Chapter 25
Cancer Research in the Arab World

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25.1 Introduction

Health research productivity in the Arab countries is lagging than other non-Arab countries in the Middle East and the world [1–3]. It is below the world average except for four countries (Qatar, Tunisia, Lebanon, and Kuwait) [2]. However, there has been an increase in scientific productivity since the start of the 1990s [4]. A study on the toxicology research output among Middle Eastern Arab countries has also shown that Arab countries are falling behind in the number of publications and noted a rise in the research activity [5].

The Arab world was delayed in the number of publications in top journals and the number of citations [2]. International collaborations have contributed to the recent increase in citations and publishing in top quartile journals [2]. It has been reported that common metrics that assess health research are missing from some Arab countries [6]. Research in the Arab region has been criticized for several issues, including the underinvestment in research and development, production, and use of research [4, 7, 8]. Arab countries have low Gross domestic Expenditure on Research and Development (GERD) as a percentage of Gross Domestic Product (GDP), with Libya (0.86) and Morocco (0.73) having the highest GERD/GDP ratios [9]. It is worth noting that most Arab countries suffer from brain drain except for the

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Gulf Cooperation Council (GCC) countries who, on the contrary, attract professionals, including academicians and researchers from the Arab world and elsewhere [10]. Conflict, political turmoil, and difficulty in publishing in journals with high impact factors are among the other reasons given to the Arab countries' delay in comparison to the world [1, 11]. Further, few faculty members and graduate students in the Arab world publish, and those who do mostly published in journals that are not indexed in Scopus or Web of Science. Moreover, not all Arab universities require publications for academic promotions. For the 11 Arab countries that have available data, the number of researchers per million inhabitants ranges from 19 in Sudan to 1394 in Tunisia [9]. Another challenge that some Arab countries, GCC countries, in particular, face in conducting research is the heterogeneity of the non-national population and their transient nature with implications such as sampling, the need for translating questionnaires into several languages if used as a tool and conducting longitudinal studies [12].

25.2 Cancer Research Output in the Arab World

There is a rise in cancer incidence rates in the Eastern Mediterranean Region (EMR) countries that include 19 Arab countries in addition to Afghanistan, Iran, and Pakistan. This rate is expected to increase twofold from 2012 to 2030. The top five cancers among males are lung, prostate, colorectal, liver, and urinary bladder [13]. The corresponding cancers for females are breast, cervical, colorectal, ovarian, and stomach cancers. Despite this burden, cancer research output in the Arab countries is low, which is a disadvantage to the academic community [13]. Further, none of the institutions in the Arab world were listed among the 2020 top 200 institutions in cancer research based on the Nature Index [14]. Globally, cancer research has been increasing, with the United States and China taking the lead [14, 15].

Of all the research performed worldwide, 4% was on cancer research in 2014 [15]. A study comparing the health research output and burden of disease in Palestine indicated that cancer is seldom addressed in the country's publications relative to its burden [16]. On the other hand, a scoping review of Non-Communicable Diseases (NCDs) from seven Arab countries reported that there was a relative surplus of cancer publications compared to cardiovascular diseases [17]. Only one study assessed the cancer research output of Arab countries, however, it was limited to seven countries out of the twenty-two [18]. Another study examined breast cancer research in all Arab countries [19]. Two studies assessed cancer publications output in Qatar [20] and Egypt [21]. The Qatari study reported that cancer publications represented 17% out of total publications from 2000–2012, below the world average (24%) with the number of cancer publications per 1000 population increasing from nil in 2000 to 0.02% in 2012 [20]. The Egyptian study concluded that the Egyptian cancer and biomedical publications comprised 0.13% of the world's cancer publications between 1991 and 2010 [21].

The review of cancer research productivity in seven Arab countries that covered 14 years starting 2000, ending 2013, indicated that the productivity in Arab countries is lower than Europe, Japan, and the United States, which was attributed to the lower number of researchers, lack of financing, research support, networking, and difficulties in accessing reliable and valid data. Furthermore, the review highlighted the role of political unrest in hindering research output [18]. In a publication on global cancer research, none of the Arab countries were listed as contributors of at least 1% of the global cancer publications, although few low development index countries were included [22].

