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EPIDEMIOLOGICAL ANALYSIS OF AGE, SEX, AND REGIONAL CHARACTERISTICS OF BONE AND CARTILAGE SARCOMAS IN THE FERGHANA VALLEY

Khasanov A.I.[1] , Karimov O.M.[2,3]
[1]Republican Specialized Scientific and Practical Medical Center of Oncology and Radiology,[2]Ferghana Branch of the Republican Specialized Scientific and Practical Medical Center of Oncology and Radiology, [3]Ferghana Medical Institute of Public Health, Ferghana, Uzbekistan

nargizaxonsotqinova95@gmail.com, akbarkhasanov@mail.ru

FARG‘ONA VODIYSIDA SUYAK VA TOG‘AY SARKOMALARINING YOSH, JINS VA HUDUDIY XUSUSIYATLARINING EPIDEMIOLOGIK TAHLILI

Xasanov A.I.[1], Karimov O.M.[2,3]
[1]Respublika ixtisoslashtirilgan onkologiya va radiologiya ilmiy-amaliy tibbiyot markazi, [2]Respublika ixtisoslashtirilgan onkologiya va radiologiya ilmiy-amaliy tibbiyot markazi Farg’ona filiali, [3]Farg’ona jamoat salomatligi tibbiyot institute, Farg’ona, O’zbekiston

nargizaxonsotqinova95@gmail.com, akbarkhasanov@mail.ru

ЭПИДЕМИОЛОГИЧЕСКИЙ АНАЛИЗ ВОЗРАСТНЫХ, ПОЛОВЫХ И ТЕРРИТОРИАЛЬНЫХ ОСОБЕННОСТЕЙ САРКОМ КОСТЕЙ И ХРЯЩЕЙ В ФЕРГАНСКОЙ ДОЛИНЕ

Хасанов А.И.[2] , Каримов О.М.[1,3]
[1]Республиканский специализированный научно-практический медицинский центр онкологии и радиологии, [2]Ферганский филиал Республиканского специализированного научно-практического медицинского центра онкологии и радиологии, [3]Ферганский медицинский институт общественного здоровья, Фергана, Узбекистан.

nargizaxonsotqinova95@gmail.com, akbarkhasanov@mail.ru

Abstract

Background. Bone sarcomas are rare malignant tumors that are clinically significant because of their disease course and prognosis. Studying their epidemiological characteristics, including distribution by age, sex, and place of residence, is important for identifying regional patterns and improving oncological care. A comprehensive analysis of long-term trends and the demographic characteristics of patients with sarcomas in the Ferghana Valley is an important research priority. **Objective.** To conduct an epidemiological analysis of the distribution of patients with bone sarcomas in the Ferghana Valley by age, sex, and place of residence during 2018–2025, and to identify the main characteristics of disease incidence trends. **Materials and Methods.** The study was designed as a retrospective epidemiological analysis. The study

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materials comprised medical records and oncology registry data for patients diagnosed with bone sarcomas in the Ferghana, Andijan, and Namangan regions during 2018–2025. Patients were analyzed according to age, sex, place of residence, and year of diagnosis. Data were expressed as absolute numbers and percentages. Differences between groups were planned to be assessed using Pearson's chi-square test or Fisher's exact test, where appropriate. The statistical significance level was set at p=0.05. **Results.** According to the available data on bone and soft tissue sarcomas in the Ferghana Valley during 2018–2025, incidence rates showed fluctuations over time. The highest reported rate was 0.96‰ in 2019, while the lowest was 0.70‰ in 2024. In 2025, the rate increased to 0.77‰. A total of 715 patients were analyzed, including 417 males (58.3%) and 298 females (41.7%). The proportion of rural residents ranged from 67% to 77% during the observation period and reached 75% in 2025. The mean age of patients decreased from 51.0 years in 2020 to 42.1 years in 2025. These findings indicate differences in the age, sex, and residential distribution of the patients studied. **Conclusion.** The incidence trends of bone and soft tissue sarcomas in the Ferghana Valley during 2018–2025 were not uniform. Males and rural residents accounted for higher proportions of the analyzed patients. A decline in the mean age of patients was also observed in the later years of the study period. These findings highlight the need to improve regional epidemiological surveillance, calculate age- and sex-standardized indicators, and further assess the completeness of disease detection and registration.

Keywords: bone sarcoma, soft tissue sarcoma, epidemiology, Ferghana Valley, age distribution, sex distribution, rural population, incidence trends, retrospective analysis.

