

Psychosocial consequences of false-positive results in screening mammography

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ABSTRACT

Introduction: To evaluate the psychosocial impact of benign breast biopsies on Lebanese women after a screening mammography and the effect of these biopsies on patients' attitudes toward subsequent screening. **Methods:** In this retrospective study (January 2005 till April 2011), 109 consecutive patients with a history of breast biopsy without cancer were asked to answer a phone questionnaire. The response rate was 91.7% (100 women accepted to participate). A questionnaire about sociodemographic characteristics, biopsy characteristics, and patients' attitudes as measured by the negative Psychosocial Consequences Questionnaire (PCQ) and other independent questions was filled by phone call by one interviewer. **Results:** The negative PCQ score was low for most women (only 9% have a negative PCQ score $\geq 18/36$) and is statistically dependent on the result of the last mammography ($P = 0.01$) and the number of previous benign breast biopsies ($P = 0.01$). A total of 10% of women increased their medical visits after this biopsy, 8% were treated for psychiatric problems after this biopsy, and 19% self-examine their breasts more than once per week. The benign breast biopsy experience increases the willingness to adhere to the screening mammography in 71% of the patients, this reported adherence depends positively on the score of the negative PCQ ($P = 0.043$). **Conclusions:** The negative psychosocial effect of the biopsy is minimal in general and is positively correlated to the adherence to future mammographies. Interventions are necessary to decrease the anxiety in most susceptible women and to raise the awareness of women at risk of nonadherence to the screening mammography.

Keywords: Biopsy, breast neoplasms, mammography

Introduction

The mortality attributed to breast cancer, the most common noncutaneous cancer in women, has decreased worldwide since the institution of mammography as a preventive test.^[1,2] The American Cancer Society recommends an annual mammography between the ages of 40 and 75 years and it was estimated in 2005 that 70% of women in the US between 40 years and 65 years of age had a mammography in the past 2 years.^[1]

However, mammography is not free of side effects. The United States Preventive Services Task Force has stated that negative consequences of mammography could outweigh the benefits in some cases.^[1,3] These negative consequences, sometimes unknown or not explained to the patient,^[4] are partially related to false-positive mammography.^[1,3] A false-positive result refers to any mammographic result requiring supplemental imaging or biopsies to eliminate the diagnosis of cancer.^[5] In the US, 10% of mammographies lead to false-positive results, and nearly half of the women having had 10 mammographies will be faced with a false-positive result with an absolute risk of 18.6% of biopsy.^[6] Consequently, many women will have to wait for

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the correct diagnosis, an experience thought to be traumatic by many experts.^[7-9]

Studies from Europe, America, and Australia report the effect of mammography on psychosocial aspects. No study in eastern populations or in Lebanon has explored the negative effect of false-positive mammography. National recommendations supported by the Ministry of Public Health state that every healthy Lebanese woman should have an annual mammography starting age 40.^[10] It is therefore essential to evaluate the impact of false-positive mammography results on Lebanese women. The objective of this study is to evaluate the psychosocial impact of benign breast biopsies on Lebanese women after a screening mammography and to describe the effect of these biopsies on the attitude toward breast cancer screening.

Methods

Recruited female patients from the pathology registry of Hôtel-Dieu de France hospital had the following inclusion criteria: the experience of at least one benign breast biopsy after screening mammography, biopsy date between January 2005 and April 2011. The term «biopsy» in this study includes nonsurgical (aspirations, needle biopsies) as well as surgical biopsies. Exclusion criteria were: a history of malignant biopsy in the pathology register or during the study period, women more than 75 years of age during the mammography, any biopsy following a diagnostic mammography.

Ethical aspect

The study received the approval of the institutional review board of the hospital. All interviews were done after oral approval of the patient.

