Original article

Clinical and therapeutic characteristics and medical cost of managing cancer patients in Al-Anbar, Iraq: A cross-sectional study

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ABSTRACT

Background: Cancer is a complex disease that is one of the leading causes of death. This study aimed to investigate the clinical and therapeutic characteristics, as well as the medical cost of managing adult cancer patients in Al-Anbar city in Iraq from the patient's perspective.
Method: This was a prospective cross-sectional study that was carried out at the Al-Anbar Oncology Centre between September and December 2021. Direct medical cost data includes the cost of treatment, healthcare professional visits, laboratory tests, and surgery. Furthermore, patients were contacted and asked to estimate the direct non-medical costs (transportation costs) connected with their disease, as well as describe side effects of their cancer therapy. Logistic regression was used to identify variables associated with higher cancer management costs.
Results: This study included 500 patients in total. The median overall management cost is 2,765.0 $ (IQR: 3,888.7$). The median cancer management cost differed statistically significantly depending on the stage of the disease, with stage two patients having a lower median cost than other patients (p < 0.05). Patients suffering from colon and brain cancer having significantly higher costs (p ≤ 0.05). The median duration of disease was 1.0 year (IQR: 1.0 year). More than half the patients (65.4 %) were at stages three and four. Breast cancer (among females), ovarian cancer (among females), and lymphoma were the most common types of cancer, accounting for 53.9 %, 10.5 %, and 8.6 %, respectively. Almost all patients (99.8 %) were undergoing chemotherapy. More than half of the patients (64.8 %) had surgery to manage their disease, and 16.6 % had radiotherapy as part of their treatment plan. The most widely utilized chemotherapy therapeutic classes were antimicrotubular and platinum analogues with 34.0 % and 33.6 %, respectively. The most common cancer therapy side effects were nausea and vomiting, hair loss, and appetite loss, with 85.2 %, 75.2 %, and 54.2 %, respectively.
Conclusion: Breast cancer (in females), ovarian cancer (in females), and lymphoma are the most common types of cancer in Iraq. More research on the risk factors for these types of cancer is needed. Furthermore, additional economic studies from other perspectives are required to highlight the economic burden of cancer in Iraq.

1. Introduction

Cancer is an uncontrollable cell proliferation that spreads throughout the whole body (Su 2015). Cancer caused the deaths of 9.6 million people around the world in 2018 (Bray 2018). In 2015, an average of 90.5 million people were diagnosed with cancer (GBD 2015 Disease and Injury Incidence and Prevalence Collaborators 2016). Metastatic cancer affects half of all people with cancer (GBD 2015 Disease and Injury Incidence and Prevalence Collaborators 2016, McGuire 2016, Bray 2018). Smoking is one of the major cancer risk factors, accounting for around 22 % of cancer deaths (World Health Organization 2022). Overweight, lack of

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exercise, unhealthy diet, and alcohol consumption are other risk factors that account for around 15 % of cancer-related deaths (Jayasekara 2016, National Cancer Institute 2022, World Health Organization 2022).

The most frequent type of cancer among women is breast cancer, accounting for 25 % of all female cancer patients and 15 % of all female cancer fatalities. Males are more likely than females to develop lung cancer, which accounts for 13 % of all cancer cases (Torre 2015). Iraq was in a state of continuous war, which led to the prevalence of various cancer risk factors (obesity, smoking, poor diet, diabetes); this has lately changed, despite the lack of adequate preventive efforts (Khader 2018).

Iraqi healthcare expenditure is lower than in other countries in the Middle East. In 2019, the country's annual budget was 133 trillion Iraqi dinars (ID) (91 billion United States Dollar (USD)); only 4.5 % (six trillion ID) of that was spent on the environment and healthcare. In 2015, the World Health Organization (WHO) reported that the average spent per person in Iraq for healthcare services was $154 per person, compared to neighboring Jordan's $257 and Iran's $366 (Al-Saiedi and Haddad 2021).

