Analysis of Awareness Campaigns on Cancer through Google Trends: Integrative Literature Review

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Análise das Campanhas de Conscientização sobre o Câncer por meio do Google Trends: Revisão Integrativa da Literatura

Análisis de las Campañas de Concientización sobre el Cáncer a través de *Google Trends*: Revisión Integradora de la Literatura

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ABSTRACT

Introduction: Population awareness campaigns about cancer and its risk factors aim to encourage people to have healthier behaviors. It is essential to evaluate these campaigns' results on the interest and behavior of the population. **Objective:** To analyze the impact of awareness campaigns of different types of cancer on the interest of internet users through Google Trends. **Method:** An integrative literature review was carried out, including primary studies that analyzed the impacts of campaigns from Google Trends available in PubMed, Scopus, Web of Science and LILACS databases. **Results:** Of the 179 articles found, 19 were included for analysis. The impact of the campaigns varied in effectiveness, depending on the type of cancer addressed, the region they were carried out and reach. Off-campaigns factors had a synergistic or concurrent effect on the population's interest in the topics covered. **Conclusion:** The increase of the population interest, if the case, has not always translated into greater awareness about ways of preventing and diagnosing cancer. How the ways the campaigns are carried out must be improved in order to increase the population's interest in the topic and make long-term behavioral changes possible.
Key words: neoplasms; information seeking behavior; internet; public awareness; health Communication.

RESUMO

Introdução: As campanhas de conscientização da população sobre o câncer e seus fatores de risco objetivam incentivar as pessoas a terem comportamentos mais saudáveis. É essencial avaliar os resultados dessas campanhas na alteração do interesse e do comportamento da população sobre o tema. **Objetivo:** Analisar o impacto das campanhas de conscientização dos diferentes tipos de câncer sobre o interesse dos internautas por meio do *Google Trends*. **Método:** Revisão integrativa da literatura, incluindo estudos primários que analisaram os impactos das campanhas a partir do *Google Trends*, disponíveis nas bases PubMed, *Scopus*, *Web of Science* e LILACS. **Resultados:** Dos 179 artigos encontrados, foram incluídos 19 para análise. O impacto das campanhas variou em efetividade, dependendo do tipo de câncer abordado, da região de realização e do alcance. Fatores externos às campanhas tiveram efeito sinérgico ou concorrente no interesse populacional sobre os temas abordados. **Conclusão:** O aumento do interesse populacional, quando existente, nem sempre se traduziu em maior conscientização sobre as formas de prevenção e diagnóstico do câncer. Devem-se aprimorar as formas de realização das campanhas visando aumentar o interesse populacional sobre o tema e viabilizar mudanças de comportamento de longo prazo.
Palavras-chave: neoplasias; comportamento de busca de informação; internet; conscientização pública; comunicação em saúde.

RESUMEN

Introducción: Las campañas de concientización de la población sobre el cáncer y sus factores de riesgo tienen como objetivo incentivar a las personas a tener comportamientos más saludables. Es fundamental evaluar los resultados de estas campañas a la hora de cambiar el interés y el comportamiento de la población sobre el tema. **Objetivo:** Analizar el impacto de las campañas de concientización sobre diferentes tipos de cáncer en el interés de los internautas por medio de *Google Trends*. **Método:** Revisión integrativa de la literatura, incluyendo estudios primarios que analizaron los impactos de las campañas de *Google Trends* disponibles en las bases de datos PubMed, *Scopus*, *Web of Science* y LILACS. **Resultados:** De los 179 artículos encontrados, 19 fueron incluidos para análisis. El impacto de las campañas varió en efectividad, dependiendo del tipo de cáncer abordado, la región donde se llevaron a cabo y su alcance. Factores externos a las campañas tuvieron un efecto sinérgico o concurrente en el interés de la población por los temas abordados. **Conclusión:** El aumento del interés de la población, cuando existe, no siempre se ha traducido en una mayor conciencia sobre las formas de prevención y diagnóstico del cáncer. Se deben mejorar las formas en que se realizan las campañas para aumentar el interés de la población en el tema y posibilitar cambios de comportamiento a largo plazo.
Palabras clave: neoplasias; conducta en la búsqueda de información; internet; sensibilización pública; comunicación en salud.

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INTRODUCTION

Cancer is a world public health problem, it is one of the main causes of premature death (earlier than 70 years of age) in 127 countries[1]. An increase of 20% of the disease incidence occurred in the last decade and for 2040, more than 28 million new cases[2] are estimated. In Brazil, for each year of the triennium 2023-2025, 704 thousand new cases of cancer are anticipated. Except non-melanoma skin cancer, 483 thousand new cases of cancer are expected (49.5% for men and 50.5% for women[3]).