Questionnaire and variables

The questionnaire was administered by phone during the month of August 2011. It includes 54 questions in Arabic, open or closed-ended, most using a Likert scale of 4. These questions target in the first part the sociodemographic [Table 1], medical [Table 2], and screening characteristics [Table 3] of patients. The questionnaire then evaluated the psychosocial state of the patient after a benign breast biopsy with a validated tool, the Negative Psychosocial Consequences Questionnaire or negative PCQ.^[11] This tool [Table 4] measures each of the negative emotional, physical, and social scores after a benign breast biopsy. The addition of these three scores gives the total negative psychosocial score. The PCQ can measure the short term psychosocial changes (less than 1 month after eliminating cancer diagnosis according to Brewer *et al.*^[5] and less than 3 months according to Broderson^[12]). It also measures the long-term psychosocial changes after a screening mammography (more than 1 month after refuting the diagnosis of cancer according to Brewer^[5] or 3 months according to Broderson^[12]), and it has been used with this end in view in many articles.^[12] An Arabic translation of the negative PCQ was performed by

Table 1: Demographic characteristics of the sample

| Demographic characteristics | Number | Mean/Percentage |
|-----------------------------|--------|-----------------|
| Age (years) | 100 | 51.42 |
| Education | 98 | % |
| Primary | 6 | 6.12 |
| Complementary | 16 | 16.33 |
| Secondary | 23 | 23.47 |
| Technical | 2 | 2.04 |
| University | 51 | 52.04 |
| Marital status | 100 | % |
| Single | 14 | 14.00 |
| Married | 83 | 83.00 |
| Widow | 3 | 3.00 |
| Number of children | 99 | % |
| 0 | 17 | 17.17 |
| 1 | 8 | 8.08 |
| 2 | 23 | 23.23 |
| 3 | 34 | 34.34 |
| 4 | 12 | 12.12 |
| 5 | 3 | 3.03 |
| 6 | 2 | 2.02 |
| Work | 97 | % |
| No | 54 | 55.67 |
| Yes | 43 | 44.33 |
| Religion | 99 | % |
| Christian | 82 | 82.83 |
| Druze | 2 | 2.02 |
| Muslim | 15 | 15.15 |
| Practice of Religion | 99 | % |
| No | 4 | 4.04 |
| Yes | 95 | 95.96 |

Table 2: Medical characteristics of the sample

| Medical characteristics | Number | % |
|--|--------|--|
| Other cancer | 97 | |
| No | 92 | 94.95 |
| Yes | 5 | 5.15 |
| Family history | 100 | |
| No | 68 | 68.00 |
| Yes | 32 | 32.00 |
| 1 st degree parent with breast cancer | 15 | 46.66 of those who have a family history |
| Health | 100 | |
| Very good | 53 | 53.00 |
| Good | 26 | 26.00 |
| Average | 18 | 18.00 |
| Bad | 3 | 3.00 |
| Insurance | 100 | |
| No | 13 | 13.00 |
| Yes | 87 | 87.00 |
| Type of insurance | 87 | |
| Army | 1 | 1.15 |
| Private insurance | 39 | 44.83 |
| Private insurance + Social security | 11 | 12.64 |
| Private insurance + Mutuelle | 1 | 1.15 |
| Social Security | 16 | 18.39 |
| Mutuelle | 11 | 12.64 |
| Others | 14 | 16.10 |

one mental health specialist. The negative PCQ was translated back by another mental health specialist to English to ensure the validity of the translation. Our questionnaire also included questions about the number of medical visits after the biopsy, the history of depression and anxiety after a benign breast biopsy and the estimation of the personal and other women's risk of breast cancer.^[13] Other questions suggested by Lerman's article [Table 5] are included in the questionnaire measuring psychosocial consequences in a different way.^[14] The last part of the questionnaire included the patient's perception of the efficacy of mammography after her experience,^[13,14] the patient's attitude toward further mammography screening, and her tolerance to the disadvantages of screening mammography.^[3]

Table 3: Screening characteristics of the sample

| Screening characteristics | Number | Mean | Standard deviation |
|----------------------------------|--------|-------|--------------------|
| Number of mammographies | 99 | 6.39 | 5.20 |
| Date last mammography (months) | 100 | 8.82 | 8.10 |
| Number of biopsies | 100 | 1.83 | 1.25 |
| Date of the last biopsy (months) | 100 | 31.99 | 19.10 |
| Surgical Biopsy | 100 | 52% | |
| Result of last mammography | | | |
| Suspect | 24 | 24.48 | |
| Benign | 14 | 14.28 | |
| Normal | 61 | 61.24 | |
| Annual breast clinical exam | | | |
| No | 21 | 21.21 | |
| Yes | 78 | 78.79 | |
| Medical advice for mammography | | | |
| No | 6 | 6.06 | |
| Yes | 93 | 93.94 | |

