Original Article

# A Comparative Statistical Study of the Prevalence of Bladder and Rectal Cancer Among Patients in Najaf Province, Iraq

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## Abstract

**Background:** Bladder cancer begins when cells in the bladder begin to grow uncontrollably. Rectal cancer is a type of cancer that forms in the tissues of the rectum. Cancer has become more prevalent in recent years, with bladder and colorectal cancer metastasizing to the other. **Objectives:** The study aimed to create statistics for bladder and rectal cancer for the years 2015–2020. **Materials and Methods:** This study retrospectively reviewed National Hospital for Oncology and Blood Diseases (NHOBD) records for all patients with advanced metastatic bladder and rectal cancer. Age and gender were recorded. The wide range of possibilities of involvement of bladder and rectal cancer requires patient- and disease-specific approaches. Cystectomy for adherent or invasive colorectal cancers achieves good local control. **Results:** Data were collected from NHOBD for bladder and rectal cancer for the years 2015–2020, where each year included different ages classified within age groups and categories (15–25, 26–36, 37–47, 48–58, 59–69, 70–80, and 81–91). Gender and age were taken into account, and the percentage, prevalence rate, and change in mortality rate in cases were calculated for cases of bladder and rectal cancer, and whether there was an increase or decrease in the number of cases. **Conclusion:** It was found that cancers increase with age and that the percentage of change is positive, indicating an increase. All results were assessed statistically using a program (Statistical Package for Social Sciences) version20, and thus it is considered a preliminary study for subsequent studies.

**Keywords:** Bladder, prevalence rate, rectal cancer

## Introduction

The bladder, a hollow organ in the pelvis, retains urine before it leaves the body.[1] The bladder is lined by a layer of cells called the urothelium, which is separated from the bladder wall muscles, known as the muscularis propria, by a thin, fibrous band called the lamina propria. This function makes the bladder a crucial component of the urinary system.[2] One of the most prevalent malignancies in the world is bladder cancer. It arises when healthy bladder lining cells, most frequently urothelial cells, change and grow uncontrollably to form a mass known as a tumor.[3] Most persons with bladder cancer receive their diagnosis once they begin to exhibit symptoms because there is currently no test that is reliable enough to screen the general population for the disease; as a result, when cancer is discovered at a more advanced stage in some individuals.[4]

A study found that 22% of colon cancer cases were identified in seven regions in Najaf, Iraq, in 2021. The data were processed using Statistical Package for Social Sciences (SPSS) version 20 (IBM Corp., Armonk, NY, USA) and chi-square test. The association was not significant because the *P* value was >0.05, but the percentage change was positive (+64.28). That is, there is an increase in the incidence rate over time.[5]

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**Submission:** 03-Mar-2023 **Accepted:** 26-Dec-2024 **Published:** 29-Mar-2025



**How to cite this article:** Kadhim SA, Hussein HA, Mohammed AR, Sagban HJ, Alsabari EK. A comparative statistical study of the prevalence of bladder and rectal cancer among patients in Najaf province, Iraq. Med J Babylon 2025;22:87-92.

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Website: https://journals.lww.com/mjby

DOI: 10.4103/MJBL.MJBL_254_23

A study showed that rectal cancer incidence increased at a faster rate than colon cancer incidence (6.6% among women and 5.2% among men).[6]

Increasing rates of bladder cancer have been observed in many European countries, whereas death rates have decreased in many other countries, particularly in more developed regions.[7]

In previous studies, the total number of children with cancer, who were newly diagnosed and registered during the years 2012–2020, was 802 (males=449, females = 353, male to female ratio = 1.2:1). Children under 5 years of age (327) formed the majority, compared to the other two groups (5–10 years and 10 years and older). Brain/central nervous system cancer was the most common type of childhood cancer (170 cases), followed by lymphoma (150 cases: HL 110 cases and NHL 40 cases), and then leukemia (137 cases: ALL 117 cases and AML 20 cases); the highest number of cases was observed in Najaf Center compared to others (Kufa, Al-Manathira).[8]

