CAHIERS MAGELLANES-NS
Volume 06 Issue 2
2024

ISSN:1624-1940
DOI 10.6084/m9.figshare.2632599
http://magellanes.com/

INSIGHTS IN BREAST CANCER RESEARCH: A BIBLIOMETRIC ANALYSIS IN SAUDI ARABIA

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Abstract

Objective:
In 2020, breast cancer was ranked as the fifth leading cause of cancer-related deaths globally. One of the most prevalent cancers worldwide is the breast cancer. According to the International Agency for Research on Cancer, there were over 2.26 million new breast cancer cases and approximately 685,000 deaths globally. [1] Researchers in Saudi Arabia have been actively contributing to breast cancer research, publishing numerous studies. [2] A systematic analysis of these publications is essential to understand the current landscape and guide future breast cancer research policies in Saudi Arabia.

Methodology:
The search query used for this study included: "Breast cancer" OR "cancer in women" OR "breast premalignant lesion" OR "Potentially malignant disorder" AND AFFIL (Saudi AND Arabia). Articles were retrieved from the PubMed Central database, and various bibliometric tools within PubMed were used to analyze key metrics. The search yielded a total of 2,482 journal articles related to the query. Most of these publications originated from King Saud University (1,330), followed by King Abdulaziz University (560), King Faisal Specialist Hospital and Research Centre (213), and King Saud University College of Applied Medical Sciences (108).

Conclusion:
Saudi researchers are actively addressing the public health challenge posed by breast cancer. However, the analysis revealed that a few institutions are leading in research output, while contributions from others remain limited. To enhance breast cancer research efforts, the health department should take proactive steps to encourage greater participation from a wider range of institutions. Evidence from the research indicates that the disease has been more prevalent over the last 20 years, highlighting the need to raise community awareness about breast cancer prevention measures.

Keywords: Bibliometric analysis- breast cancer- malignant disorder- Saudi Arabia- PubMed.

Introduction:

Breast cancer is one of the most prevalent cancers among Saudi women, accounting for 21.8% of all cases. It ranks as the ninth leading cause of death among Saudi women, according to recent cancer mortality statistics. [6,7,8] It is also the second most frequent cancer among Saudi women, according to Al-Qahtani [9]. Ibrahim et al. [10] project that breast cancer rates in Saudi Arabia will rise in the coming decades due to population growth and aging. The Saudi Cancer Registry at King Faisal Specialist Hospital and Research Centre reports approximately 930 new breast cancer cases annually. In 2010, 5,378 cancer cases were diagnosed in Saudi Arabia, with 1,473 (27.4%) of these being breast cancer.

Between 2001 and 2008, 6,922 cases of female breast cancer were reported to the Saudi Cancer Registry. The Women between the ages of 30-44 and 45-59 had the greatest overall percentages of female breast cancer cases (31.6 and 31.2%), respectively. At 26.6 per 100,000 women, the eastern area of Saudi Arabia has the highest overall ASIR, followed by Makkah (19.4) and Riyadh (20.5). With

ISSN:1624-1940
DOI 10.6084/m9.figshare.2632599
http://magellanes.com/

average ASIRs of 4.8, 6.1, and 7.3 per 100,000 women, respectively, Asir, Baha, and Jazan had the lowest averages. [5]
Original research articles published in leading journals are critical in disseminating knowledge and informing the public about scientific advances (Foy et al., 2008). Research publications are a key indicator of a nations or institution's progress in a specific area of knowledge. Bibliometric studies have been widely used to assess research productivity across different fields (Haq and Al Fouzan, 2018). Investigating major issues like breast cancer through such studies can help establish proper guidelines at the national level. With the rise of the digital era, numerous medical databases now offer specialized search tools and citation analysis online. PubMed provides access to a vast collection of journals and offers various search methods, including advanced, author, basic, rapid, and source searches. Over the past 20 years, Saudi Arabia has made significant investments in research and higher education (Alhaider et al., 2015). Scholars in the Kingdom have produced a considerable body of research on breast cancer. This study aims to analyze breast cancer research in Saudi Arabia, published between 1991 and 2024, using the PubMed database. [20]

Materials and Methods

Bibliometric indicators from the PubMed database were used to analyse research publications by various authors from different institutions in Saudi Arabia. PubMed Central (PMC) has grown from its original two journals, PNAS: Proceedings of the National Academy of Sciences *and* Molecular Biology of the Cell, to include thousands of publications. Founded in 2000, the PubMed database also features preprints collected by the NIH Preprint Pilot and author submissions via the NIH Manuscript Submission System (NIHMS).

