Original Article

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Oncology Section

Survival of Acute Myeloid Leukaemia Patients- A Retrospective Study from the Yopougon University Hospital, Abidjan, Ivory Coast

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ABSTRACT

Introduction: The survival of acute leukaemia patients has improved significantly thanks to multidrug chemotherapy and the development of cell therapy and marrow transplantation. However, this is not the case in Middle Income Countries (MICs), particularly in Côte d'Ivoire, West Africa where much efforts are still needed to improve the treatment of these patients.This study raises the issue of the fate and survival of Acute Myeloid Leukaemia (AML) patients in these countries.

Aim: To study the overall survival and survival factors of patients with AML under the present practice conditions.

Materials and Methods: This retrospective study was conducted in the Department of Haematology of Yopougon University Hospital in Abidjan, Ivory Coast. The data was collected from January 2005-April 2019 and data processing happened over a duration of one year from November 2019-November 2020. The mortality and survival were studied on 75 AML patients.The socio-demographic, pretherapeutic and therapeutic characteristics were recorded. Statistical Package for the Social Sciences (SPSS) statistics version 26 was used for data analysis, comparisons were done using by the Chi-square test and survival through the Kaplan Meier method and the log rank test.

Results: The patient's age ranged from 1-74 years, with two peaks (37 and 49 years old) with a sex ratio at 1.03. Majority of patients (50.7%) had a low socio-economic level. Overall, 81.6% of patients started treatment within two weeks. Out of total patients 38 (50.7%) patients received chemotherapy, which was curative for 10 (13.33%) patients and palliative for 28 (37.33%) patients. There was not a single patient of complete remission. A total of 4 (5.3%) were alive, 51 (68%) died, and 20 (26.7%) were lost to follow-up. The average overall survival (OS) was 90 days and the probabilitý of Overall Survival (OS) was 62% at one month, 49% at six months, and 10% at one year. The predictive factors for prolonged survival were high socio-economic level (p=0.046), absence of bleeding syndrome (p-0.04), haemoglobin level ≥10 g/dL (p-0.02), cytological type different from AML-M0 (p-0.05).

Conclusion: The therapeutic results were inferior to those obtained in developed countries where high level diagnostic and therapeutic techniques give very promising results. This study highlighted the difficulties of AML management and identified five prognostic factors of survival in the care conditions of MIC.

Keywords: Assessment, Chemotherapy, Middle income countries, Mortality, Prognosis

INTRODUCTION

Ivory Coast is a MIC in West Africa, where AML is estimated to account for only 1% of cancers and represent 0.7% of hospital admissions [1,2]. The overall incidence is low and their frequency is underestimated in Africa due to lack of diagnostic and care infrastructure.

The management of acute leukaemia has improved markedly with chemotherapy and the development of cell therapy and bone marrow transplantation [2]. According to The Centre for International Blood and Marrow Transplant Research (CIBMTR); the probabilities for survival at 10 years after Haematopoetic Cellular Transplant (HCT) were 84% for AML, 84% for ALL. The CIBMTR, is a group of nearly 500 HCT centres worldwide that contribute detailed data on all the allogenic HCT performed at their centres. It is a research affiliate of the International Bone Marrow Transplant Registry, Autologous Blood and Marrow Transplant Registry, and the National Marrow Donor Program (NMDP) established in 2004 [3].

However, this is not the case in MICs, particularly in Côte d'Ivoire, (West-Africa), where many efforts are still needed to improve the treatment of these patients. In contrast to developed countries, diagnosis is delayed and approximate due to the small number of specialists, limited access to imaging (e.g., Positron emission tomography (PET) and Computed Tomography scan) and high-tech laboratory practices (e.g., immunophenotyping, molecular biology and Next Generation Sequencing (NGS) technologies). Refusal or abandonment of treatment, lack of adherence to treatment and especially inadequate supportive care contribute to poor outcome. These obstacles are themselves linked to unfavourable factors such as the absence of universal health coverage as in France. This last situation increases private or family financial constraints. Finally, mobility difficulties or interference with traditional medicine can also play an occasional role.

