SPECIAL COMMUNICATION

Re-validate the dataset of Iraq cancer registries

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Abstract

Objective: To evaluate the cancer registry in Iraq over a 5 year period from 2013 to 2018 (except 2017 as software data was not accessable) in all of Iraqi's provinces. Further more to study the incidence rate and the pattern of distribution of breast cancer in various provinces of Iraq.

Method: All data was collected from the cancer registration centres of Iraq. Original data is set to highlight and update the cancer state of the country.

Results: On data analysis it was observed that the incidence of cancer with the number of new cases each year, were higher in some cities compared to others. The major cause for this difference is the displacement of people from their home cities due to ISIS attack, which changed the demographic distribution of people in Iraq. Current results revealed an increase in the number of new cases registered annually during 1994-2018. Moreover, cancer incidence rate per 1005 population showed that Baghdad, Karbala and Al Najaf have a higher incidence in the period between 2013-2018. Breast cancer in females is the most frequent malignancy in Iraq, followed by colon cancer and leukaemia. This reveals the importance of cancer awareness programmes in drawing the attention to early diagnosis and treatment.

Conclusion: This study provides the incidence of cancer, especially breast cancer in Iraq. This will assist the researchers to identify regional differences in the prevalence figures.

Keywords: Iraq, Cancer registry, Baghdad, Incidence rate.

Introduction

The Programme of cancer registry was established in 1960 by Cancer Oncology Society of Iraq followed by its development under the surveillance of the Ministry of Health in 1976. The objective of this study was to collect data on new cancer cases on a regular basis, determine the extent of disease, staging, biomarker status, treatment, survival, and mortality rate of Iraqi's cancer patients.[1]

Depending on recent studies, registry data has become a rich source of information for cancer researchers, especially for those working in the area of breast cancer which is the leading malignancy in women worldwide.[2]

According to GLOBOCAN foundation, the data recorded in 2018 revealed that breast cancer had the second highest rank followed by lung cancer which has 11.6% incidence rate of all new cases, and 5th rank in mortality with 6.6% of all cancer deaths (for both sexes and all ages) worldwide.[3]

American Cancer society data of 2018 indicates that breast cancer represents the most common cancer among the population as a whole and among females in particular at international, national and local levels.[4]

The epidemiology of breast cancer is studied with the objective of risk management to help manage risks at various levels: prevention, early diagnosis, risk factor identification, treatment initiation and prognosis.[5]

The number of new cases for both sexes and all ages shows that breast cancer is the leading malignancy (20.3%) followed by lung cancer (8.4%), leukaemia (6.6%), bladder cancer (5.7%) and colorectum (5.5%) and (53.5%) for other cancers. The total number of new cases in Iraq were finally reported to be 25,320 according to Globocan 2018F statistics. The most frequent top 5 cancers in females recorded by Globocan 2018 in Iraq were ranked as follows: breast, leukaemia, colorectum, brain and nervous system.[3] However, the cancer incidence in Asia has a higher rate than other populations as (43.6%) compared to Europe which was 25%.[3]

Several factors associated with the increase in the incidence of breast cancer include, genetic and family history which play a major role,[6] exposure to radiation,[7,8] obesity and lifestyle,[9,10] lack of exercise,[11] history of breast feeding,[12] low levels of vitamin D,[13] smoking habit[14] and may be other factors.

Therefore, the main aims of present study are:

- To identify the time trend of cancer in Iraqi Provinces during a specified period (2013, 2014, 2015, 2016, 2018). The year 2017 was left out due to the loss of data.

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• Compare the trend of cancer in the city of Baghdad with other cities. Enable the identification of regional differences.

• Specifically look into Breast cancer and facilitate research and developments in breast cancer.

• Highlight the most controversial and puzzling results of cancer registration in Iraq and then try to find solutions.

Data collection: This study was based on the pool of data obtained from official sources in Baghdad governorate/ ministry of health which gather basic information on cancer. All data were collected from the Iraqi Cancer Registry (books and CD) covering the years 2013, 2014, 2015, 2016, and 2018.

