

# Survival Patterns of the Patients with Prostate Cancer in Nineveh Province 2010-2014

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## ABSTRACT

Prostate cancer is the second most frequently diagnosed cancer in men worldwide. The continued increase in the incidence of prostatic cancer has been attributed to screening with prostate-specific antigen testing. The risk of being diagnosed with cancer increases substantially with age. Survival statistics vary greatly by cancer type and stage at diagnosis. The aim of the present study is to examine the death and survival rates of the patients with Prostate cancer in Nineveh Province, during the period 2010- 2014. A five-year retrospective review of cancer records from Mosul Cancer Registry center was conducted. Observed survival rates were measured and period analysis was used to derive 5-year survival rates. 95% confidence intervals were calculated and P-value of  $\leq 0.05$  was considered to denote statistical significance. Many patients with prostate cancer were in the age  $\geq 70$  years, and they had the highest case fatality and those at the distant stage of cancer extension. The survival rates showed a greatest decline over the age span and cancer cases diagnosed at an early stage will appear to live longer with their disease.

**Key words:** Prostate cancer (PC), Mosul Cancer Registry center (MCRC), 5-year survival rates, case fatality rate (CFR)

## HOW TO CITE THIS ARTICLE

Moayad Aziz Alabdaly<sup>1</sup>, Bassam Abd Almobi Al Neema, "Survival Patterns of the Patients with Prostate Cancer in Nineveh Province 2010-2014", International Journal of Enhanced Research in Science, Technology & Engineering, ISSN: 2319-7463, Vol. 7 Issue 3, March -2018.

## I. INTRODUCTION

Prostate cancer (PC) is the most common solid tumor in men and the third common cause of mortality among men of developed countries <sup>(1,2)</sup> and the second most common cancer among men worldwide <sup>(3)</sup>.

Prostate cancer is the second most frequently diagnosed cancer in men, with 1.1 million new cases estimated to have occurred in 2012. Two-thirds of these cases were diagnosed in developed countries <sup>(4)</sup>. Incidence rates vary by more than 100-fold worldwide, and are higher in Northern and Western Europe, Northern America, Oceania, and some Caribbean island nations, and lowest in Asia and Africa <sup>(4-6)</sup>. Much of the variation reflects differences in the use of prostate specific antigen testing <sup>(7)</sup>. The continued increase in the incidence of prostatic cancer has been attributed to screening with prostate-specific antigen testing <sup>(8-11)</sup>.

In general, the crude incidence and mortality rates of prostate cancer were 30.8 and 8.6/100000, respectively. Both the incidence and mortality crude rates were higher in more developed regions than in less developed regions (incidence: 122.4/100000 vs. 12/100000; mortality: 23.4/100000 vs. 5.6/100000, respectively) <sup>(12)</sup>. In contrast, the incidence of prostate cancer is much lower in Asia and Africa <sup>(4,6)</sup>.

In Iraq Cancer of the prostate is the 10th leading cause cancer in males, accounting for 3.3% of the newly diagnosed cancer cases in males only <sup>(13)</sup>.

Cancer incidence and death rates vary considerably between racial and ethnic groups, Geographic differences and differential expansion of facilitated health services, with rates generally highest among black people and lowest among Asian/Pacific Islanders<sup>(14-17)</sup>.

Cancer can occur at any age, which increases substantially with age. In developed countries, 58% of all newly diagnosed cancer cases occur at 65 years of age and older, compared with 40% in developing countries<sup>(18)</sup>.

Survival statistics vary greatly by cancer type and stage at diagnosis. Survival is expressed as the percentage of people who are alive a certain period of time (usually 5 years) following a cancer diagnosis<sup>(19)</sup>.

Cancer survival rates in a population are affected by age of the patients, the stages of cancers, and treatment is existing<sup>(18)</sup>. The burden of cancer is generally measured incidence (the number of new cases diagnosed in a year); mortality (the number of deaths attributed to cancer); and five-year survival rate<sup>(20,21)</sup> which is the most frequently used indices for measuring the efficacy of therapy in cancer<sup>(22)</sup>.

Treatment choices vary depending on age, stage, and grade of cancer, in addition to other medical conditions<sup>(23-25)</sup>.

