The Egyptian Journal of Hospital Medicine (April 2025) Vol. 99, Page 2302-2309

Single Hormone Receptor Positive Breast Cancer: Clinical Significance and Impact on Outcome

Manal Abd El-Hameed Salah-Eldin [1], Hayam Fathy Ghazy [1], Mariam Hussein Bassal [2]*

1 Medical Oncology, Faculty of Medicine, Mansoura University, Dakahlia, Egypt

2 Medical Oncology Resident – Meet Ghamr Oncology Center, Dakahlia, Egypt

Corresponding author: Mariam Hussein Bassal, Email: daisyhussein.mh@gmail.com, Phone: +201091859391

ABSTRACT

Background: Single hormone receptor (HR) positive breast cancers form nearly one out of ten of the most common female malignancy. Yet, no specific management strategies available in our battle with this distinct breast cancer subtype.

Objective: This study aimed at unveiling the clinico-pathologic characteristics and prognosis of both single estrogen receptor (ER)-positive and single-progesterone receptor (PR)-positive breast cancers.

Patients and Methods: Epidemiologic, clinico-pathologic and survival data of 785 single HR-positive breast cancer included female patients had been studied. Patient records, from January 2010 to December 2020, were retrieved from Oncology Center Mansoura University (OCMU)' system (Medical Oncology Clinic).

Results: In this study, the incidence of single HR-positive breast cancer was 12.15% (8.47% single ER-positive and 3.68% single PR-positive). Statistical differences had been observed among both single-HR positive subgroups regarding age, menopausal state, tumor size, axillary lymph node involvement, distant metastases pattern and certain management aspects. Better survival indices were observed with single PR-positive subgroup.

Conclusion: Both single HR-positive subtypes had distinct clinco-pathologic and prognostic significance. Further research is needed for optimizing management strategies.

Keywords: Breast cancer, Hormone receptor, Clinico-pathologic characteristics, Survival.

INTRODUCTION

Breast cancer is a global and national burden with health initiatives launched on both levels for enhancing its management and lowering mortality rates [1, 2]. Breast cancer is of high molecular diversity. Molecular markers assessment is bio-vital for prognosis and therapy planning. Single HR-positive breast cancers constitute nearly 10% of all molecular subtypes [3].

Several theories could contribute to the biology of single HR-positive tumors. Single ER-positive tumors maybe contributed to non-functioning estrogen receptors, epigenetic change, loss of 11q23 heterozygosity, hyperactive growth factors signaling pathways, estrogen receptor splice variants or certain microRNAs [4].

Single PR-positive tumors maybe contributed to estrogen receptor beta (ERβ) isoform, estrogen receptor mutation or splice variants, androgen receptor (AR) expression, hyperactive growth factors, hypermobility group A (HMGA1) overexpression and certain microRNAs [5].

Both single HR-positive subtypes have distinct demographic, pathologic, predictive and prognostic significance [3, 6]. This study inquired about the variable aspects of single HR-positive breast cancer subtypes.

PATIENT AND METHOD

Study design: This was a retrospective cohort study, at Oncology Center Mansoura University (OCMU), Egypt.

Data source: Data were extracted from patients' medical records available on medical oncology clinic medical records, Oncology Center Mansoura University (OCMU), during the period from January 2010 to December 2020. Data collection and follow up was till October 31st, 2024.

Inclusion criteria: Females ≥ 18 years old with single HR-positive breast cancer patients, with pathologically confirmed diagnosis of breast cancer and complete molecular data regarding hormone receptor status.

Exclusion criteria: Females younger than 18 years old and incomplete molecular data or diagnosed with more than one malignancy.

Data collected: Demographic data included year of diagnosis, age at time of diagnosis, gender and menopausal state. Pathologic data included histologic subtype: invasive duct carcinoma (IDC), invasive lobular carcinoma (ILC), mixed (IDC & ILC) or other histologies. Tumor grading was based on the Nottingham modification of Bloom and Richardson Score for breast cancer histological grading [7]. Tumor (T), Node (N), Metastasis (M), staging was done according to the American Joint Committee on Cancer (AJCC) 8th edition anatomic staging of breast cancer [8]. Estrogen and progesterone receptors (ER & PR) were assessed by immunohistochemistry (IHC); they were considered positive when nuclear staining of tumor cells was ≥ 1%. Human epidermal growth factor receptor (HER2) was assessed by IHC: Positive with IHC score 3 (or gene amplification by In Situ Hybridization (SISH) done at Ministry of Health Central laboratory), negative with IHC score 0 or 1 (or no gene amplification by SISH), and equivocal with IHC score 2 (and not assessed by SISH).

