INCIDENCE AND TIME TREND OF CANCER IN BASRAH

Jawad K. Hassan, Narjis A-H Ajeel & Sa'ad Sh. Hamadi

ABSTRACT

This is a cross sectional record based study that included all registered cancer cases in Basrah Oncology Center for 6 years period (1997-2002). The number of deaths due to cancer and the total population of Basrah for these years were obtained from Basrah Health Office, and Central Statistical Bureau, respectively. The study showed that the incidence of cancer in Basrah steadily increased in the years (1997-2002). It increased from 17.9/100,000 population in 1997 to 25.4/ 100,000 population in 2002. The increase in the incidence was more marked for males where the incidence increased from 13.4/100,000 in 1997 to 24.5 /100,000 in 2002.Despite this increase the incidence and mortality rates of cancer in Basrah were less than that reported in Western societies by more than 10 times. These rates were also less than that registered in Baghdad or Nineveh. The rates in Western Basrah were less than that in the center or the East of the city. This may reduce the significance of the carcinogenic effect of industrial pollution or the use of depleted uranium in this part of Basrah. The deficient screening programs and recording system for cancer can be explanations for the low incidence of cancer in Basrah.

INTRODUCTION

Cancer can be caused by both external and internal factors. Most of the variations in cancer risk are due to factors that are not inherited, but related to aspects of lifestyle or environment. Because of the still limited success of cancer therapy, prevention should be the main concern. [1] The demonstration of association of a disease with place implies either that the inhabitants of the particular place possess characteristics of etiologic importance in the disease and different from those of the inhabitants of other places, or that etiologic factors are present in the biologic, chemical and physical, or social environments of the people inhabiting the affected places, or that both these types of explanations apply. [2] The international differences observed for cancer are generally important, since most of them concern diseases of unknown etiology, and the international differences are in many instances the most striking feature of the descriptive epidemiology of the disease. [2] For example, unusually high death rates from stomach cancer exist in Japan more than any other nation.[2] Large-scale geographical patterns have been used to generate hypotheses linking malaria endemicity to the occurrence of Burkitt's lymphoma and sunlight exposure to the incidence of skin cancer. [1,3] The type and magnitude of social, biological, physical, and chemical changes that occur with passage of time are as infinite as time itself. [2] The variation in the incidence and mortality rates of cancer with time can be artificial. It may be related to improvement in diagnosis or recording of cancer cases, bias in recording e.g. for political reasons, or may be related to the aging of the population *(susceptible individuals)*. Real increase in the incidence and mortality rates of cancer may be related to many factors. First, changes in the lifestyle of the population as related to diet, drinking water, smoking, alcohol drinking, exercise, type of work, etc. Second, change in the case fatality, which may be related to the low level of immunity or ineffective management of cancer patients. Third, introduction of a new causative agent like the use of depleted uranium (DU) against our country, or other environmental pollutants. These may include physical (radiation), chemical, or biological (bad water quality and poor drainage of sewage).[2] Incidence variation of certain cancers over time reveals the importance of environmental rather than genetic factors in cancer etiology.[1,4] There was a critical need to study the incidence and time trend of cancer in Basrah, because of the worldwide elevation of cancer rates, and the exposure of our environment to different types of pollutants and radiation. Therefore the

Jawad K. Hassan, MBChB, MSc, PhD, Department of Pharmacology, College of Medicine, University of Basrah, Iraq.
Narjis A. H. Ajeel, Department of Community Medicine, College of Medicine, University of Basrah.
Sa'ad Sh. Hamadi, Department of Medicine, College of Medicine, University of Basrah, Iraq.

present study was carried out to study the incidence & mortality of cancer in Basrah over six- year period.