Sample size calculations

A sample of 100 females was targeted to allow for adequate power for bivariate and multivariate analyses to be carried out according to the Epi info sample size calculations with a population size of 1.5 million women in Lebanon, a 7% expected frequency of false positive mammography results^[6,15] and a 95% confidence limits.^[16]

Statistical analysis

Stata version 11 was used for statistical analysis. The analysis was done in January 2012. The Student's *t*-test and the Chi-square test were used to compare means and distributions respectively. The normality of variable distributions was verified. If the variables studied did not follow a normal distribution, the comparison of means and percentages was done with nonparametric tests. The bivariate analysis of variables affecting the negative PCQ score and the willingness to adhere has been done. Variables associated with these outcomes at a significance level of 0.2 were analyzed in a multivariate backward stepwise analysis. Alpha was fixed at 0.05. A *P* value of less than 0.05 was considered as significant.

Results

A total of 100 women answered the questionnaire (rate of response of 91.7%). 58% of women in our sample had a negative PCQ score of zero, which means that they did not present any negative psychosocial changes. The mean negative PCQ score is 4.97 ± 7.50 out of a total of 36. only 9% had a score superior to 16/33 which indicates substantial psychosocial changes. According to the subscores of the negative PCQ [Tables 4 and 5],

Table 4: The Negative PCQ

| Over the last week, how often have you experienced the following things because of thoughts and feelings about breast cancer? | Not at all (0) | Rarely (1) | Some of the time (2) | Quite a lot of the time (3) |
|---|----------------|------------|----------------------|-----------------------------|
| (P) Had trouble sleeping | | | | |
| (P) Experienced a change in appetite | | | | |
| (E) Been unhappy or depressed | | | | |
| (E) Been scared and panicky | | | | |
| (E) Felt nervous or strung up | | | | |
| (E) Felt under strain | | | | |
| (S) Found you have been keeping things from those who are close to you | | | | |
| (S) Found yourself taking things out on other people | | | | |
| (S) Found yourself noticeably withdrawing from those who are close to you | | | | |
| (P) Had difficulty doing things around the house which you normally do | | | | |
| (P) Had difficulty meeting work or other commitments | | | | |
| (E) Felt worried about your future | | | | |

E: Emotional, P: Physical, S: Social

Table 5: Negative PCQ scores

| Mean score (PCQ) | Number | Mean | Standard deviation | Min | Max | Total possible score |
|--------------------|--------|------|--------------------|-----|-----|----------------------|
| Negative Emotional | 100 | 3.42 | 5.29 | 0 | 15 | 15 |
| Negative Social | 100 | 0.42 | 1.30 | 0 | 6 | 9 |
| Negative Physical | 100 | 1.13 | 2.91 | 0 | 12 | 12 |
| Negative PCQ | 100 | 4.97 | 7.50 | 0 | 29 | 36 |

Number: Number of patients; Mean: Mean score of each part of the PCQ. Min: Minimal score obtained by the patients in each PCQ category. Max: Maximal score obtained by patients in each PCQ category. Total possible Score: Addition of maximal score in each part. Negative PCQ Score: Negative emotional+negative social score+negative physical score

Table 6: Psychosocial effet according to the qualitative questions of Lerman

| Thoughts about Breast Cancer | Number | Percentage |
|------------------------------|--------|------------|
| Worry | | |
| Frequently | 28 | 28.28 |
| Often | 17 | 17.17 |
| Rarely | 15 | 15.15 |
| Never | 39 | 39.4 |
| Affect humor | | |
| Frequently | 10 | 10.1 |
| Often | 6 | 6.06 |
| Rarely | 7 | 7.07 |
| Never | 76 | 76.76 |
| Affect daily work | | |
| Frequently | 9 | 9.09 |
| Often | 6 | 6.06 |
| Rarely | 5 | 5.05 |
| Never | 79 | 79.79 |

negative psychological changes are much more significant than social or physical changes. The psychosocial changes due to thoughts about breast cancer were also evident in the answers to Lerman's questions [Table 6].