Received: 07/01/2025
Accepted: 09/03/2025

Radiologic data were obtained for clinical staging and assessing distant metastatic pattern if occurred (bone only, visceral only or both bone and visceral metastases).

Surgical status was obtained if the patient had mastectomy, breast conservative surgery or not operated. It was also recorded if the patient had or not post-operative radiotherapy (PORT). Chemotherapy and endocrine therapy data were collected.

Survival data included progression free survival (PFS) and overall survival (OS). PFS was assessed from the date of diagnosis till the date of disease progression. OS was assessed from the date of diagnosis till the date of death or the last follow up.

Ethical approval: This study protocol was accepted by the Institutional Review Board (IRB) of Mansoura Faculty of Medicine, Mansoura University, Egypt. (Code Number: MS.21.11.1751). This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical design:

Statistical Package for the Social Sciences (SPSS version 20.0) software was used for data analysis. Tests were used to test differences for significance according to the type of data. Qualitative data were represented as number and percentage and association of qualitative variable by Chi square test (X^2). Quantitative data were represented by mean ± SD. Differences between quantitative independent groups by t test and multiple by ANOVA. P value was set at ≤ 0.05 for significant results & < 0.001 for high significant result. Survival analysis was done using the Kaplan-Meier method. Univariate analysis was performed using the log-rank test.

RESULTS

Epidemiology: Patient selection flow chart demonstrates the proportions of breast cancer subtypes in this study that were 66.02%, 21.83%, 8.47% and 3.68% for double HR-positive, double HR-negative, single ER-positive and single-PR-positive tumors respectively (**Figure 1)**.

Most of single PR-positive cases were diagnosed during the period from 2010 to 2015 as demonstrated in **Figure 2**.

Demographic data: The median age of cases in this study at time of diagnosis was 52 years (20-86). With significant difference (***P* = 0.00**), older (mean age 53.17±11.53) postmenopausal females formed most of single ER positive cases, while younger (mean age 49.24±11.46) premenopausal females formed most of single PR positive cases (**Table 1**).

Pathologic data: No difference was found between single HR-positive subgroups regarding pathologic types, histologic grade or stage. Significant differences were found regarding tumor size (T) (***P* = 0.003**) and axillary lymph node (N) involvement (***P* = 0.002**) between single HR positive subgroups (**Table1**). Tumors ≤ 5cm (T1 & T2) and infiltration of 1-3 lymph nodes (N1) were more common with single ER-positive subtype, while advanced tumors (T3 & T4) and advanced nodal disease (N2 & N3) were more common with single PR positive subtype.

HER2 overexpression percentage in single HR-positive tumors was 24.7% (in between the percentage in double HR-positive tumors "16.5%" and double HR negative tumors "44.2 %") (**Figure 1**).

Distant metastatic pattern significantly differed (***P* = 0.00**) between this study subgroups. Skeletal involvement was more prevalent in single ER-positive cases, while visceral involvement was more prevalent in single PR positive cases (**Table 1**).

Treatment data: Operation type differed significantly in this study (***P* = 0.02**), with more conservative surgeries done for single ER-positive cases, while more mastectomies done for single PR positive cases. Most of cases in both subgroups received post-operative radiotherapy (PORT) (**Table1**).

Both subgroups received anthracyclines in the first line (***P* = 0.07**). Single ER positive cases received taxanes more frequently in first line (***P* = 0.00**). Single PR positive cases received taxanes (***P* = 0.008**) and other chemotherapies (***P* = 0.002**) more frequently in second lines. As most of single PR positive cases were diagnosed from 2010 to 2015, the most commonly used 1st line chemotherapeutic regimen was 6 cycles of FAC protocol while taxanes and other chemotherapy regimens were mainly used upon disease progression.

First line endocrine therapy was aromatase inhibitors (AIs) commonly in single ER positive cases and tamoxifen commonly in single PR positive cases (***P* = 0.00**). Both subgroups received AIs commonly in second lines (***P* = 0.12**).

Survival analysis: The mean follow up duration in this study was 9.96±3.42 years. As for survival indices for cases in this study: mean PFS was 37.27 ± 31.6 months and mean OS was 52.41 ± 38.8 months. Insurance-covered patients were referred to Health Insurance for continuation of follow up. The mean follow up duration in the single PR positive subgroup (11.51 ± 3.04years) was longer than that in the single ER positive subgroup (9.28 ± 3.36 years). Survival indices significantly differed in this study (***P* = 0.00**) as shown with Kaplan-Meier survival curves, with better survival in single PR positive cases (Table 2, Table 3, Table 4, Figure 3 & Figure 4).

