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Research on the Relationship Between Breast Cancer and General Female Deaths Related to the Disease

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Abstract

BACKGROUND/AIMS: This research aimed to examine the relationship of breast cancer (BC) with general female deaths related to the disease.

MATERIALS AND METHODS: In the research, data collected from the World Health Organization-International Agency for Research on Cancer (IARC), the World Bank, and the Turkish Ministry of Health were used for 1998-2017 period. BC diagnostic incidence, all female mortality, and disease female mortality parameters were used as research parameters with controlling variables such as number of physicians and private-government health expenditures.

RESULTS: BC diagnosis incidence was negatively correlated with female mortality ($r=-0.988$; $p<0.01$), disease related female mortality ($r=-0.990$; $p<0.01$) and private health expenditure ($r=-0.815$; $p<0.01$). BC diagnosis incidence was positively correlated with physicians ($r=0.992$; $p<0.01$) and government health expenditure ($r=0.815$; $p<0.01$). Year-controlled partial correlation analysis results showed that BC diagnosis incidence was positively correlated with disease female mortality ($r=0.473$; $p<0.05$) and private health expenditure ($r=0.551$; $p<0.05$) whereas BC diagnosis incidence was negatively correlated with physicians ($r=-0.681$; $p<0.05$) and government health expenditure ($r=-0.551$; $p<0.05$). The effects of all female mortality ($B=-243.37$; $p<0.05$), disease female mortality ($B=3160.37$; $p<0.01$), and number of physicians ($B=-59611.22$; $p<0.01$) were significant at the multivariate level.

CONCLUSION: With the increase in the diagnosis of BC, there is a decrease in female deaths in the society, while helping to decrease female deaths due to other diseases. In addition to the diagnosis of BC, it is possible to follow-up for other conditions with a high mortality level.

Keywords: Breast cancer, diagnosis, mortality

INTRODUCTION

Breast cancer (BC) is one of the leading causes of cancer-related deaths in women, and it causes many women to die worldwide every year.[1-3] Although there are still studies on the risk causes of the disease, the risks of other cancer types, especially the family, are also valid for BC. Today, many methods have been developed for the early treatment of BC, including chemotherapy, surgical removal of the mass, and breast prosthesis. Although BC has a high mortality rate, early diagnosis is vital in BC and significantly reduces mortality rates.[4-7] However, early diagnosis requires not only individual awareness but also social and public awareness.

Female deaths have a different place in society than deaths in general. Due to patriarchal structures or social norms, women have more difficulty accessing health services than men.[8-10] As a result, diseases in women have a higher mortality value and can negatively affect both public health and the health and quality of life of individuals. In the process that starts with the mother's qualifications of the woman and birth and continues with the raising of the child, mothers are more prone to diseases, both psychologically and physically.[11-14]

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Local and international struggle is important in monitoring the statistics of women's deaths and public health throughout the world. Therefore, many international institutions, especially organizations such as the World Health Organization (WHO) and World Bank (WB), organize studies to prevent female deaths. However, despite these studies, it is necessary to investigate whether sufficient results have been obtained. In the literature research conducted for this purpose, it is seen that this subject has not been adequately examined. The fact that the WHO-International Agency for Research on Cancer (IARC) data were provided until 2012, the data of the Ministry of Health of Türkiye until 2017, and the fact that they do not distinguish between mortality and incidence confirms this. Therefore, the relationship between BC-related deaths and other female deaths needs to be elucidated. In this study, we aimed to examine the relationship of BC with general female deaths related to the disease.

MATERIALS AND METHODS

In the research, a dataset collected from the WHO-IARC, the WB, and the Turkish Ministry of Health was used for 1998-2017 period. Cancer incidence values were collected from the WHO-IARC from 1998 to 2012 and the Ministry of Health Cancer Reports from 2013 to 2017. The most recent report of the Ministry of Health on cancer was published in 2021. In this report, and in the National Statistics Agency, the latest BC deaths are given until 2017. In the IARC reports compiled by WHO for the whole world, incidence data were given for Türkiye only between 1998 and 2012.

Dependent Variable

BC diagnosis incidence.

Independent Variables

Mortality rate, adult, female (per 1,000 female adult).

Mortality from CVD, cancer, diabetes, or CRD between the exact ages of 30 and 70 years, female (%).

Controlling Variables

Physicians (per 1,000 people).

Domestic private health expenditure (% of current health expenditure).

Domestic general government health expenditure (% of current health expenditure).

Ethical Concern

Because the research is based on public data and excludes private information, no ethical approval or informed consent is needed. Data provided by the WHO-IARC, the WB, and the Turkish Ministry of Health were open to the public, and no written or any permission, registration is needed.

