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Epidemiology of breast cancer in women in Norway

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Abstract

Introduction. Breast cancer in women in Norway currently accounts for 23% of all cancer cases and is also the most common cause of death in this population. Thanks to the availability of preventive tests and the implementation of tests, many cases of the disease are diagnosed at an early stage, which has a positive impact on the prognosis. The introduction of new technologies and treatment methods in oncology has given many women a chance for longer survival and even complete recovery.

The aim of the study was to present the epidemiological situation of women with breast cancer in Norway and to identify factors that may be important for the incidence, duration of survival and mortality due to this cancer.

Material and methods. The work uses a review and analysis of the literature from the Norwegian online database Kreftregisteret Cancer in Norway (from 2019-2022) and a review of data published by: Norwegian Ministry of Health and Welfare and Statistics Norway.

Results. Breast cancer in Norway is the most common cause of death in women under 65 years of age. In 2022, 4,197 new cases were recorded, i.e. more than in previous years, and the average age of women at diagnosis was 62 years. The incidence rate of breast cancer in the female population aged 50–69 was also higher and clearly associated with the more frequent use of hormonal treatment during menopause. The effects of treatment of this cancer in Norway are satisfactory, because nine out of ten women diagnosed with breast cancer survive 5 years after diagnosis.

Conclusions. Breast cancer among women in Norway is still a serious health and social problem, but the functioning of the health care system and the attitude of women themselves allow for satisfactory treatment results. Evidence of significant progress in the diagnosis and treatment of women diagnosed with breast cancer is the fact that over 90% of patients with this cancer can be considered cured.

Keywords: Epidemiology, Breast cancer, woman, Norway

Introduction

Breast cancer is currently the most common cancer among women in Norway, accounting for 23% of all cancer cases [1,2]. As a cancer showing a constant increasing trend, it is also the most common cause of death in women under 65 years of age. In 2022, 4,197 new cases of breast cancer were reported, and the average age of patients was 62 years. The increase in the risk of breast cancer in the female population is determined by many factors referred to as civilization and mainly related to an inappropriate lifestyle and the extension of its average duration. The effects of breast cancer treatment in women in Norway are satisfactory, because nine out of ten women diagnosed with breast cancer live longer than 5 years [2]. The introduction of preventive mammography had a decisive role in the health situation of women in this country in terms of breast cancer. Recognizing the disease in its early stage and starting treatment resulted in better treatment effects, which resulted in full recovery or a longer recovery period [1,3,4].

Objective

The aim of the study was to present the epidemiological situation of women regarding breast cancer in Norway and to identify factors that may be important for the incidence, survival time and mortality due to this cancer.

Material and methods

The work was prepared by reviewing and analyzing current literature from scientific sources or publications and Norwegian statistical registers. The main review was of medical information available on websites in the *Kreftregisteret Cancer in Norway* database (from 2017-2022) regarding the occurrence of breast cancer in women. Data published by: Norwegian Ministry of Health and Welfare *Helse - og omsorgsdepartamentet Sammen mot kreft Nasjonal kreftstrategi* (from 2013-2017), *Leve med kreft Nasjonal kreftstrategi* (from 2018-2022), *Nasjonalt kvalitetsregister for Brystkreft Årsrapport* (from 2018-2022) were also analyzed. 2021-2022), *Helsedirektoratet Brystkreft - handlingsprogram* (from 2022-2023), *Helsenorge -Brystkreft* (from 2021-2023) and Statistics Norway - *Statistisk Sentralbyrå*. When selecting sources, care was taken to ensure their substantive consistency and timeliness, and when describing the reliability of information, mainly materials from foreign-language sources (published in Norwegian). The work defines commonly used epidemiological measures, i.e. morbidity and mortality rates and survival rates.

Results

The basic epidemiological measures determining the health status of a selected population are morbidity and mortality rates and survival rates.

Morbidity, or incidence, is a coefficient determining the number of new cases of a disease diagnosed in relation to the total number of people living in a specific area, exposed to a given disease over a certain period of time, i.e. within a month or a year. Specific or specific morbidity may concern part of the population, and the criterion here may be age or gender [5].

Mortality is defined in basic (crude) terms and on the basis of certain specific factors - cause of death, gender or age. In basic terms, mortality is the ratio of the number of all deaths in the studied population at a specific time to the size of a given population, usually in relation to 100,000 people per year. Prevalence, on the other hand, means the number of people suffering from a specific disease at a certain time in relation to the total size of a given sample or population in which this disease occurred [6].