As far as the last cancer research publications review of Arab countries is concerned, only seven Arab countries were included that covered a 14-year period which ended in 2012. Thus, we identified cancer publications for the last decade starting 2010 and ending 2019 to include all Arab countries. We searched using Scopus, PubMed/Medline, and Google Scholar using the keywords "Arab" and "cancer" and repeated the search for each of the 22 Arab countries and "cancer."

The review that we conducted included 4541 publications confirmed that the publications almost doubled in 2019 compared to 2010, with a steady increase since 2017 (Fig. 25.1). Among the seven Arab countries included in the review by Hamadeh et al., [18] Morocco had the highest proportion of publications (40.8%),

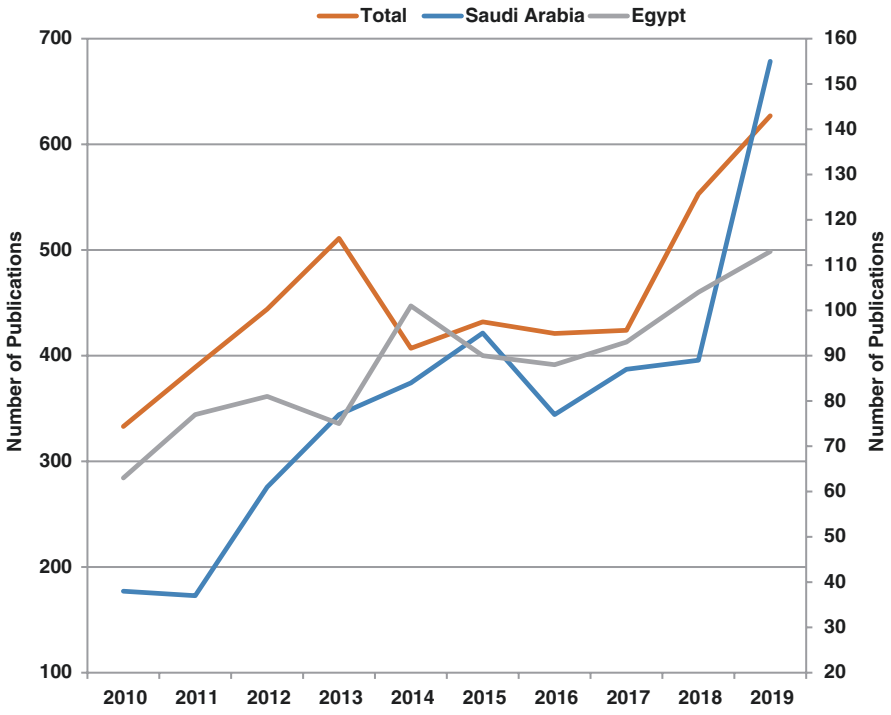

Fig. 25.1 Annual number of cancer publications in the Arab world, Egypt, and Saudi Arabia, 2010–2019

followed by Lebanon (25.3%), Kuwait (19%), Iraq (5.8%), Sudan (5.4%), Bahrain (2.1%), and Palestine (1.6%). In our review, there was a large variation between the countries where some contributed to most of the output and some hardly had any publications. Few studies included several Arab countries or were regional like those conducted in the GCC countries, Maghreb countries and the North African countries. The top five countries that had major contribution to the cancer research productivity were Egypt (19.5%), Saudi Arabia (17.6%), Morocco (11.8%), Tunisia (8.5%), and Jordan (8.2%), accounting for almost two-thirds of the cancer publications in this period excluding their contribution to regional or global studies. Egypt and Saudi Arabia had a steady rise in the number of publications in recent years in line with the increase in total publications (Fig. 25.1). However, there was a dearth in cancer publications from the Arab Sub-Saharan African countries (Comoros Islands, Djibouti, Mauritania, and Somalia). The majority (92.2%) of the publications were in English and the remaining in French (mostly from the Maghreb countries) except for one in Italian, and the other in Spanish.