MATERIALS AND METHODS

This is a cross sectional record based study included all newly registered cancer cases over six-year period (1997-2002). Only these years were included because the recording system was established in 1997 & no complete records were available before that year. The cancer registry records are available at the Oncology Center in Al-Saader Teaching Hospital. Each record contains the following information: age, sex, address, diagnosis (based on the histopathological report), and time of first diagnosis. Cancer deaths according to age and sex were obtained from the cancer death records in Basrah Health Office. Basrah population & the distribution of population according to age & sex were obtained from the Central Statistical Bureau, Ministry of Planning. The study included only histopathologically confirmed cancer cases. The date of the first histopathological report was considered as the date of diagnosis and hence used for calculation of the incidence rate. Only patients from Basrah Governorate were included.

RESULTS

Distribution of cancer cases according to type

After exclusion of skin cancer, a total of 2292 histopathologically diagnosed cancer patients were registered in Basrah Oncology Center over the 6-year period. (Table-1) shows the distribution of cancer cases according to type of cancer for both sexes. Breast cancer was the most commonly recorded cancer in this center followed by lymphoma, leukemia, lung, & colorectal cancers. This table also shows that cancers were more common in males than females for all the cancers that may occur in both sexes except breast cancer.

Table 1. Distribution of cancer cases in Basrah according to type for both sexes (1997- 2002).

Type of cancer	No.	% of Total	% in Males	% in Females
Breast	558	24.3	0	100.0
Lymphoma	328	14.3	56.8	43.2
Leukemia	277	12.1	59.7	40.3
Lung	173	7.5	71.4	28.6
Colorectal	122	5.2	56.6	43.4
Bladder	106	4.6	78.3	21.7
Prostate	74	3.2	100	-
Stomach	69	3.0	52.2	47.8
Bone	69	3.0	62.3	37.7
Ovarian	65	2.8	-	100.0
Pancreas	62	2.7	63.4	36.6
Kidney	60	2.6	55.0	45.0
Uterine	53	2.3	-	100.0
Soft tissue	50	2.2	66.7	33.3
Nervous system	46	2.0	70.0	30.0
Unknown origin	115	5.0	43.8	56.2
Others*	65	2.8	65.0	35
Total	2292	100	44.5	55.5

(*: Skin cancers were excluded.)

Age and sex distribution

Of the 2292 registered cancer cases in Basrah over the study period, 1019 (44.5%) were males and 1273 (55.5%) were females. The incidence rate of cancer in children <15 years was 4.9 per 100,000 which is much less than that for those who were 15 or > years old (36.8/100,000 population). In children the incidence rate of cancer was higher among males than females, while the reverse was true for those 15 years or more. The age and sex distribution of cancer cases is shown in (Table-2) which shows that the proportion of cancer cases in extreme ages

(below 20 & above 60 years old), in males was nearly twice that in females. But there was no sex difference in percentages of cancer cases at age groups of (20 to 29) and (50 to 59). This table also shows that females got cancer at an earlier age than males, where more than half (53.5%) of cancers in females occurred at age group of 20 to 49 years old while 51.4% of cancers in males occurred at older age groups (50 years old and more).

Table 2. Age and sex distribution of cancer patients in Basrah (1997-2002).

Age (Years)	Males		Females	
	N	*%*	*N*	*%*
<10	111	10.9	57	4.5
10-19	83	8.1	54	4.2
20-29	91	8.9	111	8.7
30-39	86	8.4	219	17.2
40-49	124	12.2	351	27.6
50-59	200	19.6	261	20.5
60-69	209	20.5	159	12.5
70+	115	11.3	61	4.8
Total	1019	100	1273	100

Time trend:

The time trend of cancer incidence and mortality over the period (1997 to 2002) is shown in (Figure-1). The incidence rates (IR) of cancer steadily increased in the years 1997 to 1999, then declined in 2000 to start another elevation. The mortality rates (MR) showed different pattern, these rates showed slight fluctuations with the highest rates were in 1997, 2000, and 2001. The same incidence and mortality patterns remained, when children were excluded (Figure-2).

The IR of cancer in children showed prominent elevation in 1999, which dramatically declined and became stable over the years 2000-2002. The mortality rate ranged between 3/100,000 to 3.8/100,000 except in 2002 where the rate reached 5/100,000 (Figure-3). The IR of cancer in males was less than those in females for all the studied years except in 1999 (Figure-4). While the MR in males was more than that for females throughout the study period (Figure-5).