In oncology, the measure of the effectiveness of cancer treatment is the survival rate, which is the percentage of patients suffering from a specific type of cancer who survive for a

specified period of time after diagnosis. The analysis of survival rates also takes into account other causes of death in patients who do not survive 5 years after diagnosis, and these deaths may be the result of other factors or comorbidities [7].

When analyzing epidemiological indicators, the socio-demographic structure of a given population is important for describing the phenomenon under study. In terms of population, Norway is one of the least populated countries, with an area of 385,207 km2 inhabited by 5,488,984 people in the last quarter of 2022 (data from May 10, 2023), of which 2,723,514 were women and 2,765,470 men. According to data from the Norwegian Statistical Office - Statistisk Sentralbyrå, in the first quarter of 2023, the total population of Norway increased slightly and amounted to 5,504,329 people (data from May 16, 2023) [8].

Cancer is a fairly common medical and social problem for this population in Norway. In 2020, 35,515 new cancer cases were diagnosed, including 19,223 among men and 16,292 among women. Statistics from 2020 indicate that there were a total of 305,503 people of both sexes diagnosed with cancer, and 10,981 people died from it. Although a higher incidence of cancer can be observed every year, favorable epidemiological trends are also observed in the form of a decrease in the mortality rate and an increase in the survival rate of patients with certain types of cancer [9].

Analyzing the causes of malignant tumors among the Norwegian population, it can be concluded that there are many predictors determining the process of carcinogenesis. The increased incidence of cancer is mainly related to the unfavorable effects of civilization progress as well as an inappropriate lifestyle. Nevertheless, an important negative carcinogenic factor is the aging of the Norwegian population. The increasing number of oncological diagnoses is commensurate with the pace of population aging and is associated with greater susceptibility to cancer in older people. In Norway, over 30,000 new cases of cancer are diagnosed every year, and forecasts say that almost every third Norwegian will be diagnosed with one form of cancer before the age of 75 [3]. In 2021, over 300,000 Norwegians were living with cancer. Despite the rather disturbing statistics regarding the increase in cancer patients in this country, the number of people living with cancer continues to increase, and in the last 10 years this number has increased by approximately 100,000 people. According to statistics, at the end of 2021, 316,145 people were living with a diagnosis of cancer, and 10,953 people died because of it [10,11]. Thanks to properly coordinated health care in this country, i.e. preventive and diagnostic activities, early diagnosis and progress in the treatment of malignant tumors, the number of people who have good and longer prospects for survival or have fully recovered is increasing. Moreover,

research on the functioning of people with cancer shows that their quality of life is getting better [3].

The National Oncology Strategy developed by the Department of Health, implemented in 2013, is currently aimed at improving the health and epidemiological situation in Norway. "*Sammen mot kreft*" (i.e. Together against cancer) [4]. This strategy, as the main goal of health policy, assumes that Norway will become a leading country in the fight against cancer, among others, thanks to the introduction of a standardized oncological package, the so-called "*pakkeforløp*". This package assumes taking actions at various levels of prevention, i.e. primary and secondary, related to improving public awareness of cancer risk factors, motivating self-control and self-monitoring of health, as well as performing screening tests for the diagnosis of various cancers [1,2,4,9].

The introduction of the strategy resulted in the creation of the "*Nasjonalt handlingsprogram for kreft*", i.e. the National Action Program for cancer patients, contributing to the improvement of standards and procedures as well as cooperation between general practitioners, other specialists and health care institutions dealing with the treatment of cancer patients. According to reports, the biggest challenge for oncological care that Norway is currently facing are the huge costs associated with treating patients, staff shortages in the health care system and unfavorable epidemiological forecasts regarding the increase in new cancer cases [1].

The structure of cancer incidence among women in Norway in 2017-2021 remained at a similar level. In these years, a total of 82,353 cancer cases were diagnosed, including breast cancer (22.2%), followed by lung cancer (10.1%) and colorectal cancer (9.8%). Other types of cancer accounted for 25.4% of the remaining cases [2].

