Research Article

Patient with myelodysplastic syndrome and acute myelocytic leukemia at Dr. Soetomo General Hospital, Surabaya

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ABSTRACT

Background: According to the World Health Organization, there are 250 cases of leukemia globally. The case fatality rate (CFR) is at 76%, for young/middle age, the CFR is 35–40%, and for age older than 60, it is 5–15%. The occurrence of acute myelocytic leukemia (AML) is 3.5/100,000 people per year, with a higher occurrence in men than in women (4.3 vs. 2.9, at the age of 67 years old). The incident of myelodysplastic syndrome (MDS) mostly occurs in people over the age of 70 years old and tends to turn into AML. The objective of this case report is to know the number of leukemia cases, especially AML and MDS cases that are based on gender and age. **Methods:** These data were gathered from 228 leukemia patients from a total of 434 visits. Incomplete exclusions were applied to 47 people with the age range of 14–77 years old, while the remaining 181 people formed the complete sample. The diagnoses of AML and MDS are based on the morphology of blood smear cell and hematology analysis. **Results:** In Surabaya, East Java, Indonesia, AML is found at 38.66% and MDS at 4.98% from 181 samples, with higher cases in women than men. **Conclusion:** In summary, patients with AML diagnosis were related to age; the highest risk of AML was found at the ages of 46–61 years (37.14%) from 70 people. There were four patients with an MDS diagnosis at the ages of 14–29 years, while there was only one older aged patient, aged 62–77 years old (11.1%), showing that the younger age group presents a higher risk. We hope future research will further observe new biomarkers to diagnose AML, MDS, and MDS-related AML.

KEY WORDS: Acute myelocytic leukemia, Hematology, Incomplete exclusions, Leukemia, Myelodysplastic syndrome

INTRODUCTION

Leukemia (blood cancer) is cancer that is rarely found compared to other cancers such as lung cancer and breast cancer. Moreover, leukemia is mostly found in children under 15 years old. Acute myelocytic leukemia (AML) is a heterogenic disease that consists of many kinds of clinical descriptions and genetic disorders including cytogenetic mutation, genetic mutation, and changes in gene expression.[1] Myelodysplastic syndrome (MDS) is hematopoiesis, which first has a regular organization (apoptosis), becoming dysplastic and ineffective (anti-apoptosis) in the spinal cord. It seems that immature cells (blast) increase and the transformation from MDS to AML occurs.[2-4]

In 2015, 35–40% of AML medication cases consist of young/middle age people, with the youngest age of 6 years old and the oldest age of then 60 years old,[5] for which the frequency percentage is 5–15%. According to the World Health Organization (WHO), there are 250 cases of leukemia all over the world. The case fatality rate is at 76%.[6,7] On the other hand, MDS is a disease dominated by anemia. The patients gradually feel tired and weak, develop dyspnea and fever, but 50% of patients say that they do not have any complaint. MDS is found in routine smear checking. It has disease history or chemotherapy and radiation treatment, symptoms consist of fever and weight loss. The disease

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is dominated by the elderly of around 70 years old. It can be said that about a person of up to 60 years old suffers from MDS in every 500 populations.

There are many primary MDS cases, but this disease may be caused by radiation exposition and chemotherapy.[3,8,9] Patients with secondary AML are recommended to be transferred to special and experienced clinics with MDS disorder managing. Myeloproliferative disorder or exposed range due to leukemogenesis medication or other chemical materials.[3,6] Patient profiles with MDS and AML are evaluated to give a comprehensive report in Surabaya, East Java, Indonesia. Based on the explanation above, this research investigated the number of leukemia cases, especially AML and MDS cases, based on the gender and age in Surabaya. MDS needs an accurate diagnosis because it can develop into AML during the course of the disease. According to the reference of longevity, men have a higher risk of contracting leukemia than women and have a higher mortality rate.

METHODS

Research Subjects

The population in this research consists of all data of leukemia patients who attend outpatient treatment in the Clinical Pathology Laboratory of the Medical Faculty of Airlangga University of Dr. Soetomo General Hospital in Surabaya, between January 2 and October 30, 2014. All patients met inclusion and exclusion criteria.

Diagnosis of Leukemia

The diagnosis of leukemia is based on a morphology blood cell smear, using a hematology analyzer (Xysmex XN-1000-B3). Leukemia includes AML, chronic lymphoid leukemia, chronic myelocytic leukemia (CML), acute lymphoblastic leukemia (ALL), and MDS.

Data Analysis

Data were collected and analyzed through descriptive statistics analysis. Then, data were presented as bar graph among of leukemia types.

RESULTS

Research Subject Condition

The data that the researcher collected showed that there are 228 leukemia patients out of 434 visits. Incomplete exclusion consisted of 47 people, and 181 people were included in the study, with the age range from 14 to 77 years old [Figure 1].

Leukemia Patients Diagnosis

From leukemia patients of the Clinical Pathology Laboratory of the Medical Faculty of Airlangga University of Dr. Soetomo General Hospital in Surabaya, between January 2 and October 30, 2014, it was found that 70 people (38.66%) were diagnosed with AML, 68 people (37.57%) were CML, 27 people (14.92%) were ALL, and 9 people (4.98%) were MDS. Leukemia in female patients (59.12%) was found to be higher than in male patients (40.88%) [Figure 2]. On the one hand, the MDS diagnosis had higher risk in women than in men, as it was found in 6 women (66.67%) and 3 men (33.33%). On the other hand, women had a higher risk than men for having an AML diagnosis, as it was found in 40 women (40%) and 30 men (30%). In sporadic AML cases, mutations found in stem cells occurred. Leukemia had a risk of 19.89% in the age group of 14–29 years old, with 36 people, 37.02% in the age group of 30–45, with 67 people, 34.80% in the age group of 46–61, with 36 people, 8.29% in the age group of 62–77, with 15 people, and the highest risk of leukemia in the age group of 30–45 (37.02%) from 181 people. The risk for patients with AML diagnosis in the different age groups was as follows: 12 people age 14–29 years (17.14%), 25 people age 30–45 years (35.71%), 26 people age 46–61 years (37.14%), 7 people age 62–77 years (10%), and the highest risk of AML was in the age group of 46–61 years (37.14%) from 70 people. Patients with MDS diagnosis, the age of 14–29 years old, have a higher risk with 4 people

