Med Clin (Barc). 2015;144(4):156–160

MEDICINA CLINICA

www.elsevier.es/medicinaclinica

Original article

Breast cancer incidence related with a population-based screening programme☆

Carmen Natal[a,*], Martín Caicoya[b], Miguel Prieto[b], Adonina Tardón[c]

[a] Servicio de Salud del Principado de Asturias, Oviedo, Asturias, Spain
[b] Consejería de Sanidad del Principado de Asturias, Oviedo, Asturias, Spain
[c] Instituto Universitario de Oncología, Universidad de Oviedo, Oviedo, Asturias, Spain

ARTICLE INFO

Article history:
Received 19 February 2014
Accepted 24 April 2014
Available online 20 October 2015

Keywords:
Breast cancer screening
Breast cancer incidence
Overdiagnosis

ABSTRACT

Objective: To compare breast cancer cumulative incidence, time evolution and stage at diagnosis between participants and non-participant women in a population-based screening programme.
Methods: Cohort study of breast cancer incidence in relation to participation in a population screening programme. The study population included women from the target population of the screening programme. The source of information for diagnostics and stages was the population-based cancer registry. The analysis period was 1999–2010.
Results: The relative risk for invasive, *in situ*, and total cancers diagnosed in participant women compared with non-participants were, respectively, 1.16 (0.94–1.43), 2.98 (1.16–7.62) and 1.22 (0.99–1.49). The relative risk for participants *versus* non-participants was 2.47 (1.55–3.96) for diagnosis at stage I, 2.58 (1.67–3.99) for T1 and 2.11 (1.38–3.23) for negative lymph node involvement. The cumulative incidence trend had two joint points in both arms, with an Annual Percent of Change of 92.3 (81.6–103.5) between 1999 and 2001, 18.2 (16.1–20.3) between 2001 and 2005 and 5.9 (4.0–7.8) for the last period in participants arm, and 72.6 (58.5–87.9) between 1999 and 2001, 12.6 (7.9–17.4) between 2001 and 2005, and 8.6 (6.5–10.6) in the last period in the non-participant arm.
Conclusions: Participating in the breast cancer screening programme analysed increased the *in situ* cumulative cancer incidence, but not the invasive and total incidence. Diagnoses were earlier in the participant arm.

Incidencia de cáncer de mama en relación con la participación en un programa de cribado poblacional

Palabras clave:
Cribado de cáncer de mama
Incidencia de cáncer de mama
Sobrediagnóstico

RESUMEN

Objetivo: Comparar la incidencia acumulada de cáncer de mama, su evolución temporal y el estadio al diagnóstico entre mujeres participantes y no participantes en un programa poblacional de detección precoz.
Métodos: Estudio de cohortes de incidencia de cáncer de mama en relación con la participación en un programa de cribado poblacional. La población de estudio fueron mujeres de la población diana del programa, y la fuente de información para los diagnósticos y estadios, el Registro poblacional de tumores. El período de análisis estuvo comprendido entre 1999 y 2010.
Resultados: Los riesgos relativos de diagnóstico de cáncer invasivo, *in situ* y total de las participantes en el programa respecto a las no participantes fueron, respectivamente, 1,16 (intervalo de confianza del 95% [IC 95%]: 0,94–1,43), 2,98 (IC 95%: 1,16–7,62) y 1,22 (IC 95%: 0,99–1,49). El riesgo relativo de participantes frente a no participantes para diagnóstico en estadio I fue de 2,47 (IC 95%: 1,55–3,96); para T1 de 2,58 (IC 95%: 1,67–3,99) y para afectación ganglionar negativa de 2,11 (IC 95%: 1,38–3,23). La incidencia acumulada tiene 2 puntos de cambio en ambos grupos, con unos porcentajes de cambio anual

☆ Please cite this article as: Natal C, Caicoya M, Prieto M, Tardón A. Incidencia de cáncer de mama en relación con la participación en un programa de cribado poblacional. Med Clin (Barc). 2015;144:156–160.

* Corresponding author.
E-mail addresses: carmen.natal@sespa.princast.es, natal.ramos.carmen@gmail.com (C. Natal).

2387-0206/

de 92,3 (IC 95%: 81,6–103,5) en 1999–2001, de 18,2 (IC 95%: 16,1–20,3) en 2001–2005 y de 5,9 (IC 95%: 4,0–7,8) en el último período en participantes, y de 72,6 (IC 95%: 58,5–87,9) para 1999–2001, de 12,6 (IC 95%: 7,9–17,4) en 2001–2005 y de 8,6 (IC 95%: 6,5–10,6) en el último período en no participantes.
Conclusiones: La participación en el programa de cribado de cáncer de mama analizado incrementa el riesgo de tener un diagnóstico de carcinoma *in situ*, mientras que no se incrementa el riesgo de cáncer invasivo. Por otra parte, los diagnósticos en este grupo se producen en estadios más precoces.