The reality in MICs such as Côte d'Ivoire, resembles another model of patient care that could be compared to the obligation of result rather than the obligation of means, in the sense that the caregiver would be expected to obtain good results without giving him all the means of adequate care. Indeed, the medical code of ethics imposes on the physician the obligation of means and not the obligation of result [4]. The physician and the healthcare system must use all available means for a better care of the patient.

The aim of the study was to evaluate the survival of patients with AML in MIC practice and care conditions. The secondary objectives were to analyse the impact of pretherapeutic characteristics on the survival and identify prognostic factors applicable to the living and working conditions.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Haematology of Yopougon University Hospital in Abidjan, Ivory Coast. The data was collected from January 2005-April 2019 and data processing happened over a duration of one year from November 2019-November 2020. A total of 75 patients with AML were selected.

Inclusion criteria: Patients with AML diagnosed on the basis of cytological diagnosis by myelogram or on the basis of immunophenotyping diagnosis by bone marrow aspiration were included in the study.

Study Procedure

Patients were enrolled on the basis of their medical records containing clinical and biological pretherapy data by blood count (haemogram), myelogram, immunophenotyping, and conventional cytogenetic (karyotype).

The patient files selected were the complete files containing the following information:

Non therapeutic data regarding chemotherapy which could be:

- Either curative with the CA-CRB protocol (Cytarabine (CA) - Cerubudine (CRB) i.e. induction 3+7, consolidation and maintenance therapy);
- Or palliative chemotherapy (Aracytin 15-30 mg/m^2 subcutaneous for 15 days every month or hydoxyurea 25 to 50 mg/kg day or prednisone 1-2 mg per days)

On therapeutic data regarding therapeutic response:

- Complete Remission (CR) which was defined as absence of all clinical signs, normalisation of the haemogram, reduction of bone marrow blastosis below 5%.
- The delay of CR was defined as the time between the date of initiation of treatment and the date of the myelogram confirming CR.
- Partial Remission (PR) was defined as a decrease in tumour syndrome without achieving complete remission.
- Induction failure when after induction therapy, full remission was not achieved.

On patient outcome

- Lost to follow-up, known as abandonments were defined as patients who stopped treatment against medical advice and/or lost contact with the physician or other healthcare professional.
- Living patients were those who were regularly followed in the department
- Deaths in the hospital.

Finally, the patients were enrolled on the basis their medical records providing socio-demographic data (age, sex, place of residence) and allowing an estimation of the Socio-Economic Status (SES). This status was assessed through criteria such as employment and income, family size, daily expenses, presence of running water, presence of electricity, ability to pay for prescriptions. The most relevant was average family income. The files used provided complete data to estimate the average monthly income. The socio-economic level was considered low if the average income was below the lowest monthly guaranteed interprofessional wage allowed in this country (the guaranteed minimum wage = 100 dollars) and considered high if the income was higher than 2000 dollars per month.

STATISTICAL ANALYSIS

The SPSS, version 26, was used for data analysis. Comparisons were made using Chi-square test. The significance level of the p-value was ≤0.05. The Relative Risk (RR) and its Confidence Interval (CI) were used to estimate the significance of the observed differences. Survival was calculated using the Kaplan Meier method and the log rank test was used to compare the survival curves.

RESULTS

Pre-therapeutic characteristics are described in [Table/Fig-1]. The mean age of the population was 37.49 ± 20.04 years. Majority of the population belonged to the age group of 20-40 and 50-60 years with 22 (29.3%) and 24 (32%), respectively. The sex ratio was 1.03. The majority of patients had a low 38 (50.7%) or intermediate 34 (45.3%) socio-economic status. The common reasons for admission was cytopenia 44 (58.7%) and hyperleukocytosis 18 (24%). Two-thirds of the patients were examined within three months and 13 (17.3%) had a previous diagnosis [Table/Fig-1]. About 11 (14.7%) had a World Health Organisation/Eastern Cooperative Oncology Group (WHO/ECOG) =1 or Performance status (PS) =1 [5].