A large number of cancer patients could be saved from premature death and suffering had they timely access to early detection programmes and adequate treatment[4]. In addition to warranted access to services, communication actions to expand the society's awareness on how to prevent and early detect cancer and to overcome stigmas which delay the search for treatment continue being critical to cope with this rising public health problem[5].

Campaigns to inform and educate the population about the causes, symptoms, diagnosis and treatment of several types of cancer are one of the most common forms to raise the population awareness about this disease. The awareness campaigns are carried out in different months of the year and aim to encourage the individuals to adopt healthier behaviors[6].

Examples of campaigns widely divulged in Brazil and in the world are "*Outubro Rosa*" (Pink October) for breast cancer and "*Novembro Azul*" (Blue November) for prostate cancer[7]. Despite the similarities of the nomenclature the countries and the media adopt in the campaigns, they vary locally.

Given this scenario, it is necessary to evaluate the results these campaigns have on the population interest and behavior which can help to investigate the effectiveness and reach of these initiatives. The resources can be optimized and detect gaps, limitations and opportunities of improvement, supporting the planning, execution and evaluation of novel strategies of communication and health education targeted to cancer prevention and control.

It is known that currently the Internet has become a pivotal source of health-related information at world level, providing invaluable data to analyze the population interests[8]. Google Trends (GT) is a cost-free tool that can support the evaluation of the campaigns efficacy and analyze the tendency of the volume of searches for certain terms at Google's search along the time and in different regions[9].

A recent systematic review[10] with 85 articles concluded that there was a significant increase of the number of publications related to oncology that used GT. The articles addressed a wide variety of topics, which hampered a deeper analysis of each theme. Thus, the objective of this article is to analyze the impact the awareness campaigns of the different types of cancer had on the interest of internauts through GT.

METHOD

Integrative literature review aimed to determine the current knowledge about a specific theme through the identification, analysis and synthesis of independent results on the same subject[11]. The methodological steps to conduct an integrative review were followed[12]: (1) research question, (2) literature search, (3) data collection, (4) critical analysis of the studies included, (5) discussion of the results and (6) presentation of the review.

An unregistered review protocol was utilized. The search was carried out on May 29, 2023 at the databases PubMed, SciVerse Scopus, Web of Science (WOS) and Latin American and the Caribbean Literature on Health Sciences (LILACS). The tool PICO (acronym of Population, Intervention, Comparison and Outcome was utilized to construct the search strategy)[13]: P – internauts; I – cancer awareness campaigns; C – period without campaigns; O – internauts raising interest on different types of cancer. Eventually, the research question was created: "What is the impact of awareness campaigns on internauts interests on different types of cancer through Google Trends described in the literature?".

For each one of the databases investigated, in response to the research question, it was created a three-group structured keywords-based search strategy: (a) related to GT, (b) related to oncology and (c) related to awareness campaigns (Chart 1).

Fully available primary studies (articles) published in any language and time period which evaluated the impacts of awareness campaigns on prevention and diagnosis of different types of cancer utilizing GT have been included. No additional exclusion criteria were defined.

One investigator conducted the search and exported the results to the platform Rayyan[14], where articles were identified, and duplicates were excluded. Next, two independent authors read all the titles and abstracts to reach a first selection of articles at the same platform. And in the third step, two independent authors read the articles in full, confirmed the eligibility criteria and eventually obtained the final studies sample. Discrepancies were resolved upon consensus by the same investigators to speed up the review.

After the studies were selected, the following data of interest were extracted and exported to an Excel spreadsheet: year of publication, journal, title, objective,

Chart 1. Search strategies at the databases selected. Rio de Janeiro, RJ, Brazil, 2023