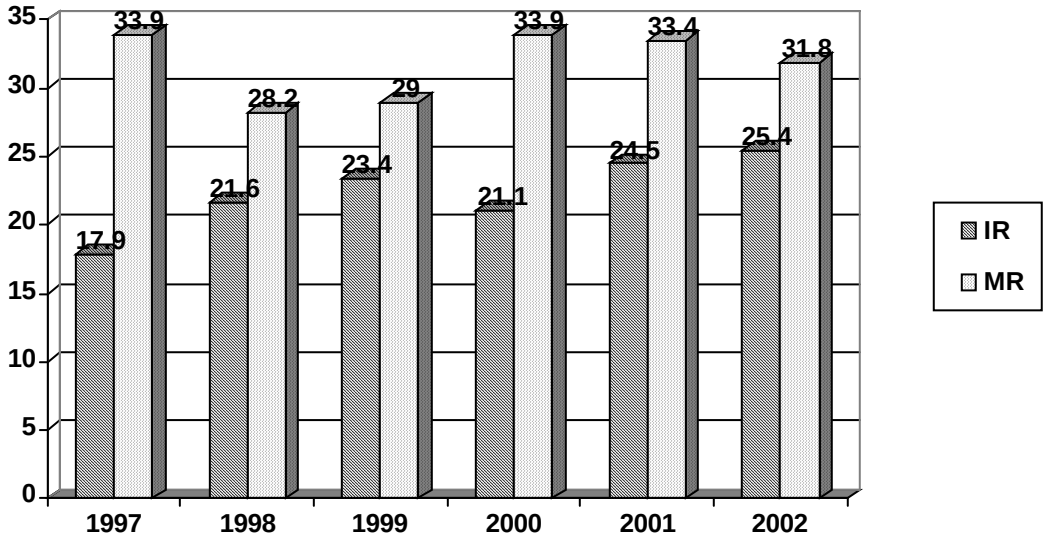

Fig 1. Cancer incidence and mortality rates (per 100,000) (Basrah 1997-2002)

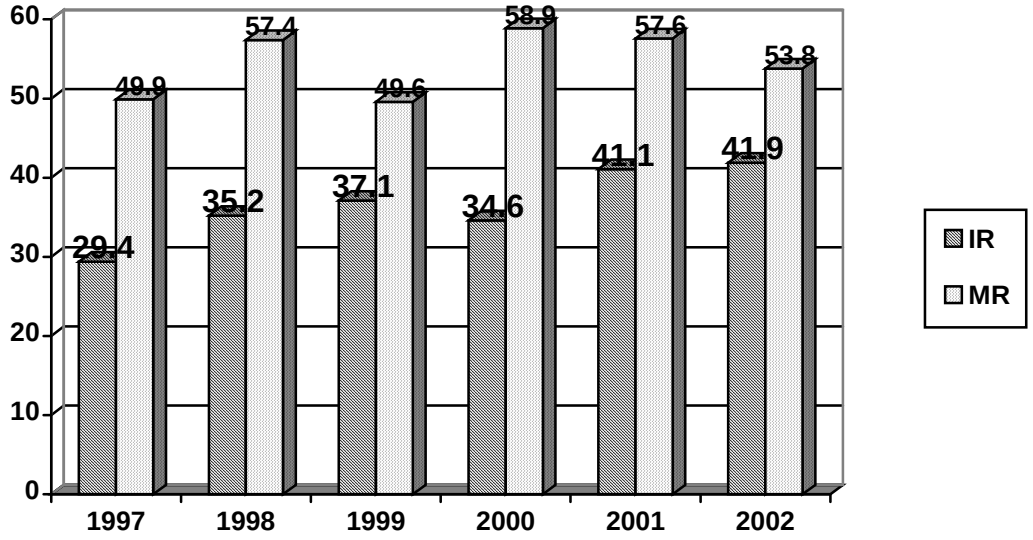

Fig 2. Cancer incidence and mortality rates for ≥15 years old (per 100,000) (Basrah 1997 - 2002).

