

Seasonal variations in hematological disorders: A 10-year single-center experience



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Background

Seasonal variations in hematological disorders have been largely reported by several epidemiological studies.¹⁻¹⁰ Although the etiology behind this could be due to environmental factors or infectious agent, significant seasonal variations have been revealed in many studies.^{1,2} In particular, many recent studies have reported seasonal variations in hematological disorders such as aplastic anemia (AA), acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), and immune thrombocytopenic purpura (ITP).¹⁻⁴ In developing country such as Pakistan, several determinants such as higher population density, and environmental factors have largely increased the burden of hematological malignancies.^{11,12} By using the MeSH terms such as “seasonal variation in haematological disorders, we retrospectively analyzed the 10-year data of hematological disorders among patients diagnosed on the basis of bone marrow biopsy, who attended National Institute of Blood Diseases (NIBD) clinics.

Materials & Methods

We retrospectively reviewed the 10-year records of hematological disorders among patients' NIBD clinics from year 2006 to 2015. All cases of aplastic anemia (AA), acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), immune thrombocytopenic purpura (ITP), and acute promyelocytic leukemia (APML) were categorized on the basis of the seasons in which they were diagnosed such as winter (December-February), spring (March-May), southwest monsoon periods (June-September), and retreating monsoon period (October and November). Statistical analysis was performed by using SPSS and STATA. Inferential statistics were explored using the chi-square test for heterogeneity to evaluate seasonal variations. P-value

Objective

To assess the seasonal variations in hematological disorders among patients diagnosed on the basis of bone marrow biopsy,

Results

A total of 1982 cases were reviewed. Men were predominantly higher (n = 1190, 60%) as compared to women (n = 792, 40%). Frequency of ALL was found to be higher (513, 25.9%), followed by ITP (504, 25.4%), AML (490, 24.7%), AA (396, 20%), while APML was observed in only 79 (4%) patients. Seasonal variations in the diagnosis of hematological disorders were observed (*P*-value <.001), except in APML diagnosis (*P*-value = .445) as shown in **Figure 1**. Significant seasonal variations were also detected in both genders in stratified analysis. Diagnosis of the patients with respect to Years and heterogeneity tests as presented on table 1. However **Table 2**: Diagnosis of the patients with respect to Seasons and gender, and heterogeneity tests as displayed on **Table 2**.

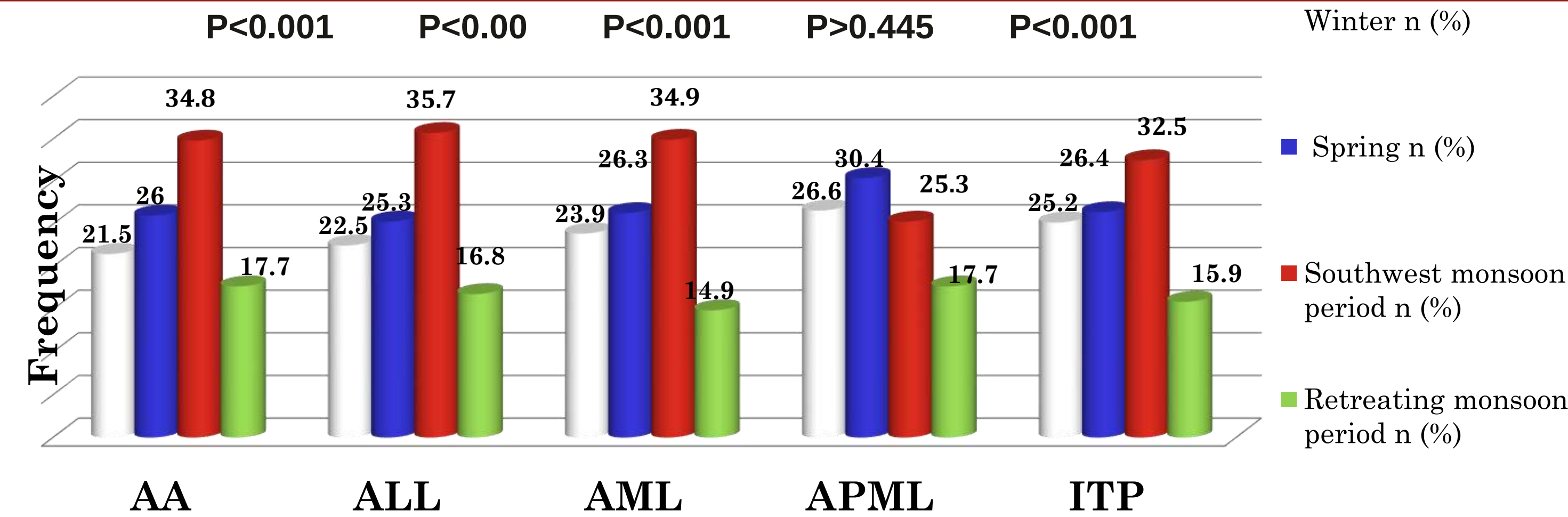
Table 1:Diagnosis of the patients with respect to Years and heterogeneity tests (n = 1982)