Annotatsiya

Dolzarbligi. Suyak sarkomalari kam uchraydigan, ammo klinik kechishi va prognozi bilan ahamiyatli bo‘lgan xavfli o‘smalar guruhiga kiradi. Ularning epidemiologik xususiyatlarini, jumladan, yosh, jins va yashash hududiga ko‘ra taqsimlanishini o‘rganish kasallikning hududiy xususiyatlarini aniqlash va onkologik yordamni takomillashtirish uchun muhimdir. Farg‘ona vodiysida suyak sarkomalarining ko‘p yillik dinamikasi va bemorlarning demografik tarkibini kompleks tahlil qilish ushbu yo‘nalishdagi dolzarb vazifalardan biridir. **Tadqiqot maqsadi.** 2018–2025-yillarda Farg‘ona vodiysida suyak sarkomalari bilan kasallangan bemorlarning yosh, jins va yashash hududiga ko‘ra taqsimlanishini epidemiologik jihatdan tahlil qilish hamda kasallanish dinamikasining asosiy xususiyatlarini aniqlash. **Material va metodlar.** Tadqiqot retrospektiv epidemiologik tahlil shaklida rejalashtirildi. Tadqiqot materiallarini 2018–2025-yillarda Farg‘ona, Andijon va Namangan viloyatlarida suyak sarkomalari bilan kasallangan bemorlarning tibbiy hujjatlari va onkologik registr ma’lumotlari tashkil etdi. Bemorlarning yoshi, jinsi, yashash hududi va kasallik qayd etilgan yillar bo‘yicha taqsimoti o‘rganildi. Ma’lumotlar mutlaq sonlar va foizlarda ifodalandi. Guruhlar o‘rtasidagi farqlarni baholash uchun Pearsonning χ^2 mezoni yoki zarur hollarda Fisherning aniq mezonidan foydalanish ko‘zda tutildi. Statistik ahamiyatlilik darajasi p=0,05 etib belgilandi. **Natijalar.** 2018–2025-yillarda Farg‘ona vodiysida suyak va yumshoq to‘qima sarkomalari bo‘yicha keltirilgan ma’lumotlarda kasallanish intensivligi o‘zgaruvchan dinamikaga ega bo‘ldi: eng yuqori ko‘rsatkich 2019-yilda 0,96‰, eng past ko‘rsatkich esa 2024-yilda 0,70‰ ni tashkil etdi. 2025-yilda ko‘rsatkich 0,77‰ gacha ko‘tarildi. Jami 715 nafar bemor tahlil qilinib, ularning 417 nafari (58,3%) erkaklar, 298 nafari (41,7%) ayollar ekanligi qayd etildi. Bemorlar orasida qishloq aholisi ulushi kuzatuv davrida 67–77% oralig‘ida bo‘lib, 2025-yilda 75% ni

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tashkil etdi. Bemorlarning o‘rtacha yoshi 2020-yildagi 51,0 yoshdan 2025-yilda 42,1 yoshgacha pasaydi. Ushbu natijalar o‘rganilgan bemorlar guruhida jinsiy, yosh va hududiy taqsimot xususiyatlari mavjudligini ko‘rsatdi. **Xulosa.** Farg‘ona vodiysida 2018–2025-yillarda suyak va to‘qima sarkomalari bilan kasallanish dinamikasi bir tekis bo‘lmagan. Tahlil qilingan bemorlar orasida erkaklar va qishloq aholisi ulushi yuqori bo‘lgan, shuningdek, so‘nggi yillarda bemorlarning o‘rtacha yoshida pasayish kuzatilgan. Olingan natijalar hududiy epidemiologik kuzatuvni takomillashtirish, yosh va jins bo‘yicha standartlashtirilgan ko‘rsatkichlarni hisoblash hamda kasalliklarni aniqlash va ro‘yxatga olish to‘liqligini chuqurroq o‘rganish zarurligini asoslaydi.

Kalit so‘zlar: suyak sarkomasi, yumshoq to‘qima sarkomasi, epidemiologiya, Farg‘ona vodiysi, yosh tarkibi, jinsiy taqsimot, qishloq aholisi, kasallanish dinamikasi, retrospektiv tahlil.

