

Research Article

Incidence Trend of the Leukemia Reported Cases in the Kingdom of Saudi Arabia, Observational Descriptive Statistic from Saudi Cancer Registry

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Abstract

Objectives: Leukemia is a type of the cancers that needs careful registration and reporting among Saudi hospitals. Leukemia is defined as neoplastic proliferation of abnormal white blood cells (WBCs).

Methods: This study was conducted to investigate the incidence of leukemia in the Kingdom of Saudi Arabia, to determine which age group leukemia most commonly affects and also to identify which region in Saudi Arabia is mostly targeted by leukemia. A quantitative observational retrospective cross sectional analysis of the reported cases of leukemia was conducted based on the reports of Saudi Cancer Registry (SCR) in the Ministry of Health (MOH) at Saudi Arabia about leukemia in all regions from the period of January to December 2009. A P-value < 0.05 was considered statistically significant with confidence interval (CI) of 95%.

Results: 619 cases of leukemia were reported. Males are slightly more affected with leukemia by 343 cases (55.4%) than females by 276 cases (44.6%). Patients who are 75+ old of age are the commonly affected age group with leukemia by 20.8 per 100,000 for males and 10.3 per 100,000 for females. Najran was the commonly affected region with leukemia by 7.3 per 100,000 for males and 5.9 per 100,000 for females. The commonly morphological distribution of leukemia was acute lymphoblastic leukemia (ALL) by 133 cases (39%) for males and 108 cases (39%) for females.

Conclusion: Further studies and reports are needed to identify the risk factors targeting a specific age group and specific region in Saudi Arabia with leukemia.

Keywords: Incidence, Leukemia, and Kingdom of Saudi Arabia.

1. Introduction

Leukemia is considered as one of the cancers that have little registration among Saudi hospitals. Leukemia is defined as neoplastic proliferation of abnormal white blood cells (WBCs). These abnormal white blood cells accumulate and interrupt the production of normal and functional WBCs as well as the synthesis of erythrocytes and platelets resulting in anemia and thrombocytopenia. Broadly, Leukemias are classified into four subtypes: acute myelogenous leukemia (AML), acute lymphoblastic leukemia (ALL), chronic lymphocytic leukemia (CLL) and chronic myeloid leukemia (CML)¹. Myelogenous leukemia is present when myeloid cell lineages such as granulocytes or monocytes are affected but when lymphocytes are affected then lymphocytic leukemia is present². The difference between the acute and chronic leukemias is that the acute leukemias are rapidly progressing immature cells (immature cell proliferation which is blast or blast equivalent) while the chronic leukemias are slowly progressing mature cells³. 48,610 newly diagnosed people with leukemia living in United States. 15,680 people are diagnosed with chronic lymphocytic leukemia (CLL), 14,950 people are diagnosed with acute myeloid leukemia (AML), 6,070 people are diagnosed with acute lymphoblastic leukemia (ALL), 5,920 people are diagnosed with chronic myeloid leukemia (CML). Adults people are more commonly affected with both chronic myeloid leukemia and chronic lymphocytic leukemia than children. Children are commonly affected with acute lymphoblastic leukemia (ALL) than adult's people⁴. Incidence trends of all types of leukemia are commonly higher among males than females by 57% of males diagnosed recently in 2013.⁴ Acute lymphocytic leukemia (ALL) incidence was twice than acute myeloid leukemia (AML) for adolescents from 15 to 19 years of age however acute myeloid leukemia (AML) is 57% higher than acute lymphocytic leukemia (ALL) in young adults aged from 25 to 29 years of age⁴. The five-year survival rate of major types of leukemia from 2003 to 2009 was 83.1% for chronic lymphocytic leukemia (CLL) followed by 68.8% for acute lymphoblastic leukemia (ALL), 58.6% for chronic myeloid leukemia (CML) and 24.9% for acute myeloid leukemia (AML)⁴. In United States, 10,370 people died with acute myeloid leukemia (AML) followed by 4,580 people died with chronic lymphocytic leukemia (CLL), 1,430 people died with acute lymphoblastic leukemia (ALL) and 610 people died with chronic myeloid leukemia (CML)⁴.

2. Methods

A quantitative observational retrospective cross sectional analysis of the registered cases was done according to the reports of Saudi Cancer Registry (SCR) in the Ministry of Health (MOH) at Saudi Arabia about leukemia in all regions of Saudi Arabia from the period of January to December 2009. In this study, we looked for incidence of leukemia, which age group is most commonly infected and also to identify which region in Saudi Arabia is mostly targeted for leukemia. Data was analyzed using SPSS [Statistical Package for Social Sciences] (version 19.0). Analyses of the data were including running Chi-Square (χ^2) tests for each region in Saudi Arabia, and for each age group that had leukemia. A P-value < 0.05 was considered statistically significant with confidence interval (CI) of 95%. The median is a descriptive statistic that was used as a measure for the quantitative data.

