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Original Article

Cancer Publications in One Year (2023): A Cross-Sectional Study

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Abstract

Introduction

Cancer is a disease where transformed cells undergo uncontrolled division and survival. The incidence of cancer and hence its burden is on the rise. This study aims to evaluate the scientific studies published on cancer in the year 2023.

Methods

A cross-sectional study included the cancer papers that were published in the year 2023. After extracting the data from the Google Scholar engine, they were all gathered and recorded in a Microsoft Excel 2010 sheet. All of the data were rigorously evaluated, calculated, and then presented as frequencies and percentages.

Results

A total of 181,189 studies published in 2023 on cancers and their different types were seen as eligible to be included in this study. Amongst them, studies on breast cancers with 31,000 studies were the most common whereas subglottic cancers with only 7 studies were the least common in that year.

Conclusion

The gap between the incidence rate of each type of cancer and the number of studies published on each type makes it harder to thoroughly grasp the nature of the disease to its utmost extent.

1. Introduction

Cancer is a disease that results in uncontrolled division and survival of the transformed cells [1]. Whenever a cell breaks the

usual restraints on cell division and starts proliferating on its own, cancer arises. The disease can develop in almost all of the different tissues of the body. Although each type of cancer has its unique features, there are a lot of similarities among them in the early processes that lead to cancer [2]. Many different characteristics have been identified that can distinguish between normal and cancer cells, such as growth or proliferation in the absence of a growth signal and growth despite the presence of a stop signal or a signal stimulating death such as apoptosis. Other features such as invasion into the surrounding tissue and the different areas of the body as well as hiding from the immune system, modulating the immune system in a way as to help cancer grow and even resulting in blood vessel growth towards the tumor are all among the common features of cancer [3]. In the majority of the cases, the uncontrolled proliferation and the evasion of the body's apoptotic mechanism are due to either the activation of an oncogene or the deactivation of a tumor suppressor gene [4]. Furthermore, accumulation of many different mutations in different genes is usually required for a cancer to develop; however, mutations in the TP53 tumor suppressor gene are known to be the most common, seen in 36.6% of cancers. Other common ones include MUC16 seen in 18.9% and CSMD3 observed in 13.7% of the cases [5]. Many have emphasized the roles of environmental carcinogens such as electromagnetic fields, ultraviolet, radioactivity, air pollution, xeno chemicals, pesticides, biocides, and certain viral families [6]. Hepatitis B virus, Hepatitis C virus, human immunodeficiency virus, human T-cell lymphotropic virus, human herpesvirus 8, Epstein-Barr virus, and human papillomavirus are all among the viruses that can induce cancers of different types [7]. The International Agency for Research on Cancer estimated 9.7 million deaths from cancer in the year 2022 alone and 20 million new cases. They also estimate that about 1 in 5 people will develop cancer in their lifetime. The number of cancers in a year is predicted to have a 77% increase from 20 million in 2022 to 35 million in 2050 [8]. As a result of the significant global burden the disease possesses and the rise in its incidence, this study was conducted to determine the number of studies published focusing on cancer and its different types.

2. Methods

2.1. Study design

A cross-sectional study was conducted on all the studies that emphasized different forms of cancer in human beings. The study took over a month to finish from January 1st, 2024 to February 15th, 2024.

2.2. Setting

Google Scholar engine was thoroughly searched to find all of the English language studies related to the topic using the following keywords; cancer OR cancers OR carcinoma OR carcinomas OR cancerous OR malignant OR malignancy OR malignancies OR malignancy. Keywords were also used for the different organs of the body such as; (brain-"intracranial"),(lung),(esophageal-"esophagus"),(liver-"hepatic"),(gastric-"stomach"),(eyes -" ocular"),(naso-sinonasal),(ear),(oral),(tongue),(small intestine –" small bowel"), (colorectal-"large intestine"-large bowel"), (pancreas-"pancreatic"), (bladder-"vesical"), (prostate-"prostatic"), (endometrial-"uterus "-" uterine"), (penile-"penis"), (testicular-"testis"), (thyroid), (adrenal), (skin-"cutaneous"), (salivary gland), (pituitary), (parathyroid), (bone marrow), (bone "skeletal"), (nasopharynx, oropharynx, hypopharynx, supraglottic, glottis, subglottic), (lymphatic system), (cervical), (ovarian), (renal-"kidney"), (breast), (vulvar-"vaginal") and (anal-"anus"). To aid the data collection, references used in the selected studies were also checked for eligibility.

2.3. Inclusion criteria

Any study published in English on cancer and its different types in the year 2023 was included.