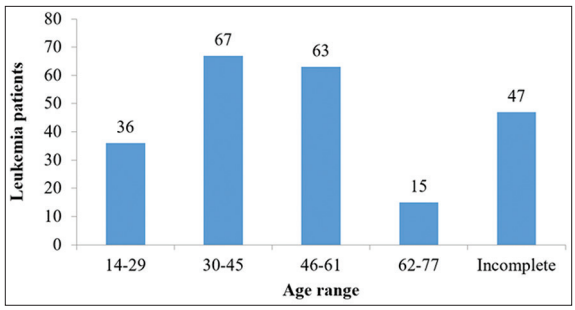

Figure 1: Leukemia diagnosis recapitulation based on the age of the Clinical Pathology Department of Dr. Soetomo General Hospital, Surabaya, January 2, 2014–October 30, 2014

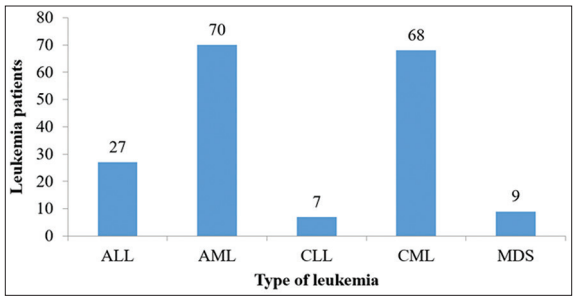

Figure 2: Leukemia diagnosis recapitulation of the Clinical Pathology Department of Dr. Soetomo General Hospital, Surabaya, January 2, 2014–October 30, 2014. ALL: Acute lymphoblastic leukemia, AML: Acute myelocytic leukemia, CLL: Chronic lymphoid leukemia, CML: Chronic myelocytic leukemia, MDS: Myelodysplastic syndrome

(44.4%), the age of 62–77 years old with 1 person (11.1%).

DISCUSSION

Genetic mutations found in AML cases (CEBPA, RUNX1, and TP53) are a predisposition that develops, becoming AML through some series (M0, M1, etc.).[11] The correlation between AML and MDS in elderly patients shows bad prognosis tendency; when the age increases, the number of illnesses will increase.[4,10] According to the WHO for AML in 2001, it needs to be added the new sign of molecular (2008 update).[10] Cytogenetic abnormalities occur in 25% of AML cases of new patients, using 2001 WHO classification, while 70–75% are included with the 2008 updated classification.[1,12-14]

In determining AML diagnoses, the following methods are commonly used: (i) Immunophenotyping from human leukemia cells can be studied with flow cytometry in some parameter (multiparameter). This checkup is important to differ between AML and acute lymphoblastic leukemia (ALL) and to identify the AML type (AML classification based on FAB).[2,4,13] According to Deschler B's research, AML is 2.5%, and ALL is 1.3% from 100,000 of new cancer. In 2015, adult AML treatment was given to 35–40% adult patients, where the youngest was 6 years old, and 5–15% were elderly patients older than 60. AML is predicted for 2–3% of people per year.[5] Based on previous research, the MDS risk at age 70 years is predicted for one person over the age of 60/500 populations. It is not yet known why 20–30% of MDS cases develop into AML. According to the research that has been conducted, it may be due to a combination of genetic factors and microenvironmental factors from certain diseases.[2,9] According to Deschler B's data (database), MDS progressively develops into AML (MDS-related AML). For example, the checkup of cytometric flow to show specific antigens used by a cluster of differentiation (CD) 13 and or CD 117.[15] (ii) Clinical description: Bone marrow aspiration, anemia, and thrombocytopenia. Patient physical checkups (hepatomegaly), cytokimia, and immunophenotyping (flow cytometric) differentiate AML and ALL. (iii) Polymerase chain reaction (PCR) or real-time PCR determines molecular abnormality. (iv) FISH (determines residual disease).[15-17] MDS diagnosis uses the WHO and FAB classification by paying attention to hematology descriptions: MDS has a non-effective dysplastic characteristic and develops to be AML in 20–30% of cases.[7] Physical checkup, clinical description, and previous disease history, such as RA, RAEB, and CMML, are needed for diagnosis[1,13,14]

Among leukemia patients of the Clinical Pathology Laboratory in Dr. Soetomo General Hospital, Surabaya, between January 2, 2014, and October 30, 2014, AML diagnosis was found in 38.66% of patients, and MDS was found in 4.98%. Women with leukemia diagnosis were higher than for men: There were 107 women (59.12%) and 74 men (40.88%). Women had a higher risk than men regarding an MDS diagnosis, there were 6 women (66.67%) and 3 men (33.33%). Furthermore, women also had higher AML diagnosis risk compared to men, there were 40% of women and 30% of men. A high leukemia risk was found for patients aged 30–45 years (37.02%) from 181 people. Patients with AML diagnosis were related to age; the highest risk of AML was found at the ages of 46–61 years (37.14%) from 70 people. There were four patients with an MDS diagnosis at the ages of 14–29 years, while there was only one older aged patient, aged 62–77 years old (11.1%), showing that the younger age group presents a higher risk. We hope future research will further observe new biomarkers to diagnose AML, MDS, and MDS-related AML.

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