In 2020, the five most common cancers among women in Norway, in terms of the frequency of new cases diagnosed, were as follows: breast cancer (3,424 cases), colorectal cancer (2,169 cases), lung cancer (1,627 cases), skin melanoma (1,158 cases) and uterine cancer (764 cases). The total number of all new cancer cases in this population was 16,292 people, and the total number of deaths was 5,065 cases, including 591 women died due to breast cancer [2,9].

In 2021, 4,011 new cases of breast cancer in women were diagnosed in Norway, while a year later, i.e. in 2022, 4,197 cases [12]. The incidence of breast cancer among women in 2022 per 100,000 population was 144.1 cases, and the average age of women at diagnosis was 62 years [13].

The stage of cancer advancement at the time of diagnosis is important for subsequent prognosis. In the years 2018 - 2022, breast cancer was diagnosed most often in the early stage of the disease, i.e. stage I (42.8% of women), and in stage II, III and IV in 28.9%, 9.8% and 4.4%, respectively. women. However, in 14.1% of women the stage of cancer advancement was not clearly determined at the time of diagnosis [2, 11].

It is difficult to clearly determine the causes of breast cancer among women in Norway. Just like in other countries, we can only list the most common risk factors for this cancer, which include: age, overweight or obesity during menopause, early menstruation and late menopause, lack of childbirth, alcohol abuse, low physical activity, long-term use of hormones in combination estrogens and gestagens during menopause, or previous treatment with radiotherapy in the chest area, e.g. in the case of lymphoma [2,14]. In Norway, the presence of breast or ovarian cancer in a woman's immediate family is an important predictor of this cancer, because hereditary breast cancer accounts for 5 to 10% of all breast cancer diagnoses [2].

Breast cancer in Norway is also the most common cause of death among women under 65 years of age. The increase in the number of new cases of breast cancer concerns primarily those women who were in the age covered by the mammography program, i.e. over 50 years of age (82%). The increasing incidence of breast cancer in women aged 50 to 69 is statistically significantly related to the increase in the use of hormonal drugs during menopause [1,2].

The effects of breast cancer treatment in Norwegian women are currently satisfactory, because nine out of ten women diagnosed with this cancer survive for at least 5 years after the first diagnosis [2].

Such effects of treatment of women with breast cancer in Norway may result from access to specialized clinical diagnostic and treatment centers, of which there were 17 in this country in 2022. In assessing the effectiveness of medical care for women with breast cancer in these centers, the following factors were taken into account, among others: diagnostic, treatment and reconstruction criteria. The analysis results were satisfactory, but areas that required improvement were noted. An important qualitative criterion analyzed in relation to the occurrence of breast cancer in women in Norway was the 5-year relative survival rate, where, assuming 88% and above, in 2022 the result was 92.3% [2].

According to reports from the National Cancer Registry in Norway, which deals with medical statistics and monitors the quality of oncological care, the survival rates of women with breast cancer are satisfactory. Comparing the years 2021 and 2022, assuming an 88% 5-

year relative survival rate, the result was slightly higher than expected and at the same level in the reported years (i.e., similarly, 92.3% vs. 92.3%) [2].

In order to assess the incidence and quality of oncological care for breast cancer patients in Norway, various indicators are analyzed based on the recommendations of EUSOMA - *European Society of Breast Cancer Specialists*. On their basis, it is assumed that individual goals will be achieved at various levels in three categories: transfer of medical data, performance of specialized procedures and the survival period of patients after oncological treatment. Analyzing the rate of transfer of medical information from radiology departments in 2021, the result was 75%, assuming 80% or higher. The achieved result indicates the need for improvement in this area. Providing information regarding the performance of surgical procedures was rated better - 95.7% (assumed 80% or more) and information about postoperative check-ups - 90.9% (assumed 80% or more). When it comes to indicators regarding the implementation of medical procedures in women diagnosed with breast cancer, the highest score was for the indicator for performing biopsy or cytology - 99.8% (assuming 90% or more) [13, 15]. An important factor that remains at a high level proving the good quality of oncological care for women treated for breast cancer in Norway was the relative survival rate in the period 2017 - 2021, which amounted to 92.3% and was higher than the lowest accepted level of 88%. [15,16,17,18,19].

The implementation of the mammography screening program in 1995 had a significant impact on improving the health situation of women regarding breast cancer in Norway. During the implementation of the program, a total of 6.3 million invitations were sent to women aged 50-69, and 4.7 million screening tests were performed on approximately one million of them. Performing 150,000 additional tests allowed for the detection of approximately 26,000 new cancer cases, of which: 4,500 were at the stage of Ductal Carcinoma in situ (DCIS) and 21,800 were at the stage of invasive cancer [20].