PMC's collection spans from the late 1700s to the present, containing over 10 million full-text records in biomedical and life sciences. This includes preprints, peer-reviewed author manuscripts, and formally published journal articles. With over 35,000 titles from approximately 12,000 publishers, including 34,000 peer-reviewed journals across various fields such as physical, biological, and health sciences, PMC is a vast repository for academic research. The National Library of Medicine (NLM) updates these records daily, adding new citations and modifying existing ones.

For this study, the search string "Breast cancer" OR "cancer in women" OR "breast premalignant lesion" OR "Potentially malignant disorder" AND AFFIL (Saudi AND Arabia) was used to retrieve articles from PubMed Central. Boolean operators were applied as this is a systematic bibliometric analysis focused on breast cancer research. The data collected was sorted by publication year, funding sources, international and inter-university collaborations, and subject matter. Various data analysis tools available within the PubMed database were utilized to assess these bibliometric parameters.

Al-Kahtani R, Mahmood N et.al were stated in their analysis about the noticeable increase in scientific publications in KSA, indicating that breast cancer research has garnered significant attention. They found 3831 publications in the field of breast cancer. In 2021, the highest number of publications was recorded. They also mentioned that the King Saud University and King Faisal Specialist Hospital & Research Centre funded most of the projects and contributed the most publications. [21] But in this research I observed that there was a huge rise in recent publications about breast cancer due to the wide spread of disease all over the world.

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Results

A total of 2,482 papers published between 1991 and 2024 were identified in the search. Notably, there has been a significant increase in breast cancer publications over the past decade (Figure 1). From 1991 to 2000, only 19 publications were recorded. However, research output has surged since 2011, with 2010 and 2016 being the most productive years, accounting for 722 publications combined. The 2,482 publications received over 1,350 citations in total, with a notable h-index reflecting their impact.

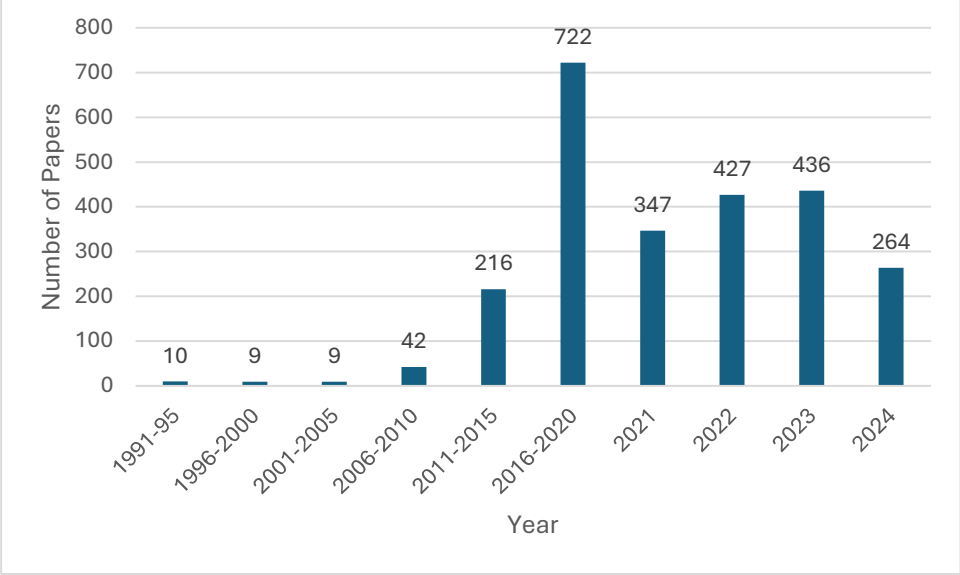

Fig: 1 Year-Wise Distribution of the Number of Publications on Breast Cancer from Saudi Arabia

The analysis showed that approximately 230 documents (72%) were original research articles, while around 124 (20%) were review articles. The remaining publications were distributed as follows: Conference Papers (3; 0.09%), Letters (9; 1.36%), Editorials (21; 3.17%), Book Chapters (10; 2.41%), and Short Surveys (2; 0.08%).