	AA (n = 396) Years (%)	ALL (n = 513) (%)	AML (n = 490) (%)	APML (n = 79) (%)	ITP (n = 504) (%)
2006	18(13.7)	49(37.4)	34(26)	5(3.6)	25(19.1)
2007	22(14.9)	37(25)	54(36.5)	8(5.4)	27(18.2)
2008	44(18.4)	53(22.2)	70(29.3)	9(3.8)	63(26.4)
2009	18(11.1)	48(29.6)	49(30.2)	9(5.6)	38(235)
2010	37(21.4)	41(23.7)	30(17.3)	2(1.2)	63(36.4)
2011	35(20.8)	34(20.2)	46(27.4)	7(4.2)	46(27.4)
2012	35(21.3)	45(27.4)	36(22)	7(4.3)	41(25)
2013	55(21)	57(21.8)	50(19.1)	10(3.8)	90(34.4)
2014	74(26.1)	77(27.2)	66(23.3)	8(2.8)	58(20.5)
2015	58(23)	72(28.6)	55(21.8)	14(5.6)	53(21)
Chi-square	77.53	34.89	31.75	11.25	67.54
P*	<0.001	<0.001	<0.001	<0.001	<0.001

Table 2: Diagnosis of the patients with respect to Seasons and gender, and heterogeneity tests (n = 1982)

Cases	Winters n(%)	Spring n(%)	South- west monsoon period n (%)	Retreating monsoon period n(%)	Chi- Square value	P- Value
Male						
AA	42(17.6)	66(27.6)	87(36.4)	44(18.4)	22.5	<0.001
ALL	80(22.9)	71(20.3)	131(37.5)	67(19.2)	30.26	<0.001
AML	75(25.0)	84(28.0)	97(32.3)	44(14.7)	20.34	<0.001
APML	13(25.5)	17(33.3)	10(19.6)	11(21.6)	2.25	0.0521
ITP	64(25.5)	64(25.5)	79(31.5)	44(17.5)	9.86	0.02
Female						
AA	43(27.4)	37(23.6)	51(32.5)	26(16.6)	8.47	0.037
ALL	34(20.7)	59(36.0)	52(31.7)	19(11.6)	23.85	<0.001
AML	42(22.1)	45(23.7)	74(38.9)	29(15.3)	22.75	<0.001
APML	8(28.6)	7(25.0)	10(35.7)	3(10.7)	3.71	0.294
ITP	63(24.9)	69(27.3)	85(33.6)	36(14.2)	19.74	<0.001

Figure 1:Seasonal pattern of the diagnosis



Conclusion

The finding of this study has reported an increase in the hematological disorder during 2006 to 2015. Particularly, majority of the cases were reported in southwest monsoon period, whereas least cases were reported in retreating period. Significant seasonal and yearly variations were detected in all diagnosis except the APML.

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