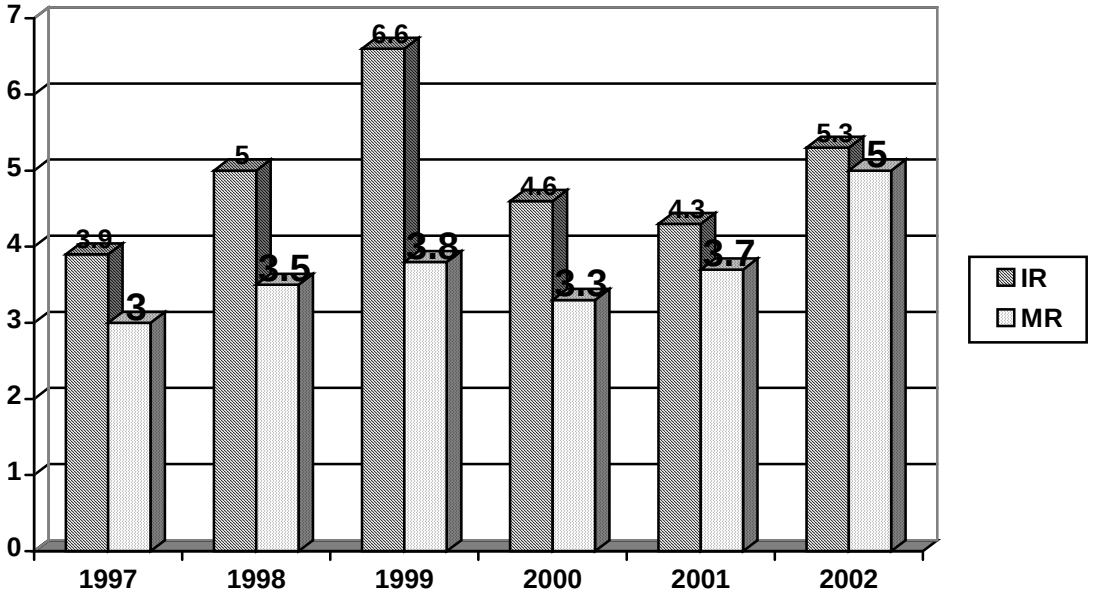

Fig 3. Incidence and mortality rates of cancer among children (per 100,000) (Basrah 1997-2002)

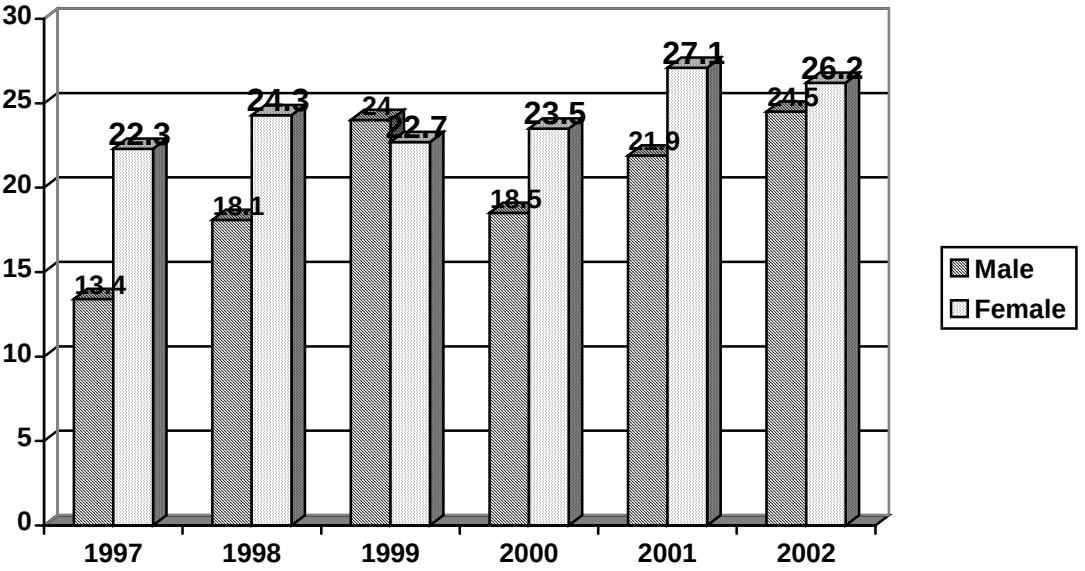

Fig 4. Incidence rates of cancer (per 100,000) according to sex (Basrah 1997-2002).