The estimated personal risk of breast cancer perceived by the participants averaged 37% while that of other women 38.2%. Nearly, half of the women (47%) estimated that their risk was equal to the risk of other women. 8% of these women were treated for psychological or psychiatric problems after their biopsy experience but the exact nature of the problem was not explored. Also, 10% of the women increased their medical visits after the breast biopsy. While 51% of women never examined their breasts, 21% examined them once per month, 9% once per week, and 19% more frequently after they had their biopsy.

A total of 94% of the women still consider that mammography is an efficient way of screening for breast cancer. All women considered that the price to pay to save one life from breast cancer death is tolerable. 71% of women declared that the experience of breast biopsy encouraged them to have further annual mammography more systematically, 20% did not change their adherence, 8% thought that their personal experience decreased their mammography adherence in the year that followed, and 5% thought that this experience has decreased their mammography adherence in the long term.

There is a significant correlation in bivariate analysis between the negative PCQ and the three qualitative questions used by Lerman [Table 7]. The number of biopsies performed ($P = 0.01$), as well as the result of the last mammography ($P = 0.01$), were the most significant predictors of the amount of psychosocial distress according to the negative PCQ in multivariate analysis [Table 8].

The bivariate and multivariate analyses of the adherence are represented in Table 9. The multivariate analysis of the adherence

Table 7: Bivariate association between the negative PCQ score and demographic, medical, psychosocial and screening characteristics

| Demographic and screening characteristics | Negative PCQ Mean | SD | Neg PCQ P |
|---|-------------------|-------|-----------|
| Age | 4.97 | | 0.09 |
| Religion | 4.97 | | 0.08 |
| Result of the last mammography | | | 0.02 |
| Suspicious | 4.79 | 6.06 | |
| Benign | 12.43 | 11.20 | |
| Normal | 3.38 | 6.01 | |
| Number of biopsies | | | 0.02 |
| 1 | 2.69 | 5.67 | |
| 2 | 5.61 | 7.64 | |
| 3 | 10.63 | 9.61 | |
| 4 | 18 | 9.85 | |
| 5 | 5 | 0 | |
| 8 | 7 | 9.90 | |
| Date of the last biopsy | | | 0.02 |
| 1 st 50% | 6.74 | 1.23 | |
| 2 nd 50% | 3.20 | 0.80 | |
| Psychosocial and screening effects | Negative PCQ Mean | SD | Neg PCQ P |
| Worry about Breast Cancer | | | 0.002 |
| Frequently | 10.04 | 9.62 | |
| Often | 4 | 6.61 | |
| Rarely | 5.13 | 6.79 | |
| Never | 1.82 | 3.88 | |
| Worry affects Humor | | | 0.0008 |
| Frequently | 11.7 | 10.6 | |
| Often | 14.67 | 11.60 | |
| Rarely | 9.14 | 6.94 | |
| Never | 3 | 5.33 | |
| Worry affects daily work | | | 0.0003 |
| Frequently | 13 | 10.37 | |
| Often | 14.67 | 11.60 | |
| Rarely | 9.80 | 6.50 | |
| Never | 3.08 | 5.42 | |
| Increase in medical visits after the biopsy | | | 0.028 |
| Yes | 10.70 | 9.25 | |
| No | 4.21 | 6.82 | |
| Adherence to mammography | | | 0.057 |
| Yes | 5.94 | 8.03 | |
| No | 5.45 | 1.83 | |

Only variables with $P < 0.1$ are presented; P significant if $P \leq 0.05$. SD: Standard Deviation

shows that the negative PCQ is the only significant predictor of adherence to mammography ($P = 0.043$).