According to the Norwegian Breast Cancer Screening Program, participation in mammography does not provide complete certainty in diagnosing all cases of cancer in women, and the disease may appear between one and the next examination, hence it is recommended to perform these tests in women, similarly to Poland, which two years. Even though no pathological changes were detected in a mammogram in Norway, it is recommended to visit a specialist if women notice disturbing symptoms or ailments that may suggest cancer. However, the most important task in the field of breast cancer prevention is to perform mammography in as many women as possible due to the fact that early diagnosis of

cancer allows for effective treatment and thus significantly reduces the number of deaths due to breast cancer among women aged 50-69. [1,21,22,23,24,25,26].

The incidence of breast cancer in women in Norway in 2017–2019, 2020 and 2021 in relation to three age ranges, i.e. up to 49 years, 50-69 years and over 70 years of age, is presented in Figure 1. Women between 50 and People aged 69 and over who developed breast cancer were divided into two groups, i.e. those with symptoms but not participating in the mammography program and those without symptoms but participating in the screening program (Fig. 1) [15].

In 2021, 512 more cases were found in women aged 50-69 years covered by the mammography program and 37 more cases in women not covered by this program compared to 2020 (Fig. 1). Comparing the average from 2017 to 2019 regarding the occurrence of breast cancer in women aged 50-69, 189 more new cases of this cancer were diagnosed in women covered by the mammography program and by 107 in women not using the preventive program (Fig. 1) [15].

The analysis of Årsrapport data shows that in 2021, 666 more cases of pre-invasive and invasive breast cancer were diagnosed in women compared to 2020. In 2021, the number of women who reported for preventive mammography was 221,208 and was much higher compared to by 2020, when it was performed in 172,217 women (there were 48,991 more cases). In the period 2017-2019, an average of 223,058 women benefited from mammography per year [16].

In 2020, Norway recorded a decrease in the number of breast cancer cases in women, which was undoubtedly influenced by the Covid-19 pandemic. Due to the pandemic, the diagnostic activities of medical centers in this country were temporarily suspended. In 2021, there was a clear upward trend in new cases of breast cancer in women detected on the basis of mammography (Fig. 1). This was mainly due to the fact that, in order to compensate for the reduction in the number of preventive tests performed during the Covid-19 pandemic, more invitations for mammography were sent to women in 2021 than usual. However, due to the specific capacity of breast cancer diagnostic centers, the period of carrying out these tests has been significantly extended [1,15].

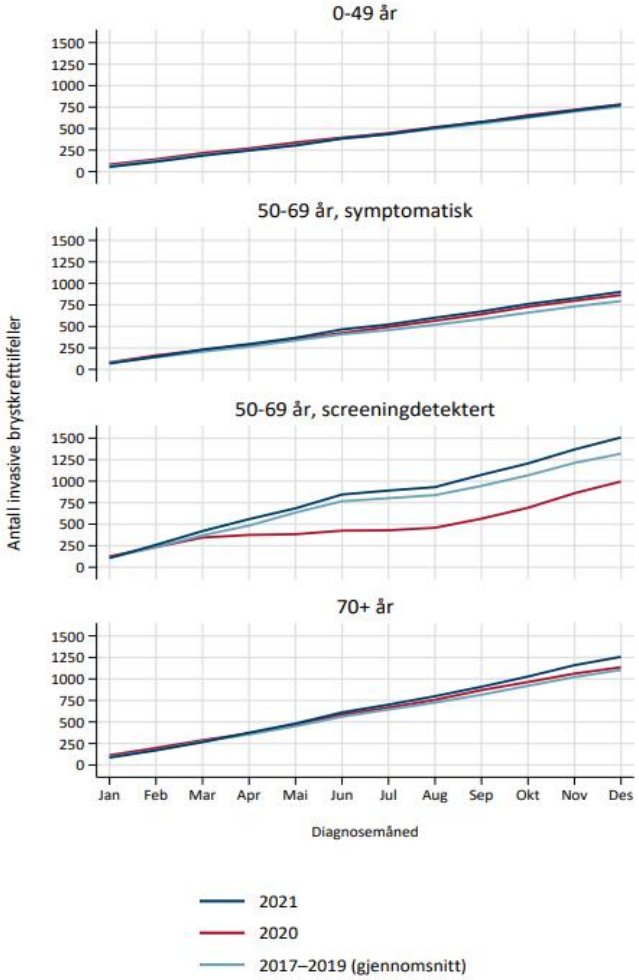

Fig. 1. Cumulative incidence of invasive breast cancer and DCIS in women in Norway in 2017-2019,2020,2021 [15]

