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SURVIVAL RATE AND ASSESSMENT OF ACUTE MYELOID LEUKEMIA THROUGH PROGNOSTIC FACTORS

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Abstract:
Background: *Acute Myeloid Leukemia is malignant complication with important identified factors of prognosis. The objective of this research work was the development of the Prognosis's assessment scheme in acute myeloid leukemia on the basis of prognostic factors. In few regions of world, like Pakistan or other countries, this particular scheme will be much beneficial specially when there is non-availability of cytogenetic testing.*
Methodology: *In this research work, we analyzed 70 patients suffering from Acute Myeloid Leukemia during a period of five years in Mayo Hospital Lahore. We collected the data retrospectively from the medical history of the patients and analyzed this collected data with the help of Excel and Epi Info.*
Results: *On the basis of age, Group A-1 (less than 40 years) had a survival of forty months, contrary to Group B-1 (≥ 40.0 years) with a nineteen months survival (P=0.00410). Group A-2 (patients with secondary Acute Myeloid Leukemia) survived for 15 months, whereas Group B-2 (patients with Acute Myeloid Leukemia de novo) survived for forty months (P=0.00210). In addition, Group A-3 (patients with mild co-morbidities) achieved a survival of forty months, Group B-3 (patients with moderate co-morbidities) survived for nineteen months, whereas Group C-3 (patients with severe comorbidities) survived for seven months (P=0.00370). According to blast number and WBC, Group A-4 (higher levels) had a survival of twenty-five months, whereas Group B-4 (lower levels) survived for forty months (P=0.00350).*
Conclusion: *The studied prognostic factors are much useful to detect the level of risk of the Acute Myeloid Leukemia for every patient at the time of diagnosis. We formulated this assessment prognosis scheme with 3 risk groups on the basis of secondary Acute Myeloid Leukemia, age, co-morbidity, blasts, WBC & cytogenetic examination.*
Keywords: *Prognosis, Factor, Acute Myeloid Leukemia, Survival, Co-Morbidity, Excel.*

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INTRODUCTION:

Acute Myeloid Leukemia is a malignant disease and it is characterized as the accumulation and proliferation of different myeloid progenitor cells in bone-marrow, which ultimately causes hematopoietic failure [1, 2]. There is an increase in the prevalence Acute Myeloid Leukemia with the increase of age and there are verse outcomes of treatment in the older patients as compared to the younger patients [3]. Acute Myeloid Leukemia diagnosis is based on the cellular morphology, molecular, immunology and cytogenetics features [4]. There are many identified prognostic factors in Acute Myeloid Leukemia disease, including age of the patient, dysfunction of organ, performance status, secondary Acute Myeloid Leukemia, WBC (White Blood Cell) and blast count at the time presentation, karyotype and molecular abnormalities [5, 6]. Maximum research works on large multi-centers scale have stated that cytogenetics and age at the time of diagnosis are the most important prognostic determinants for the patients suffering from Acute Myeloid Leukemia [7].

There is focus of this research work on rate of survival, evolution of Acute Myeloid Leukemia and prognostic factors in the patients. The rationale of this research work was to organize an assessment scheme for Acute Myeloid Leukemia prognosis. Even if there was already present study on the prognostic factors, our aim was the development of score, which is much easy to calculate, for timely prognostic assessment at the time of diagnosis. Particularly in Pakistan or other countries, this particular scheme will be much beneficial especially when there is non-availability of cytogenetic testing.

METHODOLOGY:

We performed this retrospective research work on 70 patients, having 19 to 83 years of age with a median age of 58 years. With the utilization of statistical tests like Epi info & Excel, we managed to analyze, associate and compare different variables. In addition, this research work was observational and analytical. The duration of this research wok was from March 2015 to February 2020. All the participants of this research work were present with Acute Myeloid Leukemia. All these patients got admission at Mayo Hospital Lahore. On the basis of the Kaplan-Meier's method, we assessed the rate of survival of the patients to illustrate the disparities between traits of the patients and particular variables. We framed 5 research hypotheses, which confirmed a short survival for the patients of 58-year-old, patients present with severe co-morbidities, patients with secondary Acute Myeloid Leukemia, and patients present with the elevated levels of blasts and WBC. The collected data utilized in this research work comprised gender, place of origin, age of the patients, admission date, type of FAB, classification of WHO, cytogenetic assessment, immune-phenotyping, data of laboratory testing (hemoglobin, LDH, erythrocytes, blasts, platelets and leukocytes), co-morbidity, symptoms, other associated malignancies, treatment, complications during treatment, dysplasia, death date and censorship status. Coding of censorship coding included 2 groups of patients. 1st group was censored if at the end of research, there was loss of some patients, whereas 2nd group was complete if there was occurrence of some patients during the research.

