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Distribution of Patients Who Underwent Oncological FDG PET/CT Imaging in the Nuclear Medicine Unit of a Tertiary Care Hospital According to Cancer Type

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ABSTRACT

This study aimed to investigate the distribution of oncology patients who underwent positron emission tomography-computed tomography (PET/CT) imaging using 2-[18F]-Fluoro-2-deoxy-D-glucose (FDG) radiopharmaceutical, according to cancer type.

Our study included 2595 (F/M: 1367/1228) patients who were referred to our Nuclear Medicine department for oncological FDG PET/CT imaging in 2023. Patients are divided into groups according to their cancer type. The frequency of imaging number according to cancer types was obtained by proportioning the number of imaging types of cancer in each group to the total number of imaging.

The most common cancer type in FDG PET/CT imaging performed in our department is breast cancer (20.5%). The frequency of imaging for malignancies originating from the lung, stomach and esophagus was calculated as 19.6%, 10.5% and 7.6%. Oncological FDG PET/CT imaging performed for these four organs constitutes 58.2% of the FDG PET/CT imaging performed in our department.

When the distribution of cancer types in our country is evaluated, lung and breast cancers are the most common cancers. It is known that stomach and esophageal cancers are less common and come after colorectal cancers. However, considering the number of imaging studies for esophageal and stomach malignancies in our patients referred to our unit, the incidences of these cancers in our region are higher than in the whole country.

Keywords: Fluorodeoxyglucose, cancer type, statistics

Introduction

Disability Adjusted Life Years (DALY) is measured as one year of healthy life lost. It is a parameter that includes the years that have passed since the disability occurred and the time lost due to deaths at an early age. (1). When DALY data calculated according to diseases in the report prepared by the World Health Organization in 2016 is examined, it is seen that cancers constitute the greatest burden worldwide in both men and women, followed by ischemic heart disease and stroke. Among the causes of death, it is right after ischemic heart diseases. (2). While it is estimated that 18 million people were diagnosed with cancer in 2018, it is predicted that this number will increase to 30 million by 2040. (3). It is an undeniable fact that cancer is a public health problem in our country, as in all societies, and that it shortens life expectancy and reduces its quality. By obtaining detailed and accurate information about cancer epidemiology, basic information about the possible causes of cancer and population trends can be obtained. In this way, effective policies can be developed for the prevention, screening and diagnosis of the disease and appropriate health service programs can be created. (4). The frequency of cancer types may vary between countries and even in different regions within the same country. Knowing the types of cancer that are common in the relevant region will enable health policies and programs to be determined target-oriented and preventive and therapeutic steps to be taken more effectively. Imaging methods are an integral part of the diagnosis, treatment response and follow-up stages of cancers. The frequency of imaging performed in the relevant region according to the type of cancer is a parameter that can partially reflect the frequency of the type of cancer in that region. For example, if the frequency of lung and stomach cancer is high in a region, the ratio of the

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number of lung and stomach cancer cases that will apply for imaging to the number of other cancer imaging is expected to be high. 2-[18F]-Fluoro-2-deoxy-D-glucose (FDG) Positron emission tomography/Computed tomography (PET/CT), a nuclear medicine imaging technique, is a frequently used imaging method in the diagnosis, treatment response and follow-up stages of cancer patients. Our aim in this study is to analyze the number of FDG PET/CT images obtained in our unit within a year according to cancer type, to determine which types of cancer are more common in our region and thus to contribute to epidemiological studies.

Material and Methods

A total of 2595 patients who were referred to our Nuclear medicine unit for oncological FDG PET/CT imaging between January 2023 and December 2023 were included in this study. While 1367 (52.7%) of the patients were female, 1228 (47.3%) were male. ICD (International Classification of Diseases) codes for cancer types are included in the patients' FDG PET/CT imaging reports. Using these codes, reports were classified according to cancer type.

Statistical analysis: Microsoft Excel program was used for data recording and analysis. By proportioning the number of studies on cancer type in each group to the total number of studies, the frequency of imaging numbers according to cancer types was obtained.

Results

The most frequently imaged cancer type in FDG PET/CT imaging performed in our unit is breast cancer (20.5%). The frequency of imaging for malignancies originating from the lung, stomach, and esophagus was calculated as approximately 19.6%, 10.5%, and 7.6%, respectively. Oncological FDG PET/CT imaging performed for malignancies originating from these organs constitute 58.2% of the FDG PET/CT imaging performed in our unit. The female (F)/male (M) ratio was calculated as 28,3%/71,7% in lung cancer; 98,5%/1,5% in breast cancer; 38,2%/61,8% in stomach cancer and 46,8%/53,2% in esophageal cancer. Of the imaging performed on female patients, 39% were breast, 10% were lung, 7% were stomach, 7% were esophageal, 7% were lymphomas, 6% were colorectal, 10% were genital system cancers, and 14% were other less common cancers. In male patients, 30% of the imaging studies were lung, 13% stomach, 12% colorectal, 8% esophageal malignancies, 8% lymphomas and 29% other cancers. The frequency of all FDG PET/CT imaging performed in our unit in 2023 according to cancer is shown in Table 1.

