Comparison between the Success of Prostate and Breast Cancer Awareness Campaigns over "Google Trends" in Turkey

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Abstract

Objective: This study aimed to compare the success of breast and prostate cancer awareness campaigns using the search rates on the internet as an indicator of the public's interest in the subject.

Materials and Methods: The periodic median search rates of the "breast cancer" and "prostate cancer" terms searched between January 2010 and December 2019 annually, 2010-2014 (first period), and 2015-2019 (second period) were compared over Google Trends™. The effect of the awareness campaigns and isolated rises (an increase of at least 25%) in the normal trend were evaluated.

Results: It was observed that the median search rates for both cancer types increased in the second period (p<0.05). When trends were compared before and after the awareness months annually, an increase above the normal trend was detected for breast cancer (p<0.001). However, this increase was not observed in prostate cancer (p>0.05). Moreover, we found that the isolated rises for both types of cancer coincided with celebrity-related news covered in the media.

Conclusion: Although breast cancer awareness was created in the society, it was determined that the situation was not the same for prostate cancer. More studies are needed to enlighten the public on prostate cancer, and Google Trends™ may be an important tool that can assist the follow-up on this subject.

Keywords: Breast cancer, google trends, prostate cancer, awareness month

Introduction

Prostate cancer is the second most common cancer in males and breast cancer is the most common cancer in females. According to 2018 data, prostate cancer constitutes 8.2% of cancer diagnosis with 17.332 new patients and 4.4% of all cancer-related deaths with 5165 deaths due to prostate cancer. Alternately, breast cancer is a serious health problem with 22.345 (10.6%) new patients and 5.452 (4.7%) deaths in 2018 (1).

In Turkey, October is recognized as the breast cancer awareness month, and September 15 is accepted as the prostate cancer day. The success of a breast cancer awareness campaign has been detected in various studies. It was revealed that the number of applications to hospitals for early diagnosis increased in October compared with other months of the year. The importance of increasing awareness of early diagnosis has been put forward (2,3,4). Although there is no study examining the effect of prostate cancer awareness efforts in our country, the breast cancer awareness campaign, which has proven effective, is seen as an important scale in the evaluation of the success of prostate cancer awareness efforts (5).

Today, the internet is one of the most commonly used tools to access medical information (6). Google™ is the most used search engine worldwide, and Google Trends™ application has been widely used in the medical field in the follow-up on an online interest. It is used as an indicator of public attitude toward health as well as identifying popularities specific to terms in the performed searches (7,8). This study aimed to compare the effectiveness of breast and prostate cancer awareness campaigns in our country using searches on the Internet as an indicator of the public's interest.

Materials and Methods

The Ethics Committee of Aksaray University approved this cross-sectional study (2020/08-28). All patients who took part in the study provided informed consent.

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Google Trends™ application provided the search levels of the searched term(s) by the selected time interval and country in numerical values [relative search rate (RSR)]. Additionally, it can arrange these values so that the searched terms can be compared. "Zero" indicates that there is no data for the word we are searching for, and "100" indicates that the term has the highest search rate. The application scores other instances between zero and 100.

The searches made on Google Trends™ application using the terms "breast cancer" and "prostate cancer" in Turkish between January 2010 and December 2019 in Turkey were examined, and the rates of interest shown to each term in the annual median period were obtained. Afterwards, periodic RSR values were compared in terms of both cancer types in the periods of 2010-2014 (first period) and 2015-2019 (second period). Furthermore, by comparing the median monthly RSR values of all years for breast and prostate cancers, we tried determining whether a different course than the normal trend occurred during the awareness campaigns. Moreover, rises in the interest rates 25% higher than normal within a specified period except for the awareness months were evaluated as rapid rises, and the reasons behind such increases in these searches were investigated. Moreover, the cities that had the most searches for both terms were identified.

Statistical Analysis

SPSS 20.0 (SPSS, Chicago, IL) was used for the statistical analysis. Discrete quantitative data were shown as median (interquartile range). Shapiro-Wilk test was used to evaluate the homogeneous distribution of the data. Mann-Whitney U test was used to compare two independent groups, while the Wilcoxon test was used to compare two dependent groups. The ANOVA procedure with linear models was used to assess changes over time in different outcomes measured and separate repeated measures. A p-value less than 0.05 was considered statistically significant.

