

The impact of the early period of the COVID-19 pandemic on screening programmes of breast, colorectal and cervical cancer

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ABSTRACT

Introduction: The SARS-CoV-2 pandemic has changed the lives of many people in various aspects. Preventive actions instigated due to the pandemic by governments and the fear of citizens have contributed to the decline in the number of people tested for cancer and halting some of the cancer prevention programmes. The study's main goal was to collect and analyse data from publicly available statistics and scientific articles on the differences in the number of screenings performed. This study compares the numbers of screenings for specific cancers in overlapping periods before and after the outbreak of the pandemic.

Material and methods: In the process of creation, search engines and pages collecting data as well as scientific articles were used, from which a narrow part was selected in line with the idea of the study.

Results: The information collected concerned the differences in the number of screening tests performed for breast, colorectal and cervical cancer. There were visible declines in the number of study participants from different regions of the world during the periods of 2020 compared to the statistics from 2019 among all three types of cancer.

Discussion and conclusions: The pandemic period left a mark in many places of the world on the number of cancer preventive examinations analysed at work, which is also reflected in the overall case. Since the start of the pandemic, attention has focused mainly on the prevention of deaths resulting from SARS-CoV-2 virus infection, while leaving other life-threatening diseases in the background, including cancer. Maintaining the continuity of preventive programmes and creating solutions ensuring the safety of oncological patients in the era of restrictions may prove to be a key issue in preventing delayed diagnosis and thus reducing the costs of treatment and hospitalization of patients, as well as deaths in future years.

KEY WORDS: colorectal neoplasms, quarantine, SARS-CoV-2, breast neoplasms, uterine cervical neoplasms, early cancer detection.

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INTRODUCTION

The COVID-19 pandemic had a significant impact on our civilization, changing the lives of many people in various aspects. According to data from Our World in Data [1] and JHU CSSE COVID-19 Data [2] as of September 21, 2022, the total number of cases of SARS-CoV-2 infections worldwide was 614 million, with deaths exceeding 6.5 million. In Poland, 6.27 million cases were recorded [3]. However, these were

not the only reasons for the loss of life during the last 2.5 years due to the disease. Particularly in the early stages of the pandemic, when governments around the world were adapting to the newly emerging situation, preventive measures against cancer, among other things, became more difficult due to the widespread use of lockdown policies and concerns about contracting SARS-CoV-2 in medical facilities. The consequences of limited access to oncology diagnosis and treatment

were postponed, creating a health debt for humanity. It is expected that in the coming years, more advanced-stage cancers will be diagnosed, and their effective treatment may be difficult, less efficient, and expensive.

The main goal of the study was to investigate and analyse the data collected in scientific articles on the participation of patients in screening tests, in the period before and during the early pandemic, in terms of the diagnosis of some of the most common neoplastic lesions: breast cancer, colorectal cancer and cervical cancer.

MATERIALS AND METHODS

The data were collected from platforms such as Google Scholar, Science Direct, PubMed.gov, Polish National Cancer Registry, MPDI and government webpages. Out of the 30 sources found, searched using the keywords quarantine, SARS-CoV-2, early cancer detection, breast neoplasms, colorectal neoplasms, uterine cervical neoplasms, it was decided to cite 21 of them. The choice of citations and keywords was based on finding sources, which:

- included research on secondary prevention programmes for breast, colorectal and cervical cancers,
- compared periods in 2019 and 2020 (before and during the “first wave” of the pandemic),
- allowed introduction of the variety of countries where data was gathered, in the later work,
- showed the imbalance that the early pandemic imposed on cancer screening rates.

Gathering diverse work, comparing the corresponding statistics from the period before and shortly after the outbreak of the pandemic, was the main aim during the selection process with the target of evaluating the negative impact of the early COVID-19 crisis on stated cancers’ screening programmes.

RESULTS

EARLY DETECTION OF BREAST NEOPLASM

This particular research [4] was conducted as part of the breast and cervical cancer in the Śląskie, Mazowieckie, Warmińsko-Mazurskie voivodeships of Poland.