RESULTS:

We found the histogram of age intervals as high in the patients having more than 48 years of age (55.0%). Additionally, we included 22 patients in 48 to 57 years of age interval, followed by 25 patients in their 6th decade and 23 patients were in their 7th decade until the age of 83 years.

Table 1: Prognosis Assessment Scheme

Points	Age (years)	Secondary Acute Myeloid Leukemia	Comorbidity	WBC (cells/mm^3)	Blasts (%)	Cytogenetics
1p	<40	-	Mild	<13000	<40%	t (13,15), t (6,19), inv16*
2p	40-57	Present	Moderate	13,000-100,000	20-60%	Normal karyotype*
3p	>57	Present with other malignancies	Severe	>100,000	>60%*	del (5q), +6, del(7q), t(v,9) (v,21) *

*from Medical Literature. Low Risk: 3-4p; Intermediate Risk: 5-7P; High Risk: 10-15P.

Figure-1 represented statistical test performed in Epi Info, where we divided all the patients in 2 groups; Group A-1 less than 40 years old and Group B-1 patients with ≥40 years old.

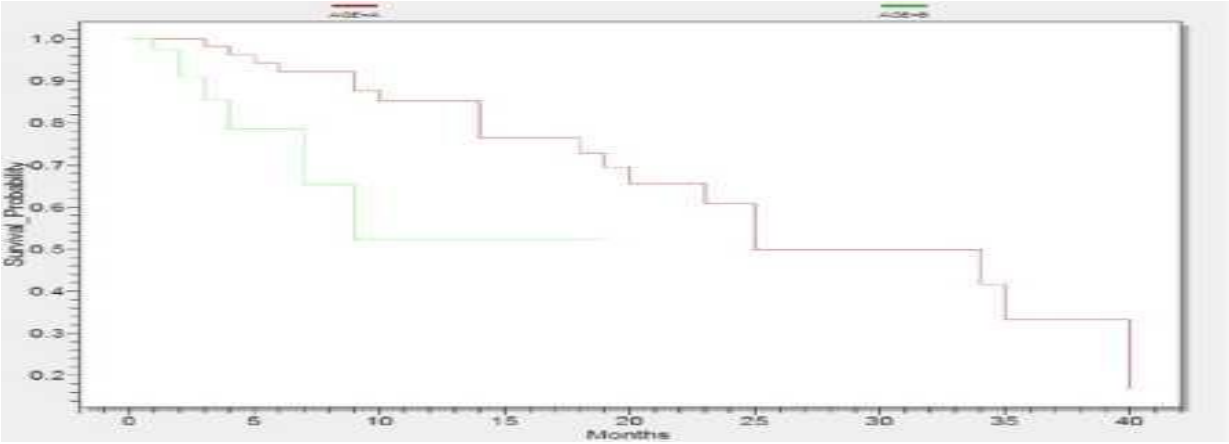

Figure 1. Survival probability according to age Group Ai <58 years (red) and Group B1 2 40 years (green)

In consequence, Group A-1 achieved a rate of survival of forty months and Group B-1 a nineteen months survival rate (P=0.00410). Almost 12.0% presented with other types of malignancies were in need of radio-chemotherapy. In consequence of these other malignancies, many patients developed secondary acute myeloid leukemia. Analysis of the rate of survival of the patients present with primary & secondary Acute Myeloid Leukemia showed important differences.