A study found that CRC in Iraq is still primarily a disease affecting the elderly and is increasing in incidence and mortality in all age groups. The incidence proportion of CRC in patients aged 20 to 50 years increased from 1.46 per 100 000 population in 2000 to 4.36 per 100 000 population in 2019, which is an APC of 5.6%.[9] A study was conducted on cab bladder and re-calculating the prevalence of lung cancer for the period from 2012 to 2021 in Iraq, Karbala, according to the results of the study, the numbers increased in general, except for the years 2013 and 2015, which were similarly high compared to the period before and after.[10] One study in Iraq had the highest prevalence of testing (42%) for acute lymphoblastic leukemia among cases followed by acute myelogenous leukemia (30%), chronic lymphocytic leukemia (9%), chronic myelogenous leukemia (7%), hairy cell leukemia (5%), natural killer cell leukemia (4%), and mast cell leukemia (3%).[11] A study showed that the prevalence of thalassemia increases with population expansion, as the prevalence of thalassemia in Najaf reached 75.9 per 100,000 people in 2018, and increased to 94.21 in 2022, while the incidence rate of thalassemia in 2018 was 1.08/100,000 people, and the highest incidence rate was 4.33 in 2021 and the lowest incidence rate was 0.12 in 2022.[12]

In light of the above studies and due to the recent spread of bladder and rectal cancer, we conducted a statistical study to serve as a baseline for subsequent studies, not only in central Iraq but also in southern and northern Iraq, in order to provide data that help in reducing the incidence of these diseases. Further research is required to investigate the underlying processes of these epidemiological patterns, with additional examination of relevant risk factors.

## Results

### Statistical treatment of theoretical data

The present study examines the statistical analysis of bladder and rectal cancer prevalence in Al Najaf, Iraq, for male and female cases, those who frequented the Middle Euphrates center cancer (National Hospital for Oncology and Blood Diseases [NHOBD]) in Al Najaf province from 2015 to 2020. Iraq has recorded a rise in cancer patients with a high prevalence and mortality rate. The current study is a statistical and epidemiological analysis. Data for male and female patients were collected and disaggregated by age and gender.

In Table 1, the number of cases of bladder and rectal cancer, females and males, was documented for the years 2015 to 2020 for the age categories 15–25, 26–36, 37–47, 48–58, 59–69, 70–80 and 81–91, It is shown in Table 1 that the highest cases of bladder cancer were observed for men in 2019 and the lowest cases were observed in 2016. As for women, the highest cases of bladder cancer were in 2018 and 2017 and the lowest cases were in 2016. As for rectal cancer in men, it was higher in 2017 and lower in 2016