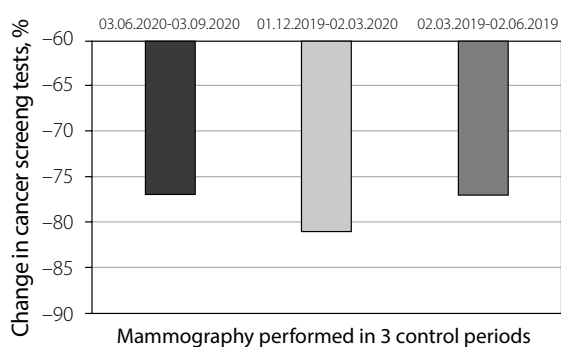


FIGURE 1. Percentage decreases in the numbers of screening tests [Data from the Research Patient Data Registry; a centralized repository of clinical and administrative data at Massachusetts General Brigham]

A decrease in the number of performed mammography tests was recorded in the analysed voivodeships:

- by 10,772 in Mazowieckie Voivodeship (24%),
- by 8,753 in Warmińsko-Mazurskie Voivodeship (54%),
- by 33,524 in Śląskie Voivodeship (56%).

In the months immediately preceding the pandemic (January-February 2020), the number of mammography tests in two of the examined voivodeships increased compared to the previous year: by 62% in Mazowieckie Voivodeship, by 6% in Warmińsko-Mazurskie Voivodeship, while in Śląskie Voivodeship, it fell by 14%. A significant decrease in the number of mammograms was visible in all three voivodeships already in March 2020:

- by 23% in Mazowieckie Voivodeship,
- by 49% in Warmińsko-Mazurskie Voivodeship,
- by 64% in Śląskie Voivodeship.

During the period of pandemic restrictions (April-May 2020), all three voivodeships experienced a decrease in the number of mammograms performed by over 90% compared to the same period in 2019. The decrease was 91% in the Mazowieckie Voivodeship, 94% in the Śląskie Voivodeship, and 97% in the Warmińsko-Mazurskie Voivodeship.

Other studies [5] revealed the numbers of cancer screenings in the United States; there was a decrease in the number of mammograms performed (by 91%) in the months of March-May 2020 compared to the corresponding months of 2019. The total US population deficit in breast cancer screening related to the COVID-19 pandemic has been estimated at 3.9 million women. In Taiwan, the decrease in mammograms performed in January-April 2020 was 22% compared to the same period in 2019. Belgium also experienced a decline, with only 50% of the cytology tests performed in the first four months of 2020 compared to the same period in 2019. In April 2020, an 80% decrease in the number of cytology tests was recorded. Similar data come from Southern California – in the months of March-June 2020, compared to the corresponding months of 2019, a decrease in screening cytology was recorded by 78% in the group of women aged 21-29 and by 82% in the group of women aged 30-65 years.

The study [6] conducted in New England, USA, covered four 3-month periods. One period during the first peak of the pandemic, from March 2 to June 2, 2020, was compared with 3 control periods before and after the main study period:

- previous 3 months from December 1, 2019, to March 2, 2020;
- the same 3 months in the previous year from March 2 to June 2, 2020;
- 3 months after the main study period from June 3 to September 3, 2020.

The study found a higher percentage of positive screening test results during the initial period of the pandemic compared to the three follow-up periods for mammography (4.1% vs. 1.9-2.3%) (Figure 1).

EARLY DETECTION OF COLORECTAL NEOPLASMS

In the case of changes in the large intestine, the data shown in scientific articles show the following results. The work of the team from the Gastrointestinal Endoscopy Unit, S. Eugenio Hospital, Rome, Italy [7], shows a decrease in the number of examinees by 74.79% in the period 09.03.2020-04.05.2020 (group of 60 participants) compared to the corresponding period in the year 2019 (group of 238 participants). At the same time, the percentage share of detected polyp lesions (both low- and high-risk) and cancerous lesions was higher in the pandemic group. The next study was conducted as part of the TriNetX Research Network [8], where data had been gathered from 20 different institutions in the United States of America representing over 28 million patients between January and April in 2019 and 2020. The presented study showed the following changes in the number of screening tests performed for colorectal cancer (Figure 2).