Results

The median RSR was 35 (9.75) and 45 (8.5) for breast cancer and 12 (3.75) and 18 (5) for prostate cancer in the first and second periods, respectively. Although the median RSR favored breast cancer in all periods (p<0.001), the RSR value increased for both cancers in the second period (p<0.05) (Table 1; Figure1).

When the effect of breast cancer awareness month was examined, it was found that the median RSR of October in all years was higher than the median RSR of the normal trend (p<0.001) (Figure 2). When the years were evaluated within

themselves, it was observed that the median RSR indexes of October in every year were higher than the median RSR of the normal trend in its own year (p<0.001) (Figure 3).

When the effect of the prostate cancer awareness campaign was examined, it was observed that the median RSR of September in all years and the normal trend were similar (p>0.05). When the years were evaluated within themselves, it was determined that this situation continued in the same way (p>0.05) (Figure 4).

Except for the awareness campaign months, when the situations detected as rapid rise were examined, it was seen that the value, which was 60 in October 2011, when the RSR was at the highest level for breast cancer, increased by 53.33% and reached 92 in December 2011. The RSR value for prostate cancer increased from 10 to 29 in January 2014 (190%) and from 19 in June 2017 to 36 in July 2017 (89.47%). It was seen that, in the periods when there was a rapid rise for breast cancer, the most searched term accompanying breast cancer on Google was "Deniz Uğur," and this coincided with the period when this famous person was diagnosed with breast cancer. In the periods when there was a rapid rise for prostate cancer, the most searched term accompanying prostate cancer on Google was "Harun Kolçak," and this coincided with the period when this famous person was diagnosed with prostate cancer and died as a result (Figure 1).
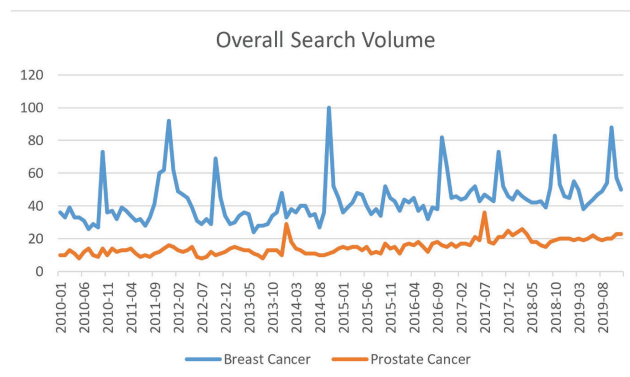

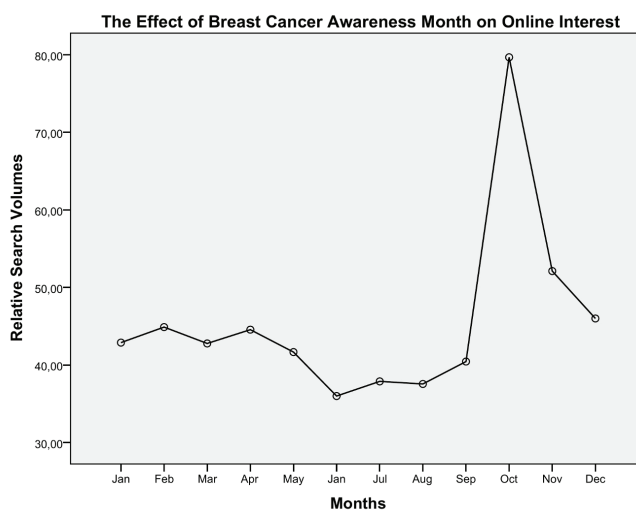Figure 1. Comparison between the prostate and breast cancer search rates

Figure 2. The effect of breast cancer awareness month on online interest

Table 1. Comparison of the relative search rates by years				
Period (year)	2010-2019	2010-2014 (1st period)	2015-2019 (2nd period)	p-values†
Breast cancer (RSR)	41 (10.38)¥	35 (9.75)¥	45 (8.5)¥	0.043
Prostate cancer (RSR)	13.75 (6.88)	12 (3.75)	18 (5)	0.041
Values are reported as median (interquartile range): RSR: Relative search rate ¥p<0.001 vs. prostate cancer (Mann-Whitney U test) †Wilcoxon test				