2.4. Exclusion criteria

Pre-print articles (non-peer-reviewed) were excluded along with any non-English articles, those with only their abstract available and studies published in predatory journals. To determine whether or not a journal was predatory, Kscien's list was used [9].

2.5. Data analysis

The data extracted from Google Scholar was collected, organized, and recorded in a Microsoft Excel sheet so that it could be thoroughly re-evaluated. Data presentation was through frequencies and percentages. Descriptive analyses were performed on IBM SPSS Statistics software.

3. Results

A total of 181,189 studies from the "Google Scholar" search engine were included in this study. The most common was breast cancer with 31,100 (17.1%) studies and the least common was subglottic with 7 studies. Overall, the study emphasized on cancers of 35 different organs alongside those of the different throat compartments. As for the type of cancer, the most common one was multiple myeloma with 5460 studies, making up (3%) of the total studies and (87.4%) of the bone marrow cancers. On the other end of this spectrum, the least common cancers were lymphoma, sarcoma, carcinoid, and intensive lobular carcinoma, all with 0 publications. In the brain, medulloblastoma was the most common type with 423 studies making up 31.3% of the total brain tumor. Astrocytoma with 231 (17.1%), Ependymoma with 184 (13.6%), and Oligodendroglioma with 45 (3.3%) all came after that. Hepatocellular carcinoma was the most common by far in the liver with 80.6% of the liver cancers. In the kidney, renal cell carcinoma with 3,480 makes up 72.7% of the total 4,784 renal cancers. Other much less commonly found tumors such as Wilms tumor, Lymphoma, transitional cell, and sarcoma were also documented, amongst others (Table 1).

Table 1. Distribution of published papers in 2023 regarding the site of cancer origin and types of cancer

Cancer regarding the origin site	Number of studies	Cancer Types	N. (%)
Brain tumor	1,350	Medulloblastoma	423 (31.3%)
		Astrocytoma	231 (17.1%)
		Ependymoma	184 (13.6%)
		Oligodendroglioma	45 (3.3%)
		Others	467 (34.5%)
Lung cancer	18,700	Non-small cell carcinoma	188 (1%)
		Adenocarcinoma	213 (1.1%)
		Small cell carcinoma	272 (1.45%)
		Squamous cell carcinoma	316 (1.7%)
		Others	17711 (95%)
Esophageal cancer	3,340	Squamous cell carcinoma	1200 (36%)
		Adenocarcinoma	41 (1.2%)
		Others	2099 (62.9%)
Liver cancer	13,640	Hepatocellular carcinoma	11100 (80.6%)
		Others	2540(18.6%)
Gastric cancer	8,814	Adenocarcinoma	43 (0.5%)
		GIST	310 (3.5%)
		Lymphoma	12 (0.13%)
		Diffuse gastric tumor	1 (0.01%)
		Neuroendocrine tumor	24 (0.3%)
		Others	8424 (95.5%)
Ocular cancer	1,022	Retinoblastoma	425 (41.5%)
		Uveal melanoma	467 (45.7%)
		Squamous cell carcinoma of the conjunctiva	2 (0.2%)
		Medulloepithelioma	12 (1.2%)
		Others	116 (11.35%)
Nasal, Sinonasal cancer	341	Olfactory neuroblastoma	52 (15.2%)
		Squamous cell carcinoma	35 (10.3%)
		Melanoma	21 (6.15%)
		Lymphoma	12 (3.51%)
		Others	221 (65%)
Ear cancer	19	Basal cell carcinoma	1 (5.3%)
		Others	18 (95%)
Oral cancer	5,004	Squamous cell carcinoma	1560 (31.1%)
		Verrucous carcinoma	13 (0.26%)
		Lymphoma	2 (0.04%)
		Others	3429 (68.5%)
Tongue cancer	341	Squamous cell carcinoma	173 (50.7%)
		Others	168 (49.3%)
Small intestine cancer	52	Lymphoma	0 (04%)
		Adenocarcinoma	3 (5.8%)
		Sarcoma	0 (0%)
		Carcinoid	0 (0%)
		Others	49 (94%)

Tabe 1. Continued...