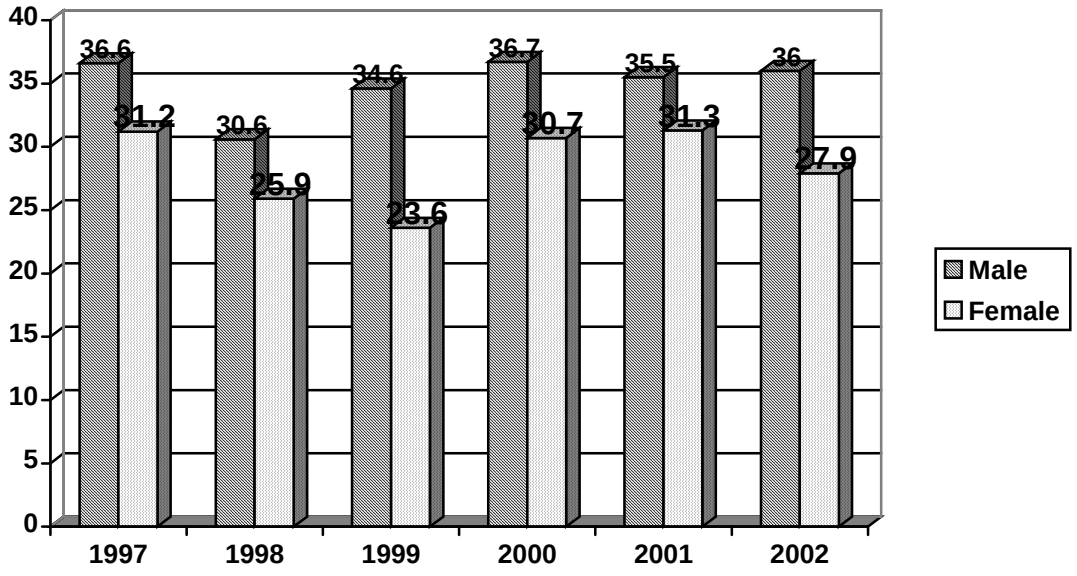

Fig 5. Mortality rates of cancer (per 100,000 population) according to sex (Basrah 1997-2002)

Distribution by place of residence:

The incidence of cancer in different parts of Basrah city over the studied 6 year period (1997 to 2002) is shown in (Table-3). The pattern of incidence rates of cancer in each part of Basrah over time was almost similar to that of Basrah general population, except that in southern Basrah (Abu-Alkhasib). The lowest rates were found in this part with a marked decline in the incidence rate of cancer in the year 2002. Higher rates were reported for the eastern part (Shat Al-Arab) and for the city center.

Table 3. The incidence rates of cancer (per 100,000 population) according to place of residence (Basrah 1997-2002)

Year / Place	1997	1998	1999	2000	2001	2002	Average
Center	22.6	30.0	32.2	30.8	32.3	35.2	30.8
North	12.5	13.1	15.1	14.6	15.5	18.0	14.9
West	13.9	17.9	18.7	13.4	21.6	18.3	17.4
South	6.1	12.5	10.8	9.2	14.3	7.1	10.0
East	49.0	28.2	35.9	23.7	40.6	45.7	37.3
Total	17.9	21.6	23.4	21.1	24.5	25.4	22.5

DISCUSSION

Time trend of cancer in Basrah:

