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Research Article

Incidence of Anemia among Female with Solid Tumors at Diagnosis in Jazan City Before Receiving Treatment

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Abstract

Background and Objective: The incidence of cancer in Saudi Arabia has increased in recent years. Anaemia may result from various etiologies in patients with cancer, mainly nutritional deficiencies, direct disease effects, hemolysis, blood loss, inflammation of chronic disease, effects of chemotherapy and radiation therapy. This study aimed to evaluate the incidence of anaemia among female cancer patients with leukocytosis in Jazan city using the retrospective record-based study of 235 female cancer patients in Jazan at the time of diagnosis. **Materials and Methods:** Female patients who met the following inclusion criteria were included in this study: First, diagnosis of any type of cancer at grade 1 only, second, a measurement of RBC and Hb, RBC count less than $4.5 \text{ M } \mu\text{L}^{-1}$ and haemoglobin Hb level less than $11.5 \text{ g } \mu\text{L}^{-1}$. **Results:** Among this study, breast cancer was the common type, followed by female genital tract, colorectal and the least common type is head and neck. Significantly, the highest number of anaemia cases detected were in the colorectal cancer group (32%), followed by the breast group with 29%, the female genital tract (27%) and the head and neck cancer group with about 12%. **Conclusion:** Anemia is common among female solid cancer patients at diagnosis in Jazan city, the risk of developing anaemia is high after chemotherapy therefore promoting awareness about the risk of anaemia is important in Jazan city especially among female individuals.

Key words: Anemia, cancer, Jazan City, solid tumour in female

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Competing Interest: The author has declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Cancer is considered a critical challenge for human society's well-being. Cancer is a diverse disease targeting many tissues and this diversity causes many difficulties in diagnosis and treatment, especially as the earlier diagnosis can lead to more effective treatment^{1,2}. In males, the highest percentages of cancer types are prostate, lung and bronchus, colon and rectum and urinary bladder, respectively^{3,4}. In females, cancer prevalence is highest in the breast, lung and bronchus, colon and rectum, uterine corpus and thyroid, respectively⁴. The data indicate that prostate and breast cancer constitutes a major portion of cancer in men and women, respectively. For children, the most common types of cancer are blood cancer and cancers related to the brain and lymph nodes, respectively. Cancer occurs due to a chain of successive mutations in genes, so these mutations change cell functions¹. Chemical compounds have an apparent role in forming gene mutations and cancer cells⁵. Several functions of the immune system are affected by anaemia, including nonspecific immune host mediators, particularly the phagocytic system⁶.

In Saudi Arabia, the incidence of cancer has increased in recent years⁷. According to the Saudi Cancer Registry, there were 1979 recorded cases of breast cancer in 2015 and in 2018, the World Health Organization (WHO) stated that the number had increased to 3629 cases. The incidence of colorectal cancer in males, which is more common than in females, showed an increase in the number of cases, from 810 in 2015-2405 in 2018. Thyroid cancer in both men and women has increased in the number of cases, from 1020 cases in 2015-2462 cases in 2018. A recent study in Taif reported the prevalence of anaemia among female cancer patients⁸.

Anaemia is a common disorder where the body has low levels of RBC which lead to impaired oxygen distribution to the human body cells and tissues, moreover, it is described either by a low haemoglobin H, RBC or HCT count less than normal levels. The WHO stated that anaemia is determined as Hb level $<12 \text{ g dL}^{-1}$ in non-pregnant women and $<13 \text{ g dL}^{-1}$ in men ≥ 15 years. Anaemia is 1 of the most frequent comorbidities in cancer patients. From 30-90% of all cancer patients are anemic⁹. Anaemia is a multi-factorial problem in patients with malignancies. Anaemia is very common, its prevalence is about 40% in patients with cancer, increasing up to 90% after chemotherapy.

Anaemia may result from various etiologies in patients with cancer, mainly nutritional deficiencies, direct disease effects, hemolysis, blood loss, inflammation of chronic disease, effects of chemotherapy and radiation therapy. Nutritional

deficiencies are easily managed and are typical causes of anaemia in patients with cancer. Also, inflammation caused by cancer itself may lead to anaemia via inflammatory cytokines TNF- α and IL-6 (tumour necrosis factor- α and interleukin-6) and genetic regulatory mechanisms of erythropoiesis. In patients with cancer, anaemia contributes to decreased quality of life⁹. The objective of this study was to evaluate the incidence of anaemia among female cancer patients in Jazan City.