Statistical Analysis

Research parameters are described with means and standard deviations with ranges. Since the data set is under 30 years, non-parametric tests were used. Spearman's rho correlation analysis and year-controlled partial correlation analysis were used for the correlation analysis. Since all regression linearizations include deviations,[15] the Generalized Linear Model (Logit) was used for multivariate analysis. SPSS 25.0 for Windows was used at 95% confidence interval and 0.05 significance level.

RESULTS

The minimum BC incidence was 707 and the maximum value was 11,851 with 2506.40±4118.58 mean value. The mean female mortality was 68.02±11.09, and the mean disease-related female mortality was 12.77±1.39 (Table 1).

According to Spearman's rho correlation analysis, BC diagnosis incidence was negatively correlated with female mortality ($r=-0.988$; $p<0.01$), disease related female mortality ($r=-0.990$; $p<0.01$) and private health expenditure ($r=-0.815$; $p<0.01$). BC diagnosis incidence was positively correlated with physicians ($r=0.992$; $p<0.01$) and government health expenditure ($r=0.815$; $p<0.01$) (Table 2).

Table 1. Minimum, maximum values, means, and standard deviations of the research parameters

	Minimum	Maximum	Mean	SD
BC diagnostic incidence	707.00	11851.00	3506.40	4118.58
All female mortality (per 1,000 female adult)	51.58	93.73	68.02	11.09
Disease female mortality (female, %)	11.00	15.20	12.77	1.39
Physicians (per 1,000 people)	1.22	1.85	1.58	0.19
Private health expenditure (% of current health expenditure)	19.50	38.32	27.49	6.38
Government health expenditure (% of current health expenditure)	61.68	80.50	72.51	6.38

BC: Breast cancer, SD: Standard deviation.

Table 2. Spearman's rho and year-controlled correlation analysis results for the relationship between BC mortality and research parameters

	Spearman's rho	Year-controlled partial
All female mortality (per 1,000 female adult)	-0.988**	0.013
Disease female mortality (female %)	-0.990**	0.473*
Physicians (per 1,000 people)	0.992**	-0.681**
Private health expenditure (% of current health expenditure)	-0.815**	0.551*
Government health expenditure (% of current health expenditure)	0.815**	-0.551*

*p<0.05, **p<0.01, BC: Breast cancer.

Year controlled partial correlation analysis results showed that BC diagnosis incidence was positively correlated with disease female mortality (r=0.473; p<0.05) and private health expenditure (r=0.551; p<0.05) whereas BC diagnosis incidence was negatively correlated with physicians (r=-0.681; p<0.05) and government health expenditure (r=-0.551; p<0.05) (Table 2).

Although the correlation of private health expenditure with BC diagnosis incidence was significant at the univariate level (p<0.01), its effect on BC diagnosis incidence was insignificant at the multivariate level (p>0.05). The effects of all female mortality (B=-243.37; p<0.05), disease female mortality (B=3160.37; p<0.01), and number of physicians (B=-59611.22; p<0.01) were significant at the multivariate level (Table 3).

The BC incidence rate has been increasing between 1998 and 2017. However, there was a shift in 2013 (Figure 1).

DISCUSSION

Female mortality is an issue that is emphasized all over the world, and research to be carried out by many international organizations is supported because health is seen as a global public good.[16,17] Among female deaths, BC is important both because it is specific to women and because it is easier to treat with early diagnosis. However, official data, statistical shares, and literature studies indicate that there is not enough work on this subject[18,19]. This study aimed to examine the relationship of BC with general female deaths and female deaths related to the disease.

Studies on the incidence and mortality level of BC are in an increasing trend because of the reflection of communication and health services all over the world[20-25]. In fact, it is still unclear whether this increase is due to the increase in the incidence of the disease itself or to the increase in the possibilities of examination and diagnosis. The general opinion on this subject shows that with the increase in diagnostic possibilities, unexplained deaths have decreased gradually in the past, and the diagnosis of cancer types, especially BC, is made more frequently. In the data compiled for Türkiye, which we examined in the study, it is seen that the incidence of BC has increased over time. Especially since 2013, there has been a more serious increase.

At this point, it should be noted that although BC is important in terms of cancer types and mortality in women, it is not sufficiently followed up by the WHO and the Ministry of Health. WHO has not followed the data since 2013, and the Ministry of Health does not follow or share the data after 2017 or before 2013. These disruptions experienced according to other cancer types or WHO data from other countries show that both institutions are not sufficiently effective and successful in data sharing.

According to the results of the correlation analysis, there was a statistically significant and negative relationship between all female deaths, female deaths due to disease, and incidence of BC diagnosis. This shows that as the diagnosis rate increases, the number of deaths decreases. In fact, the success rate in treatment and early diagnosis is increasing day by day. On the other hand, the year-controlled analysis shows that this situation is not significant with the temporal effect.