	Search Strategies
PubMed	(Google Trends[tw] OR Google Trend[tw]) AND (Neoplasms[mh] OR Neoplas*[tw] OR Cancer*[tw] OR Tumor*[tw] OR Tumour*[tw] OR Carcinoma*[tw] OR Oncol*[tw]) AND ("Health Promotion"[tw] OR awareness OR campaign*)
Scopus	TITLE-ABS-KEY ("Google Trends" OR "Google Trend") AND TITLE-ABS-KEY (Neoplasms OR Neoplas* OR Cancer* OR Tumor* OR Tumour* OR Carcinoma* OR Oncol*) AND TITLE-ABS-KEY ("Health Promotion" OR awareness OR campaign*)
WOS	TS=("Google Trends" OR "Google Trend") AND TS=(Neoplasms OR Neoplas* OR Cancer* OR Tumor* OR Tumour* OR Carcinoma* OR Oncol*) AND TS=("Health Promotion" OR awareness OR campaign*)
LILACS	("Google Trends" OR "Google Trend") AND (Neoplasms OR Neoplas* OR Cancer* OR Tumor* OR Tumour* OR Carcinoma* OR Oncol*) AND ("Health Promotion" OR awareness OR campaign*) AND (db:("LILACS"))

method, main results and evidence level. The types of cancer addressed in each study, the country and period investigated were included in the description of the objective. The Joanna Briggs grades of recommendation were utilized for levels of evidence[15].

RESULTS

One hundred and seventy-nine (179) publications were found, 98 duplicates were excluded and also 59 articles, after reading the title and abstract. In addition, three were excluded because only the abstracts were available. Eventually, 19 articles were included for analysis as portrayed in the flowchart[16] (Figure 1).

The summary of the 19 articles selected in ascending order from the publication date is portrayed in Chart 2[17-35]. The studies were published since 2017 until 2022 addressing recent themes and rising interest. Most of them analyzed campaigns on breast cancer (n=13 – 68%), followed by prostate cancer (n=10 – 52%). The USA (n=10 – 52%) and Brazil (n=4 – 21%) were the countries mostly analyzed by the studies. Because all of them were descriptive observational studies, the level of evidence was four.

DISCUSSION

The efficacy and reach of the impact of cancer awareness campaigns and its risk factors in the internauts' interest measured by GT varied.

The type of cancer addressed, and region reached by the campaign held direct association with the results obtained. In addition, external factors had synergetic or competing effect on population interest on the campaigns' theme.

There was consensus about the effects of the campaign Pink October in the increased interest for information confirming the seasonality of the peaks of interest during October[17,19,20,24,25,29,30,32,33,35]. Although the interest for breast cancer was higher than for other types of cancer during the year[24,36], the effect of this campaign is short-lived with the level of interest resuming base level in nearly two months[17,19,20,27,30,32,35]. Two studies identified that the overall mean of interest on breast cancer due to the reduction of investments in the campaigns, screening services and public health education actions in USA and Malaysia has declined[19,27].

It is known that women's adherence to screening exams, specially mammography was positively impacted by the campaign "Pink October". However, it is an ephemerous measure, as the increase of search for exams is usually limited to October through December, and in the remaining nine months of the year, it drops[37]. Many women, furthermore, are screened off the recommended age range or have difficulties to access health services due to social or regional inequalities[32]. The challenges to ensure a fair access are evident like the necessity to intensify the actions of health literacy, disclosure of best scientific-based evidences and expansion of services during the whole years, not only in October[32,37].

Prostate cancer awareness campaigns had poor effect on public interest measured by GT, mainly when compared to breast cancer campaigns[20,24,26,28,29,33,35], suggesting that communication strategies and health education for men need to be improved[38]. Males health-related behaviors need to be understood as well as the stigmas affecting this population associated with early detection of the disease[39]. It is postulated that the campaign "Blue November" has to be reviewed and reformatted given