MATERIALS AND METHODS

Study area: This study was conducted from December, 2020 to February, 2021 in Jazan city, Saudi Arabia.

Research protocol: This is a retrospective record-based study of cancer patients in Jazan at the time of diagnosis. Female patients who met the following inclusion criteria were included in this study: First, diagnosis of any type of cancer at grade 1 only, second, a measurement of RBC and Hb, RBC count less than $4.5 \text{ M } \mu\text{L}^{-1}$ and haemoglobin Hb level less than $11.5 \text{ g } \mu\text{L}^{-1}$. Microsoft excel for Office was used for sorting data, calculating frequencies, percentages and building diagrams.

Statistical analysis: Current results were not normally distributed, therefore unpaired-t-test for comparing non-anaemic to anaemic patients and Chi-square for comparing age groups, was considered significant $p < 0.05$.

Ethical concerns: Ethical approval was obtained from the directorate of health affairs, IRB registration number HAP-02-T-067.

RESULTS

Demographic analysis: Between 2018-2020 there were over 400 recorded cancer cases in Jazan, mostly female, with 235 cases being early diagnosed female cancer patients and there were exclusions of 15 cases. Those cases were grouped into 4 subdivisions: Breast cancer, which includes both left and right breasts, colorectal cancer, which includes sigmoid, rectum, caecum, colon and duodenum cancers, female genital tract cancers, which include ovarian, endometrium, cervical, vaginal wall and uterus and head and neck cancers, which include esophageal, pharyngeal and thyroid cancers. The data is expressed in Table 1 according to the number of cases. The highest number of cases is found in the type of breast cancer.

Table 1: Demographical data of cancer cases in Jazan in 2018-2020

	Cancer groups			
	Breast	Colorectal	Female genital	Head and neck
Number of cases	87	50	62	21
Total	220			

Numbers are reported as cases diagnosed with a specific type of cancer

Table 2: Incidence of anaemia among female cancer patients at grade 1 in Jazan city

Types of cancer	Anemic (%)	Non-anemic (%)	p-value	Anaemia incidence among age groups			p-value
				≤49 (%)	50-64 (%)	≥65 (%)	
Breast cancer	37 (41)	53 (59)	0.09	14 (37.8)	17 (46)	6 (16.2)	0.065
Colorectal cancer	37 (74)	13 (26)	0.041	11 (30)	9 (24)	17 (46)	0.028
Female genital tract	32 (51.6)	30 (48.4)	0.089	15 (46.8)	11 (34.45)	6 (18.7)	0.047
Head and neck	13 (59)	9 (41)	0.092	9 (69.2)	3 (23)	1 (0.8)	0.046

Anaemia is diagnosed when RBC <4.5 M μL^{-1} and haemoglobin Hb level <11.5 g μL^{-1}

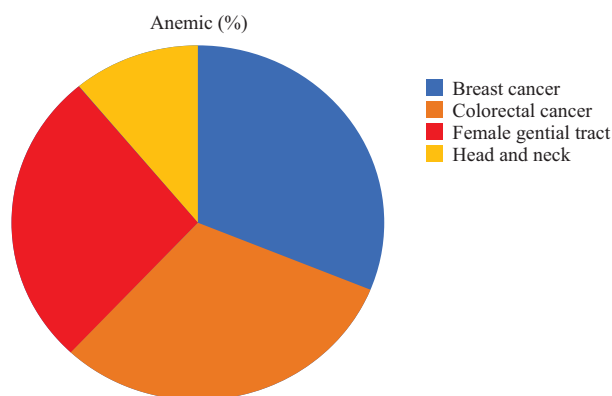


Fig. 1: Incidence of anaemia among the study group

Anaemia is diagnosed when RBC <4.5 M μL^{-1} and haemoglobin Hb level <11.5 g μL^{-1} , (p = 0.031)

In Table 2 the incidence of anaemia among cancer patients was illustrated. This study included 87 female patients with breast cancer who satisfied the inclusion criteria. Thirty four cases developed anaemia and 53 were non-anaemic. Comparing those 2 frequencies showed an insignificant p = 0.9. Most anaemic cases were found in age groups less than 65 years, elder patients that are ≥65 years were only 15% of all cases. Comparing those 2 frequencies show an insignificant p = 0.085. This study included 50 female patients with colorectal cancer patients who satisfied the inclusion criteria. The 37 cases developed anaemia and 13 were non-anaemic. Comparing those 2 frequencies showed a significant p = 0.041. Most anaemic cases were found in the 65 years and older age group, who are considered elders having 45%. Comparing those frequencies shows significant p = 0.028. This study included 62 female patients with genital tract cancer who satisfied the inclusion criteria. The 32 cases developed anaemia and 30 were non-anaemic. Comparing those, the 2 frequencies have shown insignificant