Patients characteristics		Effective n (%)
Age (years) Mean 37.49±20.04	0-20	18 (24)
	21-40	22 (29.3)
	41-60	24 (32)
	>60	11 (14.7)
Sex Ratio =1.03	Men	38 (50.7)
	Women	37 (49.3)
Socio-economic status (month income)	High (>2000 dollars)	3 (4)
	Intermediate	34 (45.3)
	Low (<100 dollars)	38 (50.7)
Reasons for admission	Cytopenia	44 (58.7)
	Hyperleukocytosis	18 (24)
	Aml previous diagnosis	13 (17.3)
Time to care (month)	0-3	52 (69.3)
	>3-6	14 (18.7)
	>6	9 (12.5)
WHO/ECOG Performance Status scale (PS)	1	11 (14.7)
	2	52 (69.3)
	3	12 (16)
Tumoural syndrome	Present	45 (60)
	Absent	30 (40)
Infectious syndrome	Present	63 (84)
	Absent	12 (16)
Haemorrhagic Syndrome	Present	16 (21.3)
	Absent	59 (78.7)
Anaemic Syndrome	Present	70 (93.3)
	Absent	5 (6.7)
Leukocytosis	<100 g/L	52 (69.3)
	≥100 g/L	23 (30.7)
Haemoglobin	<10 g/dL	70 (93.3)
	≥10 g/dL	5 (6.3)
Platelets	<100 g/L	57 (76)
	≥100 g/L	18 (24)
Bone marrow blastosis	≥50%	24 (32)
	10-49%	38 (50.6)
	0-9%	13 (17.4)
FAB cytological type	AML-M0	1 (1.33)
	AML-M1	4 (5.33)
	AML-M2	22 (29
	AML-M3	6 (8)
	AML-M4	2 (2.66)
	AML-M5	6 (8)
	Unclassified-AML	34 (45.33)
Protocol of chemotherapy used	CA-CRB	10 (13.33)
	Palliative	28 (37.33)
	Not treated	37 (49.33)

Treatment delay (day) (Range 1-307) (Mean 18±53)	<15 days	31 (41.33)
	≥15 days	7 (9.33)
	Not treated	37 (49.33)
Treatment outcome	CR	0
	PR	8 (10.7)
	Failure	30 (40)
	Not treated	37 (49.3)
Patient outcome	Alive	4 (5.3)
	Deaths	51 (68)
	Lost to follow-up	20 (26.7)

[Table/Fig-1]: Overall distribution of patient characteristics.
FAB: French American British Classification (FBC)

There were patients with anaemic syndrome 70 (93.3%), infectious syndrome 63 (84%), and haemorrhagic syndrome 16 (21.3%). The tumoural syndrome was present in 45 (60%) [Table/Fig-1,2].