When the cities that had the most searches on the Internet for both cancers were examined, it was determined that the first three cities, where the most searches for breast cancer were performed, were İzmir (RSR: 100), Ankara (RSR: 96), and Eskişehir (RSR: 95), while for prostate cancer they were İzmir (RSR: 100), Eskişehir (RSR: 91), and İstanbul (RSR: 90).
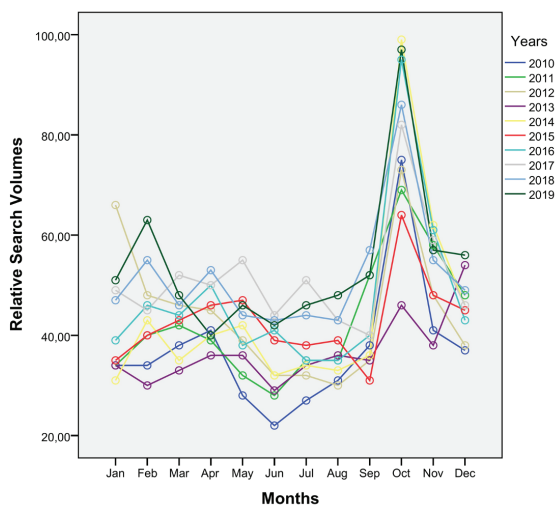

Figure 3. The effect of breast cancer awareness month on online interest by years
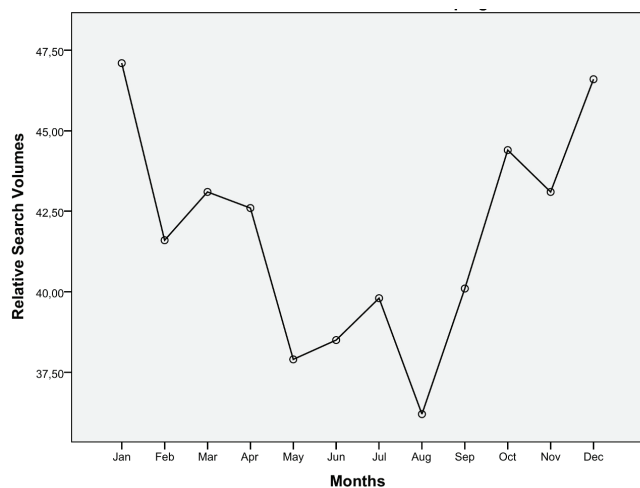

Figure 4. The effect of prostate cancer awareness campaign on online interest

Discussion

This study found that the searches for prostate and breast cancer have increased especially in the last five years, and breast cancer is more popular than prostate cancer. When the current literature was examined, according to the data of the World Health Organization for both cancers, it was observed that the incidence of prostate cancer, standardized by age, increased from 31.1 to 41.7 per 100.000, and the incidence of breast cancer increased from 43.3 to 45.6 in 2018 compared with 2014 (1,9). According to the data of the Ministry of Health,

in Turkey, in 2005, prostate and breast cancer incidence was reported to be 24.33 and 17.96 per 100,000, respectively (10). In another multicenter study conducted in Turkey, the incidence of prostate cancer, standardized by age, was 35 per 100,000 in 2009, and according to Middle East Cancer Consortium in 2016, the breast and prostate cancer incidence in Turkey was 50.7 and 47.4 per 100.000, respectively (11,12). A study examining the relationship between online search rates and cancer incidence revealed that there was a positive correlation between these for all cancer types (13). In Turkey, no regular data could be obtained for the incidence of breast and prostate cancers. However, studies conducted in our country revealed that although the incidence of breast cancer was higher than prostate cancer, the incidence increased for both cancers from 2005 to 2016. Although this situation is in line with the data obtained in our study, it is thought that online interest can be used in the detection of cancer incidence.