**Table 1: Number of Bladder Cancer and Rectal Cancer Cases in NHOBD age Categories during 2015 to 2020**

| Year | Gender | 15–25 | | 26–36 | | 37–47 | | 48–58 | | 59–69 | | 70–80 | | 81–91 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Bladder | Rectal | Bladder | Rectal | Bladder | Rectal | Bladder | Rectal | Bladder | Rectal | Bladder | Rectal | Bladder | Rectal |
| 2015 | Mal. | 3 | 0 | 1 | 0 | 6 | 0 | 5 | 1 | 19 | 0 | 15 | 0 | 4 | 0 |
| | Fem. | 0 | 0 | 1 | 0 | 2 | 0 | 3 | 1 | 5 | 0 | 6 | 0 | 0 | 0 |
| 2016 | Mal. | 1 | 1 | 0 | 0 | 1 | 0 | 3 | 0 | 10 | 3 | 11 | 0 | 1 | 0 |
| | Fem. | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | Mal. | 0 | 1 | 0 | 2 | 5 | 8 | 17 | 8 | 45 | 10 | 20 | 3 | 4 | 1 |
| | Fem. | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 5 | 17 | 8 | 8 | 2 | 7 | 0 |
| 2018 | Mal. | 0 | 2 | 2 | 2 | 10 | 3 | 14 | 6 | 27 | 6 | 25 | 1 | 0 | 0 |
| | Fem. | 0 | 0 | 3 | 4 | 3 | 3 | 5 | 1 | 12 | 4 | 7 | 2 | 3 | 1 |
| 2019 | Mal. | 0 | 1 | 1 | 2 | 7 | 2 | 10 | 8 | 24 | 8 | 42 | 4 | 0 | 0 |
| | Fem. | 0 | 2 | 0 | 2 | 0 | 5 | 2 | 10 | 5 | 4 | 7 | 2 | 4 | 1 |
| 2020 | Mal. | 0 | 1 | 3 | 4 | 5 | 3 | 20 | 7 | 28 | 9 | 28 | 2 | 6 | 0 |
| | Fem. | 1 | 0 | 0 | 5 | 0 | 5 | 7 | 11 | 8 | 5 | 8 | 1 | 5 | 0 |

**Table 2: Percentage, prevalence rate RI, morality rate for bladder and rectal cancers in NHOBD from 2015 to 2020**

| Years | Percentage | | Prevalence rate RI | | Morality rate | |
|---|---|---|---|---|---|---|
| | Bladder | Rectal | Bladder | Rectal | Bladder | Rectal |
| 2015 | 0.93 | 0.07 | 4.83 | 0.34 | 93.33 | 6.67 |
| 2016 | 0.82 | 0.18 | 1.87 | 0.41 | 81.82 | 18.18 |
| 2017 | 0.71 | 0.29 | 8.49 | 3.53 | 70.62 | 29.38 |
| 2018 | 0.76 | 0.36 | 7.54 | 2.38 | 76.03 | 23.97 |
| 2019 | 0.67 | 0.33 | 6.75 | 3.38 | 66.67 | 33.33 |
| 2020 | 0.68 | 0.32 | 7.16 | 3.42 | 67.68 | 32.32 |
| Total | 4.57 | 1.55 | 36.64 | 13.46 | 456.15 | 143.85 |

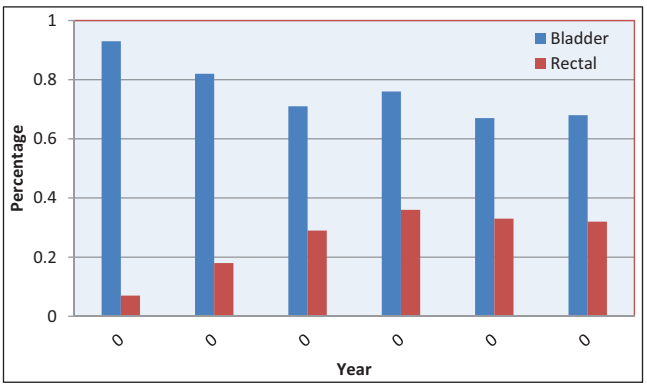


**Figure 1:** Percentage for bladder and rectal cancer in National Hospital for Oncology and Blood Diseases from 2015 to 2020

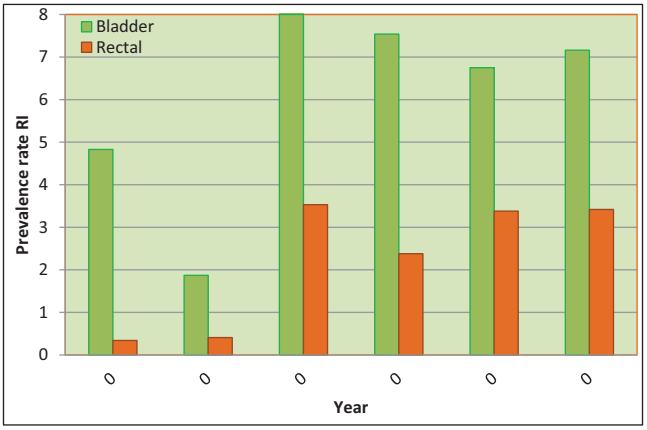


**Figure 2:** Incidence rate IR for bladder and rectal cancer in National Hospital for Oncology and Blood Diseases from 2015 to 2020

compared to women, for whom it was the highest in 2020 and the lowest in 2016.

