Factors Affecting Survival of Women Diagnosed with Breast Cancer in El-Minia Governorate, Egypt

Amany Edward Seedhom[1], Nashwa Nabil Kamal[1]

[1] MD, Lecturer of Public Health, Department of Public Health, School of Medicine,
El-Minia University, El-Minia, Egypt.

Correspondence to:
Nashwa Nabil Kamal, M.D.
Lecturer of Public Health, Department of Public Health, School of Medicine, El-Minia University, El-Minia, Egypt
Email: nashwakamal@yahoo.com

ABSTRACT

Objectives: This study was conducted to determine breast cancer survival time and the association between breast cancer survival and socio-demographic and pathologic factors among women, in El-Minia, Egypt. While there has been much researches regarding prognostic factors for breast cancer but the majority of these studies were from developed countries. El-Minia has a population of approximately 4 million. To date, no research has been performed to determine breast cancer survival and the factors affecting it in El-minia.

Methods: This retrospective study used data obtained from the cancer registry in the National Institute of Oncology in El-Minia and included 1207 women diagnosed with first primary breast cancer between 1st January 2005 and 31st December 2009 and followed to 30th June 2010. The association between survival and sociodemographic and pathological factors and distant metastasis at diagnosis, and treatment options was investigated using unifactorial chi-square test and multi-factorial (Cox regression) analyses. Kaplan-Meier analysis was used to compare survival time among different groups.

Results: Median survival time was 83.8 ± 3.2. Cox regression showed that high vs low educational level (Hazard ratio (HR) = 0.35, 95% CI; 0.27–0.46), metastases to bone (HR = 3.22, 95% CI: 1.71-6.05), metastases to lung (HR = 2.314, 95% CI: 1.225-4.373), tumor size (≤ 2 cm vs ≥ 5 cm: HR = 1.4, 95% CI: 1.1-1.8) and number of involved nodes (1 vs > 10 HR = 5.21, 95%CI: 3.1-9.01) were significantly related to survival.

Conclusions: The results showed the need to develop screening programs and standardized treatment regimens in a tax-funded health care system.

Keywords: Breast cancer, Survival, Egypt.

INTRODUCTION

Breast cancer is the most common cancer of women in the world over, and its incidence is rising, especially in developing countries, where the disease poses a major health care challenge. This growing incidence in developing countries reflects the advanced stage at diagnosis, low levels of public awareness of the risk for the disease, and poor medical infrastructure and expertise, with the resultant poor treatment outcomes.[1]

Breast cancer is the leading cause of cancer-related mortality in women worldwide. Almost half of annually diagnosed women with breast cancer belong to developing countries, where they present at a younger age with advanced-stage disease. These women also have poor overall outcomes compared to women in developed countries. The advanced stage of presentation of breast cancer in developing countries was attributed to a lack of mass education and screening programs, poverty, poor access to health care facilities, lack of expertise, and poor country infrastructure.[2]

According to the Egypt National Cancer

Institute, breast cancer is the most common cancer among women representing 18.9% of total cancer cases (35.1% in women and 2.2% in men) with an age-adjusted rate of 49.6 per 100.000 populations.[3] Advanced disease remains very common in Egypt, Tunisia, Saudi Arabia, Syria, Palestinians, and others. Mastectomy is still performed in more than 80% of women with breast cancer. Awareness campaigns and value of clinical breast examination were validated in the Cairo Breast Cancer Screening Trial.[4]

The prevalence of breast cancer in Europe and the United States is estimated between 8 to 10%. However, the lowest prevalence is seen in Asian countries at about 1%.[5] Further, the association between breast cancer survival and socio-demographic and pathologic factors has been widely studied; but the majority of these studies are from developed countries.

Prognosis is usually better than other major cancers, and an improvement in survival in recent decades has been reported.[6] This improvement has been variously ascribed to early diagnosis, including widespread use of mammography or mass screening campaigns and to increasing use of effective adjuvant therapy.[7]

Survival after cancer diagnosis is one of the major outcome measurements and key criteria for assessing quality of cancer control related to both the preventive (early detection) and the therapeutic level. Using data from cancer registries allows population-based comparisons.