Variables		Living	Death	Treatment abandonment	p-value	Total
Age	<37 years	1 (2.6%)	28 (73.7%)	9 (23.7%)	0.432	38
	≥37 years	3 (8.1%)	23 (62.2%)	11 (29.7%)		37
Sex	Men	3 (7.9%)	25 (65.8%)	10 (26.3%)	0.605	38
	Women	1 (2.7%)	26 (70.3)	10 (27%)		37
Socio-economic status	High	0	3 (100%)	0	0.099	3
	Intermediate	3 (8.8%)	26 (76.5%)	5 (14.7%)		34
	Low	1 (2.5%)	22 (57.9%)	15 (39.5%)		38
Consultation time (months)	0-3	3 (5.8%)	36 (69.2%)	13 (25%)	0.051	52
	3-6	0	13 (86.7%)	2 (13.3%)		15
	>6	1 (12.5%)	2 (25%)	5 (62.5%)		8
Performance status	1	1 (9.1%)	5 (45.5%)	5 (45.5%)	0.455	11
	2	3 (5.8%)	37 (71.2%)	12 (23.1%)		52
	3	0	9 (75%)	3 (25%)		12
Tumoural syndrome	Present	2 (4.4%)	33 (73.3%)	10 (22.2%)	0.479	45
	Absent	2 (6.7%)	18 (60%)	10 (33.3%)		30
Infectious syndrome	Present	4 (6.3%)	44 (69.8%)	15 (23.8%)	0.339	63
	Absent	0	7 (58.3%)	5 (41.7%)		12
Hemorrhagic Syndrome	Present	0	12 (75%)	4 (25%)	0.535	16
	Absent	4 (6.8%)	39 (66.1%)	16 (27.1%)		59
Anaemic Syndrome	Present	3 (4.3%)	49 (70%)	18 (25.7%)	0.209	70
	Absent	1 (20%)	2 (40%)	2 (40%)		5
Leukocytosis	<100 g/L	2 (3.8%)	35 (67.3)	15 (28.8%)	0.601	52
	≥100 g/L	2 (8.7%)	16 (69.6%)	5 (21.7%)		23
Haemoglobin	<10 g/dL	3 (4.3%)	50 (71.4%)	17 (24.3%)	0.045	70
	≥10 g/dL	1 (20%)	1 (20%)	3 (60%)		5
Platelets	<100 g/L	4 (7%)	39 (68.4%)	14 (24.6%)	0.435	57
	≥100 g/L	0	12 (66.7%)	6 (33.3%)		18
Bone marrow blastosis	≥50%	3 (7.9%)	26 (68.4%)	9 (23.7%)	0.469	38
	<50%	1 (2.7%)	25 (67.6%)	11 (29.7%)		37
Cytological type/FAB	AML-M0	0	1 (100%)	0	0.596	1
	AML-M1	0	3 (75%)	1 (25%)		4
	AML-M2	1 (4.5%)	17 (77.3%)	4 (18.2%)		22
	AML-M3	0	5 (83.3%)	1 (16.7%)		6
	AML-M4	0	0	2 (100%)		2
	AML-M5	0	5 (83.3%)	1 (16.7%)		6
	Unclassified	3 (8.8%)	20 (58.8%)	11 (32.4%)		34
Protocol of chemotherapy used	CA CRB	0	6 (60%)	4 (40%)	0.041	10
	Palliative	2 (7.1%)	24 (85.7%)	2 (7.1%)		28
	Not treated	2 (5.5%)	21 (56.7%)	14 (37.8%)		37

[Table/Fig-2]: Distribution by outcome and therapeutic characteristics.

On the paraclinical aspect, leukocytic AML >100 g/L was noted among 23 (30.7%), haemoglobin level <10 g/dL among 70 (93.3%), thrombocytopenia <100 g/L in 57 (67%). According to the French American British classification (FAB), there were 45.3% patients with unclassified AML [6]. Only 10 patients could undergo cytogenetics, which was found to be normal in three patients. The majority had an unfavourable prognosis (81.3%), and 60% had no co-morbidities.