Table (1): Comparing single estrogen receptor positive and single progesterone receptor positive subgroups

	Number (percentage %)		Significance	
Characteristic	ER- / PR+ 238 (100%)	ER+ / PR- 547 (100%)	t/X^2	*P*
Mean age	49.24 ± 11.46	53.17 ± 11.53	4.32	0.00
Menopause				
Pre-	142 (59.7%)	189 (34.6%)	42.93	0.00
Post-	91 (38.2%)	341 (62.3%0		
Peri-	5 (2.1%)	17 (3.1%)		
Pathology				
IDC	204 (85.7%)	492 (89.9%)	6.7	0.15
ILC	17 (7.1%)	29 (5.3%)		
Mixed	8 (3.4%)	6 (1.1%)		
Other	9 (3.8%)	20 (3.7%)		
Grade				
Unknown	48 (20.2%)	104 (19.0%)	1.52	0.67
1	4 (1.7%)	5 (0.9%)		
2	126 (52.9%)	284 (51.9%)		
3	60 (25.2%)	154 (28.2)		
T (Tumor)				
X	3 (1.3%)	13 (2.4%)	17.8	0.003
is (in situ)	2 (0.8%)	3 (0.5%)		
1	24 (10.1%)	78 (14.3)		
2	100 (42.0%)	277 (50.6%)		
3	52 (21.8%)	65 (11.9%)		
4	57 (23.9%)	111 (20.3%)		
N (Node)				
X	0 (0.0%)	9 (1.6%)	16.17	0.002
0	63 (26.5%)	134 (24.5%)		
1	56 (23.5%)	192 (35.1%)		
2	57 (23.9%)	102 (18.6%)		
3	62 (26.1%)	110 (20.1%)		
M (Metastasis)				
X	0 (0.0%)	3 (0.5%)	1.34	0.89
0	204 (85.7%)	455 (83.2%)		
1	34 (14.3%)	89 (16.3%)		
Stage				
0	2 (0.8%)	3 (0.5%)	13.84	0.08
1	14 (5.9%)	31 (5.7%)		
2A	42 (17.6%)	92 (16.8%)		
2B	27 (11.3%)	111 (20.3%)		
3A	43 (18.1%)	79 (14.4%)		
3B	28 (11.8%)	48 (8.8%)		
3C	46 (19.3%)	84 (15.4%)		
4	34 (14.3%)	89 (16.3%)		
Unknown	2 (0.8%)	10 (1.8%)		
Metastasis site				
Bone	6 (2.5 %)	39 (7.1%)	26.16	0.00
Visceral	40 (16.8%)	61 (11.2%)		
Bone & visceral	51 (21.4%)	112 (20.5%)		
No	112 (47.1%)	309 (56.5%)		
Unknown	29 (12.2%)	26 (4.8%)		
Operation				
BCS	27 (11.3%)	97 (17.7%)	9.66	0.02
MRM	193 (81.1%)	389 (71.1%)		
No	18 (7.6%)	57 (10.4%)		
Unknown	0 (0.0%)	4 (0.7%)		

	Number (percentage %)		Significance	
Characteristic	ER- / PR+ 238 (100%)	ER+ / PR- 547 (100%)	t/X^2	*P*
PORT				
Yes	149 (62.6%)	331 (60.5%)	2.01	0.35
No	67 (28.2%)	177 (32.4%)		
Unknown	22 (9.2%)	39 (7.1%)		
Anthracycline 1st line				
Yes	223 (93.7%)	485 (88.7%)	5.30	0.07
No	15 (6.3%)	59 (10.8%)		
Unknown	0 (0.0%)	3 (0.5%)		
Anthracycline 2nd line				
Yes	3 (1.3%)	9 (1.6%)	8.49	0.037
No	211 (88.6%)	509 (93.1%)		
Unknown	24 (10.1%)	29 (5.3%)		
Taxanes 1st line				
Yes	96 (40.3%)	298 (54.5%)	15.46	0.00
No	141 (59.2%)	242 (44.2%)		
Unknown	1 (0.4%)	7 (1.3%)		
Taxanes 2nd line				
Yes	35 (14.7%)	59 (10.8%)	9.72	0.008
No	178 (74.8%)	458 (83.7%)		
Unknown	25 (10.5%)	30 (5.5%)		
Other chemo 1st line				
Yes	5 (2.1%)	7 (1.3%)	1.93	0.38
No	232 (97.5%)	533 (97.4%)		
Unknown	1 (0.4%)	7 (1.3%)		
Other chemo 2nd line				
Yes	50 (21.0%)	93 (17.0%)	12.19	0.002
No	161 (67.6%)	425 (77.7%)		
Unknown	27 (11.3%)	29 (5.3%)		
ET 1st line				
Tamofen	85 (35.7%)	118 (21.6%)	59.52	0.00
Tamofen & Zoladex	10 (4.2%)	34 (6.2%)		
AIs	43 (18.1%)	248 (45.3%)		
Switch	63 (26.5%)	91 (16.6%)		
No	23 (9.7%)	33 (6.0%)		
Unknown	14 (5.9%)	23 (4.2%)		
ET 2nd line				
Tamofen	2 (0.8%)	5 (0.9%)	10.05	0.12
Tamofen & Zoladex	1 (0.4%)	2 (0.4%)		
AIs	40 (16.8%)	93 (17.0%)		
AIs & Others	4 (1.7%)	7 (1.3%)		
Others	2 (0.8%)	7 (1.3%)		
No	163 (68.5%)	406 (74.2%)		
Unknown	26 (10.9%)	27 (4.9%)		