This study was conducted to determine the breast cancer survival time and explore the association between the breast cancer survival and socio-demographic and pathologic factors and distant metastases at time of diagnosis in El-Minia. El-Minia has a population of approximately 4 million. To date, no research has been performed to determine breast cancer survival and its associated factors in this region.

METHODS

This retrospective study used patients' records from the National Institute of Oncology database in El-Minia, which is a hospital-based registry in a tertiary care centre which delivers oncology services to a population of approximately four million. This is the only centre which delivers oncology services in El-Minia. Therefore, most probably all cancer patients come to this hospital for treatment. However a few of them (about 2%) may travel to other treatment centers.

This study included women who were diagnosed with breast cancer between 1st January 2005 and 31st December 2009. During that period, 1256 were registered as having female breast cancer. 39 women were excluded due to previous breast cancer and other cancers. In addition, 10 women were lost to follow up. Thus, the study population comprised 1207 women who were diagnosed with a first primary invasive breast malignancy and who underwent breast surgery including axillary dissection.

Criteria of exclusion were women with previous breast cancer and other cancers, and women who had not follow-up after initial diagnosis.

All patients were followed-up at regular three-month intervals for the first year following diagnosis and regular six-month follow-ups thereafter. The last date of follow-up was 30th June 2010.

There are three treatment options that have been offered in three sequences: surgery followed by chemotherapy and then by radiation, chemotherapy followed by surgery then chemotherapy and then by radiation, and surgery followed only by radiation, which are the current practice in this region.

The registry contains information about prognostic factors: tumor size and location, histopathological grade, number of involved axillary lymph nodes, treatment modalities, distant metastasis, age at breast cancer diagnosis, and some socio-demographic factors. These variables were divided into three groups namely; socio-demographic, distant metastases, and clinico-pathological.

Statistical analysis

Univariate analyses were performed to describe the relationship between each of the independent variables and survival. Chi-square test was calculated for each comparison.

Variables were considered firstly in the three conceptual groups: socio-demographic factors, clinical/pathological factors, and distant metastases. Each model included all variables from the particular group. Variables that were statistically significant unifactorially, entered together in multi-factorial model. A final model was fitted by combining all variables which were statistically significant in the three groups separately, using Cox's regression (Multi factorial analysis). Survival time was estimated using the Kaplan–Meier method and log-rank test was used to compare survival times between groups.

All analyses were conducted using SPSS for Windows version 11 (SPSS Inc., Chicago, IL).

Ethical consideration

This study was approved by the institutional review boards of National Institute of Oncology in El Minia.

RESULTS

Effect of socio-demographic variables on survival

Of the 1207 patients included in the analysis, 840 were alive and 367 had died at the end of follow-up. The mean age at diagnosis was 56 years.

In unifactorial analysis of association of socio-demographic factors and survival, only residence, educational level, and occupation were significantly associated with survival (P < 0.0001) (Table 1). Death among rural patients was higher than among urban patients (37.0% compared to 24.9%). Patients with lower educational level had died more than those with higher education (49.6% among illiterate patients compared to 4.8% among highly educated patients). Housewives had died more than skilled patients (47.9% compared to 11.5%).

Table 1. Association of sociodemographic variables and survival among women diagnosed with cancer breast, El-Minia, Egypt