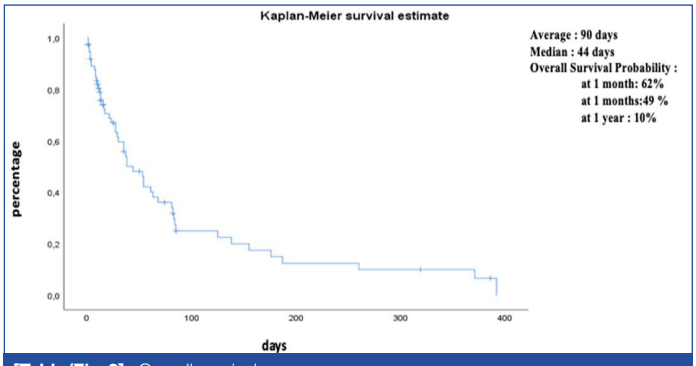
Treatment Characteristics

Overall, 81.6% of patients started treatment within two weeks. The mean time to initiation of treatment was estimated to be 18 days (1-307 days). Only 38 (50.7%) patients received chemotherapy, it was curative for 10 (13.33%) patients and palliative for 28 (37.33%) patients. The curative protocol used induction chemotherapy 3+7 (CytArabine - CeRuBudine) and the palliative treatment used low dose cytarabine in 17 (60.7%) patients, hydroxyurea in 8 (28.6%) patients and corticotherapy 3 (10.7%) patients. Concerning the untreated patients: they had only symptomatic treatment and reanimation care [Table/Fig-1].

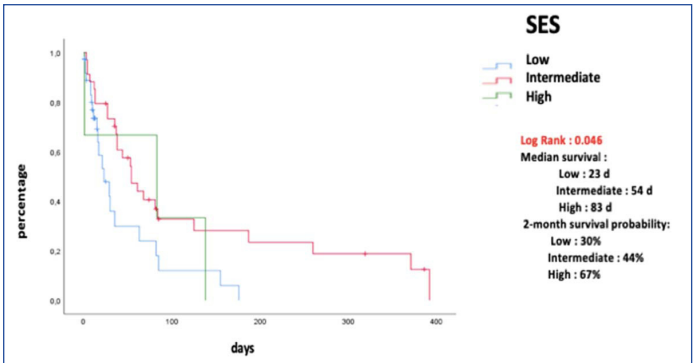
A total of 51 cases of death occurred (68%). The causes of death were decompensated anaemia in 23 (45%) patients, followed by septic shock 6 (12%) patients, leukostasis and respiratory failure 3 (6%) patients, and 19 (37%) patients of cardiopulmonary arrest due to undetermined causes. Mortality was associated with haemoglobin level (p=0.045) and type of chemotherapy used (p=0.041) [Table/Fig-2].

The mean OS was 90 days and the median was 44 days with a probability of 62% at one month; 49% at six months and 10% at one year [Table/Fig-3]. The survival was associated to the SES (log rank=0.046) [Table/Fig-4]. The median survival varied significantly by cytologic type [Table/Fig-5] (log rank=0.05) and the survival was significantly different based on the presence or absence of haemorrhagic syndrome (log rank=0.04) [Table/Fig-6] and the haemoglobin level (log rank: 0.02) [Table/Fig-7]. The same was found clinically but not significantly influencing survival (log rank: 0.18) [Table/Fig-8].

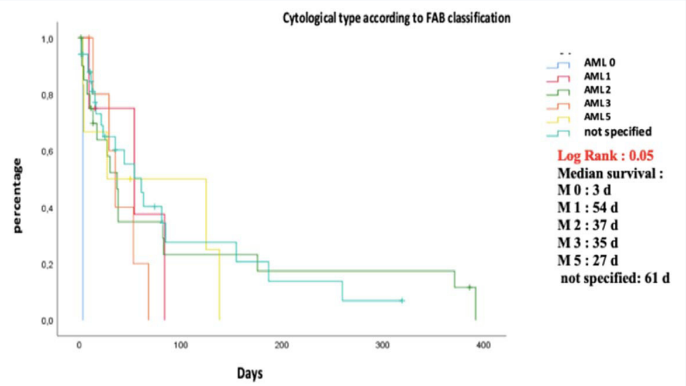
The oldest patients had a median survival of 35 days, versus 54 days for the youngest (log rank=0.44). However, the probability of



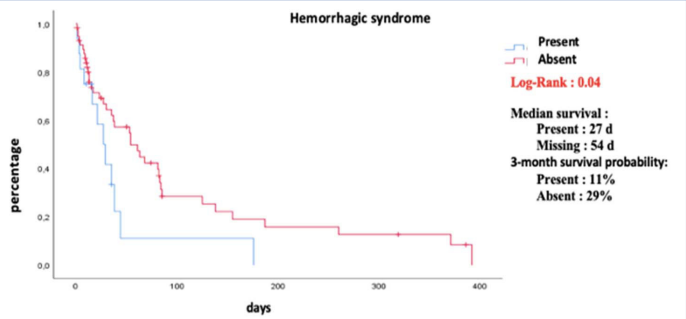
[Table/Fig-3]: Overall survival curve.