As shown in Table 2, the prevalence rate RI, which is usually referred to as incidence, is the number of new cases in a given time frame. The morality rate for bladder and rectal cancer in NHOBD is calculated for the years studied, where the percentage of the number of cases of each infection was calculated, in addition to the prevalence rate and the mortality rate, depending on the number of cases of infection for each year and the population. The total number of confirmed cases of bladder and rectal cancer during the past decade in separate areas of Najaf governorate was recorded, where the highest percentage of those infected with bladder cancer was 0.93 and the lowest percentage for rectal cancer was 0.07 in 2015, while the highest percentage was in 2018 for rectal cancer was 0.36. We also noticed the lowest percentage for bladder cancer in 2019, which was 0.6 as shown in Figure 1.

The prevalence rate RI was the highest for bladder and rectal cancers in 2018, where it was 8.49 and 3.53, respectively. The lowest prevalence rate for bladder cancer in 2016 was 1.87, while the lowest prevalence rate for rectal cancer in 2015 was 0.34; it is noteworthy that the two diseases showed a combined increase for the year 2017, as shown in Figure 2.

On the contrary, in the year 2015, the highest mortality rate for those with bladder infections was 93.33, and the lowest mortality rate for rectal cancer patients was 6.67, but in 2019, the mechanism was reversed: the lowest mortality rate was 66.67 for the bladder and the highest was 33.33 for the rectal infections, and we noted the opposite behavior for the two cancers in the 2 years; this relationship is shown in Figure 3.

From Table 3, we note that the rate of change was decreasing (−0.27) for those with bladder infections for the period studied, which indicates that the cause of bladder cancer may have been controlled in terms of chemotherapy and radiotherapy, early detection of the disease, and health awareness among the population, while it was increasing for the rectal cancer (+3.85); this increase may be due to the difficulty of early diagnosis of the rectal cancer due to its complex location for the same period.

We also notice that the percent change (P.C) calculation in rates over a certain time period involves subtracting the starting rate from the ending rate.[13] The rates might either be an annual rate or an average over 2 years. The difference is then multiplied by 100 and converted to a percent by multiplying it by the initial rate, as shown in the equations below.[14]

$$P.C_{x-y} = \left[ \frac{\text{End rate - Initial rate}}{\text{Initial rate}} \right] \times 100,$$