Аннотация

Актуальность. Саркомы костей относятся к редким злокачественным новообразованиям, имеющим важное клиническое значение в связи с особенностями течения заболевания и прогнозом. Изучение их эпидемиологических характеристик, включая распределение пациентов по возрасту, полу и месту проживания, необходимо для выявления региональных особенностей и совершенствования онкологической помощи. Комплексный анализ многолетней динамики и демографической структуры пациентов с саркомами в Ферганской долине представляет собой актуальную научную задачу. **Цель исследования.** Провести эпидемиологический анализ распределения пациентов с саркомами костей в Ферганской долине по возрасту, полу и месту проживания за 2018–2025 годы, а также определить основные особенности динамики заболеваемости. **Материалы и методы.** Исследование было запланировано как ретроспективный эпидемиологический анализ. Материалами исследования служили медицинская документация и данные онкологического регистра пациентов с диагнозом саркомы костей, выявленных в Ферганской, Андижанской и Наманганской областях в 2018–2025 годах. Проводилось распределение пациентов по возрасту, полу, месту проживания и году установления диагноза. Данные представлялись в виде абсолютных чисел и процентов. Для оценки различий между группами предусматривалось использование критерия χ^2 Пирсона или точного критерия Фишера при необходимости. Уровень статистической значимости был установлен на уровне p=0,05. **Результаты.** Согласно представленным данным о саркомах костей и мягких тканей в Ферганской долине за 2018–2025 годы, показатели заболеваемости характеризовались колебаниями. Наибольший зарегистрированный показатель составил 0,96‰ в 2019 году, наименьший — 0,70‰ в 2024 году. В 2025 году показатель увеличился до 0,77‰. Всего было проанализировано 715 пациентов, из которых 417 (58,3%) составляли мужчины, а 298 (41,7%) — женщины. Доля сельских жителей в течение периода наблюдения варьировала от 67% до 77%, составив 75% в 2025 году. Средний возраст пациентов снизился с 51,0 года в 2020 году до 42,1 года в 2025 году. Полученные результаты отражают особенности распределения обследованных пациентов по возрасту, полу и месту проживания. **Вывод.** В Ферганской долине в 2018–2025 годах динамика заболеваемости саркомами костей и мягких тканей была неравномерной. Среди проанализированных пациентов преобладали мужчины и сельские жители. В последние

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годы исследования также отмечалось снижение среднего возраста пациентов. Полученные результаты обосновывают необходимость совершенствования регионального эпидемиологического мониторинга, расчёта стандартизованных по возрасту и полу показателей, а также дальнейшего изучения полноты выявления и регистрации заболеваний.

Ключевые слова: саркома костей, саркома мягких тканей, эпидемиология, Ферганская долина, возрастная структура, распределение по полу, сельское население, динамика заболеваемости, ретроспективный анализ.

Background: According to international clinical recommendations, primary bone sarcomas account for less than 0.2% of all malignant neoplasms. Their overall annual incidence is approximately 0.8–0.9 cases per 100,000 population. The main histological types include osteosarcoma, Ewing sarcoma, and chondrosarcoma. The overall incidence of osteosarcoma is approximately 0.3 cases per 100,000 population per year; among adolescents aged 15–19 years, this figure may reach 0.8–1.1. Osteosarcoma has also been reported to occur more frequently in males than in females [1].

A global study based on 2021 data on malignant neoplasms of bone and articular cartilage estimated 91,375 new cases and 66,114 deaths in 2021. These figures cover the broader group of malignant neoplasms of bone and articular cartilage and therefore cannot be interpreted as referring exclusively to bone sarcomas or chondrosarcoma. When comparing international and national statistics, consistency in the diagnostic groups being compared is an important prerequisite for reliable epidemiological conclusions [1,3].

An epidemiological analysis published in 2025 for Uzbekistan presents the dynamics of malignant bone neoplasms from 2016 to 2024. The number of newly diagnosed cases nationwide decreased from 391 in 2016 to 325 in 2024. However, the figures did not change uniformly throughout the period: 370 cases were recorded in 2018, 325 in 2020, 343 in 2022, and 344 in 2023. These data indicate an overall decline in the absolute number of malignant bone neoplasms, although population-based incidence rates are also required to determine changes in the risk of disease [2].

The regional analysis showed that in 2024 the incidence of malignant bone neoplasms was 1.1 cases per 100,000 population in Ferghana Region, 1.4 in Jizzakh Region, and 1.2 in Tashkent city. These data make it possible to compare the situation in Ferghana Region with that in other parts of the country. However, the rate for Ferghana Region is not a combined rate for the entire Ferghana Valley—Ferghana, Andijan, and Namangan regions. Therefore, it is important to analyze data from all three regions separately and calculate the overall rate while taking their respective population sizes into account [2].