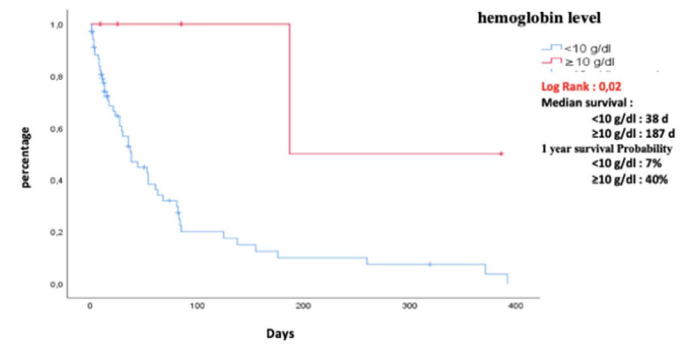
[Table/Fig-4]: Survival curve by SES.



[Table/Fig-5]: Survival curve according to FAB cytological type of AML.



[Table/Fig-6]: Survival curve according to the presence of the bleeding syndrome.



[Table/Fig-7]: Survival curve according to haemoglobin level.

Variables	Median survival (days)	3 month probability (%)	Log rank
Age			
<37 years	54	11	0.44
≥37	35	7	
Sex			
Men	44	10	0.7
Women	38	9	
Performance status			
PS 1/ PS 2	44	27	0.83
PS 3	37	14	
Leukocytosis			
<100 g/L	63	11	0.90
≥100 g/L	35	8	
Tumour syndrome			
Present	37	23	0.39
Absent	54	29	
Bone marrow blastosis			
<50%	81	13	0.92
≥50%	64	11	
Treatment delay (day)			
<15 days	138	20	0.40
≥15 days	54	15	
Protocol used			
Curative	53	19	0.36
Palliative	68	33	

[Table/Fig-8]: Non significant survival parameters.

survival at three months was better for the youngest patients, 11% against 7% for those older than 37 years [Table/Fig-8].

The impact of gender was not significant (p=0.70). However, the median survival of men seemed to be higher (44 days versus 38 days). Survival at three months was more or less the same between the two sexes (10% and 9% M/F).

The median survival of WHO performance status was 44 days for PS 1 and 2 versus 37 days for PS 3. The probability of survival at three months was 27% for patients with PS 1 and 2 versus 14% for patients with WHO performances status (PS)= 3. (log rank=0.83). [Table/Fig-8].

There was no significant influence of presence of clinical tumour syndrome and leukocytosis on survival of patients. The survival curves according to bone marrow blasts were not significantly different. Finally, when the time to initiation of treatment was short (<15 days), the median survival was 138 days versus 54 days. Depending on whether chemotherapy was curative or not, the median survival was 53 days with a three month probability of survival of 19% versus a median of 68 days and a three month probability of 33% for palliative chemotherapy. (log rank: 0.36) [Table/Fig-8].

DISCUSSION

The incidence of AML is low before the age of 40 years, then increases significantly after 60 years, reaching 20-30 cases per 100,000 after 85 years [7]. According to the international literature like Algeria, the sex ratio is close to one with a slight male predominance [8]. The age difference between Africa and the West could be explained by the low life expectancy in Africa compared to western countries. According to the WHO, the life expectancy in Ivory Coast was 58 years in 2018 [9].