3. Results

During the period from January to December 2009, the laboratories of the Saudi Ministry of Health reported a total of 619 cases of leukemia estimating for 6.3% of all newly diagnosed cancers (Table 1). Males are more affected with leukemia by 343 cases (55.4%) than females by 276 cases (44.6%) with a male to female ratio of 124:100 (Table 2). The incidence of leukemia is increasing with the increase of age. Patients who are 75+ old of age

are the most common affected age group with leukemia by 20.8/100,000 and 10.3/100,000 for males and females respectively (Figure 1). The overall Age Specific Incidence rate (ASIR) was 4.3/100,000. Age Specific Incidence Rate (ASIR) was 4.6/100,000 and 3.7/100,000 for males and females respectively (Figure 1). The median age was 26 years and 20 years for males and females respectively at the time of diagnosis (Figure 1). The commonly morphological distribution of leukemia was acute lymphoblastic leukemia (ALL) by 133 cases (39%) for males and 108 cases (39%) for females followed by acute myeloid leukemia (AML) by 89 cases (26%) for males and 85 cases (31%) for females then chronic myeloid leukemia (CML) by 55 cases (16%) for males and 45 cases (16%) for females and finally chronic lymphocytic leukemia (CLL) by 46 cases (13%) for males and 16 cases (6%) for females (Table II). The commonly region targeted by leukemia were Najran followed by Riyadh, Medina, then Eastern and Asir by 7.3, 5.8, 5.8, 5.6 and 4.4 per 100,000 respectively for males while 5.9, 5.7, 5.0, 5.3 and 3.5 per 100,000 respectively for females (Figure 2).

Table 1: Ten Most Common Cancers among Saudis, 2009 (All Ages)

| Cancer | No. | % |
|----------------------|------------|------------|
| Breast | 1331 | 13.5 |
| Colo-rectal | 1109 | 11.3 |
| Non-Hodgkin Lymphoma | 709 | 7.2 |
| Thyroid | 679 | 6.9 |
| Leukemia | 619 | 6.3 |
| Liver | 431 | 4.4 |
| Lung | 379 | 3.9 |
| Hodgkin Disease | 344 | 3.5 |
| Skin | 322 | 3.3 |
| Stomach | 313 | 3.2 |

Table 2: Morphological Distribution of Leukemia in Saudi Arabia, 2009

| Morphological Type of Leukemia | Male | % | Female | % |
|---|------------|------------|------------|------------|
| Acute Lymphoblastic Leukemia (ALL) | 133 | 39 | 108 | 39 |
| Acute Myeloid Leukemia (AML) | 89 | 26 | 85 | 31 |
| Chronic Myeloid Leukemia (CML) | 55 | 16 | 45 | 16 |
| Chronic Lymphocytic Leukemia (CLL) | 46 | 13 | 16 | 6 |
| Other Types of Leukemia or Undetermined | 20 | 6 | 22 | 8 |
| Total number of Cases | 343 | 100 | 276 | 100 |

Figure 1: Age-Specific Incidence Rate (AIR) for Leukemia in Saudi Arabia, 2009.

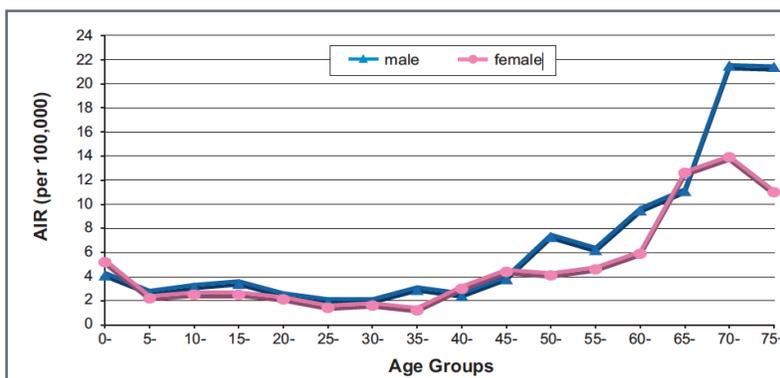
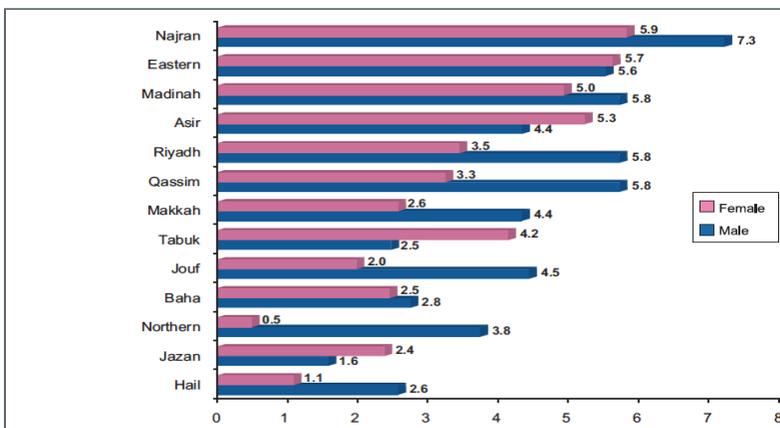


Figure 2: Regional Distribution of Leukemia in Saudi Arabia, 2009 (per 100,000).