25.3 Arab Cancer Regional Studies

There were several articles that included Arab or EMR countries or were regional, focusing on all cancers or specific cancers with various themes. Among those is the one by (Hamadeh et al. 2017) that examined cancer research [18], one examining mutations in hereditary breast and ovarian cancers [23], prostate cancer [24], liver cancer [25], cervical cancer [26] and colorectal cancer [27]. As for the regional, from the Maghreb, and GCC countries, among the most recent publications that included all cancers were those by Ben Abdelaziz et al. 2019, and Al-Zalabani 2020 [28, 29]. Others investigated specific cancers like cervical and breast cancers [30, 31].

25.4 Cancer Research in Arab Countries Based on Cancer Registries

Most Arab countries have Population-Based Cancer Registries (PBCR), yet they are not fully utilized for research. There is a deficiency in population-based studies that can provide incidence, prevalence, mortality, survival, and other data [13]. A recent survey by the International Agency for Research on Cancer (IARC) and the World Health Organization (WHO) Eastern Mediterranean Regional Office on PBCR in 12 Arab and one non-Arab country in the EMR showed that such data has limited availability, including mortality data [32]. During the past 10 years, most Arab countries did not utilize the PBCR to their full potential. Breast cancer was the most PBCR based researched cancer, followed by lung cancer. In contrast, Saudi Arabia had several publications based on PBCR that included all cancers and a landscape

of specific cancers [33–37]. There were several PBCR based studies from other countries during 2019 and 2020 [38–42].

25.5 Most Researched Cancers

Out of the 4541 publications, 712 articles included all cancers or were nonspecific. Of the remaining, the ten commonest cancers that were researched in the last decade were breast cancer, colorectal cancer, liver cancer, leukemia, childhood cancers, lung cancer, cervical cancer, bladder cancer, prostate cancer, and Non-Hodgkin's Lymphoma (NHL), with variable contributions (Fig. 25.2). It is gratifying to know that cancer publications in the Arab world focused on most of the commonest five cancers among males and females [13] with the exception of stomach and ovarian cancers.

It has been previously reported that breast cancer research output was low in the 1970s and 1980s and started to increase in the mid-1990s. However, it was lower than that of non-Arab countries in the region. Further, Egypt and Saudi Arabia were the major contributors to breast cancer research, and there was a sharp increase in the two countries in the decade preceding 2012 [19].

In our review, almost a quarter of the Arab cancer publications in the last decade focused on breast cancer. The top five Arab countries that contributed the most in breast cancer research during the last decade were Saudi Arabia (17.5%), Egypt (16.2%), Morocco (11.1%), Tunisia (9.6%) while Iraq and Jordan equally contributed to 7.8%. There was a variation between the countries with respect to the proportion of the country's cancer research focusing on breast cancer. Of all the cancer

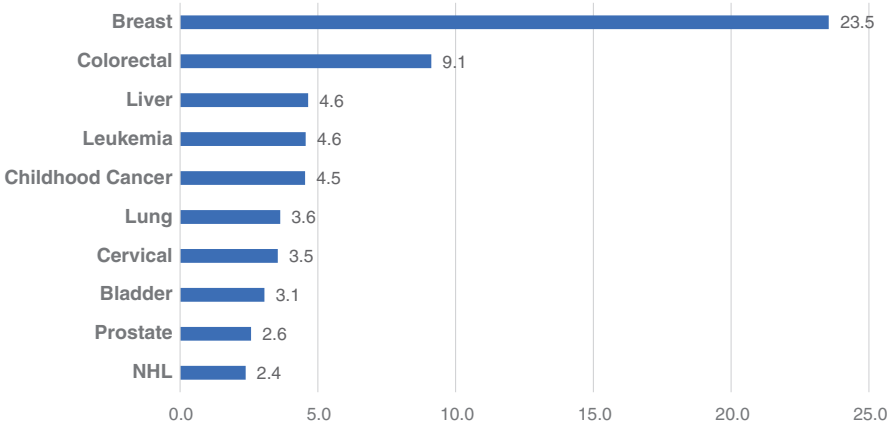

Fig. 25.2 The top ten cancers that were researched in the Arab publications, 2010–2019

research that was conducted in the country, the proportion of breast cancer articles ranged from 14.3% in Mauritania to 44.2% in Bahrain (Fig. 25.3).