It was revealed that the national breast cancer awareness campaign held in October every year, which started in the USA in 1985, increased the awareness of breast cancer in the society. On examining breast cancer diagnoses made from 1973 to 2005, the number of diagnosed patients gradually increased, especially starting from the period when the awareness campaign was initiated (14). A study conducted in our country showed that the number of females presenting to a health institution for breast examination increased in October, during the breast cancer awareness campaign, compared with other months (2). When the situation was examined for prostate cancer, a study conducted with 1400 participants from six European countries showed that the necessary awareness of prostate cancer symptoms, tests used in the detection, and treatment alternatives could not be created (15). A review article stated that the males who participated in the studies for prostate cancer screening were willing but hesitated for reasons such as social reasons, indecisiveness, uncertainties, and cost, and this was due to inadequate education of the society on this subject (16). Moreover, a study conducted in our country showed that prostate cancer awareness was not at the sufficient level (17).

It was found that the rates of searches made on the Internet for breast cancer increased during the breast cancer awareness period. However, this did not occur during prostate cancer awareness period for the "prostate cancer" term. On reviewing the studies examining the effects of cancer awareness activities in terms of searches on the Internet, a study, where cancer awareness campaigns were examined over Google Trends between 2010 and 2017, showed that there was a consistent increase in breast cancer in its awareness period; however, it was a stable course for prostate cancer (5). Our study detected that breast cancer awareness was reflected in online interest in our country and people used the Internet to obtain more information about breast cancer in this period. However, this was not the same for prostate cancer. For prostate cancer awareness, it is thought that online interest can be used for follow-up, and more activities are needed both worldwide and in our country.

In our study, the situations with significant changes in online interest in prostate and breast cancers, except for the months of awareness campaigns, were investigated, and it was detected

that two famous names caused an increase (25% above normal trend) in RSR value in the last 10 years. It was determined that Angelina Jolie's bilateral protective mastectomy caused a significant increase in the USA in the search of the term "breast cancer" made over GoogleTM during the period of 2004-2017, apart from the awareness months. This was introduced to the literature as the "Angelina Jolie Effect" and directed people to make searches on the Internet regarding mastectomy and BRCA-1 gene at a high rate. However, it was observed that celebrities diagnosed with prostate cancer did not have such an effect on RSR level (18). Between 2004 and 2016 in the UK, there was a distinct increase in breast cancer searches made over the Internet after Kylie Minogue was diagnosed with breast cancer in addition to the "Angelina Jolie Effect." This situation created its own trend for each country (19). Although celebrities other than Deniz Uğur were diagnosed with breast cancer, the increase in breast cancer trend caused by the diagnosis of Deniz Uğur may have resulted from the fact that her high-rating TV series coincided with the December 2011 period. It can be stated that the increase of prostate cancer trend due to the diagnosis of Harun Kolçak with prostate cancer and his death was evident in our country and not anywhere else. Google TrendsTM is a tool that can be used to follow the influence of celebrities and public awareness, and the use of such online data can increase cancer awareness in the society and contribute to activities conducted in this regard.

In our study, the cities that had the highest search rates for breast and prostate cancers were examined, and the city with the highest search rate for both cancers was İzmir. A study examining cancer incidence rates showed that the city with the highest prostate cancer rate in our country was İzmir with an incidence rate of 38.2/100,000, and the cities with the highest breast cancer rates were İzmir and Eskişehir with incidence rates of 45.6/100,000 and 35.3/100,000, respectively (20). Our results put forward that real epidemiological data may have a parallel reflection on searches on the Internet. It is thought that, with the widespread use of the Internet and addition of more demographic data of users to Google TrendsTM application, more progress can be made in terms of digital epidemiology.

Study Limitations

Our study limitations are as follows: not being able to obtain data from areas where there is no Internet usage, not being able to see the searches made in different languages, accessing the search statistics of only those using GoogleTM search engine, and not being able to know the age, gender, and occupation of the searchers.

Conclusion

In terms of the society's interest, success of breast cancer awareness campaigns on real grounds has been reflected in the search rates on the Internet. However, this success has not been achieved in awareness campaigns of prostate cancer. Although there is a need for improvement in the program, we can save money and time using Google TrendsTM instead of conventional field research to detect epidemiology and public cancer awareness. Moreover, we believe that Google TrendsTM can be useful in analyzing the success of the breast cancer awareness campaign and guide us to plan a successful prostate cancer awareness campaign and determine the targeted population.

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