### Aim of the Study

The aim of the present study is to examine the death and survival patterns of the patients with Prostate cancer in Nineveh Province and to construct the life tables for the concerned various mortality rates.

### Objectives

1. To measure the incidence rates, the mortality and the case fatality rates of prostate cancer, according to type of cancer, age, and stage of cancer for each year of the study period.
2. To calculate the 5-year survival rates, according to the ages and stage of the cancer for the patients in this study.
3. To make comparisons among patients diagnosed with prostate cancer, according to the age and stage of cancer.
4. To demonstrate type of different treatment modalities used for the patients with prostate cancer during the study period.

## II. MATERIALS AND METHODS

### Administrative Agreement:

Administrative agreement was obtained from all the study settings included in the research. Ethical consideration was extensively followed by the investigator during data collection and analysis in this research.

### Study Settings:

The study was conducted at Mosul Cancer Registry center (MCRC). This center collects information on all cancer cases in the area, according to the preformed information referral form.

### Study period:

Data collection of this study was done from the first of January, 2010 to 31<sup>th</sup> of December, 2014

### Study sample:

Nineveh Province has an area of 37,300 Km<sup>2</sup> and a total population of 3,026,307. 3,188,726. 3,335,200. 3,438,194 and 3,524,348 million for the years of 2010, 2011, 2012, 2013 and 2014 respectively. Population data were obtained from the directorate of health in Nineveh taking into consideration the annual population growth rate of 3.2%<sup>(26)</sup>.

The sample of the present study included all prostate cancer patients registered at the Mosul cancer registry center and the related hospitals in Nineveh in 2010 to 2014 of all ages.

The cancer cases are registered by trained personnel with respect to patient number, age, clinical stage, cancer and coded according to the International Classification of Diseases (ICD10), treatment data, survival confirmation date (according to last contact with the patient) and survival status (alive or dead). Primary-site code for prostate cancer was C61<sup>(27,28)</sup>.

The final number of included subjects was 170 (113 censored)

### Study design:

A five-year retrospective review of cancer records from the year 2010 to 2014 was conducted, and followed extensively by the investigator. The follow up included mainly if the patient has died from cancer, as a first or second cause of death as it's written on the death certificate and registered in (MCRC).

Cancer staging is done according to the summary stage system<sup>(29,30)</sup>; if cancer cells are present only in the layer of cells where they developed and have not spread, the stage is in situ. If cancer cells have penetrated beyond the original layer of tissue, the cancer has become invasive and is categorized as local, regional, or distant based on the extent of spread<sup>(30)</sup>. Stage "unknown" has been recorded to include tumour morphologies for which the summary stage system is not strictly applicable. In this analysis according to stage, patients with cancer of an unknown stage or carcinoma in situ were excluded from the present study.

The criteria of the age groups chosen for cancer survival analysis were those used for the international standard cancer patient population (international standard for cancer survival analysis/ICSS)<sup>(31)</sup>. With age been categorized into three groups (0–54, 55–69 and 70+ years) for cancer under study, to include the large number of cases.

However information concerning specific data on surgery or therapeutic agents was not available and the data were sufficiently complete to permit descriptive studies of cancer treatment patterns by cancer, age of the patient and stage of cancer. Analyses were confined to definitive or tumour directed treatment, i.e. any treatment or therapy with the aim or effect of removing, destroying or preventing growth of tumour tissue, whether "curative" or "palliative" in determined. This included surgery (and related destructive therapies), chemotherapy (and related therapies e.g. biological response modifiers and immunotherapy), hormone therapy and radiotherapy.

Follow up was done to ascertain the vital status (alive or dead) of the cancer patients. This was relied upon the notification of the deaths of registered patients using the death certificate file for the region. Collation of the two files: (the death certificate file from vital statistics and the registry file of registered cases) were performed in the cancer registry manually. In the matching process, a combination of several indices, such as name, date of birth and address, are used for checking patient identification.

#### Statistical Analysis:

Three of the most commonly reported outcome measures are estimated in this study: the incidence, the mortality, and the five years survival rate.

Other statistical methods; the case fatality rate and proportion mortality rate of the prostate cancer, according to the each year of the period 2010 - 2014.