Sociodemographic variables	Censored No. (%)	Died No. (%)	total No. (%)	Chi-square	P-value
Age group at time of diagnosis					
≤ 35 years	46 (67.6%)	22 (32.4%)	68 (5.6%)		
36–49 years	271 (71.3%)	109 (28.7%)	380 (31.5%)	0.84	0.8
50–64 years	291 (69.1%)	130 (30.9%)	421 (34.9%)		
≥ 65 years	232 (68.6%)	106 (31.4%)	338 (28.0%)		
Marital status					
Single	119 (67.6%)	57 (32.4%)	176 (14.6%)		
Married	698 (69.6%)	301 (30.1%)	999 (82.8%)	0.4	0.8
Divorced and widowed	23 (71.9%)	9 (28.1%)	32 (2.6%)		
Residence					
Urban	495(75.1%)	164(24.9%)	659 (54.6%)	20.9	0.0001*
Rural	345 (63.0%)	203(37.0%)	548 (45.4%)		
Education					
Illiterate	271 (50.4%)	267 (49.6%)	538 (44.6%)		
Read and write	270 (79.4%)	70 (20.6%)	340 (28.2%)	182.2	0.0001*
Below university level	160 (87.4%)	23 (12.6%)	183 (15.2%)		
University level or above	139 (95.2%)	7 (4.8%)	146 (12.1%)		
Occupation					
Housewife	285 (52.1%)	262 (47.9%)	547 (45.3%)		
Manual	301 (80.7%)	72 (19.3%)	373 (30.9%)	149.3	0.0001*
Skilled	254 (88.5%)	33 (11.5%)	287 (23.8%)		
No. of children			916		
≤ 3	392 (75.1%)	130 (24.9%)	522(57.0%)	0.04	0.9
> 3	298 (75.6%)	96(24.4%)	394(43.0%)		
OCP use			169		
≤ 3 years	82 (68.3%)	38(31.7%)	120(71.0%)	0.4	0.5
> 3 years	31 (63.3%)	18 (36.7%)	49 (29.0%)		
Menarche age					
≤ 13 years	346 (72.2%)	133 (27.8%)	479 (39.7%)	2.6	0.1
>13 years	494 (67.9%)	234 (32.1%)	728 (60.3%)		
Family history of breast cancer					
Yes	587 (68.8%)	266 (31.2%)	853(70.7%)	0.83	0.36
No	253 (71.5%)	101 (28.5%)	354(29.3%)		
Breast feeding					
Yes	486(70.8%)	200 (29.2%)	686(56.8%)	1.18	0.28
No	354 (67.9%)	167(32.1%)	521(43.2%)		
Total	840 (69.6%)	367 (30.4%)	1207 (100%)		

* Statistically significant

OCP: Oral contraceptive pills

Censored: the patients who still alive to the end of the follow-up

Effect of distant metastases on survival

Metastases to liver, lung, and bone were all significantly associated with poorer survival in the unifactorial analyses (Table 2). Compared to the patients without distant metastasis, deaths among those with lung, bone or liver metastasis were higher (41.7%, 40.6%, and 56.5% compared to 27.6%, 29.2%, and 27.8% respectively.

Effect of clinical/pathological variables on survival

Of clinical/pathological factors, greater tumor size and higher grade, skin and nipple involvement, higher number of involved lymph nodes, treatment and type of surgery were significantly associated with poorer survival in the unifactorial analyses (Table 3).

Patients with tumor size of 5 cm and above had died more than the patients with tumor size 2 cm and less (45.3% compared to 22.3% respectively).

Patients with poorly differentiated tumor grades had died more than those with well differentiated tumor grades (42.7% compared to 25.7%). There was a rise in deaths with the increased number of involved lymph nodes ranging from 73.8% to 26.6% compared to node negative patients.

Death among patients with skin and nipple involvement was higher than among those with free skin and nipple (46.3% and 41.3% compared to 20.7% and 27.0%, respectively).

Multifactorial analysis of variables from the three groups

We modeled all statistically significant variables of the three previous models together to explore how the effect of socio-demographic, distant metastases and clinico-pathological variables might influence survival. The factors that remained significant in multi-factorial model were tumor size, number of involved lymph nodes, residence, education, occupation, lung and bone metastases, and type of surgery (Table 4). Compared to patients without distant metastasis, those with lung metastasis had more than twice, and those with bone metastasis had over three times the risk of death. Patients with tumor size ≥ 5 cm had more increase in risk of death compared to the patients with tumor size ≤ 2 cm. Those with increased number of involved lymph nodes had more than five fold increase in risk compared to lymph node negative patients.

Kaplan-Meier analysis of survival time

Kaplan-Meier analysis displayed the mean/median survival times, standard error and 95% confidence interval for different groups with log-rank test comparing the survival time of different groups and the significant difference was observed between different groups in education, occupation, lung and liver metastasis, no. of involved lymph nodes, skin and nipple involvement, type of surgery and tumor size (Table 5). Mean survival time was 84.6 ± 1.7 and 95% CI was 81.4-87.9. Median survival time was 83.8 ± 3.2 and 95% CI was 77.6-89.9.