As in the majority of African studies, poor socio-economic conditions represent a poor prognostic factor [10,11]. In this study, 85.3% of patients had a performance status (PS) >2. According to the Swedish cancer registries (2009), at the time of diagnosis of 2696 patients, a distribution of PS by age was most favourable in the 40-44 age group and declined with age. In total, half of the patients had a PS 0 or I at diagnosis [12]. This was probably due to the fact that the Swedish healthcare system is more adapted to make the diagnosis earlier. Thus, the patients presented good condition at diagnosis.

There are two major syndromes in all acute leukaemias, the tumour syndrome and bone marrow failure. Hyperleukocytosis, which is one of the biological indicators of tumour syndrome, was >100 g/L in one-third of the cases in this study. Like other African authors, Jmili NB et al., reported that hyperleukocytosis was a poor prognostic factor [13].

The bone marrow failure syndrome was observed in all cases. Rubie H et al., also found anaemia in 100% of patients. These cytopenias could be explained by the proliferation of blasts [14]. It is known that their mitotic index is higher than that of physiological hematopoiesis, and that they induce asphyxiation of the normal cells of the bone marrow. The importance of medullary proliferation of blast cells is constantly reported in the literature as in the work of Löwenberg B et al.,. However, no correlation has been found between the proportion of medullary blast cells and circulating blast cells [11].

The delay to start the treatment could be related to the delay of diagnosis, linked to the insufficient medical infrastructure and the non performing healthcare system, but above all to the low socio-economic level of patients, which constitutes a real problem for the acquisition of drugs. These reasons could explain the low rate of induction of AML in the MICs, as also reported by African peers. Randriamampianina T et al., in Madagascar, reported the induction rate of 20.7% [10]. Therefore, palliative care and palliative chemotherapy remained the alternative, giving rise to a high rate in this study.

It should be noted that no patient achieved CR. These results are much lower than other studies, in which the CR rate is approximately 60-80% in young adults and 35-60% in elderly subjects [14,15]. The therapeutic response was higher in the reported studies because of the combination of targeted therapy with low dose aracytin. Le Floch AC et al., and Slovak ML et al., reported a CR of 76.5% and 71%, respectively [16,17]. Several factors may explain the absence of CR in the present study like the delay in diagnosis as well as in the initiation of treatment, the low socio-economic level in the face of the high cost of chemotherapy, inadequate health structures for therapeutic intensification, and defective haematological resuscitation support, notably the insufficiency or non availability of blood products and haematopoietic growth factors.

The high mortality rate of the patients in this series could be linked to absence of CR. The results of this study are superior to those reported in the literature from France where approximately 30% of deaths per year were noted. Koffi KG et al., in Côte d'Ivoire, reported 51% of deaths [18,19]. The causes of death of patients were the same as in the literature where they are often related to bone marrow failure inherent to AML or post chemotherapy [1].

Age is a powerful prognostic factor for the achievement of CR and survival of patients even if this study did not find a significant impact on mortality. AML in elderly subjects has a poor prognosis [12,20]. In addition, unfavourable cytogenetic abnormalities, and AML secondary to myelodysplastic syndromes increase with age. A study from Seattle, United States observed a total of 116 deaths in a population of 955 patients. There were 37 deaths in patients under 65 years of age versus 79 in older patients [15]. This difference with the index study results could be due to the high proportion of those lost to follow-up (26.7%), which may have underestimated the death rate in the age group over 37 years [Table/Fig-2].

Koffi KG et al., in another African study, reported that the male sex seemed to have a better prognosis than the female sex [19]. Additionally, one must take into account the social vulnerability of the female sex in African society. Few other authors did not find gender to be a factor influencing mortality[20-22].

Some African authors [19,23], have suggested that in Africa, a poor socio-economic level is an element of poor prognosis and a high socio-economic status is an element of good prognosis [19,23]. This was due to the high cost of antibiotics, which were not accessible to the vast majority of patients with low socio-economic status.