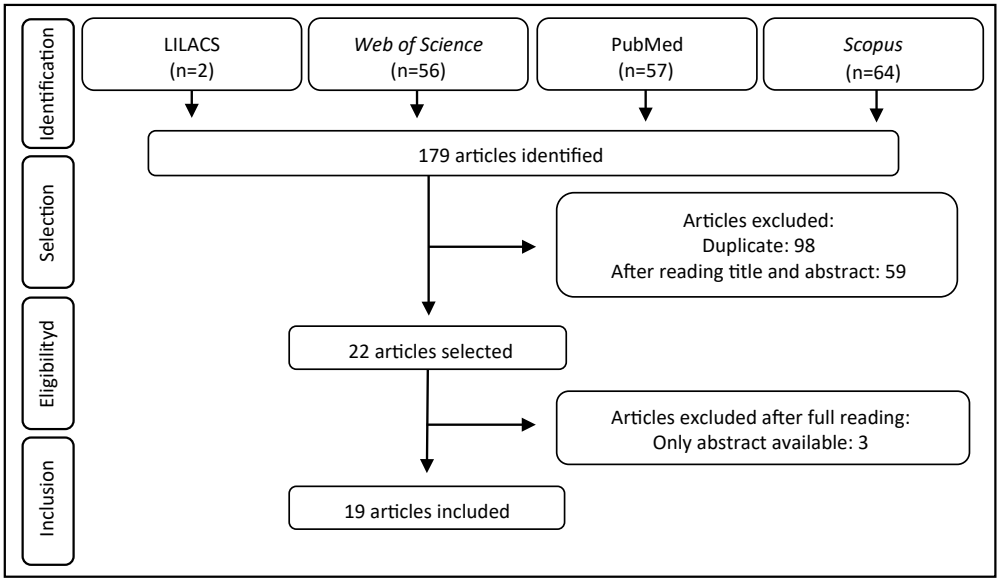

Figure 1. Flowchart of the process of articles selection

Source: adapted from Recommendation PRISMA[16].

Chart 2. Articles included with identification number (ID), year of publication, journal, title, objective and main outcomes. Rio de Janeiro, RJ, Brazil, 2023

ID	Year	Journal	Title	Objective	Main outcomes
E1	2017	JMIR Public Health Surveill	Using Google Trends Data to Study Public Interest in Breast Cancer Screening in Brazil: Why Not a Pink February?[17]	Study cycles of public interest in mammography and breast cancer in Brazil from 2011 to 2016	An upward trend of interest for mammography and breast cancer was found. The peaks of interest were in October, month of the Pink October and dropped since December
E2	2017	World Medical & Health Policy	Social Media Engagement with Cancer Awareness Campaigns Declined During the 2016 U.S. Presidential Election[18]	Examine whether the public engagement with breast and prostate cancer declined in 2016 in the US presidential campaign	The 2016 presidential campaign competed with engagement with breast and prostate cancer
E3	2019	Asian Pacific Journal of Cancer Prevention	Using Google Trends Data to Study Public Interest in Breast Cancer Screening in Malaysia[19]	Investigate the public pattern in seeking breast cancer screening information in Malaysia between 2007 and 2018	Downward trends in interest in breast cancer associated with several factors as decline of incidence and funds shortage were found. The peak of interest happened in October during the Pink October campaign
E4	2019	Ecancermedicalscience	The impact of cancer campaigns in Brazil: a Google Trends analysis[20]	Evaluate the campaigns effectiveness on eliciting the interest of the Brazilian population on breast, prostate, lung and intestine cancer from 2014 to 2019	The high interest was breast cancer, followed by prostate, lung and intestine cancer. The Pink October and Blue November raised the interest
E5	2019	Irish Journal of Medical Science	Is Movember synonymous with moustaches or men's health? An examination of internet search activity for prostate and testicular cancer during the campaign[21]	Examine the world effectiveness of the Movember campaign from 2004 to2015	Increased interest for Movember campaign. However, the term "moustache" raised interest but not for prostate and testicle cancer
E6	2020	Surgical Endoscopy	Has National Colorectal Cancer Awareness Month increased endoscopy screening rates and public interest in colorectal cancer?[22]	To examine the impact of colorectal awareness campaign on endoscopy rates and public interest in USA from 2002 through 2019	The campaign resulted in increased interest for colorectal cancer but failed to increase screening rates