Cancer is the second most common cause of death in Iraq (World Health Organization 2022). In 2020, the International Agency for Research on Cancer reported that in 2018, there were more than 25,000 new cancer cases identified in Iraq, accompanied by 14,523 deaths (International Agency for Research on Cancer 2020). The key concern among healthcare decision-makers in Iraq is to ensure the efficient use of healthcare resources and equal access across the community. Iraq uses the public sector modernization (I-PSM) program, which aims to improve public service delivery (World Bank Group 2014).

All the previous studies focused on specific types of cancer (for example, breast cancer) or specific populations (women or children). No previous study in Iraq has explored the economic impact of cancer on patients and the cost of cancer management. The aim of this study was to explore the clinical and therapeutic characteristics of adult cancer patients in Al-Anbar, Iraq. Additionally, this study provided an estimate of the medical cost of cancer management from a patient perspective in Iraq.

2. Method

2.1. Study design

This was a prospective cross-sectional study that was conducted in the Al-Anbar Oncology Centre between September and December 2021.

2.2. Sampling strategy

Patients who had any type of cancer, at any stage, and who were willing to participate in the study formed the study population.

2.3. Sampling procedure

A convenience sampling technique was used to recruit eligible participants. Cancer patients who were receiving standard medical care at the oncology cancer center were invited to participate in this study. The study identified eligible patients attending physicians' appointments with the aid of the clinic receptionists. The lead researcher (H.A) of this study recruited cancer patients after describing the study's aims and objectives. Arabic-language patient consent forms and information sheets about the study were given to the patients. Additionally, patients were made aware that their consent to participate in the study and the provision of their infor-

mation is considered as a written consent and agreement to participate in the study.

2.3.1. Inclusion criteria

Patient recruitment in this study was carried out based on the following inclusion criteria: a) have any type of cancer, b) whether male or female, c) above 18 years old, and d) are stable and conscious patients.

2.4. Data extraction

Data was collected by the researcher from patients' medical files (patients' demographics, clinical and therapeutic characteristics). This included age, gender, comorbidities, BMI, type of cancer, duration of the cancer, stage, type of cancer therapy, details about cancer therapy, and reported cancer treatment side effects. Direct medical cost data was extracted from the reports of the finance department in the oncology centre and included the cost of treatment, cost of healthcare professional's visits, laboratory test costs, and surgery costs. Additionally, patients were asked to estimate the direct non-medical costs (transportation costs) associated with their disease and to report side effects of their cancer therapy. The costs were given in USD (one USD equals 1,458.52 Iraqi dinars as of December 31, 2021).

2.5. Ethical approval

The study protocol was approved by the scientific research ethics committee at Isra University, Amman, Jordan (SREC/21/06/008) and the research ethics committee at Al-Anbar Oncology Centre (605–8/18/2021).

2.6. Sample size

According to the WHO, the number of patients with cancer in Iraq is 79,057 (World Health Organization 2020). Therefore, the minimum required sample size was 385 patients with a confidence interval of 95 %, a standard deviation of 0.5, and a margin of error of 5 %.

2.7. Statistical analysis

Data were analysed using the SPSS software, version 27. Continuous variables were presented as mean (standard deviation (SD)) for normally distributed data and as median (interquartile range (IQR)) for non-normally distributed data. Normality of the data was checked using histogram and skewness measure. A confidence interval of 95 % (P 0 < 0.05) was applied to represent the statistical significance of the results, and the level of significance was assigned as 5 %. Logistic regression was used to identify variables associated with higher cancer management costs. The dummy variable was constructed based on the median cost of the study sample (2,765.0$). Any patient with a total cancer management cost of 2,765.0$ and above was given a score of 1, and anyone below this total cost was given a score of zero. Mann-Whitney test/ Kruskal-Wallis test was used to explore the variation in the median cost between different demographic groups.

