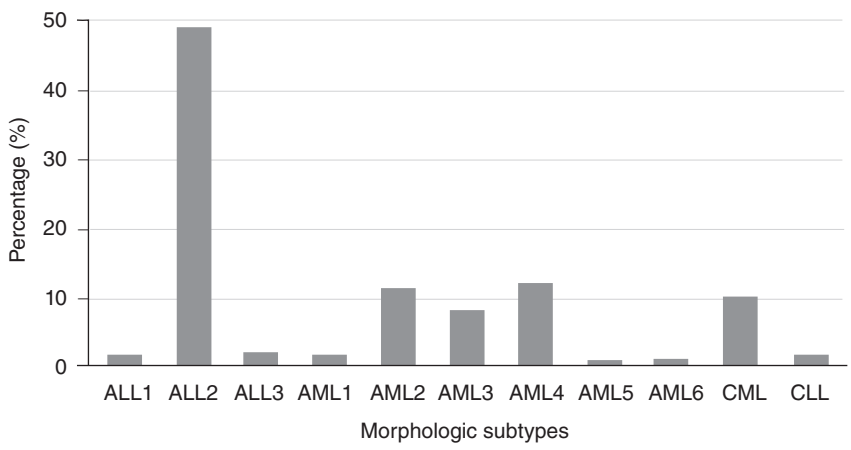

Figure 2. *Percentage frequency of the main leukemia morphologic subtypes.*

lymphoid-origin leukemias predominate at the extremes of life, with ALL being the most common cause of cancer-related death in the pediatric population, unlike chronic lymphocytic leukemia, which is characteristic in elderly people.

Internationally, the age of myeloid leukemias presentation is reported to be during the seventh decade of life: 69 years for acute and 64 for chronic leukemia[27,28]. In our series, the margin between both was also very short, but the fact that they occurred at the fifth decade of life stands out.

With regard to the chronic lymphocytic variety, the male gender was mainly affected (60% of cases). These data are constant in most registries of patients with chronic lymphocytic leukemia, and this is highly relevant, since according to different population-based studies, both response and disease severity are lower in female gender than in male gender patients (83 vs. 71%)[29].

In conclusion, this one of the largest population-based studies of our country, which combines data on age and gender from two reference institutions that are highly useful to plan different population-based policies and therapeutic trials, and even in daily practice during differential diagnoses by age group.

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