Table 1 Distribution of the Search Results Based on the Document Type

S.No	Document Type	Numbers	Percentage
1	Article	1843	74%
2	Review	467	18%
3	Editorial	64	2.5%
4	Book Chapter	2	0.1%
5	Retracted	29	1.2%
6	Article in Press	29	1.2%
7	Conference Paper	12	0.6%
8	Short Survey	36	1.5%

The manuscripts were published across 545 different journals. The highest number of articles appeared in *Molecules* (169), followed by Asian Pacific Journal of Cancer Prevention (88), Scientific Reports (78), Saudi Journal of Biological Sciences *(*62*), and* International Journal of Molecular Sciences (59), etc. are presented in the Table 2.

Table-2 Number of Publication on Breast Cancer Research Papers from Saudi Arabia Based on

ISSN:1624-1940
DOI 10.6084/m9.figshare.2632599
http://magellanes.com/

theJournal Title

S.No	Journal Title	No.of publications
1	Molecules	169
2	Asian Pac J Cancer Prev	88
3	Sci Rep	78
4	Saudi J Biol Sci	62
5	Int J Mol Sci	59
6	PLoS One	51
7	Pharmaceuticals (Basel)	46
8	Cureus	45
9	ACS Omega	44
10	Saudi Pharm J, Cancers (Basel)	41
11	Pharmaceutics , Saudi med	40
12	RSC Adv , Front Pharmacol, Diagnostics (Basel)	28 each
13	J Enzyme Inhib Med Chem, Heliyon , Biomed Pharmacother Breast Cancer (Dove Med Press) , Int J Nanomedicine	25 each
14	Biomed Res Int, Front Chem, Biomedicines, Oncotarget Polymers (Basel), Comput Intell Neurosci , Ann Saudi Med Breast Cancer Res Treat	20 each
15	Life (Basel), Plants (Basel),Drug Des Devel Ther, Onco Targets Ther, Mar Drugs, Oncol Lett, Sensors (Basel)	15 each
16	Int J Surg Case Rep, Br J Cancer	12 each
17	Integr Cancer Ther, J Family Community Med,J Family Med Prim Care, Front Mol Biosci, Evid Based Complement Alternat Med Biomolecules, Healthcare (Basel)	11 each
18	Nanomaterials (Basel), Breast Cancer (Auckl), BMC Womens Health,Eur Rev Med Pharmacol Sci,Curr Oncol	10 each
19	Others	Less than 10

The 2,482 publications were authored by 1,995 researchers. The top ten contributors are listed in Table 3, with Dr. Alanazi M leading with 30 publications, followed by Dr. Ghebeh H (22) and Dr. Eldehna WM (21). Additionally, nine authors have published 10 or more papers on breast cancer.

Table 3 Most Productive Authors for Breast Cancer Research Papers from Saudi Arabia

S.No	Author Name	Number	Percentage
1	Alanazi M	30	5.8%
2	Ghebeh H	22	0.88%
3	Eldehna WM	21	0.88%

ISSN:1624-1940
DOI 10.6084/m9.figshare.2632599
http://magellanes.com/

4	Alhakamy NA	21	0.88%
5	Siraj AK	15	0.6%
6	Alshatwi AA	14	0.57%
7	Al-Ansari MM	13	0.55%
8	Al-Oqail MM	10	0.4%
9	Al-Khalaf HH	10	0.4%
10	Zekri J	9	0.36%
11	Ghorab MM	9	0.36%
12	Alshamsan B	8	0.32%
13	Al-Eitan LN	7	0.3%
14	Rudat V	6	0.24%
15	Al-Asmari AK	6	0.24%

The affiliations of the authors were also analyzed (Table 4). The majority were affiliated with King Saud University (53%), followed by King Abdulaziz University (23%), King Faisal Specialist Hospital and Research Centre (9%), and King Saud University College of Applied Medical Sciences (4%). King Saud University had the highest number of affiliated authors overall.