Discussion

The psychosocial distress measured by the negative PCQ score is of small clinical significance for the majority of participants. This distress depends on the history of breast cancer screening of each woman since the multivariate regression showed that the number of biopsies and the result of the last mammography explained on their own 49% of the variability of the negative PCQ. This

result is very important in our point of view since the study of these two variables allows a rapid detection of patients who could present high levels of psychological distress. In fact, our results show that the amount of psychosocial distress increases initially with the increase in the number of biopsies in accordance with the results found by Lebel *et al.*^[17] and Kahn *et al.*^[18] The more the patient is having breast biopsies the more she feels anxious compared to other women: this could be explained by the accumulation of negative feelings already established from previous experiences.^[18] However, the amount of distress felt by the patients in our study began decreasing after the 4th biopsy, which explains that there is probably a mechanism of tolerance to the stress experienced during the biopsy. This result needs to be verified in future larger studies. On the contrary, the negative PCQ score is higher when the result of the last mammography done is benign, while this score is lower when the result is still suspicious. The presence of a benign breast disease can create

an underlying fear from a possible cancer due to benign lesions, a fear that is even stronger than what the patient shows when a result is still suspicious. According to the above analysis, women who present a benign breast disease and/or those who have had less than four biopsies should be most supported during their screening mammography to decrease the risk of negative psychosocial effects.

The psychosocial distress did not depend on the demographic factors in our study, whereas younger women,^[19-22] those less educated,^[19,22] those who lived in an urban region and those who had one or no children^[19] had more anxiety than others according to the literature. This distress does not depend on the medical factors analyzed: the family history of breast cancer, in particular, did not contribute to a significant psychosocial change, contrary to the results found by many authors like Lerman or Lebel.^[17,23] In addition, our study does not show any relationship between the perception of the risk of breast cancer and the amount of distress, in opposition to the results found by Absetz and Andrykowski.^[4,19] The Lebanese woman seemed to be more sensitive to her personal experience rather than to other risk factors.

The reported adherence was positively correlated to the amount of psychosocial distress after a false-positive result. The adherence to the mammography in our sample increased with the increase in psychosocial distress, in agreement with the findings of Lerman *et al.*^[14] and McCaul *et al.*^[24] The psychosocial distress is, in that case, constructive; it facilitates the breast cancer screening and encourages vigilance and autoprotection by adhering to

Table 8: Multivariate association between the negative PCQ score and demographic, medical, psychosocial and screening characteristics

| Variables | Negative PCQ score | P |
|--------------------------|--------------------|---|
| Religion | 0.55 | |
| Number of biopsies | 0.01 | |
| Result last mammography | 0.01 | |
| Worry | 0.13 | |
| Affects humor | 0.80 | |
| Affects daily work | 0.19 | |
| Increases medical visits | 0.14 | |
| Adherence | 0.30 | |

Table 9: Bivariate and multivariate study of the adherence

| Variable | Adherence | | P (bivariate) | P (multivariate) |
|-------------------------------|------------|------------|---------------|---------------------------------------|
| Religious Praticce | Yes (70) | No (28) | 0.07 | 0.12 |
| Yes | 73.4 (69) | 26.6 (25) | | |
| No | 25 (1) | 75 (3) | | |
| Insurance | Yes (71) | No (28) | 0.07 | 0.06 |
| Yes | 68.60 (59) | 1.40 (27) | | |
| No | 92.31 (12) | 7.69 (1) | | |
| Nombre of biopsies | Yes (71) | No (28) | 0.07 | 0.51 |
| Mean | 1.99 | 1.43 | | |
| SD | 1.41 | 0.64 | | |
| Date of the last biopsy | Yes | No | 0.1 | 0.09 |
| 1 st 50% | | | | |
| 2 nd 50% | | | | |
| Negative PCQ | Yes (71) | No (28) | 0.06 | 0.04 |
| Mean | 5.94 | 5.45 | | |
| SD | 8.03 | 1.83 | | |
| Anxiety towards breast cancer | Yes (71) | No (28) | 0.05 | 0.51 |
| Frequently | 70.37 (15) | 39.63 (11) | | |
| Often | 94.12 (16) | 5.88 (1) | | |
| Rarely | 80 (12) | 20 (3) | | |
| Never | 58.97 (26) | 42.03 (13) | | |
| Visits post biopsy | Yes (10) | No (87) | 0.03 | Not included in multivariate analysis |
| Yes | 14.49 (10) | 85.51 (59) | | |
| No | 0 | 100 (28) | | |