The epidemiological situation is different for younger women, i.e. up to 49 years of age, who developed breast cancer in 2017–2019, 2020 and 2021 and, due to their age, were not covered by the preventive mammography program. Epidemiological data show that in 2021, the incidence of pre-invasive and invasive breast cancer in women under 50 years of age was almost at the same level as in 2020 and on average in 2017–2019 (Fig. 1). In women aged 70 and over, there were 121 more cases of the disease in 2021 than in 2020 and 152 more new cases than on average in the years 2017–2019 (Fig. 1) [15].

According to Årsrapport data from 2021, in Norway there was an increase in the incidence of breast cancer in women confirmed by mammography compared to 2020 (Fig. 2). For women over 50 years of age with symptoms of breast cancer, a slight increase in the incidence was observed compared to 2017–2019. This trend with an overall increase in the incidence rate has been visible for over the last 10 years [15].

The total number of cases of pre-invasive and invasive breast cancer among the female population in 2017-2019, 2020, 2021 was as follows: 3,976, 3,779 and 4,445 cases of new

cases. Analyzing the incidence of breast cancer among women participating in the mammography program in 2017-2019, it was found that on average there were 1,371 new cases per year, 1,023 in 2020, and 1,544 cases in 2021. The group of women who suffered from breast cancer but had not previously undergone mammography examinations and whose diagnosis was caused by clinical symptoms in 2017–2019 included an average of 2,605 women in 2017, 2,756 in 2020, and 2,901 in 2021. The analysis of statistical data shows that the largest group of women who developed breast cancer and experienced clinical symptoms of the disease in 2021 were patients aged 70 years and over (n=1,257). It should be noted that this group was excluded from screening tests due to age (Fig. 2) [15].

Gruppe	Antall 2021	Antall 2020	Gjennomsnitt antall per år 2017-2019
Totalt	**4445**	**3779**	**3976**
0-49 år	778	782	757
50-69 år	2410	1861	2115
70+ år	1257	1136	1105
Screeningdetektert	**1544**	**1023**	**1371**
0-49 år	3	21	22
50-69 år	1508	996	1319
70+ år	33	6	30
Symptomatiske	**2901**	**2756**	**2605**
0-49 år	775	761	735
50-69 år	902	865	795
70+ år	1224	1130	1074

Fig. 2. Number of women diagnosed with invasive and pre-invasive breast cancer in women in 2017-2021 in Norway [15]

Scientific research in Norway also examines the issues of danger resulting from the emission of X-rays and their adverse effects on the body during mammography. According to these studies, they may theoretically pose a risk of developing breast cancer, but the risk is very small when women routinely participate in this type of research. However, the benefits resulting from the population dimension of these tests are much higher than the risks, so mammography as a diagnostic method for breast cancer prevention is most desirable [27].

Conclusions

1. Introduction of a standardized oncology package, the so-called „*pakkeforløp*", including mammography examinations, increased the chance of diagnosing and treating breast cancer in women in Norway at an early stage of its development, and thus improving the effects of treatment visible on the basis of 5-year survival rates.
2. It should be emphasized that the number of deaths due to breast cancer in women using the preventive mammography program, i.e. aged 50-69, decreased significantly, which

indicates the effectiveness of the population screening program. This effectiveness is also largely influenced by the high participation of women in these studies.

3. EUSOMA recommendations indicate the importance of increasing the effectiveness of oncological treatment as an important element in assessing the quality of medical care for patients with breast cancer.
4. In Norway, despite the preventive measures implemented and their effectiveness, a further increase in the number of cases of breast cancer in women is forecast. This situation results, among other things, from the intensification of civilization risk factors for this cancer and the aging of society. Therefore, there is a need to further intensify activities in the field of phase I and II prevention aimed at reducing the severity of risk factors and early diagnosis of breast cancer.

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