The proportion of publications focusing on lung cancer was 3.6% of all the publications. Over two-thirds of the lung cancer publications were from five countries: Morocco, Tunisia, Egypt, Lebanon, and Saudi Arabia. There was a large variation between the countries by the proportion of colorectal cancer research. Saudi Arabia was the leading contributor to almost one-third (32.5%) of the research on colorectal cancer in the Arab world, followed by Egypt (14.4%), Tunisia (14%), Morocco (8.4%) and Jordan (6.5%). Out of all the prostate cancer publications in the last ten years, Saudi Arabia contributed 17.9%, Egypt, 15.4%, Jordan, 12%, Tunisia, 10%, and Algeria, 8.5%. As for liver cancer, the major contributor among the Arab states was Egypt, which provided almost three-quarters of the publications, with Saudi Arabia being next contributing 10.9%. Egypt contributed the most (44.8%) of the bladder cancer publications, followed by Tunisia (13.4%) and Morocco (9.7%). Egypt (26.1%), Lebanon (14%), Morocco (14%) and Saudi Arabia (13.5%) contributed significantly to the cancer research on leukemia. About a quarter of the articles on cervical cancer were from Saudi Arabia. Morocco (19.9%), Tunisia (14%) and Egypt (9.9%) also made high contributions. Over one-third (34.5%) of the publications on childhood cancers were from Egypt. The rest were mainly from Jordan (13.1%), Lebanon (10.2%) and Saudi Arabia (10.2%). Around half of the NHL cancer publications were from Morocco and Egypt, almost equally distributed. Tunisia and Saudi Arabia contributed 20%.

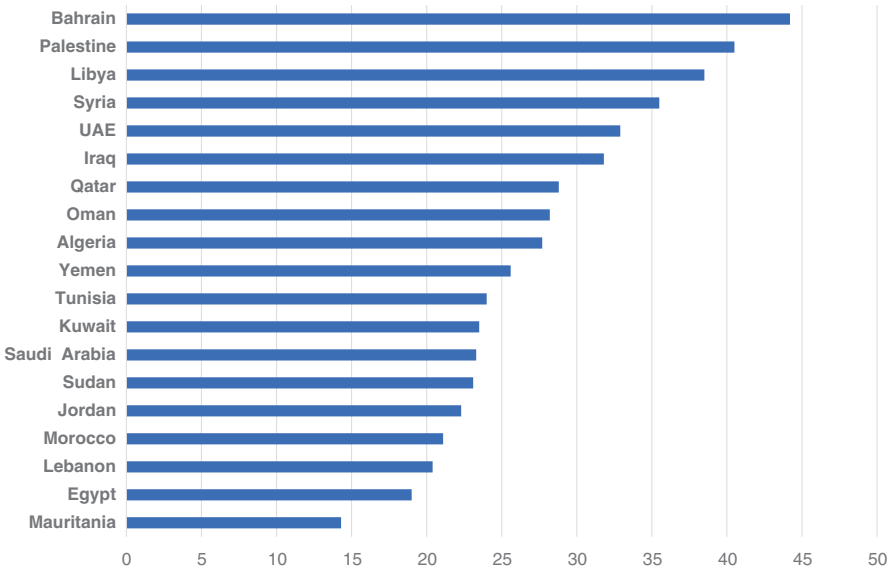

Fig. 25.3 Proportion of cancer publications allocated to breast cancer by Arab country, 2010–2019