Introduction

Breast cancer is the most frequent neoplasia in women of the Western world. In 2012, it accounted for 25% of diagnosed tumours in women. Until this year, it was the first cause of tumour death among women in the world, although it has presently been surpassed by lung cancer in developed countries.[1]

Findings from classic clinical trials allow us to affirm that biennial mammography screening in women between 50 and 69 can reduce mortality between 20% and 30%.[2] Following recommendations from the scientific community and health authorities,[3,4] all the autonomous communities of Spain have early detection programmes for their populations.[5]

However, early breast cancer detection has some difficulties: one of them is the increased incidence due to overdiagnosis, which is considered by some authors to be the primary limitation of these early detection programmes.[6] In Spain, increased incidence was detected throughout the 1980s and 1990s. As of 2001, this trend was reverted in women younger than 65 years, which is believed to be a consequence of screening saturation.[7]

Overdiagnosis is defined as a cancer diagnosis that never would have been clinically detected without the presence of screening.[8] It is difficult to quantify overdiagnosis, and in population programmes it varies from 1%[9] to 50%.[10] Because it is currently impossible to identify without screening which breast tumours never would have presented clinical manifestations based merely on their clinical and pathological characteristics,[11] a plausible approach to this issue could be the study of incidence and stage at breast cancer diagnosis in population groups who either attend or do not attend early cancer diagnosis programmes.[12] Assuming these two groups are equal, they should have the same incidence after a period of time; if the incidence of the participating group stays high over time, it is plausible to assume that this would partly be due to cancers that would never have been clinically detected.

The objective of the study was to compare the trend of breast cancer incidence proportion, stage at diagnosis, and the evolution over time between women participating and not participating in the Early Breast Cancer Detection Programme (Programa de Detección Precoz de Cáncer de Mama, PDPCM) of Asturias.

Materials and methods

This is a retrospective cohort study of breast cancer incidence correlated with participation in a population screening programme.

The study population was women targeted by the PDPCM in 1999, who had not received any invitation to participate in the programme since December 31, 2005. Women who continued to receive invitations from that date on, with the purpose of controlling the early diagnosis made in the early detection programmes, were excluded.[13,14] Women who fulfilled these conditions were between 60 and 65 years of age at the beginning of follow-up.

In Asturias, the PDPCM began in 1991 and was progressively extended until it reached a complete coverage of the population in December 1999. The target population until 2005 consisted of female residents of the autonomous community aged between 50 and 64 years. The performed screening included a biennial mammography with double projection in the initial series and single projection in subsequent series. Even though the programme recommends double reading of all the studies, its implementation has been irregular. The invitation to participate was made through personalised letters with an appointment reservation and the option to change. A reminder was sent to those women who did not go to the first appointment. The main results of the programme have been previously published.[15,16]

Breast cancer diagnoses were obtained from the population register of tumours in Asturias, with dates of diagnosis prior to December 31, 2010. ICD-O C500 to C509 codes were included.[17] Lobular carcinoma *in situ* were excluded. The population registry of tumours in the Principality of Asturias started in 1982 and its sources of information are all the hospitals in the autonomous community.

The women who were invited and who attended at least one of the appointments were defined as participants, and those who received at least one invitation but never attended the appointment or those who never received any invitation were defined as non-participants.

The diagnoses in the group of participants included: those detected during the programme, those occurred during the interval and those cases occurring once participation had concluded.

Cumulative incidence and invasion at diagnosis were analysed in both groups (participants and non-participants) with the following variables: tumour type (invasive or *in situ*), tumour size, lymph node involvement and stage, the latter following the classification criteria of the *American Joint Committee on Cancer*.[18]

The trend of the cumulative incidence between participants and non-participants was analysed depending on tumour type (invasive or *in situ*). To study the cumulative incidence trend and to detect the existence of changing points during the period, we used Poisson segmented regression models and implemented specific software provided by the *Surveillance Research Program* of the U.S. National Cancer Institute. In addition, this provides the annual percentage change (APC) of rates in each section defined with a 95% confidence interval (95% CI). The APC describes the proportion of increase or reduction in rates by time unit.

Results

The study included 14,863 women, 59.3% of which had participated at least once in the PDPCM.

During the study period, 417 breast cancers were diagnosed (388 invasive and 29 *in situ*) in a total of 14,863 women. In the group of participating women, 260 cases were diagnosed with breast cancer (238 invasive and 22 *in situ*), and in the group of women who did not participate, 157 were diagnosed with cancer (150 invasive and 7 *in situ*). The proportion of diagnoses in the first screening was 68.1% (63.6% for carcinoma *in situ* and 68.5% for invasive cancer).

Table 1 shows the distribution of the population by age group and by breast cancer diagnosis based on participation in the screening programme.

Table 2 shows the cumulative incidences of invasive cancer, *in situ* and total, in relation to participation and adjusted for age, as well as the relative risks (RR) for the group of participants compared