DISCUSSION

This retrospective study conducted at the National Institute of Oncology in El-Minia City investigated the socio-demographic and clinico-pathological factors associated with breast cancer survival in women. Of 1207 women diagnosed with first primary breast cancer between 1st January 2005 and 31st December 2009, 34.9% of cases were in the age group 50–64 years.

This study showed a statistically significant relation between breast cancer survival and lower education and occupation with low income and with a residence in rural areas

Table 2. Association of distant metastasis and survival among women diagnosed with cancer breast, El-Minia, Egypt

Distant metastasis	Censored No. (%)	Died No. (%)	Total No. (%)	Chi-square	P-value
Lung metastasis					
Yes	140 (58.3%)	100 (41.7%)	240 (19.9%)	17.95	0.0001
No	700 (72.4%)	267 (27.6%)	967 (80.1%)		
Bone metastasis					
Yes	76 (59.4%)	52 (40.6%)	128 (10.6%)	7.1	0.008
No	764 (70.8%)	315 (29.2%)	1079 (89.4%)		
Liver metastasis					
Yes	47 (43.5%)	61 (56.5%)	108 (8.9%)	38.1	0.0001
No	793 (72.2%)	306 (27.8%)	1099 (91.1%)		

Table 3. Association of clinico-pathological variables and survival among women diagnosed with cancer breast, El-Minia, Egypt

Clinico-pathological variables	Censored No. (%)	Died No. (%)	Total No. (%)	Chi-square	p-value
No. of involved lymph nodes					
0.0	645 (73.4%)	234 (26.6%)	879 (72.8%)		
1-5	153 (69.5%)	67 (30.5%)	220 (18.2%)	59.3	0.0001
6-10	31 (47.0%)	35 (53.0%)	66 (5.5%)		
> 10	11 (26.2%)	31 (73.8%)	42 (3.5)		
Tumor grade					
Well differentiated	255 (74.3%)	88 (25.7%)	343 (37.3%)		
Moderately differentiated	344 (68.5%)	158 (31.5%)	502 (54.6%)	9.3	0.01
Poorly differentiated	43 (57.3%)	32 (42.7%)	75 (8.2%)		
Tumor size					
≤ 2 cm	373 (77.7%)	107 (22.3%)	480 (42.3%)		
2-5 cm	243 (66.2%)	124 (33.8%)	367 (32.4%)	44.8	0.0001
> 5 cm	157 (54.7%)	130 (45.3%)	287 (25.3%)		
Skin involvement					
Yes	246 (53.7%)	212 (46.3%)	458 (37.9%)		
No	594 (79.3%)	155 (20.7%)	749 (62.1%)	87.98	0.0001
Nipple involvement					
Yes	168 (58.7%)	118 (41.3%)	286 (23.7%)		
No	672 (73.0%)	249 (27.0%)	921 (76.3%)	20.86	0.0001
Tumor location					
Lateral	237 (67.5%)	114 (32.5%)	351 (29.1%)		
Medial	362 (68.7%)	165 (31.3%)	527 (43.7%)	2.99	0.2
Central	241 (73.3%)	88 (26.7%)	329 (27.3%)		
Type of treatment					
C & S & C & R	245 (76.8%)	74 (23.2%)	319 (26.4%)		
S & C & R	354 (70.4%)	149 (29.6%)	503 (41.7%)	16.89	0.0001
S & R	241 (62.6%)	144 (37.4%)	385 (31.9%)		
Surgery					
MRM	233 (74.7%)	79 (25.3%)	312 (25.8%)		
RM	213 (71.0%)	87 (29.0%)	300 (24.9%)		
TM	345 (69.4%)	152 (30.6%)	497 (41.2%)	21.9	0.0001
Quadrantectomy	49 (50.0%)	49 (50.0%)	98 (8.1%)		

S & C & R: Surgery and Chemotherapy and Radiotherapy; C & S & C & R: Chemotherapy and Surgery and Chemotherapy and Radiotherapy; S & R: Surgery and Radiotherapy; MRM: Modified Radical Mastectomy; RM: Radical Mastectomy, TM: Total Mastectomy.

Table 4. Multi-factorial analysis of statistically significant factors from previous three groups among women diagnosed with cancer breast, El-Minia, Egypt.