to be continued

Chart 2. continuation

ID	Year	Journal	Title	Objective	Main outcomes
E7	2020	Journal of Cancer Education	Bladder Cancer and Google Trends: Associations Between US Search Patterns and Disease Outcomes May Show Need for Improved Awareness Strategies[23]	Assess the trends of interest in bladder cancer in USA and correlate with incidence rates and mortality from 2004 through 2019	There was no increase of interest in bladder cancer during the awareness month. The interest is associated with incidence rates and mortality but not with survival. Media news have also influenced the interest
E8	2020	Urology	Success of Prostate and Testicular Cancer Awareness Campaigns Compared to Breast Cancer Awareness Month According to Internet Search Volumes: A Google Trends Analysis[24]	To compare the efficacy of prostate, testicle and breast cancers' awareness campaigns in USA from 2010 through 2017	The interest in breast cancer increased significantly in October of each year. In contrast, none of the other cancer campaigns led to a significant increase in interest
E9	2020	Ecancermedicalscience	The impact of monthly campaigns and other high-profile media coverage on public interest in 13 malignancies: a Google Trends analysis[25]	To evaluate the impact of cancer awareness campaigns on thyroid, breast, lung, pancreas, uterus, intestine, esophageal, brain, skin, ovary, prostate and hematologic cancers and other media events on public interest in these malignancies in USA from 2010 through 2020	Public interest was significantly greater in the cancer's awareness months on intestine, skin, ovary, breast and lung cancers. The peak of interest for esophageal, pancreas and lung cancer was associated with diagnosis or death of a celebrity
E10	2021	Cureus	Using Google Trends and Twitter for Prostate Cancer Awareness: A Comparative Analysis of Prostate Cancer Awareness Month and Breast Cancer Awareness Month[26]	Evaluate whether the public interest in prostate cancer and its screening changed following awareness month in USA and compare with the effect of awareness month on breast cancer from 2009 through 2019	Public interest in awareness month on prostate cancer was lower than breast cancer
E11	2021	Journal of Cancer Policy	The pink elephant in the room: Declining public interest in breast cancer and the impact of marketing efforts[27]	Analyze the interest in breast cancer in USA considering temporal trends and how marketing efforts impacted the interest from 2004 through 2020	The interest on breast cancer had annual peaks in the awareness month, specially in 2012 when the US National Football League initiated the campaign. Since 2004, the mean interest declined following the funding trend of health screening services and education
E12	2021	*Ciência & Saúde Coletiva*	Collective interest cycles and trends in Google search related to institutional campaigns on prostate cancer: promoting health or diseases?[28]	Study oscillations of interest in prostate cancer and its screening in Brazil following Blue November campaigns from 2014 to 2019	Interest on prostate cancer increased in November of every year. There was more interest in the disease than in diagnostic exams
E13	2021	Bulletin of Uro-oncology	Comparison between the Success of Prostate and Breast Cancer Awareness Campaigns over "Google Trends" in Turkey[29]	Compare the efficacy of breast and prostate cancers awareness campaigns in Turkey from 2010 to 2019	In the last five years (2015-2019) the searches for prostate and breast cancer increased. Only the interest in breast cancer raised during the campaign. Isolated rises for both types of cancer coincided with celebrity-related news covered in the media
E14	2021	PreventiveMedicine	Using big data to gauge effectiveness of breast cancer awareness month[30]	Evaluate the interest in breast cancer and mammography in each USA state and metropolitan region between 2006 and 2019	Increase of interest in the awareness month for breast cancer varied locally
E15	2021	Asian Pacific Journal of Cancer Prevention	A Google Trends™ Analysis of Bladder Cancer: Determining Awareness Campaign Success, and Patients' Needs in Clinical Management[31]	Analyze the interest and changing trends in the diagnosis and treatment of bladder cancer from 2004 and 2019 in USA, Canada, New Zealand, United Kingdom, Australia and Ireland	The interest on bladder cancer declined in the period investigated. Awareness campaigns did not cause the desired impact

to be continued

Chart 2. continuation

ID	Year	Journal	Title	Objective	Main outcomes
E16	2021	*Cadernos de Saúde Pública*	Pink October and mammography: when health communication misses the target[32]	Evaluate the interest in breast cancer and mammography in Brazil and its association with screening mammograms from 2004 to 2019	Interest declined between 2005 and 2009. Since 2010, peaks of interest on breast cancer began and from 2013 onward, for mammograms, both in October. Excess of screening mammograms out of the recommended age range and deficit at the recommended age range were detected
E17	2022	Cancers	Impact of Breast Cancer Awareness Month on Public Interest in the United States between 2012 and 2021: A Google Trends Analysis[33]	Evaluate the impact of awareness months on breast, lung and prostate cancers in the interest of the USA population from 2012 to 2021	Breast cancer awareness month was the only one which improved the interest, it should be a symbol of success
E18	2022	Scientific Reports	Impact of the cervical cancer awareness months on public interest in Japan: A Google Trends analysis, 2012–2021[34]	Evaluate the impact of cervical cancer awareness months (January and November) in Japan from 2012 to 2021	Public interest did not significantly increase during awareness months
E19	2022	Ecancermedicalscience	Impact of cancer awareness campaigns in Peru: a 5-year Google Trends analysis[35]	Correlate public interest in breast, prostate, uterus, stomach and intestine cancers and awareness campaigns in Peru from 2016 to 2020	The topics of highest interest were breast and prostate cancers. Only breast cancer had a cyclical punctual increase of peaks of interest

the specificities, necessities, interests and men's culture as opposed to exclusive focus on prostate cancer[40]. The care provided to men should occur within a setting of dialogue, respect, autonomy and diversity in addition to skilled health professionals able to offer a humanized and holistic approach[41].

