A CASE- CONTROL STUDY ON PROSTATE CANCER IN RURAL POPULATION OF PAKISTAN

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ABSTRACT

BACKGROUND: As in many countries of the world, Prostate cancer is extremely common in Pakistan. It is the third most common malignancy among males in Pakistan. A hospital-based, case-control study was conducted in rural area of Faisalabad (Pakistan) to examine the probable risk factors of prostate cancer.

MATERIALS AND METHODS: This study was based on 102 prostate cancer cases and 204 normal controls. Logistic regression was used to estimate odds ratios and 95% confidence intervals to evaluate the relationship between prostate cancer and different risk factors.

RESULTS: Age, family history of prostate cancer and obesity significantly increased the prostate cancer risk having odds ratios and 95% confidence interval (13.56; 5.20-35.35), (4.70;1.65-13.40) and (4.26; 2.25-8.10) respectively. On the other hand, better lifestyle (physical activity) and literacy significantly decreased the prostate cancer risk having odd ratios and corresponding 95% confidence intervals (0.16; 0.08-0.30) and (0.32; 0.15-0.65) respectively.

CONCLUSIONS: In the present study age, family history of prostate cancer, obesity, literacy and better lifestyle emerged as risk factors for prostate cancer in rural population of Faisalabad.

KEYWORDS: Prostate cancer, Risk factors, Family history, Age, Smoking, Obesity, Rural Population, Pakistan

INTRODUCTION

Prostate cancer is the most common malignancy among males in United States. It is also one of the leading causes of cancer death among males of all races. It is estimated that almost 220,800 new cases of prostate cancer will be identified in the United States in 2015 which is 26% of all the cancers among men and the estimated number of deaths will be about 27,540. A man's life time risk of this disease is one out of seven. Like other countries of the world it is very common cancer among males in Pakistan. During 1998-2002, prostate cancer was the fourth common malignancy among males in Karachi (Pakistan) with an age standardized incidence rate was 10.1 per 100,000 men whereas mean age of the cases were 67.4 years. This is similar to Asia- Pacific region 9.9 per 100,000 but less than the whole world 32.8 per 100,000. There are several risk factors that have been associated with the risk of prostate cancer. Several studies have found family history as a strong risk factor. Old age and obesity, physical activity, smoking have been found to be associated with prostate cancer risk. The aim of the present study is to examine the association of family history of prostate cancer, age, smoking, literacy, marital status, physical activity, obesity and risk of prostate cancer.

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MATERIAL AND METHODS:

This is a hospital-based case-control study, conducted in three main hospitals of Faisalabad (Pakistan) during September, 2012 to August, 2013. The selected hospitals were Punjab Medical College Allied hospital, PINUM Cancer hospital and Madina Teaching Hospital Faisalabad. The study was based on 102 confirmed cases of prostate cancer and 204 normal controls. All the participants were interviewed face to face in the hospitals using the structured questionnaire. The questionnaire included information about sociodemographic factors (age, marital status), lifestyle habits such as smoking and physical activities (exercise, sports), detailed medical history and family history of prostate cancer and BMI. Lifestyle of the cases and controls was taken as ordinal variable having three categories, sedentary, normal and active lifestyle. A sedentary lifestyle means that the person has no leisure time for exercise and physical active hobbies. A normal lifestyle is a lifestyle in which up to 40 minutes are spent for exercise and such other physical activity, while active lifestyle has more than 40 minutes for leisure time for exercise and sports. BMI was computed on the basis of height and weight as weight/height² (kg/m²).

The response variable was binary and the independent variables were categories as ordinal, nominal and quantitative type. In descriptive analysis bivariate tables were used for explaining the count of each risk factor for cases and controls. In analytical approach, logistic regression model was used to estimate the odds ratios and 95% confidence interval to evaluate the association of significant risk factors of prostate cancer. The software SPSS version 16.0 was used for analysis. A variable is considered to be statistically significant if P-value is less than 0.05.

RESULTS:

This study was based on 306 individuals, including 102 confirmed cases of prostate cancer and 204 controls. Table 1 shows the characteristics of persons with respect to different risk factors. The mean age of cases and controls was 68 years and 53 years respectively. Age could not be matched because there were less male persons who visited the hospitals in older age as controls than cases. Mean age difference between the cases (68 years) and control (53 years) were distinct, which is due to the fact that prostate cancer is the disease of an older age. Marital status was similar in both cases and controls, but the literacy rate was almost two times less among the cases as compared to controls. The cases and controls were almost similar with respect to smoking and family history of cancer. The proportion of men with family history of prostate cancer was higher in cases than controls. The proportion of obese men (BMI>25) was almost two times higher in cases than controls. On the other hand normal lifestyle was about two times less in cases as compared to controls.