In this study, the tumour syndrome had no significant impact on mortality, although the death rate was higher when the tumour syndrome was significant. According to some authors the best indicator of tumour syndrome is leukocytosis, the increase of which is often cited as a poor prognostic factor [20,24,25]. Although the tumour syndrome may be absent, the bone marrow failure syndrome is observed in all cases. Archimbaud E et al., in their study on sequential chemotherapy in advanced AML, concluded that haemoglobin level <10 g/dL is a poor prognostic element. This is not true with thrombocytopenia [21,26].

The sooner the treatment is started, the better the therapeutic response and consequently the death rate. On this basis, it can be said that there was a link, even if not significant, between treatment delay and mortality. Döhner H et al., and Huguet F and Recher C, affirmed that the results of induction treatment of AML are unfavourable when the delay in treatment initiation is greater than five days [2,27]. Similarly, Sekeres MA et al., pointed out that a longer delay is associated with a decrease of CR and survival in young patients <60 years) [28].

Regarding palliative chemotherapy, the results reported in the literature are much better than in this series, which should lead us to review protocols such as those using low dose Aracytin. Indeed, Bolwell BJ et al., and Burnett AK et al., had obtained a CR rate between 31% and 18 %, respectively [29,30]. The use of palliative chemotherapy such as low dose cytarabine allows to obtain 30% of CR against 60% to 80% of the complete remission rate for curative chemotherapy [11]. This could be explained by the inefficiency of the healthcare system and the chain of care from the first orientation of the patient at the appearance of the first symptoms to the treatment and follow-up. Indeed, the decision to start a curative treatment of AML in MICs depends on many parameters unthinkable for a Westerner. These include socio-economic conditions, the unavailability of the technical platform necessary to establish the prognosis to make a better decision, the unavailability and/or unaffordable cost of drugs for induction and haematological resuscitation such as labile blood products and hematopoietic growth factors.

This research identified five factors that significantly influenced overall survival in the care conditions of MICs socio-economic status, haemorrhagic syndrome, haemoglobin level, cytological type, and type of chemotherapy used and the mean OS was 90 days and the median was 44 days with a probability of 62% at one month; 49% at six months and 10% at one year. In contrast, the overall survival rate was higher in more developed countries, Maloisel F et al., in France noted 11.8 months [31].

Lehmann S et al., noted that bleeding was the most common cause of death observed in their study and that these bleeding deaths occurred at a median of four days after diagnosis [32]. Moreover, Estey E et al., in their study on the prediction of survival during induction therapy in patients with newly diagnosed AML, concluded that eight quantifiable factors affect the risk of mortality related to induction therapy, among which the haemoglobin level [33]. Finally, regarding cytological type, the data of the present study is in agreement with of Reiffers J et al., who observed that the CR rate was higher in M1, M2 and M3 forms than in M4 and M5 forms in their studies [34]. However, FAB classification does not appear to be a prognostic parameter independent of cytogenetics and molecular biology [35]. Rare phenotypes of AML, including AML 0, 6 and 7 are associated with a poor prognosis [36].

Some authors stated that the survival of patients with a PS of 1 and 2 was significantly better than that of patients with a PS of 3. Juliusson G et al., concluded that patients with a PS >2 had a worse prognosis independent of age [12]. Appelbaum FR pointed out that the combination of age and performance status is highly predictive of early death after induction therapy in elderly patients [15].

Limitation(s)

The notion of prognosis in our conditions of practice must be nuanced, because immunophenotyping and cytogenetics which are essential to establish the prognosis were almost never performed.

CONCLUSION(S)

These unsatisfactory results are inherent to several factors: advanced stage of the disease, diagnostic and therapeutic management difficulties related to the poor technical platform, difficulties in supplying antimitotic drugs, difficulties in monitoring patients and the precarious nature of the population. Low socio-economic status, presence of haemorrhagic syndrome, haemoglobin level below 10, AML-M0 cytological type and absence of induction therapy are the poor prognostic factors of overall survival in the care conditions of a MIC country. The improvement of survival results will require the setting up of adapted hospital infrastructures, the improvement of the technical platform, the training of qualified medical and paramedical personnel and the assurance of economic support to families.

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