Variables	Hazard ratio (HR)	95% CI	P- value
Residence	2.405	1.809- 3.196	0.0001
Education	0.35	0.27–0.46	0.0001
Occupation	1.426	1.059- 1.92	0.02
Lung metastasis	2.314	1.225- 4.373	0.01
Bone metastasis	3.22	1.71– 6.05	0.018
Type of surgery	1.404	1.176- 1.677	0.0001
Tumor size	1.4	1.1– 1.8	0.009
No. of involved lymph nodes	5.21	3.1- 9.01	0.043
Tumor grade	0.97	0.72–1.3	0.87
Skin involvement	0.94	0.6–1.4	0.787
Nipple involvement	1.2	0.8–1.8	0.276
Liver metastasis	1.2	0.7–2.15	0.446
Treatment	1.86	1.39–2.50	0.127

Chi-square = 163.017

$P < 0.0001$

Table 5. Kaplan-Meier analysis of survival time among women diagnosed with cancer breast, El-Minia, Egypt

Factor	Survival time		Log-rank test (p-value)
	Mean ± SE (95%CI)	Median ± SE (95%CI)	
Residence			
Urban	88.79 ± 2.55 (83.8-93.8)	86.2 ± 6.5 (73.5-98.95)	3.7 (0.054)
Rural	81.35 ± 2.2 (77.01-85.7)	81.93 ± 3.55 (74.98-88.9)	
Education			
Illiterate	70.4 ± 2.06 (66.4-74.5)	64.9 ± 3.2 (58.8-71.1)	
Read and write	86.5 ± 3.3 (79.99-93.09)	83.9 ± 4.09 (75.9-91.9)	115.37
Below university level	115.2 ±3.6 (108.2-122.2)		(0.0001)
University level or above	115.9 ±3.5 (108.96-122.8)		
Occupation			
Housewife	72.3 ± 2.02 (68.4-76.3)	68.1 ± 2.5 (63.2-73.02)	74.6
Manual	103.6 ± 3.05 (97.7-109.6)		(0.0001)
Skilled	99.9 ± 3.9 (92.3-107.6)	94.8 ± 7.96 (79.2-110.4)	
Lung metastasis			
Yes	73.4 ± 2.98 (67.58-79.3)	73.03 ± 5.7 (61.9-84.1)	10.43
No	87.8 ± 1.9 (84.01-91.6)	84.8 ± 4.06 (76.8-92.8)	(0.001)
Bone metastasis			
Yes	74.9 ± 4.09 (66.9-82.9)	79.6 ± 8.9 (62.06-97.07)	2.6 (0.1)
No	85.6 ± 1.8 (82.09-89.1)	83.9 ± 3.4 (77.2-90.5)	
Liver metastasis			
Yes	71.1 ± 3.7 (63.8-78.4)	70.6 ± 7.95 (55.06-86.2)	10.27
No	87.1 ± 1.8 (83.5-90.7)	84.7 ± 4.09 (76.7-92.7)	(0.001)
No. of involved lymph nodes			
0.0	89.1 ± 2.09 (85.0-93.2)	89.3 ± 5.8 (77.9-100.8)	
1-5	82.96 ± 3.4 (76.3-89.7)	89.8 ± 5.4 (79.2-100.4)	29.2
6-10	66.3 ± 4.6 (57.3-75.3)	73.03 ± 6.4 (60.5-85.6)	(0.0001)
> 10	63.2 ± 4.8 (53.8-72.6)	64.0 ± 6.3 (51.7-76.3)	
Tumor grade			
Well differentiated	80.7 ± 3.1 (74.6-86.8)	82.7 ± 6.6 (69.8-95.6)	
Moderately differentiated	84.01 ± 2.4 (79.2-88.8)	83.3 ± 4.4 (74.7-91.9)	1.27 (0.5)
Poorly differentiated	76.7 ± 6.02 (64.9-88.5)	73.03 ± 6.2 (60.8-85.3)	
Tumor size			
≤ 2 cm	93.96 ± 2.9 (88.3-99.6)	93.3 ± 7.5 (78.6-108.0)	32.1
2-5 cm	79.3 ± 2.96 (73.5-85.1)	78.7 ± 5.4 (68.02-89.3)	(0.0001)
> 5 cm	69.9 ± 2.6 (64.9-74.95)	65.2 ± 4.08 (57.2-73.2)	
Skin involvement			
Yes	70.8 ± 2.2 (66.6-75.06)	68.07 ± 3.2 (61.8-74.4)	59.7
No	97.0 ± 2.3 (92.4-101.6)	127.9 ± 22.8 (83.1-172.6)	(0.0001)
Nipple involvement			
Yes	72.9 ± 2.6 (67.7-78.05)	73.03 ± 5.1 (63.03-83.03)	14.3
No	88.8 ± 2 (84.9-92.8)	93.3 ± 5.3 (82.95-103.7)	(0.0002)
Type of treatment			
C & S & C & R	83.7 ± 3.3 (77.3-90.07)	89.8 ±9.4 (71.4- 108.3)	
S & C & R	86.5 ± 2.5 (81.6-91.5)	89.3 ± 5.1 (79.3-99.3)	2.5 (0.28)
S & R	81.3 ± 2.7 (75.9-86.6)	76.6 ± 3.5 (69.7-83.5)	
Surgery			
MRM	80.9 ± 3.2 (74.6-87.2)	82.7 ± 6.07 (70.8-94.6)	
RM	90.97 ± 3.2 (84.7-97.2)	96.4 ± 7.7 (81.3-111.5)	25.4
TM	85.02 ± 2.5 (80.1-89.9)	84.8 ± 4.2 (76.5-93.07)	(0.0001)
Quadrantectomy	64.1 ± 5.3 (53.8-74.5)	57.3 ± 2.8 (51.9-62.7)	
Total	84.6 ± 1.7 (81.4-87.9)	83.8 ± 3.2 (77.6-89.9)	