Awareness campaigns for other types of cancer failed to raise public interest during the selected months when they were launched[20-22,24,30,32–34]. For instance, cervix cancer awareness campaigns in Japan were unable to expand the disease and prevention awareness[33] and, in the same line, studies evaluating bladder cancer awareness campaigns suggest they were ineffective and need to be revised or expanded[23,31].

The greatest impact on the population interest fostered by breast and prostate cancer awareness campaigns compared to other types of cancer may be associated with high incidence of these types of cancer in the countries investigated[2], screening programmes[10], the scope of disclosure and maturity of the campaigns, which count with strong financial, mediatic and symbolic resources for their achievement[42]. The pink ribbon and the moustache, for instance, are an icon to fight breast and prostate cancers, helping to draw attention, mobilize and identify individuals advocating these initiaves[43].

In addition to the difference of results according to the tumor location, they varied regionally. The regional differences may be influenced by the availability and access to cancer prevention and treatment services, how the campaigns are launched and their strength, sociocultural, economic and demographic characteristics, different access to information and to Internet and regional prevalence of cancer and its risk factors[20,30,32,33].

This result reinforces the importance of considering socioeconomic, cultural and subjective factors and populational behavioral patterns while planning these campaigns. To understand the discursive scenario and attempt to dialogue with the target public is required to produce dialogic and inclusive health communication strategies that are clear, accessible and meaningful to the other[5].

Further to factors directly related to the campaigns, events able to raise the population's interest on cancer as the media coverage[23] and disclosure or death of a celebrity by cancer have been identified[22,23,25,29]. The media, it needs to be pointed out, has been instrumental in increasing the search for health information and disclosure of essential data, reaching a wide and diversified public who are potential driving forces of cancer awareness.

Competing events negatively impacting the campaigns effects have been identified as the 2016 USA presidential campaign when public engagement in breast and prostate cancer declined[18] and reduction of interest on breast cancer in 2020 due to the rising interest in the COVID-19 pandemic[35].

Therefore, political, economic or health crisis are competing interests capturing the engagement of the population and shrinking the repercussion of cancer awareness campaigns, but these events may serve as an opportunity to widen their reach and impact and not a threat, instead[44]. Rethinking communication strategies are pivotal to understand how they affect the perceptions and behaviors the population has in relation to cancer.

The limitations of GT as source of data to analyze the campaigns appear to be quite clear and debatable. Beyond the already known limitations of the tool, GT allows to devise the internauts trends of interest from a sample of researches conducted by Google search but not necessarily mirrors the behavioral changes the campaigns are targeted to[9].

Some of the articles analyzed point out that notwithstanding the increase of the population interest some campaigns have achieved on the theme, this interest was disease-centered rather than in prevention and diagnosis[21,23,28]. Critically review GT' findings is a relevant step, as the interest increase fostered by the "Movember" campaign clearly related to the moustache visual and esthetics than how prostate and testicle cancers can be prevented instead[21]. While creating an awareness campaign, planning and evaluation of actions should be pondered wisely and align technical knowledge to the population's experience, necessities and motivations[5].

The utilization of GT as complementary strategy of analysis of campaigns offers but one relative index about the volume of searches conducted[23,28], which may eventually underestimate or overestimate the actual interest of individuals on cancer[35]. While interpreting the results of the studies, these limitations should be pondered but do not minimize their invaluable contributions as a cost-free online tool for nearly real-time disclosure of trends and interests of users in oncology[9].

More studies are suggested, though, to evaluate the awareness campaigns impacts including the analysis of the quality of information internauts accessed at peak interests moments and determination of correlations between upward interest the campaigns fostered and more measures recommended for cancer prevention and diagnosis.

The poor methodological description of the articles and high variation of the strategies to obtain the volume of GT related searches is the study limitation, which hampers comparison among them. In addition, three articles were excluded because their full text was unavailable.

CONCLUSION

The impact of cancer awareness campaigns on internauts interests varied in efficacy and reach according to the type of cancer, geographical distribution of the researches and competing events. The campaigns rising interest, when they happen, not always translated into expanded awareness about forms of prevention and diagnosis of cancer. The organization of the campaigns should be improved to increase the population interest on the theme and encourage long-term behavioral changes. Media's and celebrities ethical and accountable adherence to the campaigns may play an important role to augment the population interest on the theme.

CONTRIBUTIONS

All the authors contributed substantially to the study design, acquisition, analysis and/or interpretation of the data, wording and critical review. They approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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