ER, estrogen receptor; PR, progesterone receptor; BCS, breast conservative surgery; MRM, modified radical mastectomy; PORT, post-operative radiotherapy; ET, endocrine therapy; AIs, aromatase inhibitors; Switch, switch between tamofen and aromatase inhibitors; Other endocrine therapy, including CDK4/6 inhibitors and or afinitor.

Table (2): Comparing survival functions in single hormone receptor positive subgroups

	ER - / PR +	ER + / PR -	t	*P*
Follow up (Year**)**	**11.51±3.04**	**9.28±3.36**	**8.762**	**0.00**
PFS (month**)**	**44.16±19.63**	**33.77±13.96**	**3.12**	**0.003**
OS (month**)**	**62.98±26.96**	**46.85±16.85**	**4.95**	**0.00**

ER, estrogen receptor; PR, progesterone receptor; PFS, progression free survival; OS, overall survival.

Table (3): Kaplan-Meier survival for Progression Free Survival (estimated in months) in single hormone receptor positive subgroups

Means and Medians for PFS

ER / PR	Mean			Median		
	Estimate	95% Confidence Interval		Estimate	95% Confidence Interval	
		Lower Bound	Upper Bound		Lower Bound	Upper Bound
ER- / PR+	**44.162**	**37.017**	**51.307**	**35.000**	**28.724**	**41.276**
ER+ / PR-	**33.772**	**29.972**	**37.572**	**29.000**	**24.312**	**33.688**
Overall	**37.280**	**33.758**	**40.802**	**30.000**	**26.732**	**33.268**

ER, estrogen receptor; PR, progesterone receptor; PFS, progression free survival.

Table (4): Kaplan-Meier survival for Overall Survival (estimated in months) in single hormone receptor positive subgroups

Means and Medians for OS

ER / PR	Mean			Median		
	Estimate	95% Confidence Interval		Estimate	95% Confidence Interval	
		Lower Bound	Upper Bound		Lower Bound	Upper Bound
ER- / PR+	**62.983**	**56.487**	**69.479**	**58.000**	**47.114**	**68.886**
ER+ / PR-	**46.855**	**43.109**	**50.601**	**39.000**	**35.716**	**42.284**
Overall	**52.412**	**49.026**	**55.797**	**43.000**	**38.596**	**47.404**

ER, estrogen receptor; PR, progesterone receptor; OS, overall survival.