SE: Standard error, CI: Confidence interval

S & C & R: Surgery and Chemotherapy and Radiotherapy; C & S & C & R: Chemotherapy and Surgery and Chemotherapy and Radiotherapy; S & R: Surgery and Radiotherapy; MRM: Modified Radical Mastectomy; RM: Radical Mastectomy; TM: Total Mastectomy.

Education may result in a higher degree of health awareness, better perception of breast related symptoms and less delay in seeking medical care.[8]

Housewives and less skilled occupational groups had higher death percentages compared to skilled patients. It remains unclear whether the reason for the disparity is delay in diagnosis or differing biology of cancers in the groups with less education and income compared with more advantaged groups. A study of UK cancer patients had shown that delay of diagnosis and treatment was longer for lower social class groups than higher social class groups and this was also apparent for breast cancer.[9]

Death among patients with breast cancer was higher in rural patients, due to no access to organized mammography screening. This was in agreement with a study conducted by Dalton et al.[10]

The most important prognostic factor was the occurrence of distant metastasis. Studies carried out on selected patient groups indicated that long term survival was possible in young patients with limited metastatic disease.[11]

Our findings revealed that tumor size was significantly associated with breast cancer survival, as patients with tumor size of 5 cm and above had a higher risk of death than those with tumor size 2 cm and less. This result was consistent with another study.[12]

We found that poorly differentiated tumors carried a higher risk of death compared to well-differentiated tumors. This finding was in concordant with a study conducted by Kuru et al.[13]

Death among patients with skin and nipple involvement was higher than among those with free skin and nipple; this was matched with a study examined the clinical, pathological and molecular factors predicting breast cancer in Pakistani women.[14]

This study reported that a higher number of positive axillary lymph nodes increased risk of breast cancer-related death. This was in agreement with another study which found that the most important prognostic factor affecting local control, disease-free survival, and overall survival was axillary lymph node metastasis.[15]

The number of involved nodes was the most powerful predictor of survival on multi-factorial analysis.[16] According to our findings, not only did node positive patients have a poorer survival rate compared to node negatives, but also as the number of involved nodes increased, the risk of death increased too.