Another article providing a perspective on colorectal cancer screening in the Asia-Pacific region [9] showed the following fluctuations in the number of procedures performed in the years 2019-2020:

- Japan: -52.7% (pause of the testing programme only temporarily in some localities),
- South Korea: -10.5%,
- Taiwan: -0.4%,
- Australia: -12.8% (Faecal Occult Blood Immunochemical Test – FIT), -19.4% (colonoscopy, sigmoidoscopy),
- New Zealand: – (suspension of the testing programme in the period 23.03.202-22.06.2020),
- Thailand: – (suspension of the testing programme in the period 02.2020-03.2021),
- Singapore: -32.6% (pause of the testing programme between 03-08.2020),
- Tianjin (China): -50% (pause of the testing programme between 01-02.2020).

A study [10] was conducted on data from 25 Dutch hospitals collected in the period 2018-2020 as part of the Netherlands Cancer Registry (NCR). Comparing the number of observed colorectal cancer diagnoses with the expected number, the following decreases in diagnoses from 2020 were found:

- April: -42%,
- May: -33%,
- June: -34%.

Following a gradual resumption of screening in mid-May 2020, it was found to be catching up with missed diagnoses with diagnoses since July. In October, the observed number of detected lesions was higher than expected. The greatest increase in the incidence, by 24% above the predicted value, occurred in December of that year.

EARLY DETECTION OF CERVICAL NEOPLASM

An analysis was conducted, based on the number of cytology tests performed as part of the cervical cancer prevention programme in three voivodeships (Śląskie,

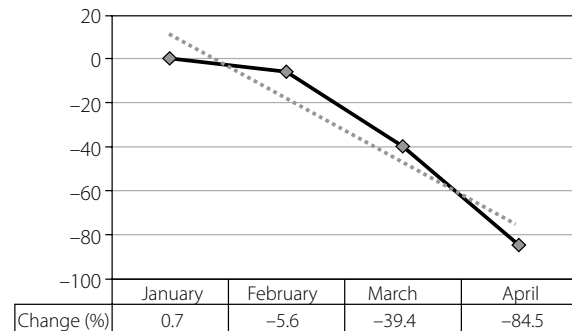


FIGURE 2. Change in the number of screening tests performed in the USA in selected months for colorectal cancer in 2019-2020 (%) [Data from TriNetX Research Network]

Mazowieckie, and Warmińsko-Mazurskie) of Poland, for the period between January and May 2019 and 2020. The findings, published on the website of *Medycyna Ogólna i Nauki o Zdrowiu* [4], revealed that there was a significant decline in the number of cytology tests during the months when pandemic restrictions were in effect (April-May 2020). In comparison to the same period in 2019, all three voivodeships experienced a decrease of over 85%. The authors further emphasized that the COVID-19 pandemic and the associated restrictions have had detrimental effects on the performance of cytological tests within preventive programmes. This decline may potentially lead to delayed detection of the disease and negatively impact patients' prognosis.

During the period of January to May 2020, a substantial decrease in the number of cytological tests performed as part of the cervical cancer prevention programme was observed in the aforementioned voivodeships:

- Warmińsko-Mazurskie Voivodeship – 5,090 (51% less),
- Mazowieckie Voivodeship – 8,035 (52% less),
- Śląskie Voivodeship – 16,468 (55% less).

A decline in the number of cytological tests was already evident in January and February 2020 in all three voivodeships, when compared to the corresponding months of the previous year:

- Mazowieckie Voivodeship by 12%,
- Warmińsko-Mazurskie Voivodeship by 14%,
- Śląskie Voivodeship by 17%.

The month of March 2020, when the COVID-19 epidemic emerged, witnessed a significant deepening of this decline, with a reduction of approximately 60% in the number of cytology tests compared to March 2019 across all surveyed provinces. Subsequently, during the period of pandemic restrictions from April to May 2020, there was a continued decrease in the number of cytology tests in all three voivodeships, compared to the corresponding months of the previous year:

- Mazowieckie Voivodeship by 87%,
- Warmińsko-Mazurskie Voivodeship by 85%,
- Śląskie Voivodeship by 90%.

