

Original article

Correlation of Progesterone Receptor in Breast Cancer and Its Incidence at the Oncology Center of Imam Hussein Hospital, Karbala

Hussein Mahdi Kadhim* 

Department of Physiology, Faculty of Medicine, University of Kerbala, Kerbala city, Iraq

Email. hussain.m.kadhim@uokerbala.edu.iq

Abstract

The most frequent cancer in women, accounting for around 25% of all cancers, is breast cancer, which is regarded as universal worldwide. With an age-adjusted incidence rate of 25.8 per 100,000 women and a fatality rate of 12.7 per 100,000 women, it is also the most common cancer among females. The receptor protein present in healthy breast cells is called a hormone receptor. Progesterone aids in the development and operation of breast cells by binding to hormone receptors. If a malignancy possesses a progesterone receptor, it is referred to as progesterone receptor (PR) positive (PR+). The study results show the relationship of receptor (PR) expression with age group. This study showed that the highest expression of PR was in the second group, with 36.67% compared to the other groups. There was also a high incidence of progesterone receptor (PR) expression in the post-menopausal patients with breast cancer (65.65%) compared to pre-menopausal patients with breast cancer (34.35%). Furthermore, a high incidence of progesterone receptor (PR) expression in the obesity patients with breast cancer (45.45%) compared to overweight and normal weight (39.39% and 15.15%) patients, respectively, with breast cancer. Statistical analysis revealed that a higher incidence of non-expression (negative) count in the second and fourth age groups were about 11 (30.56 %) patients in each group compared to the other groups, while negative expression 1 was the highest incidence in the second group about 7 (36.84 %) compared to the other groups, also negative expression 2 was the highest incidence in the second and third groups about 9 (33.33 %) in each group compared to the other groups, while positive expression was the highest rate in the second group about 17 (44.74 %) patients compared to the other groups.

Keywords. Progesterone Receptor (PR), Progesterone Receptor Positive (PR+).

Introduction

The most common cancer in women, accounting for about 25% of all cancers, is breast cancer, which is thought to be universal. With an age-adjusted incidence rate of 25.8 per 100,000 women and a mortality rate of 12.7 per 100,000 women, it is also the most common cancer among females [1]. Normal breast cells contain receptor proteins called hormone receptors. Progesterone aids in the development and operation of breast cells by binding to hormone receptors. If a cancer has a progesterone receptor, it is referred to as progesterone receptor positive (PR+). This suggests that progesterone may send signals to cancer cells that could stimulate their growth, just like it does to healthy breast cells. These drugs may help slow or even stop the growth of breast cancer cells if they have hormonal receptors. These drugs may be able to slow or even halt the growth of breast cancer cells if they have hormonal receptors. Hormone therapy is unlikely to be effective if the tumor is hormone receptor negative [2].

The primary application of the biomarker PR is in the evaluation of breast cancer. For final surgical treatment, it is customary to ascertain PR status at the time of diagnosis [3]. The American Society of Clinical Oncology and the College of American Pathologists advise ER and PR testing for all newly diagnosed cases of invasive breast cancer and breast cancer recurrences because hormone receptor evaluation on surgically resected specimens or core biopsy material is crucial to determining the effectiveness of hormone therapy [4]. The assessment of breast PR receptor activity. Currently, determining the activity of progesterone receptors (PR) in breast cancer is a standard medical practice [5]. This study aimed to assess the progesterone receptor (PR) status in all breast cancer patients at the Oncology Center of Imam Hussein Hospital in Kerbala. The goal of this research was to determine the type of progesterone receptor (PR) present in all breast cancer patients who came to the Oncology Center of Imam Hussein Hospital in Kerbala.

Methods

Between February 2023 and September 2023, 120 female patients with breast cancer had their samples taken for this study at the Imam Hussein Hospital's Oncology Center in Kerbala. Following the consulting physician's diagnosis, samples were taken based on their nature, invasion, and causes. The disease has been divided into a number of kinds.

Consequently, the information gathered includes each patient's age and hormone receptor (PR) expression. PR scores between 3 and 8 are regarded as positive expressions, whereas scores below 3 are regarded as negative expressions.

Results

Receptor expression

The relationship of receptor (PR) expression with age group. This study showed that the highest expression of PR was in the second group with breast cancer (36.67%) compared to the other groups, first, third, and fourth (16.67%, 22.5%, and 24.16%), respectively. As shown in Table 1.

Table 1. Age distribution of the study participants

Age Group (Years)	Frequency (n=120)	Percentage
<40	20	16.67 %
41- 50	44	36.67 %
51-60	27	22.5 %
> 60	29	24.16 %

Comparison of progesterone receptor (PR) expressions in the women patients according to pre- and post-menopausal status.