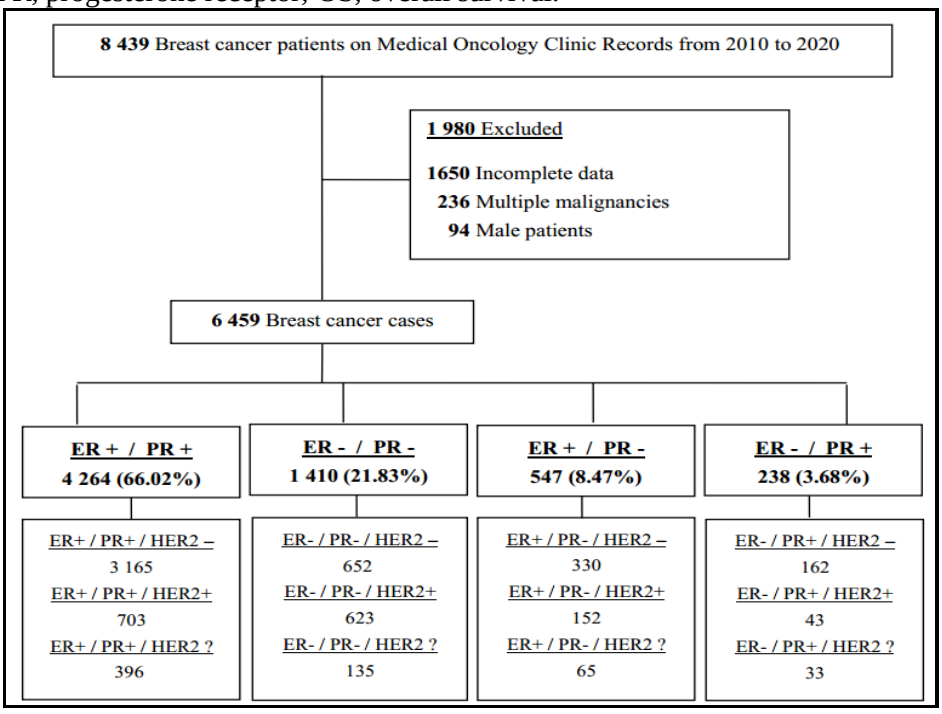

Figure (1): Patient selection flow chart

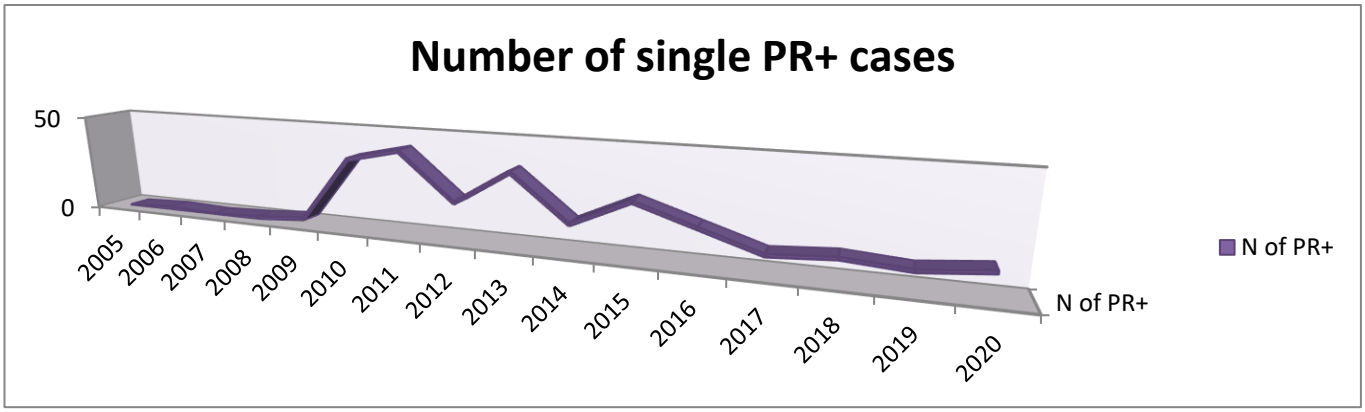

Figure (2): Chart demonstrating the relation between the number of single progesterone receptor positive cases and the year of diagnosis.

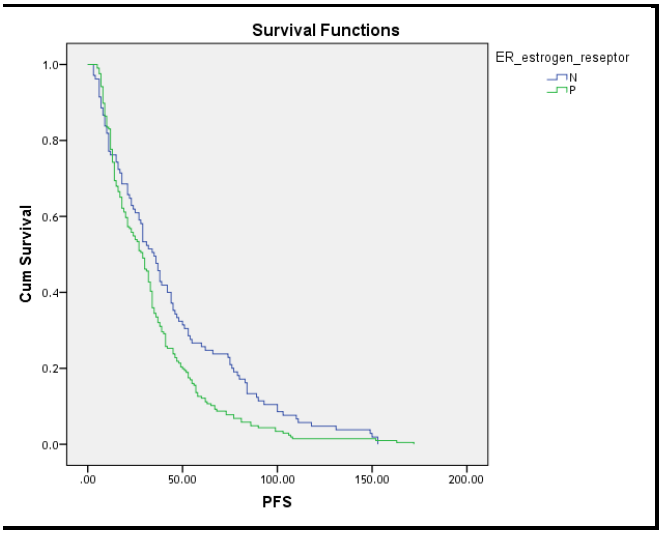

Figure (3): Kaplan-Meier survival curves for Progression Free Survival (estimated in months) in single hormone receptor positive subgroups.