The incidence rate calculation: The incidence rates have been calculated according to the data mentioned in the Annual Reports of Iraqi Cancer Registry 2013, that was used in the validation of the analyses.[6] The equation below was used to determine incidence rate of a specific city during a specific period:

Equation 1: Calculation of incidence rate.

$$*100{,}000 \text{ incidence rate} = \frac{\text{no. of new cancer cases}}{\text{population at risk}}$$

Results and Discussion

A retrospective descriptive study was done based on reviewing the Iraqi Cancer Registry for a period of five years 2013, 2014, 2015, 2016, 2018. In this study we included the registration of new cancer cases and cancer incidence rate in all of Iraqi provinces except for Kurdestan region : Erbil, Sulaimaniah and Duhuk. Then we took an example of a cancer type (breast cancer).

Figure-1 shows the Iraq regions map and its provinces.

Registration of new cancer cases between the years 1992-2016: Figure-2 represents new cancer cases in Iraq during the years 1994-2018 (except 2017 year). The results of this figure exhibit an increasing curve in cancer incidence in both genders. While the registration of females with cancer gradually increased from 2015 till 2018, This could be atributed to the changes in the life style[15] and the

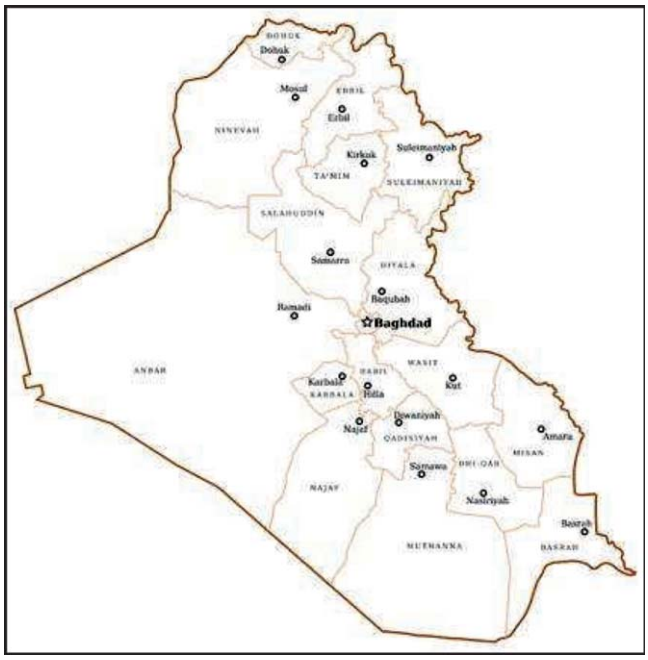

Figure-1: Iraq country map with its cities.

increased number of women undergoing plastic surgery (controversial). In 2015 a meta-analysis suggested that women who had undergone cosmetic breast implantation do not show an increased risk of breast cancer.[16,17] On the other hand, they proposed that breast implants were associated with an increased risk of anaplastic large-cell lymphoma (ALCL). In breast-ALCL, although the absolute risk remains small, the results of the their study suggest increased clinical awareness, comprehensive registration of implants and complications, and stimulation of alternative