| Table 1. Characteristics of Cases and Controls for Different Factors |
|-------------------------|------------------|-----------|-----------|
| Factor                  | Characteristics  | Cases     | Controls  |
| Age (in years)          | Less than 55     | 8         | 7         |
|                        | years & above    | 94        | 92        |
|                        | Mean age         | 68 years  | 72        |
|                        |                  | 74        | .5        |
| Education               | Illiterate       | 74        | 72        |
|                        | Literate         | 28        | 27        |
| Marital status          | Single           | 3         | 5         |
|                        | Married          | 99        | 199       |
| Family history of cancer| Yes              | 11        | 18        |
|                        | No               | 89        | 186       |
| Family history of prostate cancer | Yes | 21         | 20        |
|                        | No               | 81        | 79        |
| Lifestyle               | Sedentary        | 70        | 66        |
|                        | Normal           | 32        | 31        |
| Smoking                 | No               | 20        | 19        |
|                        | Yes              | 82        | 80        |
| Obesity                 | No               | 43        | 42        |
|                        | Yes              | 59        | 57        |
From Table 2, it was observed that out of 204 controls 179(87.7%) were correctly predicted as controls while out of 102 cases of prostate cancer 71(69.6%) were correctly predicted as cases. The overall numbers (percentages) of correctly classified and misclassified of subjects were 250(81.7%) and 56(18.3%) respectively. The percentage of correct classification is very high, which means that the fitted model is satisfactory.

**Table 2. Correct Classification and misclassification of subjects**

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted Prostate Cancer</th>
<th>Percent age Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>179</td>
<td>87.7</td>
</tr>
<tr>
<td>Yes</td>
<td>31</td>
<td>69.9</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>81.7</td>
</tr>
</tbody>
</table>

Table 3 shows the relationship between different risk factors and prostate cancer in terms of odd ratios and 95% confidence intervals of odd ratios. In this multivariate analysis, it is observed that age particularly 55 years and above have an almost 14-fold more risk for prostate cancer as compared to age less than 55 years (OR: 13.56, 95% CI: 5.20 –35.35, P=0.000).

Family history of prostate cancer have statistically significant increased risk for prostate cancer (OR: 4.70, 95% CI: 1.65-13.40, P=0.004). Obese men (BMI>25) have more than four-fold enhanced risk of prostate cancer (OR: 4.26, 95% CI: 2.25- 8.10, P=0.000).

No statistically significant association was found between prostate cancer and smoking. On the other hand, better lifestyle (moderate physical activity) was observed to be inversely associated with prostate cancer risk (OR: 0.16, 95% CI: 0.08-0.30, P=0.000). Education has also decreased the risk of prostate cancer (OR: 0.32, 95% CI: 0.15-0.65, P=0.002).

**DISCUSSION:**

Like other countries of the world prostate cancer is very common in Pakistan. It is the third most common cancer in males with a ratio of about 7% of all malignancies. The incidence and mortality rates of prostate cancer are remarkably different in various geographic regions. The incidence rate per 100,000 is 119.9 in northern America, 35.5 in southern Europe, 17.3 in Eastern Europe, 10.9 in western Asia and 7 in East Asia. In this study, some possible risk factors (age, smoking, marital status, family history of prostate cancer, lifestyle, obesity, and etc.) were evaluated and compared with other studies from all over the world.

Age is considered to be the strongest risk factor for prostate cancer in our study, which has been recently revealed in an Indian study. The incidence of prostate cancer increases with age, particularly over the age of 60 years. The probability of developing prostate cancer in males less than 39 years old is 0.005%, 2.2% between the age of 40 and 59 years and 13.7% in males between 60 and 79 years old. The
The present lifetime risk of developing prostate cancer is 16.7% (1 out of 6 men). The present study has revealed significant increase of developing prostate cancer among males with a family history of prostate cancer. Men with a family history (fathers or brothers) of prostate cancer had 3 times more risk for the development of prostate cancer as compared to without family history (OR: 3.04; 95% CI: 2.18-4.22). A Meta-analysis was conducted by Johns and Houlston to estimate the familial prostate cancer risk in relatives. Thirteen cohort and case-control studies identified the risk of prostate cancer among the relatives of prostate cancer patients. The weighted average of log relative risk and 95% confidence interval in the first degree relatives was 2.5 and (2.2-2.8), respectively. In addition, men having affected two relatives of prostate cancer had almost 4 times higher risk of prostate cancer. The majority (64%) of early onset prostate cancer incidences reported a positive family history of prostate cancer and more than 40% having a sure first degree affected relatives. The present study has shown a non-significant relationship between smokers and prostate cancer. Smoking is an emerging controversy. The effect of smoking on the epidemiology of prostate cancer is inconclusive and difficult to interpret. Some studies have found positive association between smoking and prostate cancer. But many studies failed to find any association among smoking and risk of prostate cancer. A statistically significant increase in the risk of prostate cancer was found for obese men. Many studies have shown an increased risk of developing prostate cancer for taller height and higher BMI (obese men). The education creates awareness about better way of living and frequent medical checkup. The present study has shown that the education significantly decreased the risk of prostate cancer. In this study it is observed that better lifestyle (physical activity) has inversely related with prostate cancer risk. Healthy lifestyle (physical activity) is negatively associated with prostate cancer in some studies. Liu et al conducted a meta-analysis from 24 case-control studies and 19 cohort studies to evaluate the relationship between physical activity and prostate cancer. In conclusion, the case control study shown that age, family history of prostate cancer and obesity could be considered as potential risk factors for prostate cancer in Pakistani males. Moreover, better lifestyle and education were found to have protective effect against prostate cancer.

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Some people praised Imam Ali on his face. He replied, "Allah knows me very well and I also know myself more than you. Please, Lord ! make me better than what they imagine me to be and please excuse those Weaknesses of mine which they are not aware of".

Hazrat Ali (Karmulha Wajhay)