		Adenocarcinoma	617 (4.1%)
		Lymphoma	409 (2.8%)
Colorectal cancer	14,800	Neuroendocrine tumor	57 (0.385%)
		Familial colorectal cancer	13 (0.09%)
		Others	13704 (92.5%)
		Adenocarcinoma	110 (1.6%)
		Pancreatic neuroendocrine tumor	40 (0.6%)
		Colloid carcinoma	4 (0.05%)
Pancreatic cancer	6,880	Acinar cell carcinoma	21 (0.3%)
		Adenosquamous carcinoma	12 (0.17%)
		Pancreatoblastoma	4 (0.06%)
		Others	6689 (97.2%)
		Transitional cell carcinoma	19 (0.52%)
		Squamous cell carcinoma	32 (0.9%)
Bladder cancer	3,630	Adenocarcinoma	4 (0.11%)
		Others	3575 (98.5%)
		Neuroendocrine tumor	4 (0.03%)
		Adenocarcinoma	26 (0.2%)
		Squamous cell carcinoma	5 (0.03%)
Prostate cancer	13,400	Sarcoma	1 (0.007%)
		Transitional cell carcinoma	1 (0.007%)
		Others	13363 (99.7%)
		Uterine sarcoma	77 (2.6%)
		Endometroid adenocarcinoma	6 (0.2%)
		Uterine cell carcinoma	38 (1.3%)
Endometrial cancer	2,926	Squamous cell carcinoma	2 (0.06%)
		Uterine papillary carcinoma	5 (0.17%)
		Others	2798 (95.6%)
		Squamous cell carcinoma	50 (18%)
Penile carcinoma	277	Others	227 (82%)
		Seminoma	136 (52.1%)
Testicular cancer	261	Non-seminoma	1 (0.38%)
		Others	124 (47.5%)

Tabe 1. Continued...

Thyroid Cancer	4,820	Papillary	1310 (27.2%)
		Medullary	271 (5.6%)
		Anaplastic	216 (4.5%)
		Follicular	120 (2.5%)
		PTMC	1 (0.02%)
		Hurthle cell carcinoma	8 (0.1%)
		Others	2894 (60%)
Skin cancer	2,627	Melanoma	316 (12%)
		Basal cell carcinoma	28 (1.06%)
		Squamous cell carcinoma	47 (1.8%)
		Porocarcinoma	2 (0.07%)
		Others	2234 (85%)
Adrenal cancer	652	Pheochromocytoma	508 (80%)
		Neuroblastoma	2 (0.30%)
		Others	142 (33%)
Salivary gland carcinoma	465	Parotid tumor	98 (21%)
		Submandibular cancer	26 (5.6%)
		Mucoepidermoid carcinoma	119 (25.5%)
		Minor salivary gland tumor	12 (2.6%)
		Sublingual gland tumor	3 (0.6%)
		Others	258 (55.5%)
Pituitary cancer	63	None	0.034%
Parathyroid cancer	157	None	0.9%
Bone marrow cancer	6,120	Multiple myeloma	5460 (87.4%)
		AML	305 (4.88%)
		CLL	163 (2.6%)
		CML	9 (0.14%)
		ALL	7 (0.11%)
		Others	176 (2.8%)
Bone cancer	3,360	Osteosarcoma	1550 (46.1%)
		Ewing sarcoma	334 (9.9%)
		Chondrosarcoma	247 (7.35%)
		Fibrosarcoma	110 (3.27%)
		Leiomyosarcoma	4 (0.11%)
		Clear cell chondrosarcoma	5 (0.14%)
		Others	1110 (33%)

Tabe 1. Continued...

Nasopharyngeal cancer	1,350	None	0.74%
Oropharyngeal cancer	615	None	0.33%
Hypopharyngeal cancer	164	None	0.09%
Supraglottic cancer	15	None	0.008%
Glottic cancer	81	None	0.04%
Subglottic cancer	7	None	0.004%
Lymphoma	11,300	Hodgkin lymphoma	679 (6%)
		Non-Hodgkin lymphoma	418 (3.7%)
		Others	10203 (90%)
Cervical cancer	7,120	Squamous cell carcinoma	164 (2.3%)
		Adenocarcinoma	36 (0.5%)
		Small cell carcinoma	5 (0.07%)
		Others	6915 (97.1%)
Ovarian cancer	7,750	Epithelial cell tumor	637 (8.2%)
		Germ cell tumor	34 (0.4%)
		Stromal tumor	4 (0.05%)
		Others	7075 (91.3%)
Renal cancer	4,784	Renal cell carcinoma	3,480 (72.7%)
		Wilms tumor	213 (4.4%)
		Lymphoma	6 (0.125%)
		Transitional cell	1 (0.02%)
		Sarcoma	7 (0.14%)
		Others	1077 (22.5%)
Breast cancer	31,100	Ductal carcinoma	194 (0.6%)
		Inflammatory breast cancer	225 (0.7%)
		Metaplastic	96 (0.3%)
		Intensive lobular carcinoma	0 (0.0 %)
		Papillary	34 (0.1%)
		Mucinous	33 (0.1%)
		Micropapillary carcinoma	17 (0.05%)
		Apocrine carcinoma	10 (0.03%)
		Medullary carcinoma	6 (0.02%)
		Tubular carcinoma	6 (0.02%)
		Others	30479 (99%)

Tabe 1. Continued...