25.6 Journals

Table 25.1 shows the top 5 ranked journals for the total cancer publications and the countries that contributed the most to the cancer research output in the Arab world during the last ten years. The Asian Pacific Journal of Cancer Prevention and the Pan African Medical Journal were the only non-Arab journals among the top 5 most popular journals for cancer publications from Arab countries. The former was also among the top 5 ranked journals in Egypt, Saudi Arabia, Morocco, Tunisia, and Jordan. It accounted with the Saudi Medical Journal for 20% of all the Saudi publications. In Morocco, 20% of the articles were published in the Pan African Medical Journal. It is worth noting that all the countries except for Morocco had a local journal amongst its top selected journal for cancer publications. The Saudi Medical Journal was reported to be the most popular journal for breast cancer research in Arab countries [19] and one of the top five in our review, contributing to 2.8% of the total breast cancer publications. In our review, the Saudi Medical Journal was second (2.5%) after The Asian Pacific Journal of Cancer Prevention (9.5%) for the breast cancer publications. The third, fourth, and fifth journals were Pan African Medical Journal (2.3%), BMC Cancer (2.1%) and PLoS ONE (1.7%), respectively.

The top 20 journals where Arab cancer research publications in the last decade were published are presented by quartile and Scimago Journal Rank (SJR) in Table 25.2. Their SJRs ranged from 0.11 to 1.627, with an average of 0.487. These top 20 journals had published 28.1% of the research manuscripts in the region in the last ten years, 40% of which were Q4 journals. There were few publications in the Q1 journals with high SJR like The Lancet, Lancet Oncology, Cancer Discovery, and Cancer Cell International, but their contribution was 0.7% only.

25.7 First Authors

Usually, the country of the first author is where the study is conducted. However, in the Arab region, there are several publications whereby first authors have affiliations from other Arab countries or even from non-Arab countries. Some of these publications as well do not have a co-author from the concerned country. There are several possible explanations for this phenomenon. In assigning the affiliation of the first author, we usually consider the first affiliation written as the primary affiliation if the author holds more than one. Moreover, on some occasions, the first author writes one of his affiliations that might not be corresponding to that of the country where the study was undertaken. In addition, there are some cases where an Arab individual is studying or working abroad and is affiliated to a university or a non-academic institution elsewhere but conducting the research in his country of residence.

Table 25.1 Percentage contribution of the top five journals of total Arab cancer publications and top five contributing countries, 2010–2019

	Total	Egypt	Saudi Arabia	Morocco	Tunisia	Jordan
1	Asian Pacific Journal of Cancer Prevention (7.5%)	Asian Pacific Journal of Cancer Prevention (6.8%)	Saudi Medical Journal (10.6%)	Pan African Medical Journal (19.9%)	Tunisie Medicale (13.3%)	Asian Pacific Journal of Cancer Prevention (11%)
2	Pan African Medical Journal (2.8%)	Journal of the Egyptian National Cancer Institute (5.2%)	Asian Pacific Journal of Cancer Prevention (9.4%)	Journal African du Cancer (3.9%)	Asian Pacific Journal of Cancer Prevention (5.5%)	Jordan Medical Journal (5.4%)
3	Saudi Medical Journal (2.5%)	Journal of Pediatric Hematology/ Oncology (1.5%)	Annals of Saudi Medicine (3.9%)	Asian Pacific Journal of Cancer Prevention (3.7%)	Bulletin du Cancer (4.3%)	Journal of Cancer Education (3.8%)
4	Tunisie Medicale (1.4%)	Egyptian Journal of Radiology and Nuclear Medicine (1.1%)	PLoS One (2.2%) Saudi Journal of Gastroenterology (2.2%)	BMC Research Notes (3.2%)	Tumor Biology (4%)	Eastern Mediterranean Health Journal (1.9%) Saudi Medical Journal (1.9%)
5	Gulf Journal of Oncology (1.2%) Journal of the Egyptian National Cancer Institute (1.2%)	Applied Immunohistochemistry and Molecular Morphology (1%) Chinese-German Journal of Clinical Oncology (1%) Medical Oncology (1%)	Journal of Cancer Education (2.1%)	BMC Cancer (1.9%) World Journal of Surgical Oncology (1.9%)	Pan African Medical Journal (3.1%)	Cancer Nursing (1.6%)