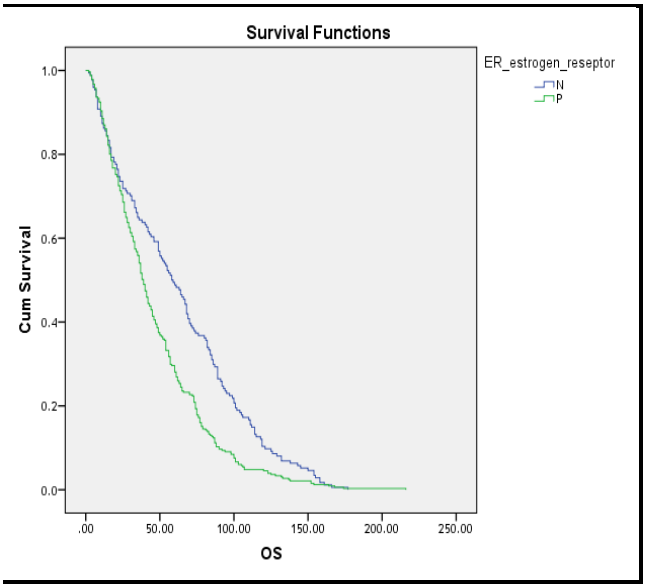

Figure (4): Kaplan-Meier survival curves for Overall Survival (OS) (estimated in months) in single hormone receptor positive subgroups.

DISCUSSION

Breast cancer has been always a provocative research field including several molecular subtypes each with distinct characteristics. This was a cohort study, allocated in single HR-positive breast cancers during the period from January 2010 to December 2020, at Oncology Center Mansoura University (OCMU).

The epidemiologic rates of breast cancer subtypes in this study were 66.02% for double HR-positive tumors, 21.83% for double HR-negative tumors and 12.15% for single HR-positive tumors. These rates are in line with that reported in previous studies [3, 6, 9, 10].

The incidence of single ER-positive tumors in this study was 8.47%, keeping with the previously reported incidence rate range (7 – 17%) for this subtype [10].

The incidence of single PR-positive tumors in this study was 3.68% and it decreased over years mostly inferred to optimizing IHC assessment in the recent years, which agrees with previous studies that reported incidence rate range 1 - 5% for this subtype [6, 10] and reported decreased incidence with refining IHC techniques [3, 5, 6].

Age distribution and menopausal status differed between single HR-positive subgroups in this study and in previous ones. Old-postmenopausal females formed most of single ER-positive cases, while young-premenopausal females formed most of single PR-positive cases [6, 9-11]. This could be referred to changes in circulating endogenous estrogen levels ± genetic expression patterns of breast cancer cells [12, 13].

Results regarding pathologic type and grade in this study groups were not significant statistically. On contrary, other studies stated that lobular and mixed histology were more common with single ER-positive tumors, while ductal histology was more common with single PR-positive tumors. It was stated that single ER-positive tumors were commonly of lower grades, while single PR positive ones were commonly of higher grades [3, 6, 9, 10]. These contradictory results may be referred to patient characteristics differences or subjective variations between pathologists.

Most of this study cases presented with (T2) tumors. Single ER-positive tumors were more frequently

smaller (≤ 5cm) and single, while PR-positive tumors were more frequently larger (> 5 cm). Previous studies observed similar relation but the tumor size limit was 2 cm in those studies [6, 9, 10]. In their meta-analysis, **Azim *et al.*** [14] reported dominance of larger tumor size among Egyptian breast cancer patients and so explaining the difference in tumor size limit between this study and others. Axillary nodal involvement with single HR-positive tumors has been debated. In this study, less nodal involvement was more frequent with single ER-positive tumors, while more nodal involvement was more frequent with single PR-positive ones. In accordance to this finding, similar relation was reported in previous studies [6, 9]. Conflicting with this finding, some studies reported reverse relation [15], while other studies reported no relation [10, 11]. This conflict may be related to different sample sizes, adjusted variables or statistical methods.

Single ER-positive cases presented mostly with stage 2B disease and single PR-positive cases presented mostly with stage 3C disease in this study. However, this observation was not significant. Similar to this finding, previous studies found that single ER-positive cases usually presented at earlier stage and single PR-positive cases usually presented at later stage [6, 9, 10].

Different distant metastatic pattern was found in this study; where single ER-positive cases had more bone metastasis and single PR-positive cases had more visceral metastasis. This comes in consistence with results from recent studies showing the metastatic pattern of single ER-positive disease followed that of double HR-positive with more common skeletal involvement, whereas metastatic pattern of single PR-positive disease followed that of double HR negative with more common visceral involvement [9, 10].

HER2 overexpression in single HR-positive tumors was higher than that in double HR-positive ones and lower than that in double HR-negative ones, aligning with similar finding from previous studies [6, 10, 16]. Increased growth factors signaling and high HER2 activity have been suggested to contribute to single HR-positive tumors' biology [5, 13].

Operation type differed between this study groups; conservative surgeries rate was higher in single ER-positive cases and mastectomies rate was higher in single PR-positive cases. Previous study observed similar findings [16]. Contradicting to this, other studies observed no difference in operation type among breast cancer subtypes [6, 17]. This contradiction is probably related to differences in patient and tumor characteristics.