Figure 1 shows the results indicate the presence of a high incidence of progesterone receptor (PR) expression in the post-menopausal patients with breast cancer (65.65%) compared to pre-menopausal patients with breast cancer (34.35%).

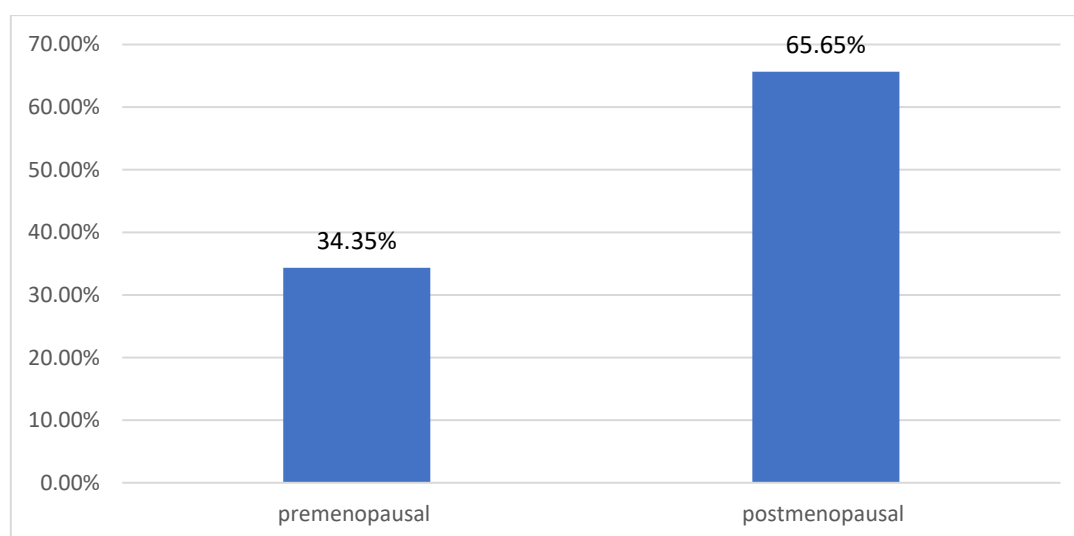


Figure 1. Progesterone receptor (PR) expression in postmenopausal groups compared with the premenopausal group.

Comparison of progesterone receptor (PR) expressions in the women patients according to body mass index (BMI).

Figure 2 shows the results indicate the presence of a high incidence of progesterone receptor (PR) expression in the obesity patients with breast cancer (45.45%) compared to overweight and normal weight (39.39% and 15.15%) patients, respectively, with breast cancer.

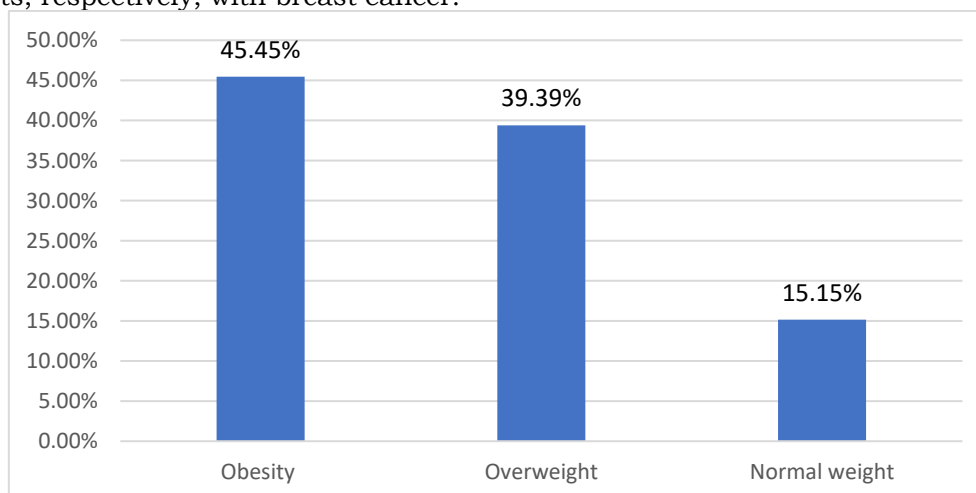


Figure 2. Percentage of progesterone receptor (PR) expression in obese, overweight, and normal weight groups.

Comparison of progesterone receptor (PR) expressions in the women patients according to diagnosis

(new diagnosis and treated).