Table 25.2 The quartiles, and Scimago Journal Ranks of the 20 top journals of cancer publications of Arab countries, 2010–2019

S. No	Name of Journal	Quartile	Scimago Journal Rank
1	Asian Pacific Journal of Cancer Prevention	Q2	0.813
2	Pan African Medical Journal	Q3	0.203
3	Saudi Medical Journal	Q3	0.276
4	Gulf Journal of Oncology	Q3	0.143
5	Journal of the Egyptian National Cancer Institute	Q3	0.424
6	Tunisie Medicale	Q3	0.149
7	PLoS One	Q1	1.395
8	Journal African du Cancer	Q4	0.188
9	Journal of Cancer Education	Q2	0.525
10	BMC Cancer	Q1	1.627
11	Eastern Mediterranean Health Journal	Q2	0.328
12	Annals of Saudi Medicine	Q3	0.24
13	Kuwait Medical Journal	Q4	0.11
14	Indian Journal of Public Health Research and Development	Q4	0.105
15	Bahrain Medical Bulletin	Q3	0.135
16	Pediatric Blood and Cancer	Q1	1.505
17	Oman Medical Journal	Q2	0.309
18	Medical Oncology	Q2	0.837
19	Journal of Pediatric Hematology/Oncology	Q2	0.452
20	Bulletin du Cancer	Q3	0.297

Scimago Journal List Ranking−2019. https://www.scimagojr.com/journalrank.php

Further, there are instances where non-Arab faculty members leave the region and publish papers on the country they had worked in but with their new affiliations.

25.8 COVID 19 Pandemic and Cancer Research

Several researchers from the Arab world were active and published on cancer and COVID-19 (Coronavirus disease 2019). Since many Arab patients, including cancer patients, seek treatment abroad, a review examined the challenges that cancer patients and their families faced during the pandemic [43]. Arab researchers also studied the impact of the pandemic on the management of cancer patients [44]. Oncologists from the Gulf and Arab countries examined managing cancer patients virtually, the challenges they encountered and had a collaborative international study on a novel approach to manage cancer patients [45, 46]. Another study provided treatment guidelines for cancer patients during the pandemic [47], and one looked into screening for COVID-19 in hospitals among asymptomatic patients with cancer [48]. A study from Jordan examined the "do not resuscitate" policy

during the pandemic in the largest cancer center in Jordan [49]. Researchers from Gaza, a city with several challenges, studied the additional ones faced by cancer patients in Gaza due to COVID-19 [50].

25.9 Conclusion

The Arab countries are mostly low to middle-income countries with few considered high income. Several countries are in conflict and political turmoil that makes research funding not a priority. Further, the research enabling environment in such a situation is not optimal, and some countries face brain drain of researchers. This partly explains why Arab countries fall behind in cancer research productivity. Nevertheless, there has been a steady increase in the cancer research yield with variable contributions between countries. Breast cancer, the commonest cancer among females in the region, is given priority over other leading cancers with respect to research output. The PBCR are not used as expected to generate cancer studies. The main journals targeted by researchers in the Arab world are international journals with low ranking and local journals. There is an urgent need to examine the challenges and barriers facing researchers in Arab countries, allocate funds for cancer research and collaborate with researchers in notable institutions regionally and globally to improve the quantity and quality of cancer research. Concerted efforts should be made to narrow the knowledge gaps with respect to the less researched cancers and generate evidence. PBCR data should be made more accessible to researchers to assist in generating knowledge that contributes to cancer control and prevention.

Conflict of Interest Authors have no conflict of interest to declare.

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