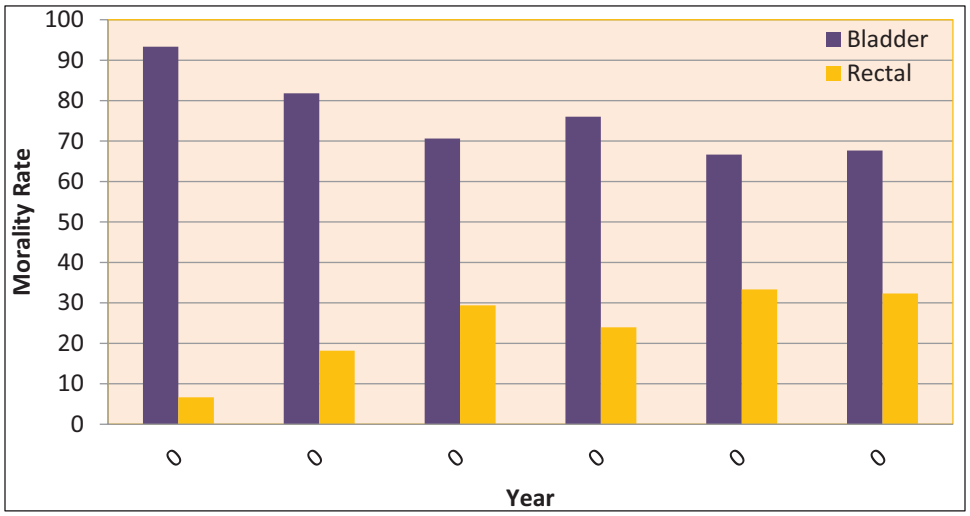


**Figure 3:** Morality rate for bladder and rectal cancer in National Hospital for Oncology and Blood Diseases from 2015 to 2020

**Table 3: Rate of change, percentage rate for bladder and rectal cancers (NHOBD) in Centers from 2015 to 2020**

| Years | Rate of change | | Percentage rate (P.C) | |
|---|---|---|---|---|
| | Bladder | Rectal | Bladder | Rectal |
| 2015–2020 | −0.27 | +3.85 | 58.57 | 96 |

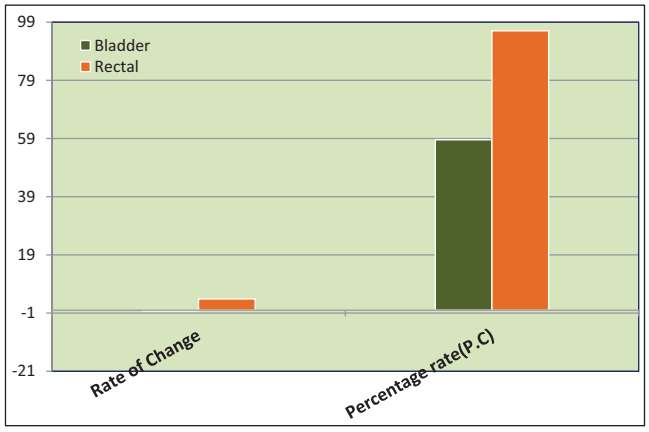


**Figure 4:** Rate of change and percentage rate for bladder and rectal cancer in National Hospital for Oncology and Blood Diseases from 2015 to 2020

$$\text{Initial rate} = \text{Rate}_x \text{ or } \left[\frac{\text{Rate}_x - \text{Rate}_{x+1}}{2}\right],$$

$$\text{End rate} = \text{Rate}_y \text{ or } \left[\frac{\text{Rate}_y - \text{Rate}_{y+1}}{2}\right].$$

P.C is 58.57 for bladder cancer cases and 96 for rectal cancer, which is the highest compared to the number of bladder cancer cases. This is due to the fact that early detection in previous years was less efficient in terms of diagnosis, equipment, and health awareness, as the building (NHOBD) was newly opened, while in subsequent years, health awareness increased, development of diagnostic and examination equipment was observed, and the number of visitors to the center building from the nearby governorates increased. Figure 4 represents the comparison between the rate of change and mortality rate for bladder and rectal cancer.

## Discussion

The data were analyzed using the SPSS Version 20 software using statistical analysis (independent sample *t* test), depending on whether the $P < 0.05$, the relationship between the number of cases of the groups is statistically significant; however, if it is larger than 0.05, it is not.[15]

The results of the statistics (SPSS) were documented for the mean number of cases and standard deviation in Table 4, with bladder and rectal cancer, male and female, for all studied age groups, and for the 6-year duration as well. It was noted that there is no statistical evidence of differences between the mean number of cases for the two cancers for the categories 15–25, 26–36, 37–47, and 48–58, while it was statistically significant for the category 59–69 and exclusively for males ($P = 0.003$); it has large significance, which means that there is a significant difference between the incidences of the two cancers over the past 6 years for this category, while it was not significant for females, as the probability was greater than 0.05 ($P > 0.05$).