Vulvar cancer	234	Squamous cell	51 (21.8%)
		Verrucous carcinoma	1 (0.43%)
		Melanoma	5 (2.1%)
		Others	177 (75.6%)
Bladder cancer	3,630	Urothelial carcinoma	242 (6.67%)
		Transitional cell carcinoma	19 (0.52%)
		Squamous cell carcinoma	32 (0.88%)
		Small cell bladder carcinoma	11 (0.3%)
		Adenocarcinoma	4 (0.11%)
		Plasmacytoid	6 (0.16%)
		Micropapillary	5 (0.13%)
		Sarcomatoid	12 (0.33%)
		Others	3299 (90.8%)
Anal canal cancer	16	Squamous cell carcinoma	14 (87.5%)
		Adenocarcinoma	1 (6.25%)
		Others	1 (6.25%)
Appendiceal cancer	62	None	0.03%
Total	181,189		

GIST: Gastrointestinal Stromal Tumor, PTMC: Papillary Thyroid Microcarcinoma, AML: Acute Myeloid Leukemia, ALL: Ac Lymphocytic Leukemia, CML: Chronic Myeloid Leukemia, CLL: Chronic Lymphocytic Leukemia.

4. Discussion

Although the term "cancer" is very broad, it usually refers to the disease that occurs as a result of uncontrolled cell division and growth [10]. The disease is among the leading causes of death worldwide, responsible for approximately 10 million deaths in the year 2020 alone [11].

Broadly, cancer can be divided into benign and malignant tumors. Benign tumors are tumors that cannot metastasize, whereas malignant tumors are those that can. Cancer can also be further classified based on organ, tissue, or cell type of origin [12]. Breast cancer, it's amongst the most common types of cancer in women, making up a total of 18% of the cancers occurring in women [13,14]. Breast cancer has many types; however, invasive ductal carcinoma is the most common since it makes up 70% to 80% of all breast cancers. Other types of invasive breast carcinomas such as triple-negative breast cancer accounting for 15% of all breast cancers and inflammatory breast cancer making up 1% to 5% of all breast cancers have all been reported, but to a lesser extent [15,16]. In this study, breast cancer with 31,000 (17.1%) out of the total 181,189 studies were the most common. Within the breast cancer types, inflammatory breast cancer had the most studies published on it with 225 scientific studies emphasizing it. Furthermore, ductal carcinoma with 194 studies, metaplastic breast cancer with 96, papillary with 34, and mucinous with 33 were all among the less commonly studied types of breast cancer.

Lung cancer is the second most common cancer in men and women following prostate cancer and breast cancer, respectively. The age-standardized cumulative lifetime risk of developing cancers of the lung is 3.8% in men, nearly double that of women with 1.77% [17]. Broad classification of lung cancer divides it into either small cell lung cancer (SCLC) or non-small cell lung cancers (NSCLC). Almost 15% of lung cancers are small cell carcinomas which are highly malignant tumors with neuroendocrine features. The other 85% of lung carcinomas are of NSCLC which are further divided into squamous cell carcinoma, large cell carcinoma, and adenocarcinoma. Amongst the three, adenocarcinoma with 38.5% appears to be the most common, followed by squamous cell carcinoma at 20% and large cell carcinoma making up 2.9% [18]. In this study, squamous cell carcinoma was the type that had the most scientific studies on it with 316 research articles. Small cell carcinoma came second with 272 studies followed by adenocarcinoma with 213 studies. Concerning colorectal

cancers, it makes up 11% of all cancer diagnoses making it the third most common cancer worldwide. The rise in colorectal cancer has been associated with red meat consumption, obesity, alcohol, tobacco, and a sedentary lifestyle [19]. Adenocarcinomas, which typically originate in the mucosa of a benign mass or an adenoma, give rise to almost 90- 95% of colon tumors [20]. Within this cross-sectional study, adenocarcinomas with 617 studies were the most focused type of colon cancer. Other common ones included the likes of lymphoma with 409 studies and neuroendocrine with 57 studies.

