JBACHS
Journal of Basic and Clinical Health Sciences

J Basic Clin Health Sci 2023; 7: 174-180
https://doi.org/10.30621/jbachs.1284320
RESEARCH ARTICLE

ANALYSIS OF CANCERS IN A UNIVERSITY HOSPITAL EMPLOYEES BETWEEN 2006 AND 2022

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Received: 16.04.2023; **Accepted:** 07.07.2023; **Available Online Date:** 30.09.2023

Cite this article as: Celikgun S, Koc T, Ucku SR, Analysis of Cancers in a University Hospital Employees Between 2006 and 2022. J Basic Clin Health Sci 2023; 7: 174-180.

ABSTRACT

Purpose: Healthcare workers are exposed to a variety of hazardous chemicals and agents that may have long-term effects on their health. One of the health problems caused by these chemicals and agents is cancer. The aim of this descriptive study is to evaluate the cancers seen in those working in a university hospital between 01.01.2006 and 30.06.2022.
Material and Methods: All healthcare professionals diagnosed with cancer between 01.01.2006-30.06.2022 were included in this descriptive study. The age, sex, occupation, working unit, and cancer type of the patients were evaluated. Data were analyzed with the statistical program SPSS-22 (SPSS Inc., Chicago, IL, USA). Data were presented using descriptive statistics (means and standard deviations for continuous variables; numbers and percentages for categorical variables).
Results: Between 01.01.2006 and 30.06.2022, 186 people working at Sivas Cumhuriyet University were diagnosed with cancer. Forty-seven point eight percent (n = 89) of them are male; the mean age of those diagnosed with cancer is 46.0 ± 8.9 (min 22, max 62). The most common cancers are thyroid (21.5%), breast (16.7%), head and neck (9.7%), hematopoietic system (9.1%), and urinary system (8.1%) cancers. When evaluated according to occupational groups, 22.6% of them are office workers, 19.9% are academicians, 15.6% are workers, 14.0% are nurses, 10.2% are health technicians, and 8.2% are research assistants.
Conclusion: In this institution, which has 2721 personnel, approximately 12 employees are diagnosed with cancer each year. Detailed records of patients diagnosed with cancer, especially healthcare professionals, should be kept. More studies are needed in detail on behaviors related to occupational exposures and cancer risk.

Keywords: healthcare professionals, cancer, epidemiology

INTRODUCTION

According to the National Institute of Occupational Safety and Health, approximately 4-8% of all cancers worldwide are caused by exposure to carcinogens in the workplace (1). In health institutions, employees face many dangers and risks. In addition to classic dangers such as injuries resulting from workplace accidents and physical, chemical, and biological hazards, employees are also exposed to increasing risks such as shift work, stress, and violence during

patient care. Many areas in health institutions contain hazardous chemicals, biological substances, and agents that can adversely affect employees' health even after long periods. These chemicals and agents can cause many diseases in health workers, such as asthma and cancer, due to their toxic effects (2). For example, numerous studies have shown a relationship between intensive formaldehyde use and leukemia and nasopharyngeal cancer (3-5).

Cancer, which is one of the most significant public health problems of our time, is defined as structures that occur when cells divide and proliferate uncontrollably and irregularly in an organ or tissue. Like in our country, cancer-related deaths in the world come immediately after deaths caused by cardiovascular diseases (6). Approximately more than one-fifth of all deaths under the age of 70 worldwide (%21.7) are due to cancer (7). In 2020, cancer caused the deaths of about 10 million people; the most common new cancer cases that year were breast (2.26 million), lung (2.21 million), colorectal (1.93 million), prostate (1.41 million), non-melanoma skin (1.20 million), and gastric (1.09 million) cancers. The most common cancers causing death in 2020 were lung, colorectal, liver, gastric, and breast cancers (8). The cancer incidence in 2020 was found to be 190.0 per 100,000. The cancer incidence was reported as 178.1 per 100,000 for women and 206.9 per 100,000 for men. The highest cancer incidence in men was observed in Hungary at 371.0 per 100,000, and the highest cancer incidence in women was observed in Denmark at 328.3 per 100,000 (9). In Turkey, the cancer incidence was 221.0 per 100,000 in 2020. In Turkey, the most common cancers reported for men were lung, prostate, colorectal, bladder, and gastric cancers, and for women, they were breast, thyroid, colorectal, lung, and corpus uteri cancers (10). A study conducted in Sivas province reported that the most common 5 types of cancer between 2010-2019 were gastrointestinal system, lung, male genital system, thyroid, and hematopoietic system cancers (11). The cancer incidence in Sivas province was also reported at 159.0 per 100,000 (12). There are very few studies on cancer that include all employees of healthcare facilities. The studies generally involve some types of cancer that are more commonly seen in healthcare workers. Some studies have reported that cancer rates among healthcare workers are higher than expected (13). Although there is no study that includes all employees in healthcare facilities in our country, there are studies that examine the incidence of cancer in certain occupational groups and the awareness levels of employees in healthcare facilities (14-15).