The result in Figure 3 showed a high incidence of progesterone receptor (PR) expression in the treated group (64.64%) compared to the new diagnosis group (35.35%).

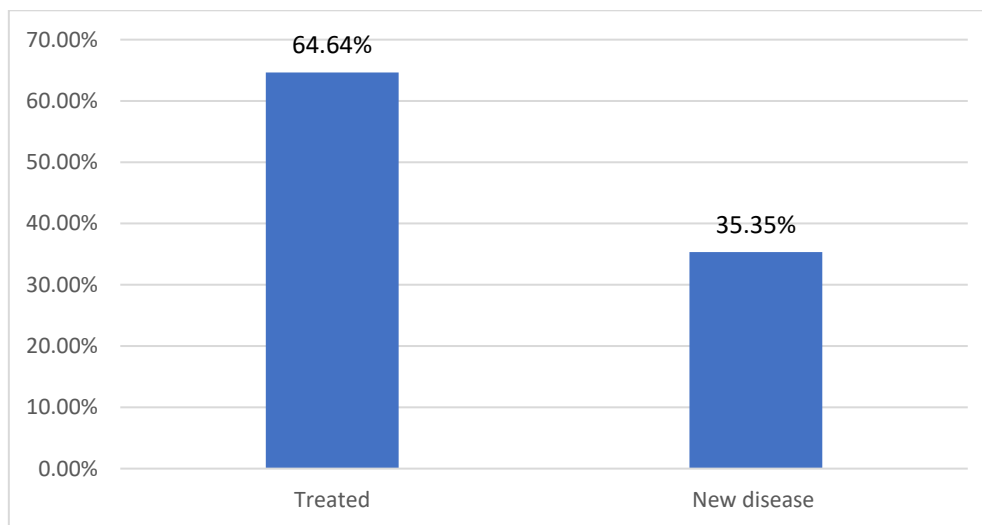


Figure 3. Percentage of progesterone receptor (PR) expression in the new diagnosis group compared with the treated group.

Progesterone Receptor expression

The association between receptor expression (PR) and age group. There was a higher incidence of non-expression (negative) count in the second and fourth age groups were about 11 (30.56 %) patients in each group compared to the other groups, while negative expression 1 was the highest incidence in the second group about 7 (36.84 %) compared to the other groups, also negative expression 2 was the highest incidence in the second and third groups about 9 (33.33 %) in each group compared to the other groups, while positive expression was the highest rate in the second group about 17 (44.74 %) patients compared to the other groups. As shown in Table 2.

Table 2. Correlation between receptor expression (PR) and age groups.

Receptor Expression	Age Groups				Total
	AGE GROUP < 40	AGE GROUP 41-50	AGE GROUP 51-60	AGE GROUP > 60	
Non-expression (Negative-) Count % within PR	6 16.66 %	11 30.56 %	8 22.22 %	11 30.56 %	36 100.0%
Expression 1 (Negative) Count % within PR	4 21.05 %	7 36.84 %	3 15.78 %	5 26.31 %	19 100.0%
Expression 2 (Negative) Count % within PR	6 22.24 %	9 33.33 %	9 33.33%	3 11.11%	27 100.0%
Expression (positive) Count % within PR	4 10.53 %	17 44.74 %	7 18.42 %	10 26.31 %	38 100.0%
Total Count % within PR	20 16.67 %	44 36.67 %	27 22.5 %	29 24.16 %	120 100.0%

Discussion**Receptor expression**

The results of the present study showed higher expression of PR was in the second age group (41-50 years) 44 (36.67 %). Our study agrees with the study by Shah [8], but this disagrees with the study performed by Bezbaruah [7] include higher expression of PR in the (51-60 years) age group.

Previous studies reported a higher proportion of PR-positive breast cancers in postmenopausal obese patients [12,14,15]. This agrees with our study, according to (figures 1 and 2), which showed a high incidence of the PR expression in the obese and postmenopausal group compared to other groups. A study conducted by Shah [8], reported that out of 317 women diagnosed with breast cancer, 133 (42%) were premenopausal, while 184 (58%) were postmenopausal. This agrees with our study according to Figure 1.

Progesterone Receptor expression

The results of the study showed a higher incidence of non-expression negative count in the second group (41-50 years) and the fourth group > 60, and this agrees with the study done by Shah [8], which also showed the highest incidence in the age group > 45, but this disagrees with the study carried out by Zheng [9].

Negative expression 1 was the highest incidence in the second group (41-50 years). This agrees with the study carried out by AlZaman [10]. Negative expression 2 was the highest rate in the second group, 41-50 years, which agreed with a study is carried out by Adel [11].