3. Results

3.1. Patients baseline characteristics

A total of 540 patients were invited to participate in this study, of which 500 agreed to participate and were involved in this study (response rate 92.3 %). More than half (64.6 %) were females. The

majority (70.4 %) were married, and more than half of them (64.2 %) were unemployed. The median reported monthly income was 800.0$ (IQR: 700$). Only 16.4 % of the patients reported that they were current smokers. The median body mass index (BMI) for the patients was 26.8 kg/cm^2 (IQR: 7.4 kg/cm^2). A total of 45.6 % of the patients had a previous surgery history. A total of 31.4 % of the patients had metastatic cancer. Around one-quarter (23.4 %)of the patients reported cancer family history, of which half of them (50.4 %) had the same type of cancer. The most common comorbidities among the patients were hypertension, diabetes mellitus, and dyslipidaemia, with 19.4 %, 14.6 %, and 4.4 %, respectively. Oral antidiabetic agents, calcium channel blockers, and beta-blockers were the most commonly used chronic disease medications. Table 1 below describes the baseline characteristics of the study sample.

3.2. Clinical characteristics of cancer patients

Table 2 shows the clinical characteristics of cancer patients. The median duration of disease was 1.0 year (IQR: 1.0 year). More than half the patients (65.4 %) were at stages three and four. The most prevalent types of cancer were breast cancer (among females),

Table 1
Patients baseline characteristics.

Demographic characteristics	Frequency	Percentage
Age(years)(mean (SD))	49.8 years (14.3)	
Gender		
Female	323	64.6 %
Marital status		
Single	58	11.6 %
Married	397	79.5 %
Divorced	4	0.6 %
Widowed	41	8.3 %
Employment status		
Retired	59	11.8 %
Unemployed	321	64.2 %
Employed	120	24.0 %
Monthly income(median (IQR))	800.0 $ (700$)	
Smoking status		
Yes	82	16.4 %
BMI (kg/cm^2) (median (IQR))	26.8 kg/cm^2 (7.4 kg/cm^2)	
Previous surgery history		
Yes	228	45.6 %
Metastasis		
Yes	157	31.4 %
Cancer family history (first degree relative with cancer)		
Yes	117	23.4 %
If the patients had cancer family history, is it the same type the patient diagnosed with? (n = 117)		
Yes	59	50.4 %
Comorbidities		
Hypertension	97	19.4 %
Diabetes mellitus	73	14.6 %
Dyslipidemia	22	4.4 %
Heart diseases	14	2.8 %
Nephropathy	3	0.6 %
Liver diseases	3	0.6 %
Epilepsy	3	0.6 %
Arthritis	2	0.4 %
Neuropathy	1	0.2 %
Chronic medications use history		
Oral antidiabetic agents	66	13.2 %
Calcium channel blockers	46	9.2 %
Beta-blockers	33	6.6 %
Angiotensin receptor blockers	33	6.6 %
Diuretics	27	5.4 %
Statin	19	3.8 %
Angiotensin converting enzyme inhibitors	14	2.8 %
Aspirin	10	2.0 %
Insulin	6	1.2 %
Antiplatelet	6	1.2 %

Table 2
Clinical characteristics of cancer patients.

Variable	Frequency	Percentage
Duration of disease (years) (median (IQR))	1.0 year (1.0)	
Stage (n = 407)		
1	16	3.9 %
2	64	15.7 %
3	170	41.8 %
4	157	38.6 %
Type of cancer[*]		
Breast	174	53.9 %[§]
Ovarian	34	10.5 %[§]
Lymphoma	43	8.6 %
Stomach	34	6.8 %
Colon	31	6.2 %
Lung	26	5.2 %
Bladder	24	4.8 %
Pancreas	24	4.8 %
Rectal	12	2.4 %
Liver	11	2.2 %
Prostate	7	1.4 %
Brain	7	1.4 %
Myeloma	4	0.8 %
Bone	3	0.6 %
Mouth	2	0.4 %
Leukaemia	2	0.4 %
Kidney	2	0.4 %
Testicular	1	0.2 %
Oesophagus	1	0.2 %
Others	50	10.0 %

[*]Total number is more than 500 as some patients had multiple types of cancer.
[§] Percentage calculated from total number of females only.

ovarian cancer (among females) and lymphoma, with 53.9 %, 10.5 %, and 8.6 %, respectively.