Postoperative radiotherapy (PORT) didn't differ between subtypes in this study nor in previous ones [6, 17]. As for chemotherapy administration in this study, most of patients received anthracyclines in the 1st line treatment with no statistical difference between the two study subgroups. Single ER-positive patients received taxanes more frequently in the 1st line treatment, while single PR-positive patients received taxanes and other chemotherapeutic regimens more frequently in the subsequent treatment lines. As most of single PR-positive cases in this study were diagnosed during the period from 2010 to 2015, the most commonly used 1st line chemotherapeutic regimen was 6 cycles of FAC protocol, while taxanes and other chemotherapeutic regimens were mainly used upon disease progression, according to the used protocols in our institution.

Single HR-positive cases showed better survival indices when received chemotherapy (In adjuvant or neo-adjuvant setting), with even more benefit in single PR positive subgroup [6, 18, 19]. OncotypeDx score for single ER positive cancers was high (>25), so benefit from chemotherapy [9]. A rational that may justify their better survival in this study, single PR-positive cancers had more chemotherapy responsiveness as the majority shared basal-like subtype characteristics in PAM50 testing [10, 18].

Statistical difference was found regarding endocrine therapy administration in the 1st treatment line in this study where AIs were mainly received in patients with single ER positive cancers, while tamoxifen was mainly received in patients with single PR positive cancers. This is most probably referred to the difference in menopausal state distribution between the two subgroups. No difference found regarding subsequent endocrine therapy lines between the two subgroups in this study and AIs were the mainly used.

Single HR-positive cancers benefit from endocrine therapy, with more benefit in single ER-positive subgroup [18]. However, this benefit is less than that in double HR-positive cancers. The endocrine resistance of single ER-positive subgroup is more to tamoxifen than AIs, and could be contributed to hyperactive growth factor signaling (PI3K/Akt/mTOR, epidermal growth factor receptor "EGFR", insulin-like growth factor1 receptor "IGF-IR"), loss of PTEN (phosphatase and tensin homolog), activated NISS or MISS (nuclear or membrane initiated steroid signaling), up-regulation of certain microRNAs ± certain estrogen receptor splice variants [4, 13, 20]. Notably, when HER2 is overexpressed, tamoxifen and HER2-targets were more advantageous in single PR-positive cancers in comparison with single ER-positive ones due to increased growth factors crosstalk in the latter [3].

Survival indices were significantly better in the single PR positive subgroup in this study; which may reveal the more aggressive behavior and less favorable outcome of negative progesterone receptor expression in the single ER positive subgroup. Another rational for better survival of single PR-positive cases is the longer mean follow up duration as most of this subgroup cases were diagnosed from 2010-2015 and previous studies observed change of single HR-positive subgroups prognosis along their follow up duration. Single ER-positive cancers got early survival advantage (within the first 5 years) from endocrine therapy that reduces early recurrence and mortality. Single PR-positive cancers got later survival advantage (after more than 10 years)

from being more likely to get eradicated with adjuvant chemotherapy. In contrast, single ER positive cancers are more indolent and so micro-metastases clonal selection & re-activation of dormant cancer cells increase liability of later progression [6, 10, 21].

Single HR positive patients' survival has been debated [18]. In line with this study, previous ones stated that survival outcomes for single PR-positive cancers were better than that of single ER-positive [21, 22]. Controverting to this finding, other studies reported better survival with single ER-positive cancers [6, 9]. Another study found no survival difference between subgroups [11]. Differences in patient cohorts, loss of follow up rates or follow up lengths could be the reason of this controversy.

Prognosis could be altered according to HER2 status. When Her2 was negative, single ER-positive cancers' prognosis was better. When HER2 was positive and target therapy added, similar prognosis observed [3].

Diversities among various studies regarding designation, sampling, ethnic grouping, follow-up periods and statistical methods could be the explanation for the controverting findings about clinico-pathologic characteristics and survival outcomes.

Retrospective design, bias probability, not revising IHC with more refined technique and not-mentioned exact endocrine therapy duration were this study's limitations.

CONCLUSION

Single ER-positive and single PR-positive tumors are distinct breast cancer subtypes. It is favored to use chemotherapy and endocrine therapy in single HR-positive cancers treatment. Aromatase inhibitors (AIs) are preferred over tamoxifen in single ER positive cancers. Single PR cancers still, benefit from endocrine therapy. Further research is needed for outlining best management strategies for single HR-positive cancers.

Funding: No funding support has been received.

Conflict of interest: No conflicts of interest present.

REFERENCES

1. Bray F, Laversanne M, Sung H *et al.* (2024): Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin., 74: 229-63.

2. Mahmoud Ali E, Mohammed Attya A, Ragab Abo Shabana K *et al.* (2022): Women's Perception Regarding the Ministry of Health Initiatives Plan for Early Detection of Breast Cancer. Egyptian Journal of Health Care, 13: 449-58.