Survival analysis was carried out using the actuarial method to construct the needed life tables<sup>(32,33)</sup>. It was estimated for each age from birth to the age 70 years and above, for each year from 2010 to 2014, for estimating cancer survival. **Observed survival rate "OSR"** is the probability of surviving from all causes of death in a group of cancer patients under study. Observed survival was measured from the date of diagnosis to the date of death or censoring, whichever occurred first<sup>(33-35)</sup>. Cancer patient survival was estimated as the cumulative probability (range 0 to 1) of survival up to a stated time after diagnosis<sup>(36)</sup>. This method involved the construction of a life table that permits the calculation of the cumulative probability of survival at time  $X$  TO  $X + I$  (time period or interval, since beginning treatment or years after Diagnosis) from the conditional probabilities of survival during consecutive intervals of follow-up time up to  $<X$  TO  $X + I$ . This method has been used in this publication to estimate the absolute survival probability<sup>(37)</sup>.

Calculation of the standard error of the five-year survival rate obtained and 95% confidence intervals were calculated to provide an estimate of the stability, uses the Greenwood's formula<sup>(33)</sup>.

In the present study, period analysis was used to derive 5-year survival estimates for 2010-2014<sup>(38,39)</sup>.

A P-value of  $\leq 0.05$  was considered to denote statistical significance. Histograms and pie chart were used to present continuous variables and tables used for categorical data.

### III. RESULTS

There were 170 cases of prostate cancer in which 57 deaths occur from the years 2010–2014, with crude incidence rate 5.1 per 100,000 and crude (cause-specific) mortality rate 1.7 per 100,000 of the population during the study period.

The individuality of the prostate cancer cases diagnosed in the period (2010- 2014) and included in the analysis are shown in Table 3.1.

Many patients with prostate cancer were old  $\geq 70$  years; 94, (55.3%). The data, which was collected by site classification, were then further classified by clinical stage. It was not possible to determine the stage for 46 (27.1%) cases, a high proportion, 65 (38.2%) of all cases are of distant stage.

**Table 3.1: The distribution of the prostate cancer cases, according to age and stage of disease (2010-2014)**

Prostate Cancer n= 170		Year of diagnosis					Total	%
		2010	2011	2012	2013	2014		
Age	0-54	3	4	4	3	6	20	10.0
	55-69	7	16	10	17	6	56	34.7
	70+	14	15	20	24	21	94	55.3
Stage	Local	4	2	7	9	4	26	15.3
	Regional	6	10	7	4	6	33	19.4
	Distant	11	19	5	15	15	65	38.2
	Unknown	3	4	15	16	8	46	27.1

In the table 3.2, which shows the case fatality rate, according to age group and stage of prostate cancer extension, case fatality rates were highest in those of 70 years or older age (37.2%), followed by those in  $\leq 54$  age group (30.0%). The case fatality rate from cancer increased with stage, which high on a distant stage (53.8%), the case fatality rate was low at local stage (7.7%).

**Table 3.2: The case fatality rate (CFR %) of the prostate cancer cases overall and according to age and stage of cancer (2010 – 2014)**

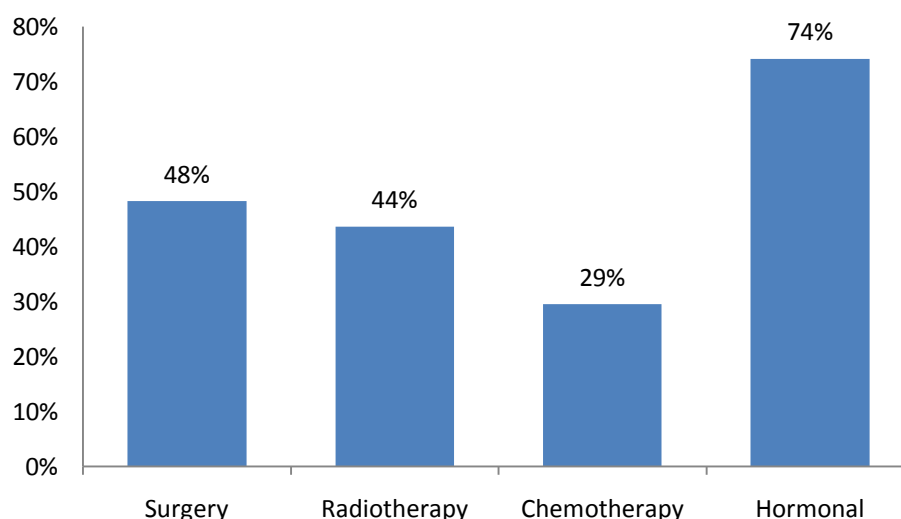
Prostate Cancer n= 170		Year of diagnosis					Overall CFR%
		2010	2011	2012	2013	2014	
Age Group	0-54	66.7	25.0	25.0	33.3	16.7	30.0
	55-69	42.9	18.8	30.0	23.5	50.0	28.6
	70+	50.0	60.0	35.0	29.2	23.8	37.2
Stage	Local	0.0	0.0	50.0	14.3	0.0	7.7
	Regional	33.3	33.3	0.0	14.3	0.0	12.1
	Distant	63.6	63.6	42.1	100.0	46.7	53.8
	Unknown	100.0	100.0	100.0	26.7	31.3	34.8