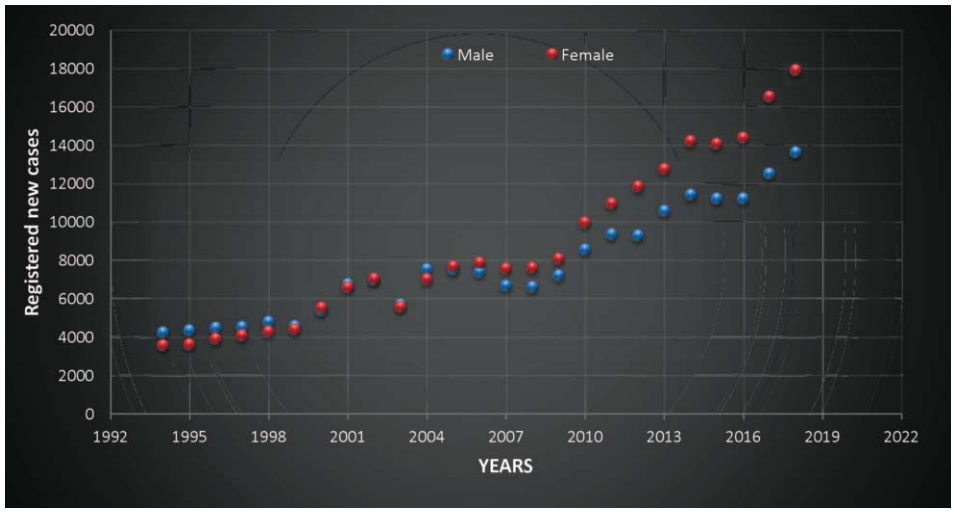

Figure-2: Registration of new cancer cases during the period 1994-2018 years, showing the differences between genders in cancer new cases in Iraq.

cosmetic/reconstructive procedures. Increase in smoking habit[14] and unhealthy junk food[18] also play major roles.

Cancer incidence rates during the years 2013-2018: The results of cancer incidence rates (Per 100,000 population) during the years 2013-2018 (except 2017 data) were collected and graphed using excel sheet from Annual reports of cancer in Iraq.[6,20-22] Table-1 and Figure-2 give an indication of the gradual annual increase in cancer incidence rates in all Iraqi provinces. Taking an example from the table, the incidence rates during 2013-2018 years in Baghdad were recorded as 78.6, 90.6, 89.4, 90.6 and 91.14.

Interestingly, the incidence rates in Karbala city were 88.47, 94.6, 98.7 and 109.82 during 2013-2016, then it decreased to 97.72 in year 2018. While the registeration rates of the remaining provinces were slightly increased during these five years, except in the three governorates (Anbar, Salah Aldeen, Ninawh) where people migrated out of the city due to ISIS violent attacks in 2014.[15] This affected the registration systems and caused missing out of most of its data.

Acoording to Figure-3 Karbala governorate (blue arrrow) exhibited a higher incidence rate compared to other governorates. This was also due to political instability during 2014, (the period of ISIS invasion to some Iraq provinces) and the increased number of immigrants from unstable cities to stable cities, for example as Karbala was a stable and safe city, most people from three unstable governorates (Al-Anbar, Nineveh and Salah Al-Deen) (red arrows) migrated here and were visiting hospitals when required.[24]

Table-1: Cancer incidence rates (Per 100,000 population) registered in all Iraqi governorates during 2013-2018 years (except 2017 year data).

Provinces	2013 year	2014* year	2015 year	2016 year	2018 year
Baghdad	78.56	90.6	89.4	90.575	91.14
Kerbala	88.47	94.6	98.7	109.82	97.72
Najaf	80.79	76.28	78.9	79.39	97.65
Basrah	60.24	71.59	69.8	73.7	79.59
Babil	65.87	69.22	69.9	64.17	70.65
Kirkuk	48.9	67.8	56.6	55.335	53.88
Thiqar	61.79	65.37	59.9	67.965	37.55
Wasit	60.31	63.46	58.7	62.37	67.24
Diyala	64.78	64.26	60.7	65.09	87.34
Muthana	58.03	60.74	48.1	57.31	81.66
Diwaniyah	60.62	62.77	57.6	72.915	77.07
Misan	57.63	59.3	56.1	59.85	69.38
Ninawah	58.61	55.75	69.8	17.235	59.12
Salalden	44.61	36.25	38.4	34.23	52.84
Anbar	61.7	23.16	26.1	27.145	62.71

*ISIS attack in June 2016.