For the two age groups 70–80 and 81–91, the behavior was the same according to the difference in the significance value for the last 6 years. For males, it was significant, and for females, it was the same for the category

**Table 4: Mean and standard deviation, *P* value for bladder and rectal cancer (male, female) in NHOBD from 2015 to 2020**

| Age | Type cancer | (Mean ±S.D) Male | P value | (Mean ±S.D) Female | *P* value |
|---|---|---|---|---|---|
| 15–25 | Bladder | 0.6667±0.121106 | 0.563 | 0.1667 ±0.04082 | 0.579 |
| | Rectal | 1.000± 0.025820 | | 0.4000 ± 0.08944 | |
| 26–36 | Bladder | 1.1667± 1.16905 | 0.535 | 0.6667 ± 0.01211 | 0.153 |
| | Rectal | 1.6667 ±1.50555 | | 2.1667 ± 2.04124 | |
| 37–47 | Bladder | 5.6667± 2.94392 | 0.108 | 0.8333± 0.013291 | 0.097 |
| | Rectal | 2.6667± 0.02943 | | 2.6667± 2.06559 | |
| 48–58 | Bladder | 11.5000± 6.71565 | 0.063 | 3.1667± 2.48328 | 0.458 |
| | Rectal | 5.000 ±3.57771 | | 4.8333± 4.66548 | |
| 59–69 | Bladder | 25.5000 11.60603 | 0.003 | 7.8333± 5.98052 | 0.146 |
| | Rectal | 6.000± 3.84708 | | 3.500 ± 3.08221 | |
| 70–80 | Bladder | 23.5000 ±11.00454 | 0.001 | 6.000± 3.03315 | 0.004 |
| | Rectal | 1.6667± 1.63299 | | 1.1667± 0.98319 | |
| 81–91 | Bladder | 2.5000± 2.5098 | 0.048 | 3.1667± 2.78687 | 0.034 |
| | Rectal | 0.1667± 0.40825 | | 0.3333± 0.51640 | |

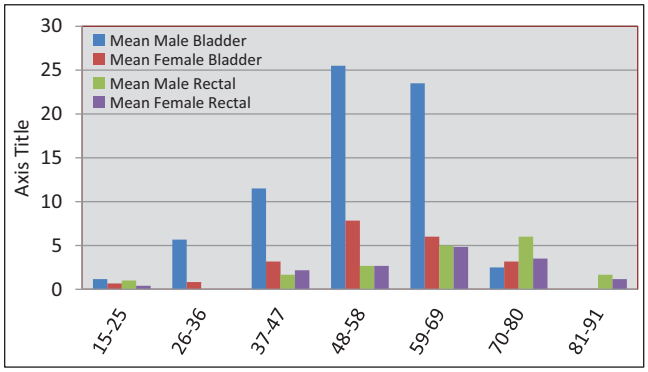


**Figure 5:** Comparison of the average number of cases for males and females with bladder and rectal cancer in National Hospital for Oncology and Blood Diseases from 2015 to 2020

(70–80) and also for the category (81–90), indicating that advanced age is an indicator of the probability of infection for males and females together, with a slight difference related to the number of cases in light of the data collected from (NHOBD) in central Iraq, and a comparison of the averages is shown in Figure 5. Our study was compared with those studies conducted on colon cancer globally.[16-18] The current study was also compared with those studies on bladder cancer globally.[19,20]

## Conclusion

There is a gradual increase in the incidences of bladder and rectal cancer. The study proved the existence of an inverse relationship between them in some years. The prevalence factor, the rate of change, and the mortality rate were variable with age and years, which indicates an increase with age for males and females. Therefore, this prevalence must be addressed by the health authorities to redesign the examination program and deal with patients more strictly. Governmental and non-governmental organizations should increase public awareness about possible signs, symptoms, and risk factors.

## Acknowledgements

All authors offer their sincere thanks and gratitude to the College of Science, University of Kufa, for providing efficient research laboratories.

## Ethical approval

The study protocol was approved by the local ethics committee.

## Conflict of interest

There are no conflicts of interest.