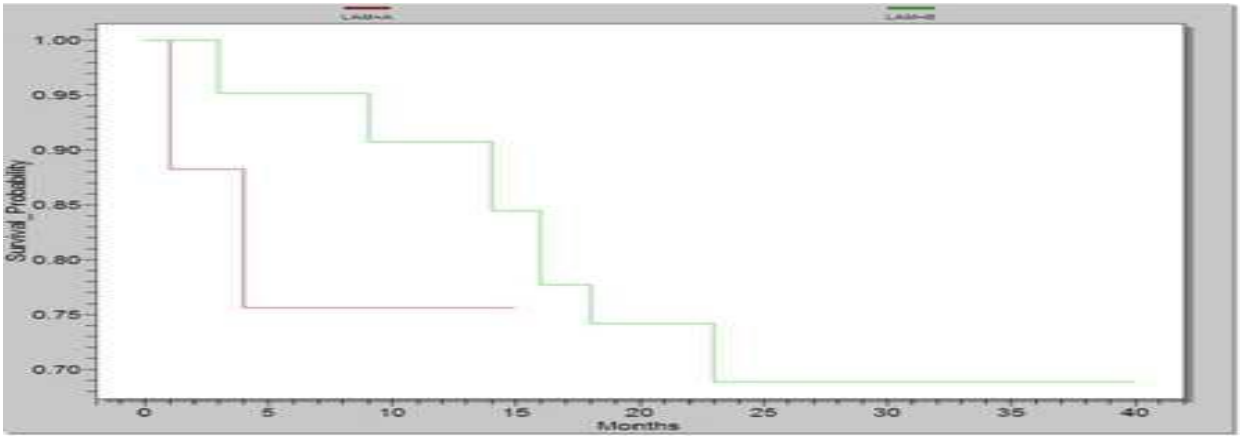

Figure 2. Survival probability according to presence of secondary AML, Group A2 with Secondary AML (red) and Group B2 with AML de novo (green)

As displayed in Figure-2, there was a survival of 15 months for the first group (A-2=Secondary AML) and forty months survival for final group (B-2=AML de novo, P=0.00210). Proportion of 42.0% patients had associated co-morbidities as most of the elderly patients were present with these complications. Most common co-morbidity was heart diseases, present in 50 patients. Digestive & respiratory diseases were present in 28 and 19 patients respectively. Next common disease was diabetes available in nineteen patients and less frequent illnesses were renal and neurological abnormalities with 8 and 7 patients respectively.

DISCUSSION:

Different clinical and biological features were identified in the past as useful factors in predicting the clinical outcomes, which can support to guide in therapy choices [8]. Large multi-center research works have showed that age of the patient, availability of secondary Acute Myeloid Leukemia, count of WBC, cytogenetic and co-morbidities at the time of diagnosis

were the vital prognostic factors for the patients of Acute Myeloid Leukemia [9]. Age remained one of vital factor for prognosis and its significance has increased in the population with elder age [10]. We also highlighted the significance of the prior malignancies as well as their treatment which also have an impact on the rate of survival of the patients [11]. Co-morbidities influence the therapeutic plan & post therapeutic outcome of index disease. Examples comprise the patients suffering from cancer and multiple research works have stated the relevance of co-morbidities in disease's prognosis [12].

A high count of WBC at the time of presentation was also considered as an independent factor of prognosis. This showed an adverse outcome in acute myeloid leukemia, particularly for group with cytogenetic intermediate risk [13]. A patient's sub-group with hyper-leukocytosis was recognized with a short survival rate in such patients [14]. The most significant prognostic determinants are the Karyotype abnormalities in the patients of Acute Myeloid Leukemia [15]. However, in this particular literature, it was stated that about half of the adult patients of Acute Myeloid Leukemia presented with a normal karyotype.

CONCLUSION:

This single-center research work assessed and confirmed the important predictors of different outcome of Acute Myeloid Leukemia. Patient's age, availability of secondary Acute Myeloid Leukemia, co-morbidities, count of WBC and blasts were very vital prognostic parameters. We also demonstrated this in study with the help of significant findings of rate of survival among various groups of patients. This current research work assessed the importance of pretreatment factors and discovered that patient's age, availability of secondary Acute Myeloid Leukemia, and presence of co-morbidities, count of WBC, blasts and cytogenetics were the vital factors which effected the outcomes of survival rate among patients suffering from Acute Myeloid Leukemia.

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