The aim of this study is to evaluate the cancers seen in those who worked in Sivas Cumhuriyet University Practice and Research Hospital, which provides tertiary health care in Sivas, between 01.01.2006 and 30.06.2022.

MATERIAL AND METHODS

The universe of the descriptive research consists of individuals who worked at Sivas Cumhuriyet University Application and Research Hospital and were diagnosed with cancer between 01.01.2006-30.06.2022. Sivas Cumhuriyet University Application and Research Hospital is an institution that includes 5 different hospitals and has a total capacity of 1081 beds. As of 2022 data, there are 2721 employees in this institution, including 179 academic staff, 308 research assistants, 1051 administrative staff, and 1083 healthcare personnel (727 nurses). Fifty point three per cent (n=1366) of the employees are women. In the study, no sample selection was made, and individuals who worked in the institution during the specified periods and were diagnosed with cancer during their employment were included in the study. Data on individuals diagnosed with cancer among institution employees were obtained from the hospital directorate after obtaining ethics committee approval. Ethical approval was obtained from Sivas Cumhuriyet University, Non-interventional clinical research ethics committee (21.09.2022-09/03). The variables of the study are the age of the patient (age 22–31, 42–51, 52, and above), gender, occupation (academic staff, research assistants, nurses, health technicians, office staff, workers, and others), the unit they work in (office, surgical sciences, internal medicine, basic sciences, laboratories, radiology, and others), and the topographic classification of cancer (16).

The data were analyzed using the SPSS-22 (SPSS Inc., Chicago, IL, USA) statistical program and presented with descriptive statistics. Quantitative data were presented as means and standard deviations (minimum-maximum values), whereas qualitative data were presented as numbers and a percentages.

RESULTS

Cancer was diagnosed in 186 individuals who worked at Sivas Cumhuriyet University Hospital between 01.01.2006 and 30.06.2022. Of these, 52.2% (n = 97)

Table 1. Distribution of cancer cases by gender and age

Gender	n	%
Women	97	52.2
Men	89	47.8
Age group		
22-31	13	7.0
32-41	42	22.6
42-51	67	36.0
52 and older	64	34.4

Table 2. Distribution of cancer type according to occupation and gender

Occupation	The most common type of cancer	n	%
Office worker (n=42)	Thyroid	18	42.9
Academic staff (n=37)	Breast	13	35.1
Worker (n=29)	Thyroid	5	17.3
Nurse (n=26)	Breast	9	34.6
Health Technician (n=19)	Thyroid	5	26.3
Research assistant (n=16)	Thyroid	6	37.5
Other (n=17)	Thyroid	4	23.5

were women. The average age of those diagnosed with cancer is 46.0±8.9 (min 22, max 62). When examined by age groups, the majority of patients, 36.0%, are in the 42-51 age range (Table 1). When the distribution is examined by profession, office workers come first with 22.5% (Figure 1).

When the distribution of occupations by unit of employment was examined, it was discovered that clerical work was the most common, accounting for 23.1% of all occupations (Figure 2).

The 5 most common cancer types were thyroid (n=40), breast (n=31), head and neck (n=18), hematopoietic system (n=17), and urinary system (n=15) cancers (Figure 3). Other types of cancer were those of the colorectal, female genital tract, skin, lung, male genital tract, brain, soft tissue, stomach and liver.

The five most common cancer types in men were thyroid (n=17), head and neck (n=15), hematopoietic system (n=11), lung (n=10) and colorectal (n=10) cancers (Figure 3). In addition to these, cancers of the male genital system, urinary system, skin, soft tissue, and brain were observed. The five most common cancers in women were breast (n=29) thyroid (n=23), female genital system (FGS) (n=12), urinary system (n=8) and skin (n=7) (Figure 3). Other cancers seen in women are cancers of the hematopoietic system, colorectal, head and neck, brain, and soft tissue.