3.3. Characteristics of cancer therapy

Table 3 describes the characteristics of cancer therapy among the study sample. Almost all patients (99.8 %) were receiving

Table 3
Characteristics of cancer therapy.

Type of therapy	Frequency	Percentage
Chemotherapy alone	167	33.4 %
Chemotherapy and surgery	250	50.0 %
Chemotherapy and radiotherapy	9	1.8 %
Chemotherapy, radiotherapy and surgery	74	14.8 %
Patients receiving pre-medications (Ranitidine, Dexamethasone, Chlorpheniramine, and Ondansetron)		
Yes	400	80.0 %
Type of chemotherapy[§]		
Antimicrotubular	170	34.0 %
Platinum Analogue	168	33.6 %
Antibiotic	147	29.4 %
Monoclonal antibodies	139	27.8 %
Antimetabolite	129	25.8 %
Antineoplastic, Alkylating	113	22.6 %
Vinca Alkaloid	43	8.6 %
Bisphosphonate Derivatives	35	7.0 %
Rescue Agents	23	4.6 %
Topoisomerase Inhibitors	22	4.4 %
Podophyllotoxin Derivatives	20	4.0 %
Uroprotectants	18	3.6 %
Estrogen Receptor Antagonist	8	1.6 %
GNRH Agonist	6	1.2 %
Aromatase Inhibitor	2	0.4 %
Angiogenesis Inhibitor	2	0.4 %
Proteasome Inhibitors	2	0.4 %
Antiandrogen	1	0.2 %

[§] Total number is more than 499 as most patients receive multiple types of chemotherapy.

chemotherapy. More than half (64.8 %) of the patients received surgery for their disease, and 16.6 % of them received radiotherapy as a part of their treatment protocol. One-third of the patients received chemotherapy only, and 50 % received combination therapy of chemotherapy, radiotherapy, and surgery, Fig. 1. The most commonly used chemotherapy therapeutic classifications were antimicrotubular and platinum analogue, with 34.0 % and 33.6 %, respectively.

3.4. Side effects of cancer therapy

Fig. 2 below shows the most commonly reported cancer therapy side effects among cancer patients. Nausea and vomiting, hair loss, and appetite loss were the most prevalent cancer therapy side effects with 85.2 %, 75.2 %, and 54.2 %, respectively.

3.5. Cost of illness

According to the statistics of the cancer centre, the total number of medical staff is 149. The estimated total monthly cost of the medical staff who take care of cancer patients is 98,550$. Given that 40 patients visit the cancer center on average every day (five days a week), the estimated monthly cost of medical staff management per patient is 112.0 $ (assuming 880 patients visit the center every day for a period of 22 working days). Details regarding the number of medical staff stratified by speciality, the mean monthly salary per specialty, and the estimated total monthly salary are available in Table 4.

Table 5 provides details regarding the monthly costs associated with cancer management. The median total management cost is 2,765.0$ (IQR: 3,888.7$). Direct medical costs accounted for the majority of cancer management costs. The two main components of the direct medical costs were surgery and chemotherapy costs. The median cost of surgery was 2,000 (IQR: 3,000$). The median chemotherapy cost was 287.5 (IQR: 1005.0$). The only direct non-medical cost that we were able to estimate was transportation costs, with a median cost of 30.0$ per month.

3.6. Patients' characteristics and their associated management cost

Table 6 shows the median cancer management cost stratified by patients' characteristics. There was a statistically significant difference in the median cancer management cost based on the stage of the disease, where stage two patients had a lower median cost compared to other patients ($p < 0.05$). Another determinant that affected cancer management costs was the type of cancer. Patients suffering from colon and brain cancer had significantly higher costs ($p < 0.05$).

3.7. Factors affecting management cost

Table 7 below shows the binary logistic regression analysis, which was conducted to identify factors that affect cancer management costs. There was no statistically significant association between patients' demographic characteristics and stage of the disease and cancer management cost ($p \geq 0.05$).