In prostate cancer, the age gradient was equally marked, declining from 61.3% (95% CI 52.8% to 69.9%) in the youngest age group to 53.0% (95% CI 50.6% to 55.5%) in the oldest. For the prostate, the 5-year survival rates by stage were 91.4% for local stage, 84.7% for regional stage and 33.5% for distant stage, all these results were seen in table 3.3.

**Table 3.3: The overall 5- year Observed Survival Rate (OSR) and according to age and stage of prostate cancer cases (2010-2014)**

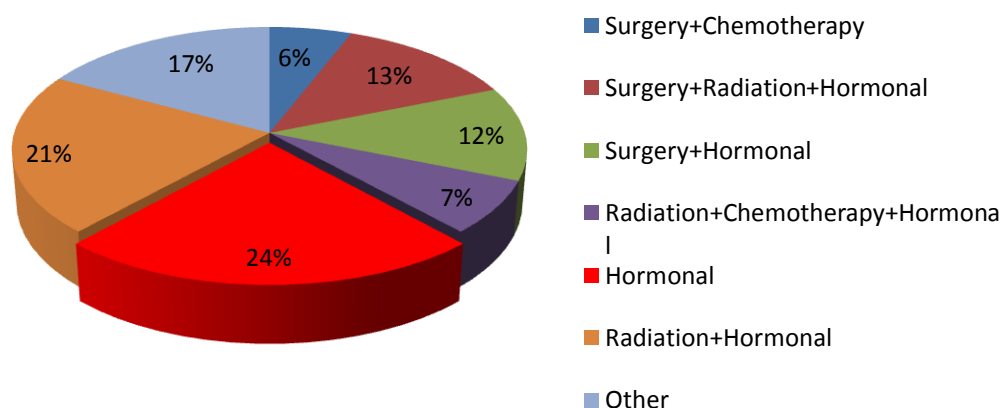
Prostate Cancer	Survival rate		95% CI
	Overall	0.560	
Age	0-54	0.613	0.528 - 0.699
	55-69	0.589	0.549- 0.629
	≥70	0.531	0.506 - 0.555
	Localized	0.914	0.905 - 0.922
Stage	Regional	0.849	0.835 - 0.862
	Distant	0.335	0.254 - 0.417

The most frequent treatments for prostate; 74% had hormonal therapy, 48% had surgical treatment, 44% had radiotherapy and (29%) chemotherapy (Figure.3.1).



**Figure 3.1 Type of treatment used for the prostate cancer cases during the study period. (Total cases= 170)**

The most frequent treatment and combinations were hormonal therapy only (24%), radiotherapy plus hormonal therapy (21%), surgery plus radiotherapy plus hormonal therapy (13%), 12 percentage for surgery plus hormonal therapy and (7%) radiotherapy plus hormonal therapy and chemotherapy, as shown in figure3.2.



**Figure 3.2 Type of treatment combinations of the prostate cancer cases during the study period. (Total cases=170)**

#### IV. DISCUSSION

The aim of the present study is to examine the death and survival patterns of the patients with the prostate cancer in Nineveh Province.