Discussion

When the list of the most frequently diagnosed cancers published by the World Health Organization (WHO) in 2018 is examined, the ranking is lung, breast, prostate, colon, stomach, liver, rectum, esophagus, cervix uteri, thyroid, bladder, NHL, pancreas, leukemia and kidney cancer. It is seen that lung and breast cancer cases diagnosed in 2018 are very close to each other, with lung cancer taking the first place by a very small margin. (3). Similar findings are observed in Global Cancer Observatory 2022 data. According to these data, the frequency of cancer in both sexes is lung, breast, colorectal, prostate and stomach cancer, respectively. In the same data, the order in male is lung, prostate, colorectal, stomach and liver, while in female it is breast, lung, colorectal, cervix uteri and thyroid cancer (5). When the most common cancer types were examined in our study, similar results were obtained for the first two places. The number of studies on breast cancer is slightly higher than that on lung cancer. Stomach and esophageal cancers are the most common cancers we encounter in our unit after lung and breast cancer, and it can be said that stomach and esophageal cancers stand out compared to the world average. However, the weaknesses of our study include the presence of duplicate images, the fact that prostate cancer is not included in the FDG PET/CT imaging indication, and the fact that FDG PET/CT is not the first choice during staging in some cancer types. For this reason, it would be more accurate to accept the findings obtained in the study as a reflection of epidemiological cancer data rather than direct information. In our study, the most common cancer types in male patients were lung, stomach, colorectal and esophageal malignancies and lymphomas, respectively. In WHO data (2018), the ranking is made up of lung, prostate, stomach, liver, colon, rectum and esophageal cancers. Excluding prostate cancer, it is observed that stomach cancer is in a similar ranking, while it is noteworthy that esophageal cancer is at the forefront in our region. While breast, lung, cervix uteri, colon and thyroid cancers constitute the top five cancers in the WHO data (2018) for female

Table 1: Frequency of FDG PET/CT Imaging According to Cancers

Cancer type	(%)	Cancer type	(%)
breast	20.534	bladder	1.015
lung	19.566	thyroid	0.864
stomach	10.530	endometrium	0.827
esophagus	7.559	nasopharynx	0.601
NHL	4.776	mesothelioma	0.601
rectum	4.625	uterus	0.413
colon	3.723	testis	0.338
HL	2.283	mediastinal mass	0.902
over	3.008	leukemia	0.3
kidney	2.294	PNS	0.3
pancreas	1.880	Brain mass	0.263
sarcoma	1.880	NET:	0.188
melanoma	1.391	small intestine	0.188
cervix	1.128	LHH	0.15
unknown origin	1.692	anus	0.15
myeloma	1.203	Adrenal mass	0.15
MTS	0.940	hypopharynx	0.112
NMSC	0.940	vulva	0.112
larynx	1.090		

HL:Hodgkin's Lymphoma, NHL: Non-Hodgkin's Lymphoma, PNS: Paraneoplastic Syndrome, LHH: Langerhans' Cell Histiocytosis, NET: Neuroendocrine Tumor, MTS: Mouth-Tongue-Salivary gland, NMSC: Non-Melanoma Skin Cancers

patients, in our study, breast, lung, stomach, esophageal malignancies and lymphomas are in the top five. Stomach and esophageal cancers are common cancers in our region, both in male and female patients. When the 2018 data of our country is examined, lung, prostate, colorectal, bladder, stomach and bladder cancers are the top cancers in men. (6). When compared with the data from our study, it is seen that stomach and esophageal cancers are more common than in our country. In 2018 data from our country, breast, thyroid, colorectal, lung, uterus and stomach cancers are seen in female patients. In the data of our study, we see a ranking as breast, lung, stomach and esophageal cancers. While stomach and esophageal cancers are seen to be above the average in our country, it is also noteworthy that lung cancer is also prominent. According to the data obtained, stomach and esophageal cancer rates in our region are above both the world and our country's statistics. Another prominent finding is that while the M/F ratio in esophageal cancer was 2.32 in the WHO 2018 data and 1.47 in Turkey 2018 data, the M/F ratio was calculated as 1.14 in our study. It can be said that esophageal cancer in our region, especially in female patients, is above the world and national average. In a study investigating the cancer distribution in the Van province and its basin with histopathological data, the five most common malignant tumors in women were esophagus, stomach, breast, skin and thyroid, while in men they were stomach, skin, bladder, esophagus and lung. (7). In the same study, the five most common malignant tumors were determined to be stomach, esophagus, skin, bladder and lung, respectively. In another study investigating the cancer distribution in the Van province and its basin, the five most common cancer types were listed as stomach, esophageal, breast, colorectal and lung cancer, respectively. In the same study, when evaluated according to gender, the five most common cancer types were breast, stomach, esophagus, colorectal and ovarian cancers in women, while stomach, esophagus, lung, colorectal cancers and lymphoma were found in men. (8). In a study conducted in 2010, it was determined that in Van province and its basin, the top three cancers in men were stomach, esophagus and lung cancers; and in women, the top three cancers were esophagus, breast and stomach cancers. (9). The data from these studies and the data we obtained in our own study show that stomach and esophageal cancers are a public health problem for the people of the region. In a

study investigating the risk factors for esophageal and stomach cancers in our region, hot tea, bread cooked by burning animal manure, fish preserved by salting, and high-salt local herbed cheese consumption are factors that increase the risk of cancer because they increase the amount of nitrate and nitrite that enter the body and have a carcinogenic effect (10). The weaknesses of the study are that repeated imaging studies were performed on the same patient throughout the year and that there were some patient groups that did not receive a histopathological diagnosis, such as solitary pulmonary nodules. In addition, since FDG PET imaging is not a primary examination in some types of cancer, such as prostate cancer and thyroid cancer, it should be noted that the statistics for these cancers do not reflect the actual number of patients.

When we examine the distribution of cancer in our country, we see that lung and breast cancer are at the top of the list. It is known that stomach and esophageal cancers are less common and come after colorectal cancers. However, considering the number of imaging studies for esophageal and stomach malignancies in patients referred to our unit, it can be said that these two types of cancer are above the national average for Van province and its basin.

Declarations

Ethics aproval Ethics commission approval was received for the study (decision no:2024/10-19)

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