Thyroid cancer was the most commonly diagnosed cancer in office workers, worker, health technicians and research assistants. Breast cancer ranks first among academics and nurses (Table 2).

DISCUSSION

In this study, cancers seen in third-level healthcare institution employees over a period of approximately seventeen years were examined.It was found that approximately 12 healthcare workers were diagnosed with cancer annually. More than half of the cases were women, about a quarter were office worker. Thyroid cancer was the most common cancer. Thyroid cancer was, also, the most common cancer in men. In women, the most common cancer was breast cancer.

In a study investigating cancers seen in physicians working at a single center in Korea, as in this study, it

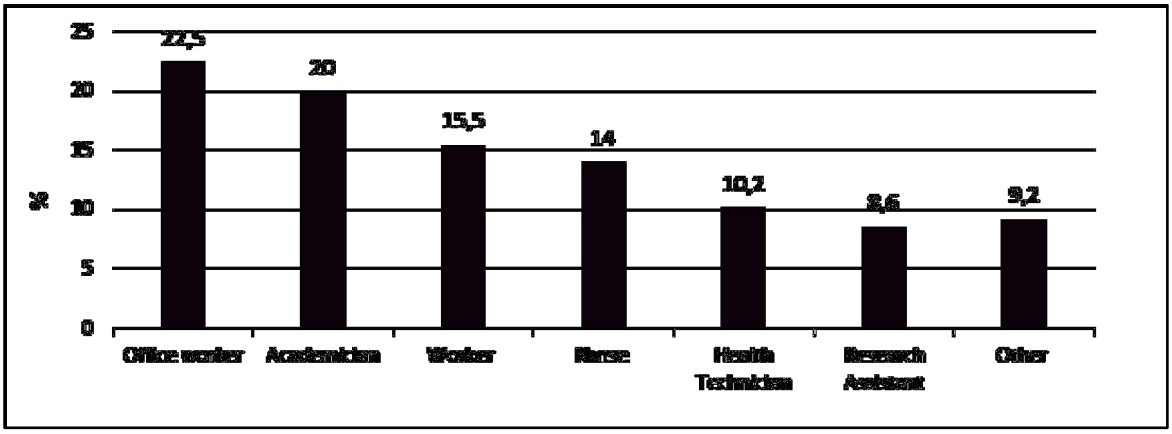

Figure 1. Distribution of cancer cases by occupation

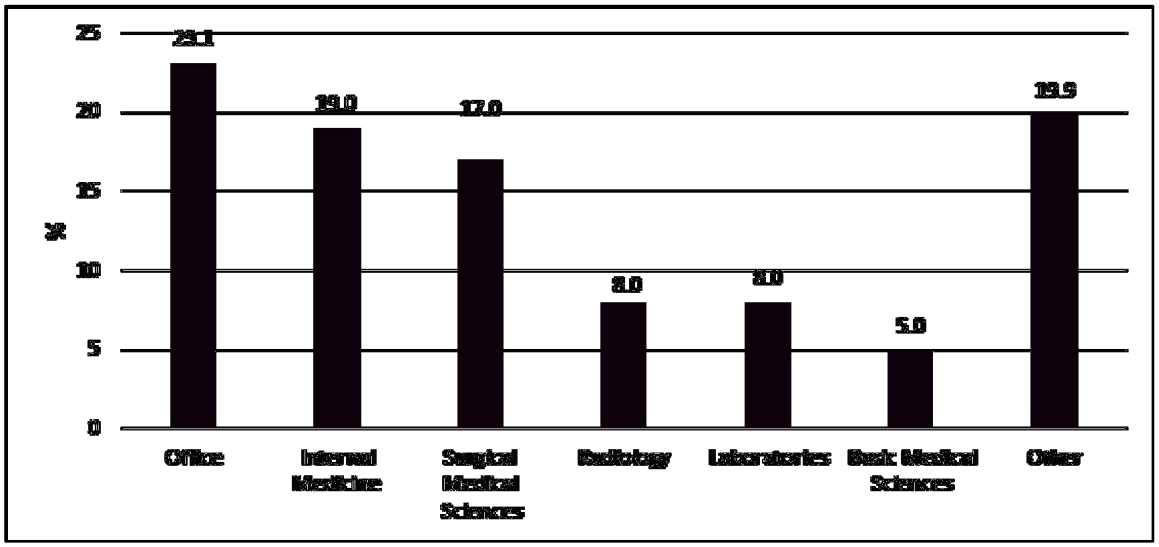

Figure 2. Cancer case distribution according to the units worked

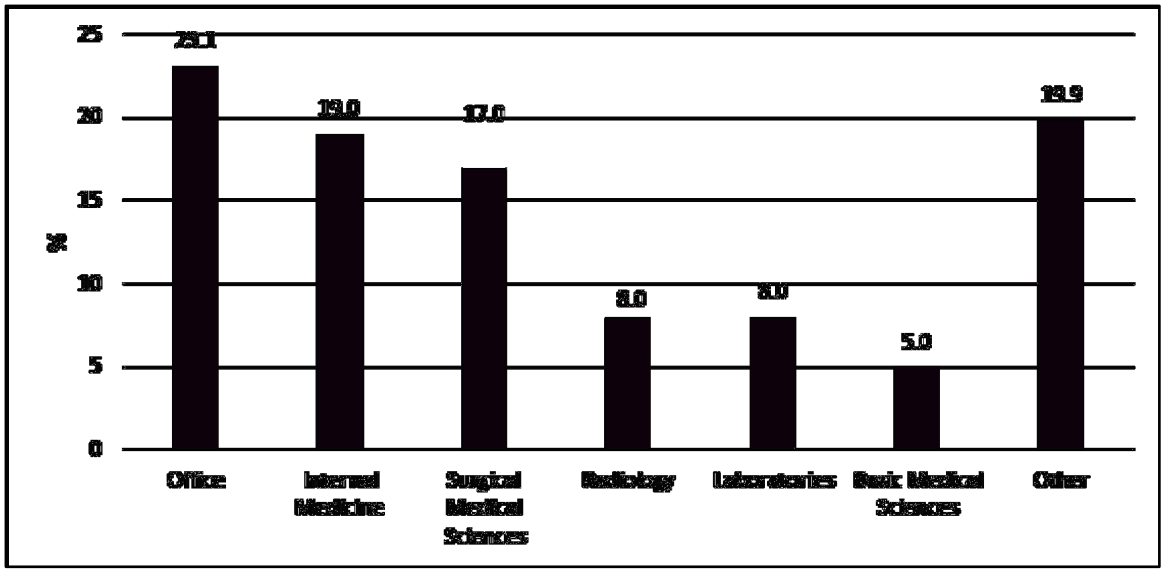

Figure 3. Figure 3. Distribution of cases according to gender and topograpfic classification of cancer

was higher (17). In the study, breast cancer was identified as the most common cancer in all women included in the study, as well as in nurse and academic women. In a study conducted on female healthcare workers in Taiwan, it was reported that 35 cancer cases were seen in 14 years in the healthcare institution. Breast cancer was the most common cancer among healthcare workers (18). In studies conducted in Taiwan and Denmark, breast cancer is the most common cancer among nurses (19-21). Breast cancer, which is the most common cancer in women in many countries worldwide, is responsible for 14% of cancer-related deaths (22). In epidemiological studies, it has been reported that many factors, such as gender, age, ethnicity, breast cancer history, breastfeeding, hormone replacement therapy, oral contraceptive use, breast diseases, and excessive weight, are effective in the formation of breast cancer (23). In addition, the active participation of women in the workforce and the chemicals and environmental factors used in workplaces play an important role