The top five governorates showing the rising incidence rates / 1005 population are shown in Figure-4. It can be observed that, Karbala city had 97.8 followed by Baghdad city 87.2, Najaf city 78.8, Barsrah city 68.8 and Babil city 67.2. The figures are highest in Karbala city compared to other governorates which share almost the same incidence rates.[25]

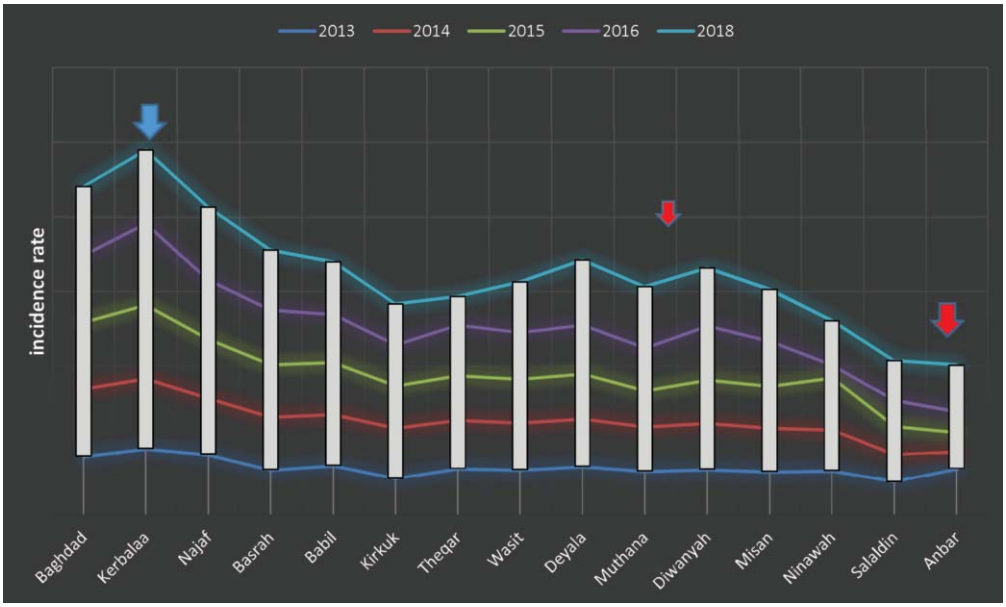

Figure-3: Incidence rate in all Iraqi provinces during period 2013-2018 years. Blue arrow represent most stable city and red arrows un stable cities (during crisis).

Breast cancer incidence rates: According to the data and annual reports of Iraqi cancer registries 2013-2018 (except 2017 data) female breast cancer (C-50) represents one of the top ten cancer figures in Iraq (Figure-5). Breast cancer has the highest incidence rate/ 1005 population compared to other cancer types. This is followed by bronchus and lung cancer which has the second rank.

Table-2 represents breast cancer incidence rate/ 1005 population in Iraqi provinces during the period 2013-2018 years (except 2017). It shows the change in the

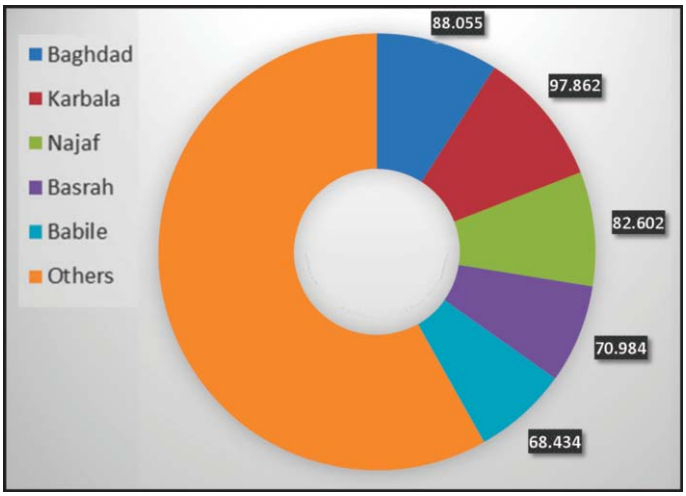

Figure-4: Top five Iraq provinces recorded higher cancer incidence rates.

incidence rate of breast cancer in all provinces during 2013-2016, Baghdad followed by Karbala and Basrah had the higher breast cancer incidence rates compared to other provinces. These results were anticipated because these three provinces recorded an increase in population rates (even Karbala which was considered a small city compared to Baghdad and Basrah).[26] They all have specialized hospitals for cancer and they register higher number of patients.