4. Discussion

This study has explored the clinical and therapeutic characteristics and cost of managing cancer patients in Iraq. The key findings are: 1) around 31.4 % of the patients had metastatic cancer, 2) Around 23.4 % the patients reported cancer in their family history, 3) More than half the patients were at stage three and four of the disease, 4) the most prevalent types of cancer were breast cancer (among females), ovarian cancer (among females) and lymphoma, 5) nausea and vomiting, hair loss, and appetite loss were the most prevalent cancer therapy side effects, 6) the median total management cost is 2,765.0$ (IQR: 3,888.7$) and the two main components of the direct medical costs were surgery and chemotherapy costs, and 7) when compared to other patients, patients with colon cancer had higher cancer management costs.

In this study, 31.4 % of patients had metastatic cancer. Metastases commonly develop when cancer cells enter the bloodstream or lymphatic system due to overproduction (Cleveland Clinic 2021). Because these two systems transport fluids throughout the body, new tumors will grow in other parts of the body
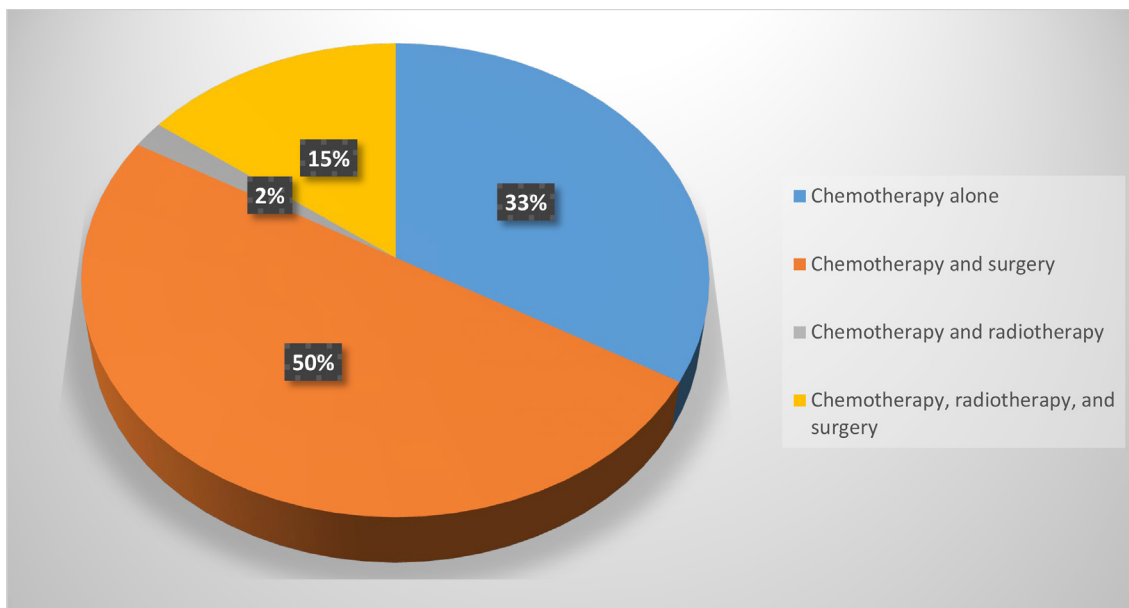