Positive expression 3 was the highest rate in the second group, studies that agreed with the present study are by Shah [8], and also agreed with the study carried out by Adel [11].

Conclusion

This single institutional study of 120 cases of breast cancer patients from Kerbala City, Iraq, suggest that mean age of breast cancer patients were between 41 and 50 years old, with PR expression positivity of 36.67% compared to other age groups, An increment of biomarker in older age gives an idea that there is a higher incidence of progesterone receptor (PR) expression in postmenopausal than premenopausal breast cancer women. Obesity is a risk factor compared to overweight and normal weight, which is represented in current results by a high level of the biomarker of progesterone receptor expression.

Acknowledgment

The author is thankful to the Department of Oncology at the Center of Imam Hussein Hospital in Karbala, Iraq.

Conflict of interest. Nil

References

1. Malvia S, Bagadi SA, Dubey US and Saxena S. Epidemiology of breast cancer in Indian women. *Asia Pac J Clin Oncol.* 2017;13(4):289–295. <https://doi.org/10.1111/ajco.12661>.
2. Breastcancer.org. Understanding hormone receptor status [Internet]. Available from: https://www.breastcancer.org/symptoms/diagnosis/hormone_status/understanding (last accessed 20/02/2020).
3. Ariga R, Zarif A, Korasick J, Reddy V, Siziopikou K and Gattuso P. Correlation of HER-2/neu gene amplification with other prognostic and predictive factors in female breast carcinoma. *Breast J.* 2005;11(4):278–280. <https://doi.org/10.1111/j.1075-122x.2005.21463.x>
4. Hammond ME, Hayes DF, Dowsett M, Allred DC, Hagerty KL, Badve S, et al. American Society of Clinical Oncology/College of American Pathologists guideline recommendations for immunohistochemical testing of estrogen and progesterone receptors in breast cancer. *J Clin Oncol.* 2010;28:2784–2795.
5. Kaul R, Sharma J, Minhas SS and Mardi K. Hormone receptor status of breast cancer in the Himalayan region of northern India. *Indian J Surg.* 2011;73(1):9–12. <https://doi.org/10.1007/s12262-010-0121-5>
6. Shukla A, Singh P, Shukla A, Mehrotra PK, Arshad F and Jain P. Study of correlation of ER, PR, HER2 receptor status in breast cancer at a single tertiary care hospital with emphasis on clinical utility of PR receptor. *Int J Community Med Public Health.* 2018;5(11):4853–4857.
7. Bezbaruah Babul, Deuribiman AN, Nivedita, Dasgupta and Sharma Jyotika. Significance of immunohistochemical biomarker in breast carcinoma from a single tertiary care hospital of southern Assam. 2019.
8. Shah A, Haider G, Abro N, Bhutto S, Baqai TI, Akhtar S and Abbas K. Correlation between age and hormone receptor status in women with breast cancer. 2022.
9. Zheng H, Ge C, Lin H, Zhou S, Tang W, Wang Q, Zhang X, Jin X, Xu X, Du J and Fu J. The impact of age on outcomes of breast cancer in different hormone receptor and HER2 groups. 2023.
10. AlZaman AS, Mughal SA, AlZaman YS and AlZaman ES. Correlation between hormone receptor status and age, and its prognostic implications in breast cancer patients in Bahrain. 2016.
11. Adel AM and Abdelghani D. Correlation between breast cancer subtypes and age at presentation in Egyptian patients: single institution experience. 2020.
12. Chauhan R, Trivedi V, Rani R and Singh U. A comparative analysis of body mass index with estrogen receptor, progesterone receptor and human epidermal growth factor receptor 2 status in pre- and postmenopausal breast cancer patients. *J Midlife Health.* 2020;11(4):210–216.
13. Kadhim HM and Al-Dujaili AN. Assessing rheumatoid arthritis patients' blood levels of the human 14-3-3 protein antibodies. *Journal of Bioscience and Applied Research.* 2025;11(2):702–710.
14. Christakoudi S, Tsilidis KK, Dossus L, Rinaldi S, Weiderpass E, Antoniussen CS, et al. A body shape index (ABSI) is inversely associated with postmenopausal progesterone-receptor-negative breast cancer risk in a large European cohort. *BMC Cancer.* 2023;23(1):562.
15. Lee J, Bae SJ, Kim HK, Nam SJ, Kim HJ, Bae SY, et al. Body mass index and progesterone receptor in postmenopausal ER-positive/HER2-negative breast cancer: a nationwide study in the Korean Breast Cancer Society and a multi-institutional cohort. *The Breast.* 2025;104515.