Aim of the study: To conduct an epidemiological analysis of the age, sex, and ethnic composition of patients with bone sarcomas in the Ferghana Valley, identify the distribution patterns of the disease across these demographic groups, and assess the observed differences.

Materials and methods: This study was designed as a retrospective epidemiological investigation of the age, sex, and ethnic characteristics of patients with bone sarcomas in the Ferghana Valley.

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Medical records and oncology registry data for patients diagnosed with bone sarcoma in the Ferghana Valley (Ferghana, Andijan, and Namangan regions) between 2018 and 2025 were used. Patients with a confirmed diagnosis of primary bone sarcoma were included. Sarcomas arising from soft tissues and malignant neoplasms that had metastasized to bone from other organs were excluded from the study group.

Patients were grouped according to age, sex, ethnicity, place of residence, and year of diagnosis. Age distribution was assessed by the relevant age groups, sex distribution by males and females, and ethnic composition based on information recorded in medical documents. Where data on histological types of bone sarcoma were available, these were analyzed separately.

Absolute numbers (n), percentages (%), and relevant indicators were calculated for the statistical analysis. Pearson's chi-square test or, where appropriate, Fisher's exact test was planned to assess differences between groups. The statistical significance level was set at $p = 0.05$. Annual trends were assessed using the number of recorded cases and, where the relevant population data were available, incidence rates per 100,000 population.

The study examined the regional distribution of patients with bone and soft-tissue sarcomas alongside their ethnic classification; specifically, the distribution of cases among rural and urban residents was analyzed.

Results: The incidence rates of bone and soft-tissue sarcomas in the Ferghana Valley from 2018 to 2025 were analyzed. The results showed fluctuations in annual incidence rates. The rate was 0.86‰ in 2018 and increased to 0.96‰ in 2019. In 2020, it declined to 0.73‰, one of the lowest values during the observation period. In 2021, the rate rose to 0.90‰ and remained at the same level in 2022. It reached 0.97‰ in 2023, fell to 0.70‰ in 2024, and increased to 0.77‰ in 2025 (Figure 1).

Compared with 2018, the incidence rate in 2025 decreased by 0.09‰, corresponding to a decline of approximately 10.5%. The decrease from 0.96‰ in 2019 to 0.73‰ in 2020, the subsequent rise in 2021–2023, and the renewed decline in 2024 indicate that the trend was not uniform. The rate of 0.77‰ in 2025 was 0.07‰, or 10%, higher than in 2024.

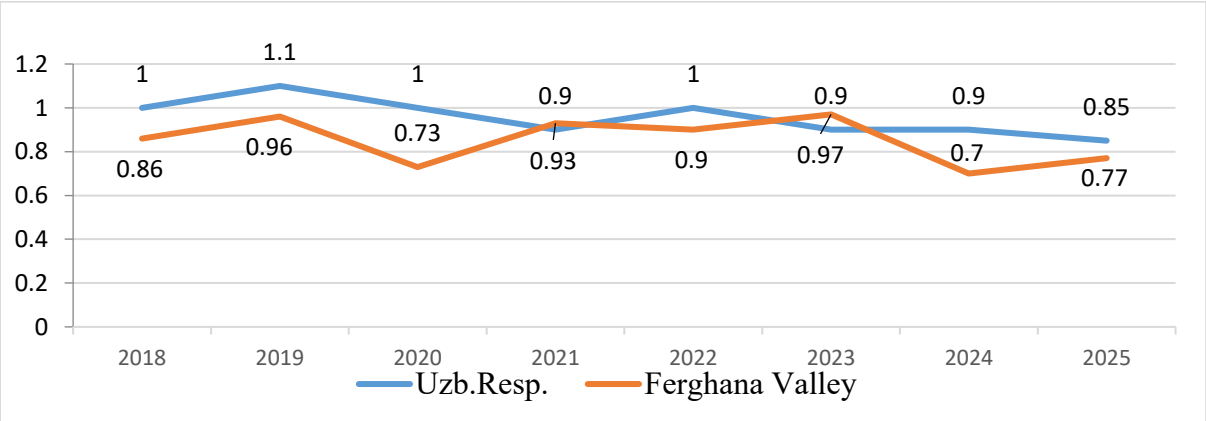


Figure 1. Incidence rates of STS in the Ferghana Valley, 2018–2025.

