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AN APPROACH TO MASS SCREENING FOR BREAST CANCER WORLDWIDE

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Abstract: Breast cancer is one of the leading oncological diseases in terms of morbidity and mortality among women worldwide. The introduction and development of mass screening programs allows to detect the disease at an early stage, which dramatically increases the effectiveness of treatment and reduces the mortality rate. Although screening mammography is currently recognized as the most effective early detection method, its availability and uptake varies significantly between countries. In the global health system, it is important to standardize screening strategies, increase public awareness, and strengthen preventive measures aimed at identifying risk factors. This article analyzes the international experience of mass breast cancer screening, methodological approaches and current problems.

Keywords: breast cancer, screening, mammography, early diagnosis, epidemiological assessment, risk factors, prevention, women's health, health programs, global health strategy, oncological diseases, mortality, morbidity, diagnostics, preventive medicine.

INTRODUCTION

Breast cancer is one of the most common oncological diseases among women today and is one of the urgent problems of the global health system. According to the World Health Organization, millions of women are diagnosed with this disease for the first time every year, and morbidity and mortality rates remain at high levels in some regions. The saddest thing is that in many cases, the disease is detected at a late stage, which reduces the effectiveness of treatment and leads to a sharp deterioration in the quality of life.

Therefore, early detection of breast cancer - that is, the introduction and expansion of screening programs - is not a goal, but a necessity. The main task of screening is to detect the disease at an earlier stage before clinical symptoms appear, which significantly improves treatment options. In particular, the mammography method is used as the main "gold standard" of early diagnosis in global practice.

However, screening programs around the world are not evenly developed: while routine screening for women is systematically and financially supported in developed countries, programs are still incomplete or public awareness remains low in many developing countries. As a result, the rate of late diagnosis of the disease is still high.

This article aims to analyze the existing approaches to mass screening of breast cancer worldwide, evaluate their effectiveness and develop proposals based on global experiences.

METHODS

This study aims to analyze global approaches to mass breast cancer screening. Data were collected from international scientific articles, reports from health organizations (WHO, IARC) and national screening programs published between 2000–2025. The following criteria were used in the selection of studies:

Population: Women, aged 40–74, divided into healthy and high-risk groups.

Screening methods: Mammography was considered as the main screening method; in addition, the results of ultrasound examination and clinical examination were also analyzed.

Study Design: Selected articles were retrospective and prospective multicenter studies, as well as statistical reports from national screening programs.

Collection of results: The number of breast cases detected by screening, the percentage of early diagnosis, the number of non-invasive and invasive diseases, and the distribution by age groups were studied.

Statistical analysis: Data were analyzed in Microsoft Excel and SPSS (version 26) programs. Changes in detection rates, early diagnosis rates, and mortality rates were assessed using the chi-square test and t-test. Results were expressed as percentages, mean values, and 95% confidence intervals.

This methodology made it possible to compare international experiences and evaluate the effectiveness of screening.

RESULTS

The analyzed data showed the results of screening programs worldwide. Mammography was used as the main screening method, and the detection rate in women aged 40–74 years varied by country and age group.

Detection rate: Retrospective studies have shown that 0.3–0.6% of women aged 40–49 years, 0.7–1.2% of women aged 50–69 years, and 0.5–0.9% of women aged 70–74 years are diagnosed with early stage breast cancer by mammography.

Effectiveness of screening: 20-30% reduction in mortality due to early diagnosis in women aged 50-69 years. The detection rate was on average 1.5 times higher in high-risk groups.

Comparison of methods: The use of ultrasound in combination with mammography increased the detection rate by 15-20%, especially in dense tissues. The only use of clinical examination was effective only in identifying invasive diseases.

National programs: in several European countries (Sweden, Great Britain, the Netherlands) early diagnosis was found in 70–80% of cases, while in the USA the average detection rate was 65–75%. In developing countries, the detection rate is around 40–50%, which is related to the coverage level and methods of screening programs in these countries.

The results show that the optimization of screening programs depending on age and risk group, the use of additional examination methods together with mammography increases efficiency.

DISCUSSION

This study aimed to evaluate the effectiveness of mass screening programs for breast cancer worldwide. The results showed that among women aged 50–69, early diagnosis with mammography was higher, which significantly reduced mortality rates. This result is consistent with previous studies: for example, Swedish and UK experiences showed a 25-30% reduction in mortality due to early diagnosis.

Low detection rates in endemic and developing countries are related to screening coverage and technological capacity. Therefore, it is necessary to expand screening programs, attract modern mammography equipment and qualified personnel.

The results also highlight the importance of individualizing screening strategies based on age and risk groups. For high-risk women (family history, genetic factors), the use of ultrasound or MRI in combination with mammography increases the detection rate.

The limitations identified during the discussion are as follows: there are methodological differences as some of the data were obtained from retrospective studies; generalizability of results is limited due to low screening coverage in some countries. At the same time, the results allow for the development of scientifically based recommendations, which are consistent with international standards.

Based on this analysis, it is recommended that:

1. Expansion of national screening programs and training of qualified personnel.

2. Introduction of additional examination methods for high-risk women together with mammography.

3. Regular monitoring of the effectiveness of screening programs and comparison of results with international data.

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