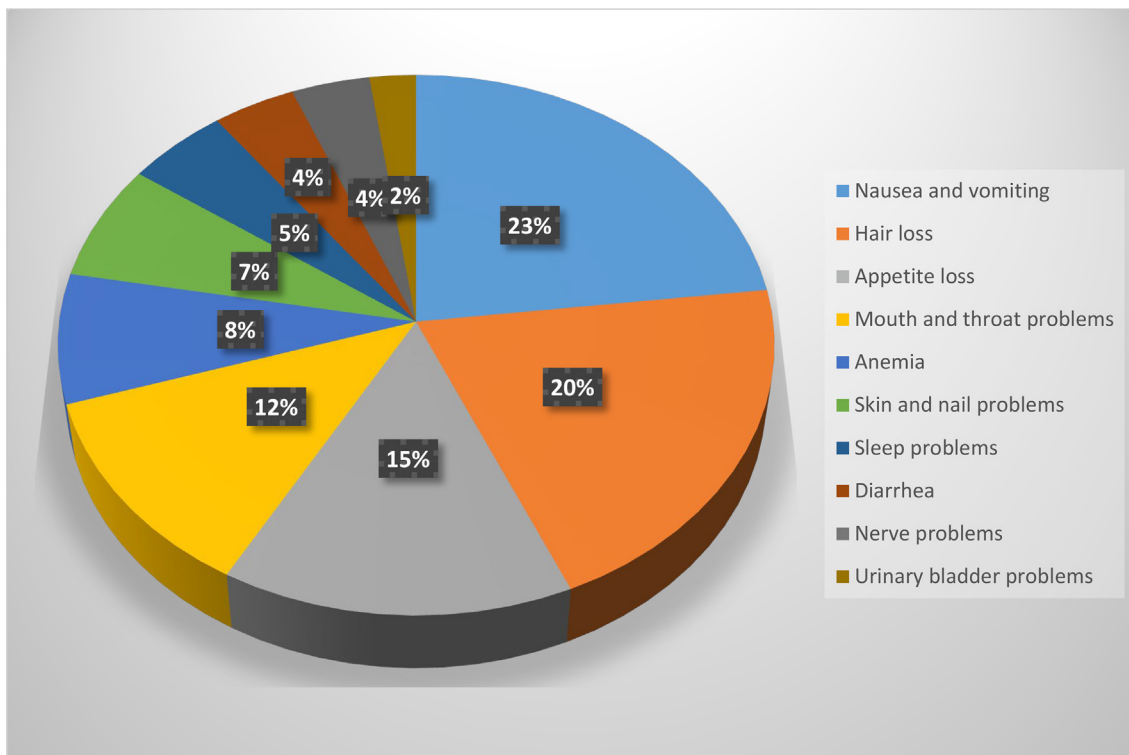**Fig. 1.** Cancer therapy management plans.

Fig. 2. Side effects of cancer therapy.

Table 4
Monthly salary of medical staff in the cancer centre.

Medical staff member	Number of members	Mean monthly salary	Total monthly salary
Oncologists	7	1350$	9,450$
Oncology residents	9	800$	7,200$
General practitioner	1	1000$	1,000$
Oncologist/surgeon	2	1500$	3,000$
Radiologists	2	1200$	2,400$
Pharmacists	38	700$	26,600$
Radiology technicians	4	600$	2,400$
Laboratory analysts	16	500$	8,000$
Nurses	70	550$	38,500$
Total cost			**98,550$**

Table 5
Monthly median cancer management cost per patient stratified by type.

Type of cost	Median cost (IQR) (US dollar)
Direct medical cost	
Medical staff (estimated mean cost/patient)	112.0$
Chemotherapy cost	287.5$ (1005.0$)
Laboratory tests cost	40.0$ (15.0$)
Other medications cost (including medications used to for the management of adverse drug reactions due to chemotherapy)	15.0$ (10.0$)
Surgery cost	2000$ (3000$)
Direct non-medical cost	
Transportation cost	30.0$ (40.0$)
Total cost	**2765.0$ (3,888.7$)** *

* Median cost of management excluding mean medical team cost/patient.

Table 6
Median management cost stratified by patients characteristics.

Variable	Median cost	IQR	P-value
Gender			
Males	2,335$	4,382.5$	0.526
Female	3,120$	3,597.5$	
Smoking status			
No	2,980.0$	3,870.0$	0.585
Yes	2,697.5$	4,347.5$	
Stage			
1	3,687.5$	3,827.3$	0.109
2	2,267.5$	3,020.0$	**0.010**
3	2,897.5$	3,515.0$	0.655
4	3,012.5$	4,581.3$	0.267
Type of cancer			
Breast	3,157.5$	2,007.5$	0.087
Ovarian	2,687.5$	9,455.0$	0.701
Lymphoma	2,730$	3,625.0$	0.941
Stomach	940.0$	3,113.8$	**0.012**
Colon	6,125.0$	6,655.0$	**0.000** *
Lung	1,100$	4,210.0$	0.096
Bladder	1,472.5$	3,973.3$	**0.05**
Pancreas	1,377.5$	5,568.8$	0.748
Rectal	2,855.0$	8,142.5$	0.862
Liver	580.0$	1,250.0$	**0.014**
Prostate	2,600.0$	4,704.0$	0.315
Brain	7,120.0$	11,305.5$	**0.015**

* $p \leq 0.001$.