The ultimate objective of all cancer programs is to decrease the mortality rate from cancer as minimum as possible. However, by supporting the effectiveness of the various medical and surgical care provided against cancer and the associated activities of cancer control and prevention, treatment measures can be significantly improved. The calculation of the 5-year survival rates plays an important role in measuring effectiveness of cancer mortality and thus achieving this objective. This study would provide a baseline, and a framework, for assessment of expected cancer motoring and will, promotes, evidence-based implementation of improvements in cancer care.

The majority (61.4%) of prostate death were over the age of 70 years, and 10.5%, of prostate cancer deaths they were under age 54 years. This was also noticed in another study; in 2008 in many regions of the world (including all of Australia/New Zealand, North America, and South America, as well as most of western and northern Europe and parts of sub-Saharan Africa)<sup>(7)</sup>.

The prostate cancer in the present research had annual incidence rate (1.0 per100000). The study results were less than those seen in Qatar 3<sup>(40)</sup>, Egypt 3.6, Jordan 5.6, however the higher rates found in Cyprus 16.4<sup>(41)</sup> and 53 in USA<sup>(18)</sup>. Prostate cancer had an overall survival rate of 56%, rising to close at 61.3% in the 0–54 and 58.9% in 55–69 age group, prostate cancer prognoses were poorer at older ages (70+ )53.1%.

The reason for the differences in the survival rates for prostate cancer would be that the patients with prostate cancer were older and many of them may have had associated morbidities that influenced the cause of death. Findings from other studies indicated that prostate cancer has poorer survived<sup>(42,43)</sup>, perhaps because of biological features of prostate tumours presenting in men<sup>(42)</sup>. Studies have also found that older men with prostate cancer are less likely to receive aggressive therapy,<sup>(44)</sup> even when co-morbidity is taken into account<sup>(45)</sup>.

The differences in this study between the survival rates were decreased as the stage of the disease advances. Survival rates for prostate cancer were large, even for distant stage 34%. For local stage prostate cancer, the survival rate was 91.4% and 84.9% for regional stage, this had corresponded to same increase of survival rate in the US, but with better results; 99% in local and regional stages, while 29% in distant stage<sup>(43)</sup>.

In this study, the increasing survival for local prostate cancer was thought to have occurred because of the patients with prostate cancer were old and the number of deaths was small. As it was suggested in the study of Coleman MP,<sup>(28)</sup> which was done in in Australia, Canada, Denmark, Norway, Sweden, and the UK, the possible explanations for these survival differences may be due to later diagnosis or differences in treatment which may be explained for the results of this investigation.

The most frequent treatments for prostate was; 74% for hormonal therapy, which was mostly used in the world<sup>(46,47)</sup>, 48% had surgical treatment, 44% had radiotherapy and (29%) chemotherapy. The most frequent treatment and combinations where hormonal therapy only (24%), radiotherapy plus hormonal therapy (21%), surgery plus radiotherapy plus hormonal therapy (13%), 12 percentage of surgery plus hormonal therapy and (7%) radiotherapy plus hormonal therapy and chemotherapy, these patterns of treatment were also used in another region as Los Angeles and California in United States and other countries<sup>(48,49)</sup>.

#### CONCLUSION

Cancer is currently one of the major public health problems in Nineveh.  
Many patients with prostate cancer were in the age  $\geq 70$  years.

The study revealed that, prostate cancer had the highest case fatality rate in those of age  $\geq 70$  years and distant stage of cancer extension.

Prostate cancer survival rates in Nineveh showed a worthy prognosis, but greatest decline over the age span was observed clearly and cancer cases diagnosed at an early stage will appear to live longer with their disease.  
The about two third of treatments for prostate was hormonal therapy.

#### RECOMMENDATIONS

The effort of ascertaining population survival lies primarily in having reliable and valid data on population incidence, and secondly, in the accuracy and completeness of follow-up. Once these barriers have been overcome, in order to



make comparisons between different populations in the same incidence period, it is also necessary to standardize the information, using a common follow-up period and similar approaches for ascertaining vital status.

- This information should be used by clinicians as a means to make evidence-based decisions concerning follow-up, surveillance, or ongoing management according to their patient's changing survival opportunities over time.
- An prepared and continued screening program for many types of cancers, aims to improve cancer survival by getting cancers diagnosed earlier, must be applied.

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