The registration figures of 2018 showed an unclear increase in the incidence rate of breast cancer in all provinces, except Karbala and Kirkuk which recorded a slight decrease in the cancer incidence rate. This may be related to a reverese migration after political stability of affected provinces.[27-31] The rising incidence rates in the remaining provinces could be explained by political stability, increased awarness, and education and accurate registration.

Table-2: Breast cancer incidence rates / 1005 population of Iraqi provinces during 2013-2018 years (except 2017 year data).

Provinces	2013 year	2014 year	2015 year	2016 year	2018 year	Mean differences
Baghdad	18.24	20.9	18.9	20.825	20.52	19.877
Kerbala	15.15	16.59	20.1	19.505	16.9	17.649
Basrah	14.18	15.88	13.5	14.82	17.6	15.196
Najaf	13.96	13.24	13.2	14.26	17.6	14.452
Diyala	11.9	13.56	11.1	13.83	19.48	13.974
Kirkuk	10.2	16.17*	12.9	13.88	12.39	13.108
Babil	10.23	11.67	11.2	10.175	12.15	11.085
Wasit	10.69	9.75	9.2	10.555	12.62	10.563
Misan	8.01	9.33	11.1	10	12.13	10.114
Ninawah	11.43	9.65	9.1	3.78**	13.46	9.484
Diwaniyah	8.14	9.42	7.2	10.705	11.7	9.433
Salh Alden	8.88	7.42	9.4	8.365	10.97	9.007
Thiqar	6.58	9.19	7.1	7.915	9.83	8.123
Muthana	8.37	10.12	7.2	8.225	8.515	8.486
Anbar	8.19	5.67	5.7	6.735	11.57	7.573

*During 2014, most immigrations to north of Iraq (Kirkuk).
**During ISIS war.

Moreover, the incidence rates of breast cancer were re-shaped as showed in Figure-6, slight gradual increase was noted during 2011-2014 years recording (11.5, 12, 12.9 and 14.3) per 100,000 of population.[13] While decreasing in the incidence rate of 2015 year to about 13.1 referred the cause to ISIS invasion to some cities and uncontrolled system lead to the loss of some records in total registration. When the data was updated by adding the incidence rate of breast cancer during 2016-2018 there was a marked increase in the rate to 19.55 and 16.82 compared to the years 2011-2014 which recorded 11.5, 12, 12.9 and 14.3 respectively. This rise is similar to the global increase.

Figure-5: The common types of cancer incidence rate/ 1005 population in Iraq during 2013-2018 years (except 2017 year data).

Breast cancer new cases: The data of new cases of breast cancer were recorded during 2013-2018 years (Figure-7). The figures of 2017 were not available. A 36% rise in the registration of new cases of female breast cancer in Baghdad was observed compared to other provinces during the period of 2013 to 2018. Following Baghdad was Ninawah and Basrah at a rate of 10% then Karbalaa, Najaf, Babil and Diyala at the rate of 5%.

Figure-6: Breast cancer incidence rate during 2011-2018 years (except 2017 year). Adopted from Iraqi cancer registry, 2015 and addition of other registration years.