(Tracey et al., 2013, Banyard and Bielenberg 2015). Around one-quarter (23.4 %) of the patients reported cancer in their family history. Having a family history of cancer increases the probability of developing the condition compared to people who do not have a family history. The strength of this association depends on how closely related the family members are, and their age (a younger age is riskier) at diagnosis. Being older is a key risk factor for cancer. More than one-third (36 %) of cancer cases reported in the UK involve people aged 75 and above (Cancer Research UK 2018). It is

Table 7
Factors affecting management costs.

Variable	Odds ratio	95 %CI	P-value
Gender			
Females (Reference group)	1.00		
Males	0.76	0.53–1.10	0.142
Smoking status			
No (Reference group)	1.00		
Yes	0.83	0.52–1.34	0.445
Stage			
1 (Reference group)	1.00		
2	0.69	0.41–1.18	0.177
3	1.10	0.76–1.59	0.616
4	1.05	0.72–1.53	0.819
Type of cancer			
Breast	1.75	1.20–2.53	**0.003**
Ovarian	0.87	0.44–1.76	0.705
Lymphoma	0.92	0.57–1.48	0.739
Stomach	0.52	0.25–1.07	0.076
Colon	3.66	1.55–8.65	**0.003**
Lung	0.60	0.27–1.36	0.223
Bladder	0.48	0.20–1.14	0.097
Pancreas	0.58	0.25–1.35	0.207
Rectal	1.40	0.44–4.47	0.570
Liver	0.10	0.01–0.75	**0.026**
Prostate	0.74	0.16–3.35	0.697
Brain	6.07	0.73–50.82	0.096

more likely that their prolonged life has led to them being at a higher risk of being exposed to different environmental risk factors, thus increasing the probability of developing different types of cancer.

The most prevalent types of cancer were breast cancer (among females), ovarian cancer (among females), and lymphoma, amounting to 53.9 %, 10.5 %, and 8.6 %, respectively. The median duration of disease was 1.0 year (IQR: 1.0 year). More than half the patients (65.4 %) in this study were at stages three and four of the disease. This highlights that most of the patients are newly diagnosed in late stages. The delay in cancer diagnosis in Iraq was influenced by a number of contributing variables. Iraq's healthcare system has been affected by the war, economic sanctions, and political issues (Al-Hadad 2011). Because of the damage imposed to government healthcare organizations, the disruption of supply chains, and the "brain drain" of important medical personnel, this reduced the quality of healthcare services (Yadalla et al., 2021). There are now only 7.8 physicians and 14.9 nurses per 10,000 people in Iraq, which is 60 % and 35 % fewer than the average physician ratio and the average nurse-to-population ratio, respectively, for the WHO's Eastern Mediterranean Region (Al Hilfi 2013, Webster 2013). In addition, it is believed that 70 % of the medical professionals who were in Iraq in 2003 have now left the country (Webster 2013).

The centralization of the Iraqi healthcare system is notable. The current percentage of uninsured Iraqis is 96.4 %. The population is left to rely on the centrally administered public health care system in Iraq, which offers few advocacy opportunities and a narrow range of therapeutic options (IRFAD 2014). The Iraqi Ministry of Health (MOH) uses a capital-intensive, curative health model that is focused on hospitals and necessitates the extensive importing of pharmaceuticals and medical supplies. The National Board of the Selection of Drugs (NBSD), which serves as the scientific and technical agency governing drug selection and monitoring registration, drug information, and post-marketing surveillance, evaluates pharmaceutical items that are imported into Iraq. The healthcare system is government-subsidized using funds from the nationalized oil sector in order to afford such a costly plan. The out-of-pocket costs for healthcare are also quite cheap, allowing Iraqis to get the services essentially for free (Iraq Now 2020).