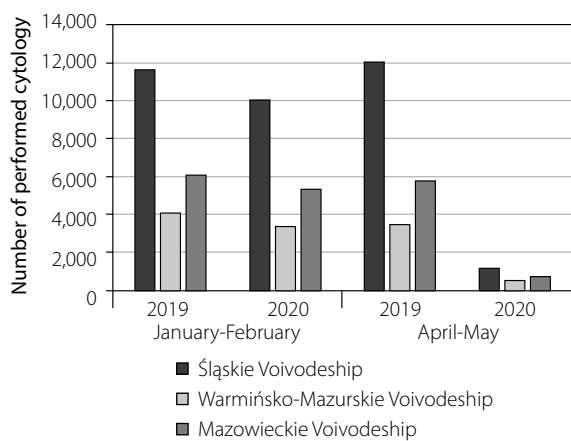


FIGURE 3. Cytological tests performed as a part of the cervical cancer prevention programme [Data from regional branches of Polish National Health Fund (NFZ)]

During the months of April and May 2020, the number of cytological tests conducted per 100,000 women as part of the cervical cancer prevention programme remained below 50 in the surveyed voivodeships. This is in stark contrast to the approximately 250 tests per 100,000 women conducted during the same period of the previous year (Figure 3).

The next review article and meta-analysis [5] considered studies from different countries, which examined a total of 403,986 women before the 2019 pandemic and 199,165 women during the 2020 pandemic for cervical cancer prevention. Studies were conducted in Slovenia, Canada, USA, Italy, Scotland, and Belgium. A study from Slovenia, based on population-based prevention studies known as Zora, identified the greatest gaps in prevention at 92% during the pandemic [11]. During the pandemic, the percentage of screening performed fell from 10.2% to 0.04%, and the overall screening deficit ranged from 43.3% to 92%.

The overall percentage of women who underwent cervical cancer screening in 2019 was 9.79%, with a prediction range of 0.42% to 23.81%. However, during the COVID-19 pandemic in 2020, the total percentage of women screened decreased to 4.24%, with an expected range of 0.9% to 17.49%. It is important to note that there was a significant heterogeneity observed among studies conducted during this period.

DISCUSSION

Worldwide in 2020, 2.3 million women were diagnosed with breast cancer and 685,000 died from it. Mammography is the most important imaging test in the detection and diagnosis of breast cancer. Mammography is performed once a year or every 2 or 3 years from the age of 40-50 to about 70-75 years, depending on the guidelines of the organizations responsible for screening programmes and on country or region where it is performed. European guidelines recommend a 2-year

interval between examinations in the general population of women aged 50-70 years. Significant differences between screening programmes in different European countries, including the form of reporting, result from cultural specificity, technical conditions, biopsy possibilities, financial constraints, and breast cancer incidence. Diagnostic mammography is performed to confirm or exclude breast cancer in patients with clinical symptoms such as a palpable lump, nipple discharge, skin thickening, and/or nipple retraction [12]. At the end of 2020, there were 7.8 million women who had been diagnosed with breast cancer in the last five years. This makes it the most common cancer. Women worldwide lose more disability-adjusted life years (DALYs) to it than to any other type of cancer. It occurs worldwide, at any age after puberty, but most often later in life [13].

The decline in mammography and cytology tests started in March 2020. The number of services provided as part of the prevention of breast cancer and cervical cancer dropped drastically in the first months after the introduction of pandemic restrictions. Delay in diagnosis and initiation of cancer treatment may affect later prognosis. For breast cancer, the relationship between waiting time for treatment and overall survival is well documented. It was found that the 5-year survival of patients treated for breast cancer was lower by approx. 5-7% in the case of a long waiting time for treatment from the first symptoms (up to 3 months vs 3-6 months) [4, 14].

In the years preceding the pandemic, there were indications of gradual but positive improvements in the incidence and screening rates of cervical cancer. Unfortunately, the timing of the pandemic had a detrimental impact on these improvements. The implemented restrictions and limitations created significant challenges for individuals seeking essential medical services, including preventive tests. As a result, preventive measures such as screenings have been notably affected within the field of oncology in Poland [15].