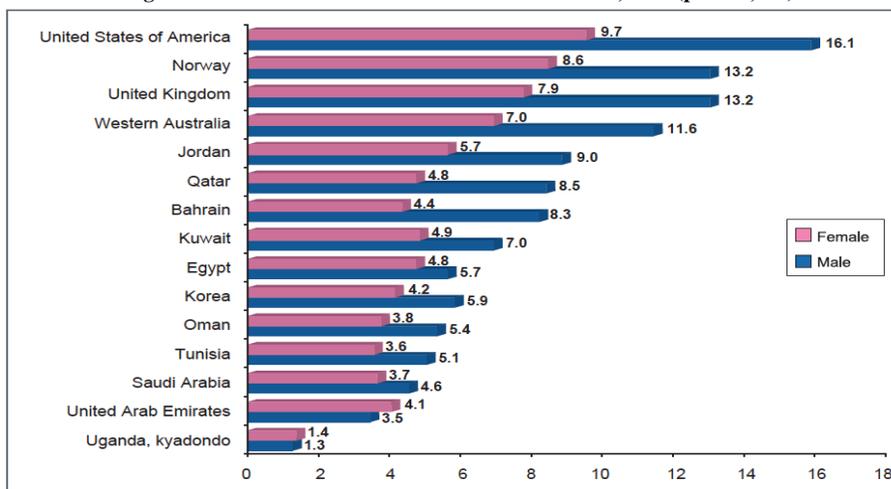


4. Discussion

The epidemiological studies showed that the incidence of leukemia in Saudi Arabia remained almost the same among the years. There was little evidence suggesting the incidence trend of the reported cases of leukemia in Saudi Arabia. Khalid Al-Ahmadi and Ali Al-Zahrani reported from 1998 to 2004 that leukemia incidence in Saudi Arabia was 8.19% ranked third for males after liver cancer and Non-Hodgkin’s lymphoma (NHL) while in females, it

was 7.2% ranked fifth after breast cancer, thyroid cancer, colorectal cancer and Non-Hodgkin's lymphoma (NHL)⁵. The incidence of leukemia in our study showed that Eastern Region ranked second which is might be due to presence of ARAMKO, the largest oil company around the world and Jubail Industrial City, global city for chemical industries. Many reports revealed that Exposure to petroleum, petrochemicals and petroleum oil was strongly associated with leukemia^{6,7,8,9} however, further studies are needed to determine whether if this association also occurs in Saudi Arabia. Moreover, there was seldom reports about the incidence of leukemia in specific region which is Northern region reporting that leukemia ranked sixth among all types of cancers by 26 cases registered in 2002.¹⁰ An other study was done in Central Hospital (Riyadh) by Khan MQ, etc.; el (from January 1981 to December 1988) reported 293 cases of different morphological types of leukemia admitted in Central Hospital in Riyadh. Acute myelogenous leukemia (AML) in this study was the most common type of leukemia that has been admitted by 37.54% followed by acute lymphocytic leukemia (24.23%) followed by chronic myeloid leukemia (19.11%) followed by chronic lymphocytic leukemia (18.77%)¹¹. Worldwide, United States of America was the most country that have higher registered cases of leukemia by 16.1 per 100,000 and 9.7 per 100,000 for males and females respectively followed by Norway and United Kingdom by 13.2 and 13.2 per 100,000 for males and 8.6 and 7.9 for females while Jordan from middle east countries ranked fifth by 9.0 per 100,000 for males and 5.7 per 100,000 for females¹². Qatar from gulf countries ranked sixth by 8.5 per 100,000 for males and 4.8 per 100,000 for females followed by Bahrain and Kuwait at much lower incidence rates¹². Kingdom of Saudi Arabia was ranked thirteenth for the registered cases of leukemia by 4.6 per 100,000 for males and 3.7 per 100,000 for females followed by United Arab of Emirates and Uganda, Kyadondo at much lower rates compared to the selected countries from Europe, middle east and gulf countries¹² (Figure 3).

Figure 3: Incidence of Leukemia in Selected Countries, 2009 (per 100,000).



5. Conclusions

This study shows that leukemia incidence increased with age; so, further research work is needed to identify the Risk factors affecting a specific age group and targeting a specific region with leukemia since multi factors are implicated in different regions in Saudi Arabia. Further comprehensive studies are required including careful reports of leukemia cases and collection of long-term registry data among Saudi hospitals with sub-type classification following new WHO leukemia classification system. Further, demographic, socio-economic, and genetic studies are required to improve the knowledge about demographical variations of the incidence of leukemia that eventually will improve our understanding about the epidemiology of the disease and enhances authorities' action against the leukemia.

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