Compared with national figures, the incidence rate in the Ferghana Valley was relatively low in most years. According to the graph, the national rate reached 1.1‰ in 2019, while the rate in the

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Ferghana Valley was 0.96‰. In 2024, the national rate was approximately 0.9‰, compared with 0.70‰ in the Ferghana Valley. This difference may indicate regional epidemiological variation. However, further investigation of diagnostic coverage, completeness of disease registration, population structure, and other factors is needed to determine the reasons for these differences.

Overall, the 2018–2025 findings indicate fluctuating incidence rates of bone and soft-tissue sarcomas in the Ferghana Valley. The highest rate during the observation period was recorded in 2019 (0.96‰), and the lowest in 2024 (0.70‰). The partial increase in 2025 highlights the need for continued monitoring and more detailed regional epidemiological analysis.

Analysis of patients' place of residence from 2018 to 2025 showed that rural residents predominated among patients newly diagnosed with bone and soft-tissue sarcomas. In 2018, rural residents accounted for 67% of patients, while urban residents accounted for 33%. In 2019, the proportion of rural residents decreased to 63%, while the proportion of urban residents increased to 37% (Figure 2).

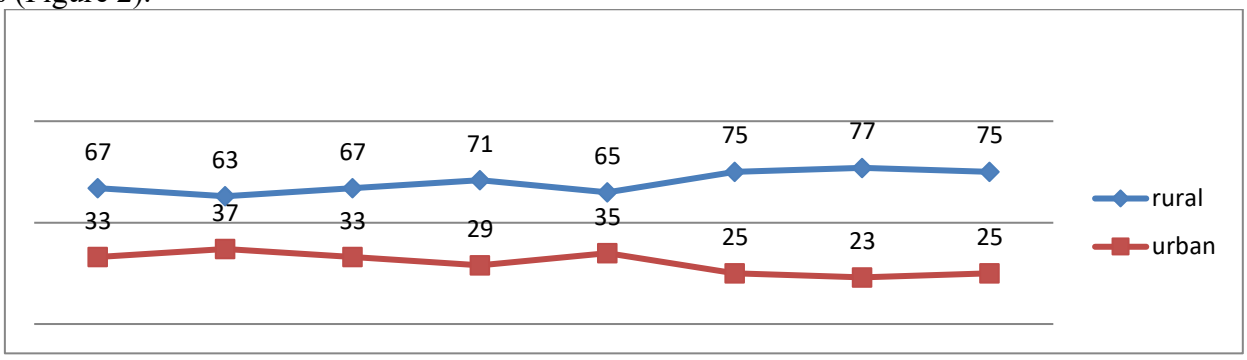


Figure 2. Distribution of patients with STS in the Ferghana Valley by rural and urban residence, 2018–2025 (%).

From 2020 onward, an overall increasing trend was observed in the proportion of rural residents: 67% in 2020, 71% in 2021, 65% in 2022, and 75% in 2023. The proportion of rural residents reached its highest level, 77%, in 2024 and was 75% in 2025. The corresponding proportions of urban residents were 33%, 29%, 35%, 25%, 23%, and 25%, respectively.

The analysis showed that the proportion of rural residents increased from 67% in 2018 to 75% in 2025, an increase of 8 percentage points. Over the same period, the proportion of urban residents decreased from 33% to 25%. The largest difference between rural and urban residents was recorded in 2024, at 54 percentage points (77% versus 23%).

These findings indicate that rural residents made up the larger share of the study group. This pattern may be associated with healthcare-seeking behavior, opportunities for cancer detection, access to regional health services, or differences in population structure.

The age and sex distribution of patients with bone and soft-tissue sarcomas in the Ferghana Valley from 2018 to 2025 was analyzed. The table included 715 patients in total, comprising 417 males and 298 females. Males accounted for 58.3% of all patients and females for 41.7%. Thus, the proportion of males was 16.6 percentage points higher than that of females, with a male-to-female ratio of approximately 1.4:1 (Table 1).

Table 1

Distribution of patients with STS in the Ferghana Valley by age group and sex (2018–2025)

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Age group	Males		Females	
	n	M ± m, %	n	M ± m, %
0–14 years	55	1.2±0.18	48	9.8±0.31
18–29 years	100	18.2±0.15	59	19.8±0.24
30–44 years	74	37.3±0.20	50	40.1±0.13
45–64 years	86	46.5±0.25	67	52.5±0.22
65 years and older	102	64.5±0.25	74	62.5±0.24
Total	417	48.1±0.15	298	41.9±0.26

Analysis of sex distribution by age group showed that the largest absolute number of male patients was in the group aged 65 years and older (102 patients), whereas among females the largest number was in the 45–64-year age group (67 patients).

