**RESEARCH ARTICLE**

**Incidence of Breast Cancer in Markazi, Iran, Population-based Cancer Registry Results**

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**Abstract:**

**Background:**
Breast Cancer (BC) is the most prevalent malignancy and a significant cause of death in females all around the world. BC includes 16 percent of all cancers.

**Objective:**
This study aimed at examining the epidemiology of BC in Markazi.

**Materials and Methods:**
This was an epidemiological study in which data resulted from the population-based cancer registry program in Markazi, Iran was used during the years 2010-2014. Data was recorded in Excel software and coded based on ICD-O and all duplicate reports were removed according to their unique codes. All cases out of Markazi were excluded from study and cases with code C-50 (all BC) were included in this study. SPSS ver.18 was used to analyze the data.

**Results:**
In this study, 1,254 new cases of BC in Markazi were included in the analysis. The highest cancer rate was reported in 2012 (319 cases). The highest crude rate of BC was reported in 2012 (45/100,000 people) and the lowest crude rate was reported in 2010 (26.2 /100,000 people). The Age-Specific Rates (ASR) of BC were 27, 37.3, 45.7, 39.8 and 31.5 per 100,000 people in 2010 to 2014, respectively. The highest ASR of BC was reported in 2012 (45.7/100,000 people) and the lowest ASR was reported in 2010 (27/100,000 people).

**Conclusion:**
The results showed similar incidence rate of BC in Markazi as compared to other provinces in Iran. Efficient approaches should be considered for cancer registry systems especially BC.

**Keywords:** Age-specific rate, Breast cancer, Epidemiology, Markazi, Malignancy, ICD-O.

**Article History**

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1. INTRODUCTION

BC is the most prevalent malignancy and the most important death cause due to cancer all around the world [1]. BC includes 32% of female's cancers and is the first death cause in 40-44 years old females [2]. This cancer includes one-third of all females' cancers [3]. The BC incidence in developed countries is higher than in developing countries [4].

The Islamic Republic of Iran is a developing country and it is in transition from communicable to non-communicable diseases [5]. Cancer is the third leading cause of death in Iran and this rate is increased over time [6]. The results of studies
showed that Iran was a middle BC prevalence country [7]. This cancer includes 16% of all cancers reported in Iran [8].

The increasing rate of the incidence of various cancers is expected by increasing the life expectancy and aging index in Iran. Age pattern and incidence of BC have been considered less in the various studies in Iran. The distribution and incidence of BC are affected by regional and environmental conditions. Therefore, the BC incidence trend measurement is required in all regions. This study was conducted due to the lack of information about the incidence of BC in Markazi, Iran.

2. MATERIALS AND METHODS

2.1. Study Design

This is an epidemiological study in which data reported by the population-based cancer registry program in Markazi of Iran was used during the years 2010-2014. Markazi is located in district 4, western Iran. Arak is the capital of this province. The population of Markazi is estimated at 1.14 million. The neighboring provinces of Markazi are Qom, Isfahan, Lorestan, Hamadan, Qazvin and Tehran.

2.2. Data Collection

The data reported from this study were extracted from population-based cancer registry national program. This program was conducted in 2014 in 11 provinces of Iran. This registry information was collected from various sources such as pathology reports, medical records center, death registry, and other sources (radiotherapy, chemotherapy, insurance, etc.). The data collection forms included questions such as demographic information, duration of cancer, location, cancer type, method of diagnosis, the exact location of tumor, the ICD-O code, location of metastasis and cancer stage. This data was obtained from the registration center. Data was recorded in Excel software and coded based on ICD-O and all duplicate reports were eliminated according to their unique codes. All cases out of Markazi provinces were excluded from study and cases with code C-50 were included in this study.

2.3. Population Estimate

The population of Markazi was 1,413,959 people (717,026 males and 696,933 females) in the census of 2016. The population of other years has also been estimated. The exponential (Geometric) growth formula was used as follows to estimate population over the years studied:

\[ P_n = P_0(1+r)^n \]

Where, \( P_n \) is the population in the year to be estimated, \( P_0 \) is population in the census year (i.e. 2011), \( r \) is the growth rate (0.22), and \( n \) is the number of years after the census. The gender and age group ratios were considered the same as that of the census year, the year when their population was estimated.

2.4. Crude and Age Standardized Rate (ASR)

The findings were shown as the number of cases by age groups and years, with crude rate, age-specific and ASR per 100,000 persons. Also, the direct standardization method was used with the World standard population to calculate the ASR.