p = 0.089. Most anaemic cases were found in patients younger than 49 years, who are considered adults, their percentage was 47%. Comparing those frequencies have shown a significant p = 0.047. This study included 21 head and neck cancer patients who satisfied the inclusion criteria. The 13 cases developed anaemia and 9 were non-anaemic. Comparing those, the 2 frequencies have shown insignificant p = 0.092. Most anaemic cases were in patients younger than 49 years, who are considered adults. Their percentage is 72%. Comparing those frequencies shows significant p = 0.021.

The study found that the highest number of anaemia cases detected were in the colorectal cancer group 32%, followed by the breast group with 29%, the female genital tract 27% and the head and neck cancer group with about 12% (p = 0.031) in Fig. 1.

DISCUSSION

This study has evaluated the incidence of anaemia in female cancer patients in Jazan. About 220 cases were included and the same number was excluded as they did not satisfy the study inclusion criteria. This study has focused only on female subjects as anaemia is twice as prevalent in females as in males^{10,11}. Anaemia is related to several health problems. The development of anaemia is due to iron deficiency and a shortage of oxygen-transporting capabilities that help to reduce the human body's physiological and biological activities. The symptoms related to this disorder range from general fatigue and weakness to those that will lead to hospitalization and increased morbidity and mortality. According to the WHO, anaemia is categorized according to Hb levels as either severe, moderate, or mild¹².

Cancer-related anaemia is detected in a third of cancer patients and it is essential to treat it before approaching

antineoplastic treatment¹³. Anaemic cancer patients showed a greater decline in their quality of life than non-anaemic cancer patients, they show more signs of fatigue, anorexia, shortness of breath, a decline in biological activities and low concentration levels¹⁴. Also, their body response to antineoplastic treatment differs from that of non-anaemic cancer patients¹⁵.

The current study has subdivided cancer groups into 4 subdivisions: Breast cancer group, colorectal cancer, female genital tract cancer and head and neck cancer. Anaemia cases were evaluated according to frequency and age group. The colorectal cancer group has the highest anaemic cases among the 4 groups, consistent with previous studies indicating high incidences of anaemia in colorectal cancer patients and the elder age group has the highest incidence rate^{13,16}. Following that, breast cancer patients have the 2nd high incidence rate, followed by female genital and head and neck cancer groups, which is consistent with other studies^{13,17}.

The association between anaemia and cancer affects the life and well-being of cancer patients. The impact of these 2 disorders is high among patients, hospitalization and the budget of health centres nationally. These can also increase hospitalization time, leading to a shortage of free beds for new patients and high spending of assigned budgets. Improving the management of anaemia can solve a high percentage of these problems. Limitations of this study include detecting co-viruses in samples and correlating the results with our findings. Correlating the findings with medications prescribed to patients before detecting cancer should be investigated.

This study recommends increasing public awareness about anaemia effects and management as well as educating them about improving their health, diet and living conditions to reduce the incidence of cancer. For future directions, this study recommends collecting samples from those patients and investigating co-viruses such as Human Papilloma Viruses (HPV) that can be detected in several cancer developments.

In this study, Anemia is common among female solid cancer patients at diagnosis in Jazan city. Anaemia is a multifactorial disorder and can lead to poor prognosis in cancer patients and other diseases such as COVID-19. More surveillance and screening studies should be conducted. The risk of developing anaemia is high after chemotherapy therefore promoting awareness about the risk of anaemia is important in Jazan city especially among female individuals.

CONCLUSION

Anaemia is common among female solid cancer patients at diagnosis in Jazan city, current study has detected anaemia

is high among the colorectal cancer group even though it is less common than breast cancer. Developing anaemia in this type of cancer is common according to several studies. Furthermore, the risk of developing anaemia is high after chemotherapy therefore promoting awareness about the risk of anaemia is important in Jazan city especially among female individuals.

SIGNIFICANCE STATEMENT

Anaemia leads to poor oxygen distribution to human cells, tissues and organs. This is due to decrease levels of haemoglobin which lead to weak functioning status. Developing anaemia after chemotherapy is common and affects the treatment of those patients. Therefore, avoidance of factors that leads to anaemia is essential. Promoting awareness about anaemia and the risk factors associated with this disorder should be conducted in Jazan city.

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