in the development of cancer. Especially in nurses working in the health-care, breast cancer increases due to working conditions (shift work disrupting circadian rhythm, exposure to biological agents and chemicals). In some studies, it has been reported that radiation technicians and technologists, who work in close proximity to radiation sources, are more likely to develop breast cancer than the general population. It has been reported that working at night, exposure to ionizing radiation, and the use of certain chemicals increase the risk of breast cancer, as well as in other cases (24-26).

In this study, it was determined that approximately one out of every ten cancer cases involved a radiology worker. It has been reported that the risk of cancer in radiology technicians has decreased in recent years with the reduction of radiation levels used in imaging. However, some studies have shown that the use of fluoroscopy in many areas increases the risk of breast cancer in female orthopedic surgeons and cardiologists due to radiation exposure (24,27,28). In a study conducted in the United States, it was reported that female orthopedic, urology, and plastic surgeons are at a higher risk of developing any type of cancer, particularly breast cancer, compared to the female population in the country, as fluoroscopy is most commonly used by orthopedic specialists (29). Many risk factors that play a role in breast cancer etiology were also examined in this study. It was shown that female surgeons with a normal body mass index who use birth control pills less and smoke less are at less risk of breast cancer than the general population. Additionally, it was reported that female surgeons have a higher frequency of risk factors that increase the risk of cancer, such as having fewer children, an advanced age at first childbirth and breastfeeding, more frequent alcohol consumption, and a longer duration of hormone replacement therapy. In the study, all of these factors were evaluated, and it was reported that the higher incidence of breast cancer in female surgeons could be explained by exposure to ionizing radiation during intensive work with fluoroscopy (29).