About 1.4 million people in the world suffer from colorectal cancer, which means that this cancer currently accounts for 10 to 15 percent of all cases of malignant tumours. In Europe, the number of new cases of this cancer annually is estimated at over 312,000, and the number of deaths at over 157,000 [16]. In Poland, it is the second most common malignant tumour in both sexes. According to the National Cancer Registry [17], from 2019 to 2020, there were 20,616 new cases of colorectal cancer, and 15,818 deaths from the disease. In the presence of high-risk factors for colorectal cancer, patients should have an annual follow-up colonoscopy. Patients with intermediate-risk factors should have a screening colonoscopy every 2-3 years. Finally, low-risk patients should have a screening colonoscopy every 5 years [18].

Restricted mobility, patients' fear of infection, and adherence to safety procedures to avoid possible infection may limit the ability to perform a colonoscopy. Another

obstacle in performing colonoscopies is the change in the position of some medical staff, including gastroenterologists, in new wards dedicated to COVID-19 [18]. Older individuals in Poland face limited access to healthcare services. One of the concerns regarding screening tests in the country is the lower reception of preventive programmes established by the Ministry of Health. However, since 2012, the Screening Programme has continued to send personalized, one-time invitations for colonoscopy to individuals aged 55-64. It is worth noting that certain other programmes of personalized invitations have been discontinued [19]. There are certain deficiencies observed in screening studies, manifested by inadequate legislative regulation and substandard data collection quality, resulting in challenges in analysing the necessary number of screening tests in Poland. Moreover, there is no parliamentary bill that establishes the required legal framework for comprehensive regulation of population-based screening programmes. The pandemic has caused a significant decline in screening tests for various reasons. The problem resulted from the higher risk of contracting coronavirus in the hospital during a routine examination. Unfortunately, not only the reduced number of screening tests performed was an obstacle, but also the insufficient care of oncologists, whose attention had to be redirected to COVID patients [20].

On a positive note, in 2023, a universal HPV vaccination programme was introduced, aligning with the goals outlined in the National Oncology Strategy for 2020-2030. This programme provides recommended free vaccination for young people [21].

The work's strength is presenting a cross-section of the performance of selected cancer secondary prevention programmes before and early after the COVID-19 pandemic outbreak. The gathered data were sourced from many places around the globe, showing similar tendencies of decline in the number of performed screenings in comparison of corresponding time periods of 2019 and 2020 on the background of the importance within programmes' crucial matter of early cancer detection at the level of analytical methods. The topic of the work does not include comparison of similar cases during other pandemics and epidemics, quality level of the cancer screenings, or rate and rising or declining tendencies of procedures performed in a previous period. The issue of the primary cancer prevention means before and after the outbreak and the difference between these two periods and its influence on the screening situation during the COVID-19 pandemic are only discussed because the major reason for the study was to show the difference in performing cancer screening tests in time periods taken into account.

The role of screening is to detect cancer early, which contributes to the reduction of mortality and complications that could be caused by a prolonged disease. Therefore, in the event of crises that may come, it will

be important to maintain cancer screening programmes. Maintaining the programmes could allow more undiagnosed patients to be protected from the moment when the case becomes untreatable.

CONCLUSIONS

Based on the data presented in the results, there is a visible downward trend within secondary prevention of breast, cervical, and colorectal cancers at the beginning of the COVID-19 pandemic. This could have been related to the restrictions introduced, public concerns about the transmission of the virus in medical units, where screening tests are performed, or the state of public's attention related to cancer screening programmes. The awareness about the importance of counteractions against these kinds of tendencies in future potential crises has to be raised. It also applies to taking actions to increase current cancer screening test numbers as a way to lower the real amount of terminal cancer cases, which could have been diagnosed in treatable stages.

DISCLOSURE

The authors report no conflict of interest.

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AUTHORS' CONTRIBUTIONS

KF, KS, EK, AK prepared concept of an article. KF, KS, EK collected data, conducted analysis and wrote the article. All authors critically revised it and approved the final version of publication.