In the 0–14-year age group, 55 males and 48 females were recorded. The absolute difference between the sexes in this group was relatively small, with 7 more males than females. In the 18–29-year group, there were 100 males and 59 females, while the 30–44-year group included 74 males and 50 females. In the 45–64-year group, 86 males and 67 females were recorded; in the group aged 65 years and older, there were 102 males and 74 females.

The data show that the number of males exceeded the number of females in most age groups. The largest absolute difference was observed among patients aged 65 years and older, where there were 28 more males than females. A notable predominance of males was also observed in the 18–29-year age group.

Overall, the findings indicate that males accounted for a larger proportion of patients with bone and soft-tissue sarcomas in the Ferghana Valley. By age, the largest absolute number of male patients was in the group aged 65 years and older, whereas among female patients it was in the 45–64-year group. These findings describe the demographic characteristics of the patients and support the need to calculate age- and sex-standardized epidemiological indicators in subsequent analyses.

In 2018, the mean age of patients was 45.9 years; it increased to 50.8 years in 2019 and 51.0 years in 2020. From 2021 onward, a downward trend was observed: 48.5 years in 2021, 49.8 years in 2022, 46.6 years in 2023, 44.4 years in 2024, and 42.1 years in 2025. Thus, mean age increased at the beginning of the period, followed by an overall decline in subsequent years, particularly from 2022 to 2025 (Table 2).

Table 2
Distribution of patients with STS in the Ferghana Valley by mean age

Variable	2018	2019	2020	2021	2022	2023	2024	2025
Mean age	45.9	50.8	51.0	48.5	49.8	46.6	44.4	42.1
Standard error (m)	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4
Trend	51.9	51.3	51.0	50.1	49.2	47.3	44.5	41.6

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Compared with 2018, the mean age in 2025 was 3.8 years lower. The difference between the highest value in 2020 (51.0 years) and the value in 2025 (42.1 years) was 8.9 years. These findings may indicate an increase in the proportion of relatively younger patients among those diagnosed with STS toward the end of the observation period. However, this conclusion should be confirmed by separately analyzing the number of patients in each age group and their proportion of all patients.

The trend values in the third row of the table decreased from 51.9 years in 2018 to 41.6 years in 2025. This row also shows an overall downward trend and may indicate changes in the age structure of patients after 2020.

From 2018 to 2025, the mean age of patients with STS in the Ferghana Valley showed a fluctuating pattern. Mean age increased from 2018 to 2020, followed by an overall decline from 2021 onward. The decrease from the peak of 51.0 years in 2020 to 42.1 years in 2025 was 8.9 years. This may indicate a change in the age structure of patients diagnosed with the disease and supports the need for a more detailed epidemiological analysis by age group.

Conclusion:

Between 2018 and 2025, the incidence rates of bone and soft tissue sarcomas in the Fergana Valley showed fluctuating trends. The highest rate was recorded in 2019, at 0.96‰, while the lowest was observed in 2024, at 0.70‰. In 2025, the rate increased to 0.77‰. These findings highlight the need for continued systematic monitoring of incidence trends in the coming years.

Analysis of the sex distribution of patients revealed that, among the 715 patients, 417 (58.3%) were male and 298 (41.7%) were female. The predominance of males was particularly evident in the age group of 65 years and older, which included 102 male and 74 female patients. Among females, the highest absolute number of cases was observed in the 45–64-year age group, comprising 67 patients.

Analysis of the patients' place of residence revealed a predominance of rural residents. Their proportion increased from 67% in 2018 to 75% in 2025, whereas the proportion of urban residents decreased from 33% to 25%. The greatest disparity between rural and urban residents was observed in 2024, accounting for 77% and 23%, respectively. These findings indicate the need for a more in-depth investigation of access to healthcare services, diagnostic capabilities, and patterns of disease registration across different geographical areas.

The mean age of patients increased from 45.9 years in 2018 to 51.0 years in 2020, followed by a subsequent decline to 42.1 years in 2025. The decrease of 8.9 years in the mean age between 2020 and 2025 may indicate changes in the age distribution of patients. A more detailed year-by-year analysis of the proportions of different age groups is required to confirm this trend.

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