Table 3. Generalized linear model (Logit) for BC incidence and research parameters

Parameter	B	S.E.	95% CI wald		Hypothesis test		
			Lower	Upper	Wald chi-square	df	p
(Intercept)	-5553566.51	881820.11	-7281902.17	-3825230.86	39.66	1	0.001
All female mortality rates	-243.37	112.59	-464.05	-22.69	4.67	1	0.031
Disease female mortality	3160.86	765.54	1660.43	4661.29	17.05	1	0.001
Physicians	-59611.22	14748.35	-88517.46	-30704.97	16.34	1	0.001
Private health expenditure	73.85	134.94	-190.62	338.33	0.30	1	0.584
Government health expenditure	0	.	.	.	.	.	.
Year	2802.08	447.58	1924.83	3679.33	39.19	1	0.001
(Scale)	1579698.79	499544.62	849964.37	2935944.54			

BC: Breast cancer, S.E.: Standard error, CI: Confidence interval.

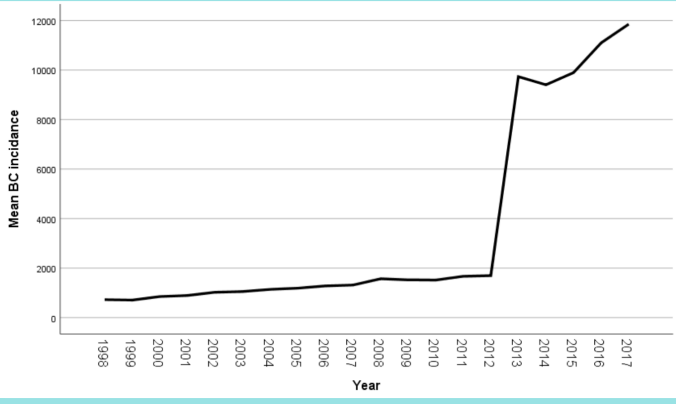

Figure 1. BC diagnostic incidence according to year.

BC: Breast cancer.

There is a statistically significant relationship between disease-related deaths and the prevalence of BC diagnosis. Therefore, rather than the effect of population increases, it should be stated that newly diagnosed diseases also have an effect on this relationship.

In the study, the number of physicians (per 1,000 people) and the effect of private and public health expenditures was examined as a control variable. Correlation analysis results show that private health expenditures have a reducing effect on BC diagnostic incidence, whereas government health expenditures play an increasing role. Making private health expenditures mostly for cosmetic, esthetic, and sanitation reasons may be effective in achieving this result. government spending on health is more planned, aimed at reducing deaths from BC and increasing early detection.

According to the results of the multivariate GLM logit model, the decreasing effect of all female deaths on BC diagnosis prevalence and the increasing effect of female deaths due to disease are significant. At this point, it is possible to state that the increase in women's deaths draws attention to women's deaths in the social sense, and BC is one of the most striking issues. It is possible to explain the inverse proportion of female deaths caused by other diseases as a decrease in attention to BC-related deaths when looking at other fields.

Study Limitations

The most important limitation of this research is that although BC is an important mortality and cancer type, data sharing in this area is very limited. Both the WHO and the Ministry of Health show serious deficiencies in sharing these data. Another important limitation of this study is that clinical studies in this area are quite limited and, more generally, population-based studies are not conducted.

Contribution to the Literature

The most important contribution of this research to the literature is the examination of a subject that is important to mortality in women and is common among cancer types. Another important contribution of the research is that it aims to examine and reveal women's deaths in a holistic framework by bringing a different perspective to the studies conducted in this field from the past to the present. In this respect, this study is important in terms of reducing the death rate of women, increasing the level of public health, and improving our understanding of BC.

CONCLUSION

As a result, with the increase in the diagnosis of BC, there is a decrease in female deaths in the society, while helping to decrease female deaths due to other diseases. In addition to the diagnosis of BC, it is possible to follow-up for other conditions with a high mortality level.

Although BC-related deaths and prevalence are serious problems, both official studies and international solidarity and data sharing on this subject are quite inadequate. Therefore, it is necessary to increase cooperation between institutions with larger budgets and to carry out larger-scale screening and diagnostic studies.

MAIN POINTS

- Breast cancer is an important global public health problem for females.
- Increase in the diagnosis of breast cancer decreases female deaths.
- Undiagnosed female deaths may be related to undiagnosed breast cancer.
- Female mortality reasons may be more understandable with the diagnosis of breast cancer.
- The number of physicians has a positive effect on the diagnosis of breast cancer.

ETHICS

Ethics Committee Approval: Because the research is based on public data and excludes private information, no ethical approval or informed consent is needed. Data provided by the WHO-IARC, the WB, and the Turkish Ministry of Health were open to the public, and no written or any permission, registration is needed.

Informed Consent: It wasn't obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: İ.Ö., Concept: İ.Ö., Design: İ.Ö., Data Collection or Processing: İ.Ö., Analysis or Interpretation: K.Y., Literature Search: İ.Ö., Writing: İ.Ö.

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