



Science

TUMOR METASTASIS DILEMMA: BONE SCAN AND PSA LEVEL IN RELATION TO PROSTATIC MALIGNANCY AMONG SUDANESE

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Abstract

Observed the patient with prostate cancer during five years to measure the survival rate that for evaluating the effectiveness of diagnosis and treatment options.

This study conducted to study bone scan and PSA level and their relation to prostatic Malignancy among Sudanese.

This study is a retrospective cohort study, which was performed in Sudan. The sample magnitude was 306 prostate carcinoma patients with age ranged between 43-93 years. The patients' follow-up through 5 years studied in order to assess whether of them were alive or dead. The observed, corrected and expected five survival of the population were used. Kalban-Meier calculation methods of five years survival were used.

The study found that only 111 (36.3%) of the 306 patients animated 5 years afterward their dates of initial management and therefore, the 5 years survival rate is 37%. The study found that the survival rate were 37%, 42% and 44% ($p > 0.05$) respectively.

The study found that there were many factors affected the survival rate in Sudanese population such as treatment type and diagnosis date.

Keywords: Prostate Gland; Survival Rate; Survival; Sudan.

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1. Introduction

In the Introduction section, present clearly and briefly the problem investigated, with relevant references.

Cancer is type of disorders that branded by out of body regulator growing and antagonistic behavior. It has more than 150 types and they alienated according to their origin. It causes the harm to the body when the affected cells divide irrepressibly to produce multitudes of tissue termed tumors excepting in certain types. Tumors can rapidly proliferate and amend the functions of various body systems due to their secreted hormones. Tumors, which remain in one place and are generally considered benign. The benign tumors rest in same site and establish restricted growing rather than the malignant ones. The malignant tumors tend to brand new blood supply to nourish in a procedure named angiogenesis. Prostate cancer considers one of the furthestmost tumor in world; it classify second among all cancers in both genders after breast in 2012¹. It likewise the most common type among the Sudanese males². In people with prostate cancer, the bone is usually the primary distant place of metastasis. More than two-third of secondary prostate carcinomas metastasize to the bones³. Survival ratio is an amount of existence fraction of cancer patients. It is the amount of persons who survive after a certain period after the diagnosis of the disease. Survival rates are crucial for treatment efficiency study. It depends on the entire inhabitants. Discrete prognosis is contingent on novel managements. Since the previous numerical analysis as well as the patient health condition⁴. The survival rate divides into many types depends on the time such as five years and ten years. It computes form the diagnosis date⁵. One of survival rate for assess the prognosis of disorder, generally calculated diagnosis period. The five years survival is defined as the number of patients who lived for 5 years from the tumor detection date. It used to assess the efficiency of management⁶.

2. Materials and Methods

This study was a retrospective cohort study, which was performed in amongst the cancer patients in Sudan. The sample magnitude was 306 patients with prostate cancer. The patients' age ranged between 45-95 years old. The study data was retrieved from patients' files system of Radiation and Isotopes Center of Khartoum (RICK) which included patient age, occupation, symptoms and its intervals, site of tumor and its magnitude, number of patient in year after diagnosis, number of alive at beginning of year, number of dying patient during year, Number of patients last seen alive during year. The 5-years survival rate, direct method, actuarial method and Kalban-Meier method calculation used in this study.

3. Results and Discussions

Calculation by the Direct Method

111 patients of total number of 306 patients were lived for 5 years. The total 5-years survival rate of was 36.3 % of all patients after estimated by the direct measurement technique.