Table: 4 Top Institutional Affiliations of Research papers on Breast Cancer

S.No	Affiliation Number percentage	Number	Percentage
1	King Saud University	1330	54%
2	King Abdulaziz University	560	23%
3	King Faisal Specialist Hospital and Research Centre	213	9%
4	King Saud University College of Applied Medical Sciences	108	4%
5	Taibah University	96	3.9%
6	Imam Abdulrahman Bin Faisal university	92	3.71%
7	Jazan University	79	3.18%
8	Dr. D.Y.Patil Dental College & Hospital	4	0.16%

The 2,482 papers on breast cancer were published across 25 different departments or subjects. Many articles were authored by the Department of Medicine, followed by Biochemistry, Molecular Biology, Chemistry, Agricultural and Biological Sciences, Chemical Engineering, and Health Sciences.

ISSN:1624-1940
DOI 10.6084/m9.figshare.2632599
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Table: 6 Subject-Wise Distribution of the Publications on Breast cancer in Saudi Arabia

Sr. no.	Subject Area	Number
1	Medicine	1303
2	Biochemistry	341
3	MolecularBiology	281
4	Pharmacology, Toxicology, and Pharmaceutics	191
5	Chemistry	64
6	Agricultural and Biological Sciences	32
7	Chemical Engineering	66
8	Engineering	67
9	Health Science	58
10	Environmental Science	79

Discussion:

The goal of this study was to assess the volume of Saudi Arabian research on breast cancer published between 1991 and 2024 using a keyword search in the PubMed database. The search results were organized based on criteria such as subject, publication year, document type, journal name, author, affiliation, and university collaboration. The substantial interest shown by Saudi researchers in breast cancer research is commendable. In Saudi Arabia, the most common cancers are thyroid, kidney, brain, colorectal, prostate, breast, and lymphoma, in that order. Specifically, 50.9% of cases are colorectal cancer (CRC), 7% are kidney cancer, and 53% are breast cancer (Almufareh NA 2020; Alqahtani WS).

Scopus, Web of Science, and Google Scholar cover a broad range of scientific fields, while PubMed focuses primarily on medicine and biological sciences. Web of Science offers records dating back to 1900, covering some of the oldest publications. Among these databases, only PubMed does not provide citation analysis, though it allows for a higher number of keywords per search. A key advantage of PubMed is its rapid updates, including both print and early online versions of publications, which is a feature not matched by Scopus or Web of Science (Matthew Falagas, 2008).

According to the IARC Globocan 2020 reports, breast cancer incidence in Saudi Arabia has reached 3,954 cases (14.2%) [11]. It remains the most frequently diagnosed malignancy in the country, with an age-standardized incidence rate of 27.3 per 100,000 and a mortality rate of 7.5 per 100,000 [12]. A concerning upward trend has been observed over the past decade (IARC, 2020; Beshan et al., 2016). Data from the Saudi Cancer Registry show an increase in age-standardized risk from 15.4 per 100,000 in 2004 to 27.2 per 100,000 in 2016. Contributing factors to this rise include an aging population, obesity, unhealthy and caloric diets, lack of exercise, smoking, and genetic predisposition. Regional

ISSN:1624-1940
DOI 10.6084/m9.figshare.2632599
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analysis indicates that 75% of breast cancer cases in Saudi Arabia are concentrated in Riyadh, Makkah, and the central region. [15]

Salman M. Albeshan, Yazeed I. Alashban et.al reported that the number of breast cancer cases in Saudi Arabia increased by 186%, from 783 cases in 2004 to 2,240 cases in 2016 at their study period. The median age at diagnosis rose from 47 to 50 years, with nearly 60% of cases diagnosed in women aged 40 and older. The percentage of localized cases increased by 17% while regional APC of 95%. The highest increases in breast cancer cases were observed in Najran, Qassim and Hail. According to the Annual Percent change (APC) rate. They also suggested the need of region-based studies to understand the rate of APC in small regions [16].