In this study, thyroid cancer was found to be the most common cancer, both overall and in men. The medical records of 382 physicians in a healthcare institution in Korea were screened, and 30 physicians were diagnosed with cancer. It was reported that thyroid cancer is the most common cancer in women, while gastric cancer is the most common cancer in men (17). However, in this study, female academic doctors were found to have breast cancer as the most common cancer, while head and neck cancer were the most common cancers in men.

In this study, the most common cancers among healthcare workers were thyroid, breast, head and neck, hematopoietic system, and urinary system cancers. According to the Globocan 2020 Turkey data, the most common cancers in Turkey are lung, breast, colorectal, prostate, and thyroid cancers (30). Similarly, in a study conducted in Sivas province, the most common cancers were reported to be gastrointestinal system cancers, lung, breast, male genital system, and thyroid cancers (11). The most common cancers among male health workers in the study are thyroid, head-neck, hematopoietic system, lung and colorectal cancers. According to the Globocan 2020 Turkey data, the most common cancers among men in Turkey are lung, prostate, colorectal, bladder, and gastric cancers (30). In a study conducted in Sivas province, the most common cancers among men are gastrointestinal system cancers, and prostate, lung, bladder, and hematopoietic system cancers (11). The ranking of cancer types in male health workers differs from these data. In this study, the most common cancers among female health workers are breast, thyroid, female genital system, urinary system, and skin cancers. According to the Globocan 2020 Turkey data, the most common cancers among women are

breast, thyroid, colorectal, lung, and corpus uteri cancers (30). In the study conducted in Sivas province, the most common cancers are breast, thyroid, gastrointestinal, female genital, and hematopoietic (11).

Although some of the data obtained in this study seem to be consistent with the Globocan data and Sivas Province data, differences in the types of cancer observed are noted due to the population included in the study being predominantly young, being healthy-worker, having regular socioeconomic income, having easier access to screening, diagnosis, and treatment, having higher cancer awareness levels, as well as the risks encountered in working conditions and the environment.

The fact that the research was conducted in a single center and that insufficient information was obtained for patients with cancer diagnoses who work in health institutions are the limitations of the study. However, the scarcity of similar studies conducted in this field worldwide and in our country, the long duration of the study period, and the high number of patients included constitute the strengths of the study.

CONCLUSION

As a result, thyroid, breast, head-neck, hematopoietic system, and urinary system cancers bare found to be the most common cancers in the study. Units considered risky in terms of cancer should be regularly inspected and examined for occupational health. Cancer records of patients diagnosed with cancer, including health workers, should be kept more comprehensively, including the units they work in and the duration of their work. Early diagnosis and screening tests arecrucial in the fight against cancer, also in healthcare workers. Therefore, active participation in screening tests should be ensured, especially by healthcare workers, and barriers to access should be removed

Acknowledgement: None.

Author contribution: To construct an idea or hypothesis for research and/or manuscript (SC, TK, RU), To design and plan the method to achieve the results (SC, RU), To organize the execution of the study, observe the progress and take responsibility (RU), To take responsibility for biological materials and referred patients (SC, TK), To take responsibility for matters such as followup of patients, collection of relevant biological materials, regulation and reporting of data, etc. (SC, TK, RU), To take responsibility for the evaluation and conclusion of findings (SC, RU), To take responsibility for literature review (SC, TK, RU), To take responsibility for the writing of the entire work or its noticable parts (SC, TK, RU), To re-evaluate the study in the scientific sense, regardless of language and literary corrections, prior to the delivery of the manuscript (SC, TK, RU).

Conflict of interests: The authors have deciphered the conflict of interest between the authors, which may affect the work reported in this article. They declare that they have no competing financial interests or personal relationships.

Ethical approval: Ethical approval was obtained from Sivas Cumhuriyet University, Non-interventional clinical research ethics committee (21.09.2022-09/03).

Funding: No financing sources were used in this study.

Peer-review: Externally peer-reviewed.

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