## Financial support and sponsorship

Supported by authors.

## References

1. Obeagu E. Chromium VI: A silent aggressor in sickle cell anemia pathophysiology. Elite Journal of Haematology 2024;2:81-95.
2. Heppner TJ, Layne JJ, Pearson JM, Sarkissian H, Nelson MT. Unique properties of muscularis mucosae smooth muscle in guinea pig urinary bladder. Am J Physiol Regul Integr Comp Physiol 2011;301:R351-62.
3. Pashos CL, Botteman MF, Laskin BL, Redaelli A. Bladder cancer: Epidemiology, diagnosis, and management. Cancer Pract 2002;10:311-22.
4. Solano JP, Gomes B, Higginson IJ. A comparison of symptom prevalence in far advanced cancer, AIDS, heart disease, chronic obstructive pulmonary disease and renal disease. J Pain Symptom Manage 2006;31:58-69.
5. Alshewered A, Kadhim SA. Evaluation of colon cancer incidence rates for the years 2016-2021, Najaf/Iraq: A study of risk assessment. Surg Gastroenterol Oncol 2024;28(Suppl_4):S19.
6. Shin A, Kim KZ, Jung KW, Park S, Won YJ, Kim J, *et al*. Increasing trend of colorectal cancer incidence in Korea, 1999-2009. Cancer Res Treat 2012;44:219-26.

7. Wong M, Fung FDH, Leung C, Cheung WWL, Goggins WB, Ng CF. The global epidemiology of bladder cancer: A joinpoint regression analysis of its incidence and mortality trends and projection. Sci Rep 2018;8:1129.
8. Najem NA, Hussein A. Trends and characteristics of childhood cancer in al-Najaf Governorate, 2012–2020. Med J Babylon 2022;19:37-42.
9. Ibrahem S, Ahmed H, Zangana S. Trends in colorectal cancer in Iraq over two decades: incidence, mortality, topography and morphology. Ann Saudi Med 2022;42:252-61.
10. Tawil FA, Kadhim SA, Hashim AK. Calculation the Prevalence rate of lung cancer for the period from 2012 to 2021/Iraq/Karbala. Neuroquantology 2022;20:886.
11. AL-Saidi DN. Role of age and sex on the incidence of leukemia in a sample of Iraqi patients. Med J Babylon 2024;21(Suppl_2):S229-33.
12. Abdulrudha NH. Prevalence of thalassemia for both genders and rate of change for the period 2018 to 2022 in Najaf, Iraq. Library Progress International 2024;44:156.
13. Ngu BH, Yeung AS, Tobias S. Cognitive load in percentage change problems: unitary, pictorial, and equation approaches to instruction. Instructional Science 2014;42:685-713.
14. Himmelblau DM, Riggs JB. Basic principles and calculations in chemical engineering. FT press; 2012.
15. Gerald B. A brief review of independent, dependent and one sample t-test. Int J Applied Mathematics Theor Phys 2018;9:50-4.
16. Siegel RL, Wagle NS, Cercek A, Smith RA, Jemal A. Colorectal cancer statistics, 2023. CA Cancer J Clin 2023;73:233-54.
17. Siegel RL, Miller KD, Sauer AG, Fedewa SA, Butterly LF, Anderson JC, *et al*. Colorectal cancer statistics, 2020. CA Cancer J Clin 2020;70:145-64.
18. Zheng Y, Wang ZZ. Interpretation of global colorectal cancer statistics. Zhonghua Liu Xing Bing Xue Za Zhi= Zhonghua liuxingbingxue zazhi 2021;42:149-52.
19. Saginala K, Barsouk A, Aluru JS, Rawla P, Padala SA, Barsouk A, *et al*. Epidemiology of bladder cancer. Med Sci 2020;8:15.
20. Parkin DM. The global burden of urinary bladder cancer. Scand J Urol Nephrol 2008;42(Suppl_218):12-20.