Contrary to the expectations, cancer level in Basrah according to the present study was not significantly increased despite the fact that depleted uranium (DU) was used during the war on Iraq. It was suggested that Depleted uranium can increase the incidence of cancer due to its toxic and carcinogenic effects. [5] One of the possible explanations is that, we are still in the latent periods after the possible exposure to the carcinogens. The diagnosis of cancer cases in excess usually starts after about 7 years for leukemia and more than 10 years for solid tumors. [1,6] But still there is a fact that DU has a toxic rather than carcinogenic effect and its carcinogenic effect can be negligible. [5,7-10] The present study showed that the average incidence rate of cancer in Basrah was still lower than what had been reported for UK and USA by

more than 10 times. Where the IR of cancer in western societies during the period from 1992 to 1998 ranged between 401-445/100,000 populations. This range had been increased after that time. [11,12] This may be explained by the weak screening and under diagnosis of cancer in Basrah. The second explanation is that cancer is a well-known disease of the richest and well-developed societies. It is less frequently detected in poor under-developed ones despite the presence of the environmental carcinogens. [13] The epidemic of cancer in western societies was mainly explained by changes in their lifestyle toward sedentary work, low physical activity, over-nutrition and overweight. [14,15] For example, according to a recent data from the WHO, rates of breast cancer were highest in the USA and lowest in the countries of eastern Asia: 91 and 18 per 100,000 women-years, respectively.[13] The slight elevation during the first three years included in the study (1997, 1998, 1999) can be mainly explained by the improvement in recording and to the strict case referral system after the restriction of chemotherapy in the Oncology Center after 1996. The IR of cancer then declined with slight elevation during the year 2002. On the other hand, the pattern of mortality rates (MR) due to cancer with time was consistent with that of IR of cancer. There was no elevation of cancer MR over the six years period. Although there were fluctuations in the rates during the first 3 years, the MR of cancer showed a decline over the last 3 years that were included in the study *(2000, 2001 and 2002)*. This may indicate that the IR of cancer may not increased or it may indicate the unreliability of mortality records as a source of information for cancer deaths. The MR in UK and USA were usually less than half that of IR. In the present study it was slightly more than the IR, which might indicate that some of the cancer cases were not recorded in the center and may also indicate the poor prognosis or poor management of cancer cases. Nearly the same findings were observed in cancer cases of 15 years old and more, but in children, the MR were slightly less than the IR. This may indicate that most of the cancer cases in children were reported in the center.

Age and sex characteristics with types of cancer:

Contrary to the belief that female tissues are more sensitive to the effect of carcinogens, nearly all types of cancer that affect both sexes were more common in males than females with the exception of breast cancer. This finding was also established in other studies.[1,4,16] The work hazards that males may get exposed to or the different habits between the two sexes are the main available explanations. But the big differences in cancer rates between males and females are beyond the scope of such explanation. In addition, females especially in western societies nearly have the same habits and get exposed to same environmental hazards as males. The study also showed that adult females were affected at an earlier age than males, while at extreme ages (below 20 and above 60 year old), males got cancer more frequently than females. This may be mainly related to breast cancer, which is more frequent in the pre-menopausal period because the estrogen level is high and hence may expose to hormonal over-stimulation.[17] This effect usually declines markedly after menopause, where ovarian secretion of estrogen is dramatically reduced.[1] That is why, breast cancer incidence rate was found in a previous study to be 26% higher among postmenopausal women receiving hormone replacement therapy (HRT),[18] while the use of anti-estrogen therapy (tamoxifen) reduced breast cancer incidence among healthy BRCA2 carriers by 62%. [19] Estrogen might influence the activity of the tumor suppressor gene BRCA1, which in turn may suppress the activity of estrogen receptors. [20] Therefore estrogen can cause local breast tissue abnormality as well as its central over-stimulating effect. [17, 21]

Place distribution of cancer in Basrah:

The average IR of cancer was the highest in eastern Basrah followed by the city center, and the least in southern part followed by western part of Basrah. Higher IR of cancers in the city center as compared with other areas over the six years study period may be related to the following: Better diagnosing facilities, the availability of and the better access of people to the Oncology Center and other health facilities, and the health concern of the population. People in Shat Al-Arab also have an access to the

Oncology Center and other health facilities similar to that of the city center. This may partly explain the relative high IR of cancer in this part. The reverse is true for southern Basrsh (Abu-Alkhasib). In addition, the lower incidence rate of cancer in this area may be also explained by the high prevalence of SCD and G6PD deficiency among the residents of this part of Basrah; where cancer is rare among this group of population. [22] Based on the results of the present study, there is no clear evidence that cancer in Basrah was flaring up. One possible explanation is the fact this is a record based study with all the limitations of such studies.