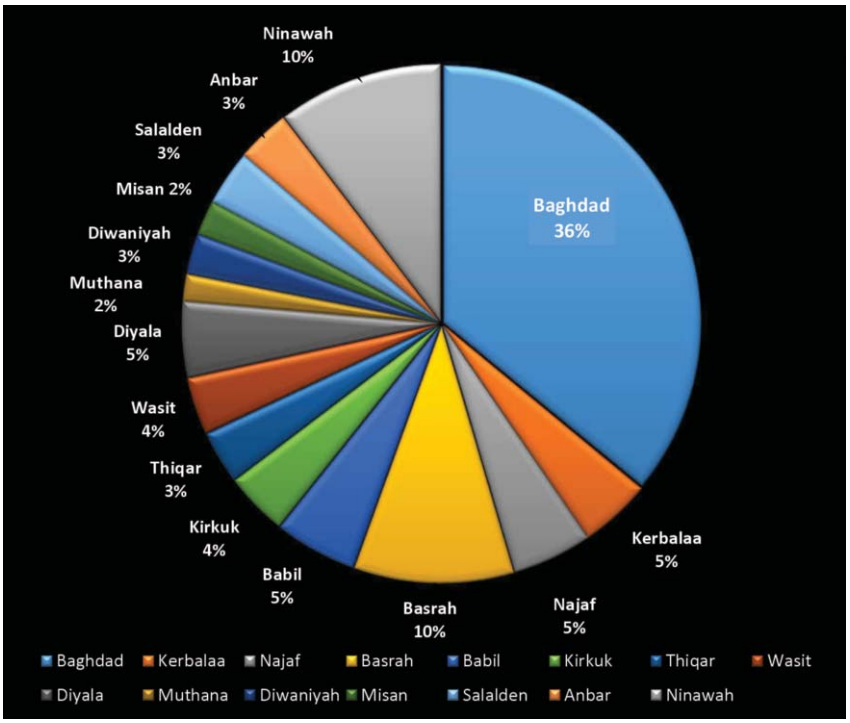

Figure-7: Number of registered new cases of breast cancer in Iraqi provin ces during 2013-2018 years.

Several drawbacks were observed in the registration of cancer patients. Eventhough Baghdad has a Nuclear Medicine Institute with the facility for histopathological confirmatory tests and other specialized hospitals, missing information was noted as follows: i) The need of cooperation of private hospitals and laboratories, ii) presence of inefficient staff in the hospital's statistics unit iii) The language of the registration forms was not Arabic, iv) Patients diagnosed with cancer resorted to travel abroad for treatment as the hospitals routine had a delayed period v) Some patients were registerd in two different cities during the intervenung period of investigation and treatment. vi) Registration staff was not aware of diverse issues which could influence collection and interpretation of cancer registry data, such as multiple cancer diagnoses, duplicate reports, reporting delays and pitfalls in estimations of cancer incidence rates.[32] As determined in the 1990s the registration of cancer is a process performed with accuracy on reliable information from local cancer diagnostic results.[33]

In the global cancer burden study during 2006-2016 there was a rise in the incidence of mortality. The explanation for this phenomena was the increased life expectancy and rise in population growth which was partially attributed to a reduced burden from other common diseases.[34] However, the contribution of population aging vs population growth causes changes in the incidence of diseases which differ substantially based on socioeconomic development. This leads to varied types of age dependent cancers, contributing to the total incidence in a population.

For a period of time Anbar, Salah Aldeen and Ninawh the three governorates faced attacks and invasions. Therefore their low incidence rates donot prove that the treatment strategy had changed or special hospitals for cancer managments and centers for early detection had been set up or the awareness level and health education of the public had improved. The logical reason is that the data collection was missed out in these provinces due to the unstable political situation. The registrations of cancer and other diseases in hospitals could not be accurately recorded

which gave false figures showing a false decline in the incidence rate in central cancer registration (Baghdad). After all the missing data is highly expected during war situations. Despite the rapidly increasing cancer burden in lower socioeconomic countries, the developing cancer and age-standardized rates were still higher in the upper class countries. It has been declared in the publications of 2014 that low and middle income countries share a high burden of cancer but due to lack of good pathology laboratories and experts the diagnosis may not have been be reliable. This was a major obstacle which caused the lack of accurate recording of cancer incidence as the standard of the European network of cancer Registry recommendation could not be met.[35]