Table 1: Calculation of observed survival rate, and its standard error, by the actuarial (life-table) method

(1) Year after Diagnosis (i)	(2) No. alive at Beginning of Year (l _i)	(3) No Dying During year (d _i)	(4) No. last seen Alive Durin g Year (w _i)	(5) Effective No. Exposed to Risk of Dying (r _i)	(6) Proportion Dying During Year (q _i)	(7) Proporti on Survivin g year (p _i)	(8) Proportion Surviving From list Treatment to end year (11p _i)	(9) Entry (5) Minus Entry (3) (r _i - d _i)	(10) Entry(6) Divided By entry (9) (q _i) r _i . d _i
0	306	8	0	306.0	0.026	0.974	0.974	298	0.0000
1	298	73	1	297.5	0.245	0.755	0.735	224.5	0.2450
2	224	50	2	223.0	0.224	0.776	0.570	173	0.0013
3	172	31	2	171.0	0.181	0.819	0.467	140	0.0013
4	139	23	3	138.5	0.166	0.834	0.389	115.5	0.0014
≥ 5	113	-	113	-	-	-	-	-	-
Total		185	121						0.249

$$(r_i) = l_i - \frac{w_i}{2}$$

$$q_i = \frac{d_i}{r_i}$$

$$p_i = 1 - q_i$$

Calculation by the Actuarial Method (Life Table)

The five-year survival rate measured by the life-table technique is 0.389 or **39%**. The life-table method was dependable since it was founded on more data. One benefit of the life-table technique is that it offers data about vicissitudes in the risk of dying in successive intervals of observation.

Thus, column 6 (**q_i**) shows that the amount of patients dying in each of the first 4 years after diagnosis augmented from 3% in the first year to 19% in the fourth. The increasing rates in column 8 may be used to plot a survival curve, providing a pictorial description of the survival pattern (Figure 1).

Table 2: Calculation of the corrected survival rate

(1) Year after Diagnosis (i)	(2) No. alive at Beginning of Year (l _i)	(3) No Dying During year (d _i)		(4) No. last seen Alive During Year (w _i)	(5) Effectiv e No. Expose d to Risk of Dying (r _i)	(6) Proportion Dying During Year (q _i)	(7) Prop ortio n Surviv ing year (p _i)	(8) Proportio n Surviving From list Treatment to end year (11p _i)
		(a) From Cancer (d(c) _i)	(b) From other causes (d(o) _i)					
0	306	6	2	0	305.0	0.020	0.980	0.980
1	298	69	4	1	295.5	0.234	0.766	0.751
2	224	46	4	2	221.0	0.208	0.792	0.595
3	172	28	3	2	168.5	0.166	0.834	0.496
4	139	21	2	3	136.5	0.154	0.846	0.420
≥ 5	113	-		113	-	-	-	
Total			185	121				

Where $(ri) = li - \frac{wi + (d(o)i}{2}$ $qi = \frac{(d(o)i}{ri}$ $pi = 1 - qi$

The five-year corrected survival rate is **42%**, compared to an observed rate of **39%**. The corrected rate indicates that **42%** of patients with Prostate Cancer escaped the risk of death from the disease within 5 years of diagnosis.

Table 3: Calculation of the relative cumulative survival rates among Prostate Cancer patients
 Based on data in Tables 1

(1) Year after Diagnosis (i)	(2) No. alive at Beginning of Year (li)	(3) No Dying During year (di)	(4) No. last seen Alive During Year (wi)	(5) Effective No. Exposed to Risk of Dying (ri)	(6) Proportion Dying During Year (qi)	(7) Proportion Surviving year (pi)	(8) Proportion Surviving From list Treatment to end year (11pi)	(9) Relative survival rate (11pi /ER)
0	306	8	0	306.0	0.026	0.974	0.974	0.974
1	298	73	1	297.5	0.245	0.755	0.735	0.835
2	224	50	2	223.0	0.224	0.776	0.570	0.647
3	172	31	2	171.0	0.181	0.819	0.467	0.530
4	139	23	3	138.5	0.166	0.834	0.389	0.442
≥ 5	113	-	113	-	-	-	-	-
Total		185	121					

$(ri) = li - \frac{wi}{2}$ $qi = \frac{di}{ri}$ $pi = 1 - qi$

ER= *Expected Survival Rate* (0.88)

Relative survival rate = $\frac{\text{(Observed survival rate)}}{\text{Expected survival rate}} \times 100\%$