3. RESULTS

In this study, 1,254 new cases of BC from Markazi were included in the analysis. The highest rate of cancers was reported in 2012 (319 cases), and the lowest rate was reported in 2010 (183 cases). Also, the mean and standard deviation in terms of age in all year groups are shown in Table 1.

The crude rate (per 100,000) and ASR of BC in Markazi is shown in Table 2. The results showed that increasing age causes to increase the incidence of BC and the highest incidence rate was observed in the groups older than 50 years old. The highest crude rate of BC was reported in 2012 (45 cases per 100,000 people) and the lowest crude rate was reported in 2010 (26.2 per 100,000 people). The ASR of BC were 27, 37.3, 45.7, 39.8 and 31.5 per 100,000 people in 2010 to 2014, respectively. The highest ASR of BC was reported in 2012 (45.7 cases per 100,000 people) and the lowest ASR was reported in 2010 (27 cases per 100,000 people).

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Mean</th>
<th>S.D.</th>
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<tbody>
<tr>
<td>2010</td>
<td>183</td>
<td>52.22</td>
<td>14.71</td>
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<tr>
<td>2011</td>
<td>257</td>
<td>50.35</td>
<td>14.74</td>
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<tr>
<td>2012</td>
<td>319</td>
<td>49.30</td>
<td>13.59</td>
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<tr>
<td>2013</td>
<td>280</td>
<td>53.01</td>
<td>14.96</td>
</tr>
<tr>
<td>2014</td>
<td>215</td>
<td>52.10</td>
<td>12.31</td>
</tr>
<tr>
<td>Total</td>
<td>1254</td>
<td>51.25</td>
<td>14.16</td>
</tr>
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<table>
<thead>
<tr>
<th>Age Groups</th>
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<td>&lt;40</td>
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<td>Number of Cases</td>
<td>33</td>
<td>43</td>
<td>63</td>
<td>40</td>
<td>36</td>
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<tr>
<td>Denominator</td>
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<td>471153</td>
<td>483702</td>
<td>484766</td>
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<tr>
<td>Crude rate</td>
<td>7.03</td>
<td>9.14</td>
<td>13.37</td>
<td>8.26</td>
<td>7.42</td>
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<td>95% CI</td>
<td>4.63, 9.43</td>
<td>6.41, 11.88</td>
<td>10.07, 16.67</td>
<td>5.70, 10.83</td>
<td>5.0, 9.85</td>
</tr>
</tbody>
</table>
4. DISCUSSION

The results obtained from our study showed that the ASR of BC in Markazi was increased from 27/100000 to 45.7/100000 in 2012. This rate was decreased again to 31.5 in 2014. An increasing trend was observed in ASR in this study from 2010 to 2014.

The various studies conducted in Iran have shown similar results. ASR was examined for BC during the 11-year period in Mirzaie’s study in Kashan in 2016. ASR was increased from 20.2/100000 in 2001 to 32.8/100000 in 2011 [9]. In a study conducted in Mazandaran, the highest rate of BC was similar and additive in all provinces that this issue can be also observed in Markazi. However, the incidence of BC has been decreasing in Italy [15], French [16], and the USA [17], which is opposite to that reported in Iran.

This study showed that most BC cases occurred at the age of 50-60 in all years. Mostly reported, ASR were for these ages. BC had the highest frequency in 5 and 6 decades of life. The ASR of BC was increased in the age of 50 and then decreased after menopause [18]. A review study showed that most cases of BC occurred in the age of 40-49 and this result was not consistent with our study [19]. The other studies also suggested that the most incidence rate was for the age under 50 [10]. In a study conducted in Mazandaran, the highest rate of ASR of BC was reported at age of 50-55 that was consistent with our results [20].

CONCLUSION

BC incidence rate and ASR were reported to increase in Markazi in 2010-2014. According to this result, the evaluation of measuring parameters of this increase is required. Therefore, it is recommended to conduct further studies related to various factors that can increase the incidence of BC.

LIST OF ABBREVIATIONS

| ASR  | Age Specific Rate |
| BC   | Breast Cancer     |

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The protocol of the study was approved by the ethics committee of Arak University of Medical Sciences under grant number IR.ARAKMU.REC.1397.184.

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Written informed consent was obtained from all the participants prior to publication.
AVAILABILITY OF DATA AND MATERIALS
Not applicable.

FUNDING
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CONFLICT OF INTEREST
The authors declare that they have no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS
Declared none.

REFERENCES