3. Zhao H, Gong Y (2021): The Prognosis of Single Hormone Receptor-Positive Breast Cancer Stratified by HER2 Status. Front Oncol., 11: 643956.

4. Kunc M, Popęda M, Biernat W *et al.* (2021): Lost but Not Least-Novel Insights into Progesterone Receptor Loss in Estrogen Receptor-Positive Breast Cancer. Cancers (Basel), 13 (19): 4755.

5. Kunc M, Biernat W, Senkus-Konefka E (2018): Estrogen receptor-negative progesterone receptor-positive breast cancer - "Nobody's land" or just an artifact? Cancer Treat Rev., 67: 78-87.

6. Li Y, Yang D, Yin X *et al.* (2020): Clinicopathological Characteristics and Breast Cancer-Specific Survival of Patients With Single Hormone Receptor-Positive Breast Cancer. JAMA Netw Open, 3: e1918160.

7. Jain P and Julie J (2023): Breast cancer: Histologic grading 2023 [Available from: https://www.pathologyoutlines.com/topic/breastmalignanthistologic.html.

8. Teichgraeber DC, Guirguis MS, Whitman GJ (2021): Breast Cancer Staging: Updates in the AJCC Cancer Staging Manual, 8th Edition, and Current Challenges for Radiologists, From the AJR Special Series on Cancer Staging. AJR Am J Roentgenol., 217: 278-90.

9. Dauphine C, Moazzez A, Neal JC *et al.* (2020): Single Hormone Receptor-Positive Breast Cancers Have Distinct Characteristics and Survival. Ann Surg Oncol., 27: 4687-94.

10. Lv M, Mao Y, Song Y *et al.* (2020): Clinical Features and Survival of Single Hormone Receptor-Positive Breast Cancer: A Population-Based Study of 531,605 Patients. Clin Breast Cancer, 20: e589-e99.

11. Rakha EA, El-Sayed ME, Green AR *et al.* (2007): Biologic and clinical characteristics of breast cancer with single hormone receptor positive phenotype. J Clin Oncol., 25: 4772-8.

12. Tarone RE, Chu KC (2002): The greater impact of menopause on ER- than ER+ breast cancer incidence: a possible explanation (United States). Cancer Causes Control, 13: 7-14.

13. Cui X, Schiff R, Arpino G *et al.* (2005): Biology of progesterone receptor loss in breast cancer and its implications for endocrine therapy. J Clin Oncol., 23: 7721-35.

14. Azim H, Elghazawy H, Ghazy R *et al.* (2023): Clinicopathologic Features of Breast Cancer in Egypt-Contemporary Profile and Future Needs: A Systematic Review and Meta-Analysis. JCO Glob Oncol., 9: e2200387.

15. Park S, Park B, Kim T *et al.* (2013): Lack of either estrogen or progesterone receptor expression is associated with poor survival outcome among luminal A breast cancer subtype. Ann Surg Oncol., 20: 1505-13.

16. Bae S, Kim S, Lee J *et al.* (2015): Poor prognosis of single hormone receptor- positive breast cancer: similar outcome as triple-negative breast cancer. BMC Cancer, 15: 138.

17. Ng C, Pathy N, Taib N *et al.* (2014): Do clinical features and survival of single hormone receptor positive breast cancers differ from double hormone receptor positive breast cancers? Asian Pac J Cancer Prev., 15: 7959-64.

18. Wang T, Wang J, Zhao W *et al.* (2024): Clinical Outcomes and Intrinsic Subtypes of Breast Cancer Patients with Single Hormone Receptor-positive Receiving Neoadjuvant Chemotherapy. Clin Breast Cancer, 24: e370-e8.e1.

19. Yao N, Song Z, Wang X *et al.* (2017): Prognostic Impact of Progesterone Receptor Status in Chinese Estrogen Receptor Positive Invasive Breast Cancer Patients. J Breast Cancer, 20: 160-9.

20. Garcia J, Silva J, Dominguez G *et al.* (1999): Allelic loss of the PTEN region (10q23) in breast carcinomas of poor pathophenotype. Breast Cancer Res Treat., 57: 237-43.

21. Schroth W, Winter S, Büttner F *et al.* (2016): Clinical outcome and global gene expression data support the existence of the estrogen receptor-negative/progesterone receptor-positive invasive breast cancer phenotype. Breast Cancer Res Treat., 155: 85-97.

22. Ethier JL, Ocaña A, Rodríguez Lescure A *et al.* (2018): Outcomes of single versus double hormone receptor-positive breast cancer. A GEICAM/9906 sub-study. Eur J Cancer, 94: 199-205.