CONCLUSION

Markers of poor prognosis for survival were large tumors, increasing number of positive lymph nodes, grade III tumors, poor socioeconomic status, and variable treatment profiles. Clinical outcomes and survival associated for each prognostic marker were inferior when compared to developed countries due to low level of awareness, lack of screening programs, and subsequent late access to treatment. Population based screening programs, outreach mammography, improvements in technical expertise and quality of care, standardized treatment regimens in a tax-funded health care system need to be developed for countries with limited resources

REFERENCES

1. Agarwal G, Ramakant P, Forgach ER, Rendon JC, Chaparro JM, Basurto CS, et al. Breast cancer care in developing countries. World J Surg 2009; 33(10): 2069-76.
2. Kumar S, Burney IA, Al Ajmi A, Al Moundhri MS. Changing trends of breast cancer survival in sultanate of oman. J Oncol 2011; 2011: 316243.
3. Ibrahim AS. Cancer profile in Gharbia, Egypt. Methodology and results. Cairo, Ministry of Health and Population. Egypt and Middle East Cancer Consortuim 2002.
4. El Saghir NS, Khalil MK, Eid T, El Kinge AR, Charafeddine M, Geara F, et al. Trends in epidemiology and management of breast cancer in developing Arab countries: a literature and registry analysis. Int J Surg 2007; 5(4): 225-33.
5. Farooq S, Coleman MP. Breast cancer survival in South Asian women in England and Wales. J Epidemiol Community Health 2005; 59(5): 402-6.
6. Sant M, Allemani C, Capocaccia R, Hakulinen T, Aareleid T, Coebergh JW, et al. Stage at diagnosis is a key explanation of differences in breast cancer survival across Europe. Int J Cancer 2003; 106(3): 416-22.
7. Sant M, Allemani C, Berrino F, Coleman MP, Aareleid T, Chaplain G, et al. Breast carcinoma survival

in Europe and the United States. Cancer 2004; 100(4): 715-22.

8. Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey SG. Indicators of socioeconomic position (part 1). J Epidemiol Community Health 2006; 60(1): 7-12.

9. Neal RD, Allgar VL. Sociodemographic factors and delays in the diagnosis of six cancers: analysis of data from the "National Survey of NHS Patients: Cancer". Br J Cancer 2005; 92(11): 1971-5.

10. Dalton SO, During M, Ross L, Carlsen K, Mortensen PB, Lynch J, et al. The relation between socioeconomic and demographic factors and tumour stage in women diagnosed with breast cancer in Denmark, 1983-1999. Br J Cancer 2006; 95(5): 653-9.

11. Andre F, Slimane K, Bachelot T, Dunant A, Namer M, Barrelier A, et al. Breast cancer with synchronous metastases: trends in survival during a 14-year period. J Clin Oncol 2004; 22(16): 3302-8.

12. D'Eredita' G, Giardina C, Martellotta M, Natale T, Ferrarese F. Prognostic factors in breast cancer: the predictive value of the Nottingham Prognostic Index in patients with a long-term follow-up that were treated in a single institution. Eur J Cancer 2001; 37(5): 591-6.

13. Kuru B, Camlibel M, Gulcelik MA, Alagol H. Prognostic factors affecting survival and disease-free survival in lymph node-negative breast carcinomas. J Surg Oncol 2003; 83(3): 167-72.

14. Siddiqui T, Khan S, Kayani N, Pervez S, Salam A. Clinical, pathological and molecular factors predicting axillary node involvement in primary breast cancer in Pakistani women. J Pak Med Assoc 2002; 52(5): 192-5.

15. Kim KJ, Huh SJ, Yang JH, Park W, Nam SJ, Kim JH, et al. Treatment results and prognostic factors of early breast cancer treated with a breast conserving operation and radiotherapy. Jpn J Clin Oncol 2005; 35(3): 126-33.

16. Banerjee M, George J, Song EY, Roy A, Hryniuk W. Tree-based model for breast cancer prognostication. J Clin Oncol 2004; 22(13): 2567-75.

COPE COMMITTEE ON PUBLICATION ETHICS

The International Journal of Preventive Medicine is a member of and subscribes to the principles of the Committee on Publication Ethics (http://publicationethics.org).

The following COPE guidelines are available on: http://publicationethics.org/guidelines

- o **Code of Conduct**
- o **Best Practice Guidelines for Journal Editors**
- o **Guidelines for retracting articles**
- o **Guidelines for the Board of Directors of Learned Society Journals**
- o **Guidance for Editors: Research, Audit and Service Evaluations**

How to handle authorship disputes: a guide for new researchers