Relative survival rate = $\frac{0.39}{0.88} * 100\% = 44 \%$

Table 4: Observed, corrected and relative cumulative survival rates among Prostate Cancer patients

Years After diagnosis	Observed survival rates	Corrected survival rates	relative survival rates
0	0.974	0.980	0.974
1	0.735	0.751	0.835
2	0.570	0.595	0.647
3	0.467	0.496	0.530
4	0.389	0.420	0.442
≥ 5			

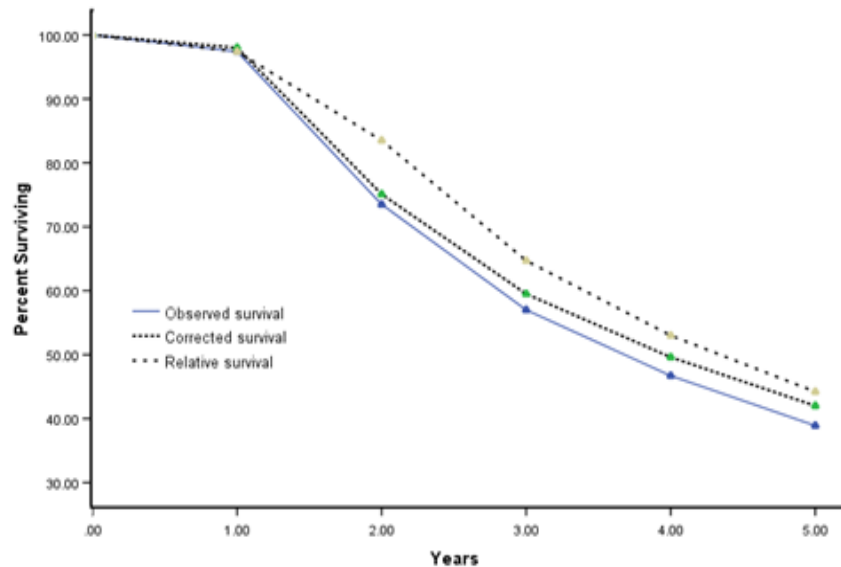


Figure 1: Observed, corrected and relative cumulative survival rates among Prostate Cancer patients Based on data in Tables 1 and 2 and 3.

4. Conclusions & Recommendations

The 5-years survival rate was 91.6% for patients who diagnosed in grade 1 of the disease, 76.5% in grade 2, 24% in grade 3 and 7.5% in grade 4. For all study samples, no one diagnosed in grade 0. From all patients who treated within the first month after the diagnose there are 68% survived more than 5 years, 36.5% for those who treated within the second month, 29.3% for the third month, 19% for the fourth, 12.5% for the fifth month and 7% for patients who treated after more than 5 months from their diagnose. The best treatment given was the combination between surgery and radiotherapy which used for 21.2% of patients and resulted in 61.7% 5-years survival rate, followed by radiotherapy, chemotherapy, radiotherapy and chemotherapy, surgery and chemotherapy, and surgery+ radiotherapy+ chemotherapy. These protocols used for 31.9, 13.1, 24.3, 2.5 and 1.9 % of all patients respectively and resulted in 21%, 6%, 6%, 0% and 0% 5-years survival rates respectively. Patients of the age group of 20-30 years were 11.2% from all patients and their 5-years survival rate was 50%, 31-40 years group was 15.6% from all patients and survived by 48%, 41-50 years group was 21.8% of all patients and survived by 34.3%, age group of 51-60 was 25% from all patients and there are 30% survived from this group, 61-70 years group was 20% and survived by 21.8%, the group of 71-80 years was 5% from all patients and there were 25% survived and the age group of 81-90 years was 1.8% from all patients and survival rate in this group was 0%. The observed, corrected and relative 5-years survival rate of cancer in Sudan are 40.5%, 52% and 47% respectively. The study found that the survival rate of prostate were 37%, 42% and 44% ($p > 0.05$) respectively.

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