In this analysis, Molecules emerged as the leading journal with 169 research papers on breast cancer. Molecules is an internationally recognized, peer-reviewed, open-access journal in the field of chemistry, published semimonthly online by MDPI. The journal is noted for its high impact factor, open-access model, and the recognition it gives to reviewers. It is renowned for upholding the highest standards of research communication in the cancer sciences community both in Asia and globally.

In the bibliometric analysis conducted by Meng G, Xu H, and Yang S, the volume and quality of literature on inflammation and breast cancer were assessed. The increasing number of annual publications reflects a growing interest in this research area. The United States leads in the number of publications on this topic. The study mapped the global landscape of researchers and institutions investigating the link between inflammation and breast cancer. Among the top 10 journals, *Cancers* had the highest publication output, while *Breast Cancer Research* had the highest impact factor. The focus of breast cancer research is shifting from phenotypic analysis to therapeutic interventions, with current trends emphasizing antibacterial activity, targeted therapy, and nanoparticles. Key topics of interest include anti-inflammation, cell death, and inflammatory cytokines [17].

Brayan E. reported that engaging in a minimum of 2.5 hours of moderate-intensity physical activity per week is associated with a 13% reduction in cancer mortality. This finding aligns with recommendations from the American College of Sports Medicine (ACSM), which advises incorporating large muscle strengthening exercises twice a week and at least 150 minutes of cardiovascular exercise per week as a preventive measure against cancer [18]. Albeshan SM, Hossain SZ stated in their research that there is a notable rise in research due to the increasing burden of breast cancer, which in turn is associated with adoption of a Western lifestyle. They also mentioned that there is a substantial percentage of Saudi women becomes overweight (28%) or obese (35%) due to the consumption of highly caloric diets and lack of exercise. [19]

Conclusions:

This study indicates that the number of publications on breast cancer from Saudi Arabia has increased significantly over the past decade. This is meant to serve as a timely alarm to alert us to the historical global breast cancer prevalence. Hence, this is an ideal moment to do additional analytical epidemiological study to pinpoint the possible risk factors contributing to the rise in breast cancer cases among Saudi women and to provide awareness to the female children from their adolescent age.

ISSN:1624-1940
DOI 10.6084/m9.figshare.2632599
http://magellanes.com/

References:

[1] https://www.moh.gov.sa/en/HealthAwareness/healthDay/2023/Pages/HealthDay-2023-10-01-31.aspx
[2] Research and innovation are two key elements in achieving vision 2030: research and innovation. Ministry of Education; 2022.
[3] Falagas, Matthew & Pitsouni, Eleni & Malietzis, George & Pappas, Georgios. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: Strengths and weaknesses. FASEB journal : official publication of the Federation of American Societies for Experimental Biology. 22. 338-42. 10.1096/fj.07-9492LSF.
[4] Al-Kahtani R, Mahmood N, Aamir S, Anjum Z. Visualizing breast cancer research trends in KSA: A bibliometric analysis. J Taibah Univ Med Sci. 2023 Jun 15;18(6):1472-1479. doi: 10.1016/j.jtumed.2023.06.003. PMID: 37409243; PMCID: PMC10318506.
[5] Alghamdi IG, Hussain II, Alghamdi MS, El-Sheemy MA. The incidence rate of female breast cancer in Saudi Arabia: an observational descriptive epidemiological analysis of data from Saudi Cancer Registry 2001-2008. Breast Cancer (Dove Med Press). 2013 Oct 17;5:103-9. doi: 10.2147/BCTT.S50750. PMID: 24648763; PMCID: PMC3929249.
[6] Registry N. Cancer Incidence Report Saudi Arabia 2002. Riyadh; 2007.
[7] Mokdad AH, Jaber S, Aziz MI, AlBuhairan F, AlGhaithi A, AlHamad NM. The state of health in the Arab world, 1990010: an analysis of the burden of diseases, injuries, and risk factors. Lancet. 2014;383:309–320. 10.1016/S0140-6736(13)62189-3
[8] Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans K. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012;380:2095–2128. 10.1016/S0140-6736(12)61728-0
[9] Al-Qahtani MS. Gut metastasis from breast carcinoma. Saudi Medical Journal. 2007;28:1590–1592.
[10] Ibrahim EM, Zeeneldin AA, Sadiq BB, Ezzat AA. The present and the future of breast cancer burden in the Kingdom of Saudi Arabia. Med Oncol. 2008;25:387–393. 10.1007/s12032-008-9051-5
[11] Alqahtani W.S., Almufareh N.A., Domiaty D.M., Albasher G., Alduwish M.A., Alkhalaf H., et al. Epidemiology of cancer in Saudi Arabia thru 2010-2019: a systematic review with constrained meta-analysis. *AIMS Public Health.* 2020 Sep 11;7(3):679–696. doi: 10.3934/publichealth.2020053. PMID: 32968686; PMCID: PMC7505779.
[12] https://gco.iarc.fr/today/data/factsheets/populations/682-saudi-arabia-fact-sheets.pdf
[13] Alghamdi I.G., Hussain I.I., Alghamdi M.S., El-Sheemy M.A. The incidence rate of female breast cancer in Saudi Arabia: an observational descriptive epidemiological analysis of data from Saudi Cancer Registry 2001–2008. *Breast Cancer.* 2013;5:103–109.
[14] Althubiti M.A., Eldein M.M. Trends in the incidence and mortality of cancer in Saudi Arabia. *Saudi Med J.* 2018;39:1259–1262. doi: 10.15537/smj.2018.12.23348.
[15] Albeshan S.M., Alashban Y.I. Incidence trends of breast cancer in Saudi Arabia: a joinpoint regression analysis (2004–2016) *J King Saud Univ Sci.* 2021;33(7)
[16] Salman M. Albeshan, Yazeed I. Alashban, "Incidence trends of breast cancer in Saudi Arabia: A joinpoint regression analysis (2004–2016)",Journal of King Saud University - Science, Volume 33, Issue 7, 2021
[17] Meng G, Xu H, Yang S, Chen F, Wang W, Hu F, Zheng G, Guo Y. Bibliometric analysis of

ISSN:1624-1940
DOI 10.6084/m9.figshare.2632599
http://magellanes.com/

worldwide research trends on breast cancer about inflammation. Front Oncol. 2023 Apr 19;13:1166690. doi: 10.3389/fonc.2023.1166690. PMID: 37152044; PMCID: PMC10154678.

[18] "Trends in physical activity research for breast cancer - A bibliometric analysis of the past ten years" yan E. Patiño-Palmaa bpatino3@areandina.edu.co · Luis López-Montoyab · Rafael Escamilla-Ugartec · Alejandro Gómez-Rodasa,d, Helion open access

[19] Albeshan SM, Hossain SZ, Mackey MG, Brennan PC. Can breast self-examination and clinical breast examination along with increasing breast awareness facilitate earlier detection of breast cancer in populations with advanced stages at diagnosis? Clin Breast Cancer 2020 Jun 1; 20(3): 194e200.

[20] Al-Kahtani R, Mahmood N, Aamir S, Anjum Z. Visualizing breast cancer research trends in KSA: A bibliometric analysis. J Taibah Univ Med Sci. 2023 Jun 15;18(6):1472-1479. doi: 10.1016/j.jtumed.2023.06.003. PMID: 37409243; PMCID: PMC10318506.

[21] Alqahtani WS, Almufareh NA, Domiaty DM, Albasher G, Alduwish MA, Alkhalaf H, Almuzzaini B, Al-Marshidy SS, Alfraihi R, Elasbali AM, Ahmed HG, Almutlaq BA. Epidemiology of cancer in Saudi Arabia thru 2010-2019: a systematic review with constrained meta-analysis. AIMS Public Health. 2020 Sep 11;7(3):679-696. doi: 10.3934/publichealth.2020053. PMID: 32968686; PMCID: PMC7505779.