P significant if P≤0.05. Only variables with P≤0.1 are represented in the table in bivariate analysis. Variable in bivariate analysis included in multivariate analysis if P≤0.1

the annual mammography. A meta-analysis by Hay *et al.* in 2006 revealed that the adherence increases with the amount of distress.^[25] This result is opposed to that of Andrykowski *et al.* in 2001,^[13] showing an increase in nonadherence with psychological distress. Breast biopsy after a screening mammography has increased the willingness to adhere reported by the Lebanese women. This attitude adopted by Lebanese women, if applied, is similar to that of the American population in the systematic review by Brewer *et al.* in 2007,^[5] whereas the Canadian population for example decreases adherence after a false-positive result.

The screening mammography remains in our study an efficient test for the detection of breast cancer in the opinion of 94% of the women who had benign breast biopsies. These women consider also unanimously that the stress endured for having hundreds of false-positive mammographies, some followed by benign breast biopsies, in order to save one person from death due to breast cancer, is worth it. Woloshin and Schwartz had already noted in a BMJ article that a third of women who were part of their study would accept more than 10 000 false-positive mammographies to avoid the death of one woman caused by a nondetected breast cancer.^[3] However, it is important to note that 9% of the women presented moderate to severe levels of distress as measured by the PCQ, while 9 to 10% have thoughts about breast cancer that affect frequently their humor and their daily work. Furthermore, 8% were treated for anxiety and depression after the breast biopsy 19% examined their breasts more than once per week, and 10% have increased their medical visits after the biopsy. This means that the biopsy is not free of psychological sequels for some of the patients; support is warranted for those who are at risk of high levels of stress notably those with benign results and many breast biopsies according to this study. As the reported adherence to the mammography increases with the amount of psychological distress after a benign breast biopsy, based on the results of this study, some stress may be benign and useful. Every breast biopsy experience that does not lead to the diagnosis of cancer constitutes what is called a “teachable moment”, a way to use the psychological distress of the patient during and after the procedure to accentuate correct ways of prevention and detection of breast cancer,^[13] such as the mammography in this case. We should not forget that having a benign breast lesion increases the breast cancer risk in those women,^[13,26] which underlines the importance of the medical follow-up in these women specifically.

Therefore, it is necessary to motivate these patients and inform them of the importance of the protection against breast cancer. Several methods are useful to sensitize the patients and increase their adherence to mammography. These women, as well as all Lebanese women, should benefit from educational sessions about breast cancer, its risk factors and the ways of prevention, so that these women understand their personal risk. Andrykowski *et al.* proposed an individual or a group directive for the development of a correct perception of the personal risk of breast cancer and the clarification of the necessary steps to detect breast cancer early.^[13] Lerman *et al.* found efficient to send

by mail educational brochures to women having had abnormal mammographies before the date of their next mammography, which increased the adherence from 53% to 66%.^[23,27] Patients should also be encouraged to personally take an appointment for the next mammography during the breast biopsy session to increase the probability of adherence to the next mammography. Since the nonadherence increases with time, some form of reminder (telephone, postal card) sent by the medical personnel before the date of the following mammography, would be helpful.^[28]

This study has some limitations. First, it is a retrospective study of the anxiety and adherence with the possibility of recall bias. Second, the PCQ has not been validated in Arabic. Thirdly, the use of the PCQ for the measure of psychosocial effects in the long term was put into question by Broderson who states that there is no clear validation of this questionnaire for the long-term effects.^[12] Moreover, our population sample is relatively small and selected from one medical center, and therefore cannot be representative of the general Lebanese population. Finally, women who refused to answer the questionnaire by telephone (9 out of 109) can have a different profile of anxiety and this can modify the results of the study.

Conclusion

Despite the evidence supporting its use, breast cancer screening by mammography is still a debatable subject worldwide. The positive or deleterious effect of breast cancer screening recommendations can vary from one population to the other. Concerning the Lebanese population, our study shows a tolerance of the Lebanese women to false positives and an increase in the adherence that follows the anxiety created by the false-positive mammography results.

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Conflicts of interest

There are no conflicts of interest.

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