REFERENCES

1. Devita VT, Hellman S and Rosenberg SA. Cancer: Principles and practice of oncology. 5th ed. Lippincott-Raven publishers, 1997: 231-251.
2. Macmahon B, Pugh TF. Epidemiology (principles and methods). 1st ed. Little, Brown and Company, 1970: 103-173.
3. Kiefe CI. Race/ethnicity and cancer survival: The elusive target of biological differences. JAMA. 2002; 287:2106-2113.
4. Peckham M., Pinedo H. and Veronesi U.: Oxford Textbook of Oncology. Oxford University press, 1995: 199-262.
5. McDiarmid MA. Depleted uranium and public health. BMJ. 2001; 322: 123-124.
6. Noshchenko AG, Zamostyan PV, Bondar OY, et al. Radiation induced leukemia risk among those aged 0-20 at the time of the Chernobyl accident: A case-control study in the Ukraine. International J. Cancer. 2002; 99: 609-618.
7. Kellerer AM. Risk estimates for radiation-induced cancer: the epidemiological evidence. Radiat. Environ.Biophys. 2000; 39: 17-24.
8. Marouf BA. The health effects of DU contamination in Al-Basrah governorate. The medical Journal of Basrah University. 2000; 18:7-9.
9. Yacoub AA, Al-Saddon IO, Hassan JG. Further evidence on the relation between depleted uranium and the incidence of malignancies. The medical Journal of Basrah University. 2000; 18:3-6.
10. WHO press WHO makes recommendations on depleted uranium and health in new monograph. Saudi Med. J. 2002; 23:248-249.
11. American cancer society. Cancer in minorities. Available at: http://health.yahoo.com/health/cancer. Accessed August 2002.
12. Jemal A, Thomas A, Murray T, et al. Cancer statistics, 2002. CA: cancer J.Clin. 2002; 52:23-47.
13. Krieger N. Is breast cancer a disease of affluence, poverty, or both? American J. of Public Health. 2002; 92: 611-612.
14. Lincoln DT, Kaiser HE, Raju GP, et al. Growth hormone and colorectal carcinoma: localization of receptors. In vivo. 2000; 14: 41-49.
15. Franceschi S, Dal-Maso L, Augustin L, et al. Dietary glycemic load and colorectal cancer risk. Ann. Oncol. 2001; 12:173-178.
16. Nicholas DR. Men, masculinity, and cancer: risk factor behaviors, early detection, and psychosocial adaptation. J.Am.Coll. Health. 2000; 49: 27-33.
17. Braendle W. Estrogens: a breast cancer risk?. Ther. Usmch. 2000; 57: 646-650.
18. Anonymus. Estrogen/progestin hormone replacement therapy risks outweigh benefits: study stopped early due to excess breast cancer, heart disease. CA: A cancer J. Clin. 2002; 52: 248-249.
19. Kimg M, Wiead S, and Hale K. Tamoxifen and breast cancer incidence among women with inherited mutations. JAMA 2002; 12:58-65.
20. Hilakivi-clarke L. Estrogens, BRCA1, and breast cancer. Cancer Res.2000; 60:4993-5001.
21. Parslov M, Lidegaard O, Klintorp S, et al. Risk factors among young women with endometrial cancer: a case control study. Am.J. Obstet.Gynecol. 2000; 182: 23-29.
22. Hassan JK. Cancer in Basrah: Pattern and determinants with emphasis on SCD and G6PD Deficiency (A new Hypothesis). PhD thesis, College of Medicine, University of Basrah 2003.