In this study, we found that the median total management cost of cancer is $2,765 (IQR $3,888.7). Direct medical costs accounted for the majority of cancer management costs. The two main components of the direct medical costs were surgery and chemotherapy costs. The median cost of surgery was $2,000 (IQR $3,000). The median cost of chemotherapy was $287.5 (IQR $1,005). The only direct non-medical cost that we were able to estimate was transportation costs, with a median cost of $30.0 per month. In this study, there was a statistically significant difference in the median cancer management cost based on the stage of disease and the type of cancer. These findings confirm those of the National Cancer Institute, which reported that the costs of managing cancer patients were lowest for localized stage cancers and highest for distant stage cancers (National Cancer Institute 2021). In 2015, the estimated national cost of cancer care was $190.2 billion in the United States. Assuming unchanged future prices, it is estimated that costs will reach $208.9 billion in 2020 (2020 US dollars). These figures cover cancer-related medical services and oral prescription medicines. Female breast, colorectal, lung, and prostate cancers, as well as non-Hodgkin's lymphomas, had the highest national medical care expenses. The variation in cancer management costs is affected by treatment patterns, and expenditures for various types of care for different cancer sites (National Cancer Institute 2022).

In a previous study in Egypt, El-Zawahry et al. (2007) found that the median cancer treatment cost was $5,817.2 per patient (El-Zawahry et al., 2007). The median cost was higher for patients who achieved complete remission compared to those who relapsed and/or died. Cancer medication costs were the main driver, and they contributed to 78 % of the total cost ($4,537) (El-Zawahry 2007). A study by Tekin & Saygılı (2019), in Turkey, reported that the average treatment cost per patient with breast cancer was $9,221 (Tekin & Saygılı, 2019). They reported that intensive care treatment had the highest average cost ($2,916.5). Moreover, the cost of managing metastatic patients was 2.8 times higher compared to non-metastatic patients. A study by Mousa et al. (2020) that was conducted on breast cancer patients in Jordan reported that costs increased in the advanced stages of the disease, with stage 4 patients paying 61.0 % more than stage 1 patients (Mousa 2021).

Confirming the findings of previous studies, this study found that cancer places a great burden on the governmental budget as it consumes money, effort, and time. In other words, cancer costs governments a great deal as they need to cater to patients' hospitalization, and medication needs, which mainly includes chemotherapy, along with other medications that cannot be neglected, including corticosteroids, analgesics, immune suppressants, and painkillers.

This study has limitations. This study was conducted in a single cancer centre, which limits the generalisability of the findings. Cancer-related indirect costs were not taken into account in our cost estimations. In addition, we were not able to extract data related to the cost of radiation therapy. We determined the mean medical staff cost by dividing the total number of patients who visited the cancer center by the total monthly salary of all medical staff. This procedure implies that all patients, regardless of the type of cancer or the complexity of the therapy, require the same level of care. Major important types of costs were not available in the medical file of the patients such as post-operative and chemotherapeutic side effects therapy and therefore, we were not able to estimate them and involve them in our cost estimation. Because the researcher extracted the data from the patients' medical files rather than digital medical files, the likelihood of under-reporting is increased. Our ability to determine causation between research variables was restricted by the study's cross-sectional design. Therefore, our findings should be interpreted carefully.

5. Conclusion

Breast cancer, ovarian cancer, and lymphoma are all prevalent in Iraq and have a significant impact on the clinical and financial status of patients. In our study, chemotherapy was essential for almost all cancer patients, and for half of them, chemotherapy, radiation, and surgery were administered together as combination therapy. The majority of patients have recently received a late diagnosis, which is a worrying sign that calls for prompt action from healthcare decision-makers. Additional research is required to examine the risk factors for these types of cancer, including lymphoma, ovarian cancer, and breast cancer. Additionally, additional economic research from other perspectives is required to illustrate the financial burden that cancer has on Iraq.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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