Even though it presents drastic variations based on geography, the incidence rate of liver cancer standardized for age is 1.41 per 100,000 in the male sex whereas in females, it is 5.2 per 100,000 females. Eastern Asia with an incidence as high as 17.8 per 100,000 individuals has the highest incidence while South-Central Asia with an incidence of 3.0 per 100,000 individuals is on the other end of this spectrum [21]. Regarding the types of liver cancers, hepatocellular carcinoma, which is a cancer that arises from cells of the liver tissue, is by far the most common type [22]. Similar results were observed in this study since out of the 13,640 total liver cancers, hepatocellular carcinoma made up 11,100 (80.6%) of them. Another very common cancer in men is prostate cancer. Prostate cancer is the leading cause of death from cancer in 48 countries worldwide. Among men, it is the fifth leading cause of death due to cancer globally while also being the second most common cancer in terms of frequency of diagnosis. Although the burden of prostate cancer is expected to rise due to the growing population globally, markers such as Prostate-Specific Antigen (PSA) used for screening and early detection of cancer have been observed to decrease mortality of prostate cancer, especially in countries such as the United States, Japan, and the United Kingdom [23]. There was a total of 13,400 scientific studies on prostate cancer in the year 2023. Adenocarcinoma was the most common type with 26 studies. Other types such as neuroendocrine tumors, squamous cell carcinoma, sarcomas, and transitional cell carcinomas are also reported.

Even though they are not the most common types of tumors, cancers of the brain and the central nervous system do result in significant morbidity and mortality. The World Health Organization (WHO) has listed over 100 types of brain and central nervous system tumors, all very complex histologically [24]. For primary malignant tumors of the brain, the worldwide yearly age-standardized incidence is 3.7 for males per 100,000 individuals and 2.6 per 100,000 for females. Both for females and males, these rates tend to be higher in well-developed countries [25]. Amongst the primary malignant tumors of the brain, glioma is the most common type. Gliomas arise from the glial cells which are further subclassified into astrocytes, ependymal cells, and oligodendroglial cells. The most common type of glioma accounting for almost half of the primary brain and spinal cord tumors is astrocytoma. Accounting for 2 to 3% of brain tumors are ependymomas which arise from the ependymal cells that form the lining of the ventricular system. Others such as medulloblastoma and oligodendroglioma are also documented [26]. In this study, Medulloblastoma with 423 studies was the most common, making up (31.3%) of the total 1,350 brain tumors. After medulloblastoma came astrocytoma with 231 studies, ependymoma with 184, and oligodendroglioma with 45. Laryngeal cancers originating from the larynx are divided into supraglottic, glottis, and subglottic regions. Incidence of laryngeal cancer is estimated at around 2.76 cases annually per 100,000 individuals whereas its mortality is approximately 1.66 deaths per 100,000 individuals annually [27]. Glottic cancer is a form of laryngeal cancer that involves both the anterior and posterior commissures and the vocal cords. Although not very common, due to its anatomic location, cancer of the glottic can have significant and detrimental effects on vital functions such as breathing and swallowing [28]. Within this cross-sectional study, glottic cancer with 81 studies was the most frequently focused type of laryngeal cancer. This was based on the number of scientific studies, followed then by supraglottic with 15 and subglottic with 7.

Other less frequently occurring cancers include those of the ear. They generally start as cancers of the skin in either the ear canal or the outer ear. The majority of cancers are squamous cell carcinomas, but others such as basal small cell carcinoma, melanoma, and adenocarcinoma could also occur [29]. In 2011, the incidence of middle ear cancer in the United States was 0.18 per one million people [30]. A total of 19 scientific studies were found in the year 2023 focused on the cancers of the ear, with only 1 of them (5.3%) being basal cell carcinoma. Another very rare cancer is that of the appendix. Although some recent studies show that appendiceal cancers are becoming more common, it is still deemed a very rare cancer as it affects 1 to 2 people per one million individuals in the United States [31]. Only 62 scientific studies were conducted focusing on appendiceal cancers in the year 2023.

5. Conclusion

To better understand the risk factors of cancer, implement appropriate screening protocols, better understand the etiology of the disease, and figure out the most effective therapeutic approach, the gap between the incidence rate of each type of cancer and the number of studies published on each type should be closed.

Declarations

Conflicts of interest: The author(s) have no conflicts of interest to disclose.

Ethical approval: Not applicable.

Patient consent (participation and publication)**:** Not applicable.

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manuscript. AAQ confirmed the authenticity of the data. All authors approved the final version of the manuscript.

Use of AI: AI was not used in the drafting of the manuscript, the production of graphical elements, or the collection and analysis of data.

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