In a study published in Plos One in 2017 by Luo Q and his team on 1864 patients with prostate cancer, 32.7% of them had "unknown" NSWCR stage. A possible reason could be the author's attribution to the differences between cancer services areas and geographical locations and insufficient recording of clinical data. They had also mentioned that lack of knowledge on the mechanism leading to the missing data it would be difficult to interpret the comparison of estimated data from the analysis of imputed data with those from the complete case analysis.[36]

Another study used population-based data on patients having cancer in one of ten different locations including breast, bladder, colorectal, lung, endometrial, ovarian, prostate, melanoma, renal cancer and NHL. They evaluated the degree of bias in Clinical Commissioning Group (CCG) indicators presented by missing-is-late and complete-case specifications. They concluded that the public reporting schemes for cancer stage at diagnosis should use a complete-case specification and should base on three-year reporting periods.[37]

Differences in data collection practices and coding systems, as well as quality of data sources, remain major challenges, as do underreporting of cancers requiring advanced diagnostics in low-resource settings (e.g., brain cancer, leukaemia, and others). Cancers that are common in the paediatric population but rare in adults are aggregated to an "other neoplasm" group, encompassing about 30% of the paediatric cancer burden and making these estimates less valuable for cancer control.

The most positive development for cancers with an infectious etiology can at least partially be attributed to the large prevention potential: 1) smoking habit, 2) increasing awareness of cancer screening programmes, 3) dietary interventions, 4) promote physical activity, 5) prevention of excess UV exposure. When considering the value of prevention strategies, the benefit in reducing the incidence of diseases other than cancer can be more important.[38]

At the end, cancer control programme shares information about cancer occurance, provide resources for cancer researchers and data for cancer prevention and control activities at local levels. Moreover, it also provides knowledge on the burden of cancer in the population, supports public health efforts to prevent the rise in new cases, improves survival and quality of life after cancer diagnosis and reduces the variations in quality of health in cancer cases.[39]

It is also suggested that the information provided by the central cancer registries should be supported by specific regulations as: 1) case reporting from all faculties of practitioners, 2) access to medical records, 3) reporting a uniform data, 4) provide a protection programme for patient's privacy, 5) access to data by researchers and 6) authorization to conduct research. These points are mentioned in the United States as public law no. 102-515 and should be included in the Iraqi cancer registry publications.[40]

Conclusion

A considerable proportion of breast cancer patients in Iraq still present with locally advanced disease at the time of diagnosis. That justifies the necessity to promote public awareness educational campaigns to strengthen the national early detection programme.

With population aging and the epidemiological transition, cancer incidence is expected to increase in the future. This will further widen the cancer divide if current trends continue. The data showing the disparities and knowledge on the root causes exists, as do the tools to reduce them. However, strategic investments in cancer control and implementation of effective programmes to ensure universal access to cancer care are required to achieve the Sustainable Development Goals as well as targets set in the WHO Global Action Plan.

Limitation

It remains crucial to improve data collection through the expansion and creation of vital registration systems, cancer registries, health surveys, and other data systems. Differences in data collection practices and coding systems, as well as quality of data sources, remain major challenges, as do under reporting of cancers requiring advanced diagnostics in low-resource settings (eg, brain cancer, leukaemias, and others).

The main challenges during data registry could be summarised as follows:

1) data collection and entry,

2) expansion and registry system,

3) health survey programmes,

4) practice in data collection and coding system,

5) quality of data sources,

6) imbalance in drug distribution through out the country due to incorrect cancer registry (Lack of proper population registration leads to an incorrect estimate of the number of patients resulting in incorrect distribution of drugs).

Recommendations

• Registry research is often difficult due to the need to manually integrate cancer registry data with other data, translating the data in arabic, and working fast and accurately.

• Iraq government needs new Consensus for each province in order to reach the actual incidence rate depending on the new population after immigration and displacement.

• Mammographic screening programmes for women aged <45 years effective in reducing breast cancer mortality, and reductions in mortality have been observed where screening has been introduced

• Activate other cancer screening programmes.

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