

RESEARCH ARTICLE

Survival Rate of Breast Cancer Patients In Malaysia: A Population-based Study

Nor Aini Abdullah¹, Wan Rozita Wan Mahiyuddin^{1*}, Nor Asiah Muhammad¹, Zainudin Mohamad Ali², Lailanor Ibrahim³, Nor Saleha Ibrahim Tamim², Amal Nasir Mustafa¹, Muhammad Amir Kamaluddin¹

Abstract

Breast cancer is the most common cancer among Malaysian women. Other than hospital-based results, there are no documented population-based survival rates of Malaysian women for breast cancers. This population-based retrospective cohort study was therefore conducted. Data were obtained from Health Informatics Centre, Ministry of Health Malaysia, National Cancer Registry and National Registration Department for the period from 1st January 2000 to 31st December 2005. Cases were captured by ICD-10 and linked to death certificates to identify the status. Only complete data were analysed. Survival time was calculated from the estimated date of diagnosis to the date of death or date of loss to follow-up. Observed survival rates were estimated by Kaplan-Meier method using SPSS Statistical Software version 17. A total of 10,230 complete data sets were analysed. The mean age at diagnosis was 50.6 years old. The overall 5-year survival rate was 49% with median survival time of 68.1 months. Indian women had a higher survival rate of 54% compared to Chinese women (49%) and Malays (45%). The overall 5-year survival rate of breast cancer patient among Malaysian women was still low for the cohort of 2000 to 2005 as compared to survival rates in developed nations. Therefore, it is necessary to enhance the strategies for early detection and intervention.

Keywords: Breast cancer - survival rate - population-based - Malaysia - ethnic groups

Asian Pac J Cancer Prev, 14 (8), 4591-4594

Introduction

Breast cancer is a major cause of morbidity and cancer related mortality among women. The prevalence of breast cancer was reported as increasing in most of the Asian countries (Sim et al., 2006; Takiar and Srivastav, 2008; Hirabayashi and Zhang, 2009; Medina et al., 2010; Park et al., 2011). Malaysia is also sharing the same experience.

The aetiology of breast cancer is largely unknown therefore, there is no definite primary prevention strategy has yet established. The main preventive strategy is focussing on the early detection and early intervention to improve the survival rates.

Despite the increasing incidence, the survival rates of breast cancer patients in many developed countries were substantially improved (Webb et al., 2004; Coleman et al., 2008). A Study at Nottingham Hospital using Nottingham Prognostic Index (NPI) showed 10 years survival rate among breast cancer patients from this hospital had increased from 55-77% recently (Blamey et al., 2007).

Study on breast cancer survival rate in this country is scarce. Other than an institutional-based studies by Taib et al. (2011) and Pathy et al. (2011), in our knowledge, there was no recent population-based survival study in

this country being published. These studies reported that there was an apparent improvement in the survival rate of breast cancer cohort diagnosed in 1993 to 1997 and in 1998 to 2002 in this setting, whereby ethnicity was noted to be a significant prognostic factor.

We constructed a population-based breast cancer databases by linking data from the National Cancer Registry, National Health Informatics Centre and National Registration Department and conducted a survival analysis with the primary aim was to determine the survival rates of Malaysian women with breast cancer.

Materials and Methods

We conducted a retrospective cohort study by examining the data on breast cancer patient who were hospitalised in majority of the hospitals in this country. All breast cancer patients diagnosed from 1st January 2000 to 31st December 2005 were included in this study. In order to ensure the optimum case ascertainment, data on breast cancer cases were obtained from two sources i.e. Malaysian National Cancer Registry (MNCR) and National Health Informatics Centre (NHIC). The MNCR was established in 1999 and aimed to capture the database

¹Institute for Medical Research, ²Disease Control Division, ³Health Informatic Centre, Ministry of Health, Kuala Lumpur, Malaysia
*For correspondence: rozita@imr.gov.my

of all cancer patients in the country. NHIC based at the Ministry of Health is a centralised data warehouse which collected all the returns from all government hospitals and partially from private hospitals. There were 13,060 patients hospitalised for breast cancer during the study period. The status of the patients whether they were dead or alive at the end of the study period and the date of death were obtained by examining the mortality data from the National Registration Department. The morbidity data were then linked to the mortality data by patient's national identification number which is unique to individual patients.

All patients diagnosed with ICD10 codes C50 series were extracted from those two sources of data and were combined into a single database. This constructed database was then cleaned by cross-validation process among the variables, omitting multiple entries and generating new variables. Males breast cancer and incomplete data entries were excluded from the analysis.

Statistical analysis

Statistical analyses were performed using SPSS version 19.0 (SPSS Inc. Chicago, Illinois, USA). The patient's characteristics were described by percentages. Kaplan-Meier analyses were conducted to estimate overall survival rates. The survival time of a patient is referred to the number of months from the date of diagnosis to the date of the patient died or the date of the end of the study for patients who were still alive or date of loss to follow-up. The differences in survival between the ethnic and age groups were compared by the log-rank test. Two-tailed p value of <0.05 was considered as statistically significant.

Results

Data on 13,060 female breast cancer cases were gathered from both sources, of which 10,230 (78%) were complete. Only individuals with almost complete data were analysed from which 6268 (61.3%) of the cases were certified death due to the complications of breast cancer. The remainder 3,962 (38.7%) were either died due to other causes, loss to follow-up or alive by the end of the study period.

More than half of the patients were Malay (53.8%) followed by Chinese and Indian with 27.1% and 9.6% respectively. Other Malaysian ethnic group and foreigners constitute 7.7% and 1.9% respectively. The descriptive characteristics of the patients were described in Table 1. The age distribution of cases during the first admission which was taken as an approximate time of diagnosis is shown in Figure 1. The peak age of diagnosis was between 40 and 60 years old, with the mean age of 50.6 years old (SD 12.22). The youngest age at diagnosis was 12 years old. About 49% of the cases were premenopausal age group (age less than 50 years old) and 51.3% were menopausal age (age 50 years old and above).

Figure 2 showed the Kaplan Meier plot of overall survival function. The overall 5-year survival rate was 49.4% with median survival time of 68.1 months. The overall observed survival rates at 1, 3 and 5 years were 70.8%, 56.9% and 49.4% respectively. The log-rank test

Table 1. The Characteristics of Breast Cancer Patients in Malaysia

		No. of case (N=10,230)	Percentage (%)
Ethnic	Malay	5,500	53.8
	Chinese	2,769	27.1
	Indian	983	9.6
	Other Malaysians	784	7.7
	Foreigners	194	1.9
Age*	Less than 50	4,634	48.7
	More than 50	4,889	51.2
Age at diagnosis (years old)	Mean		50.6
	Minimum		12.0
	Maximum		103.0

*Missing values (N=9523)

Table 2. The Survival Rate of Breast Cancer Patients by Selected Factors

Factors		1 year	3 year	5 year
Age at diagnosis	≥50	85.7	81.9	49.1
	≤50	81.1	76.3	40.9
Ethnicity	Malay	58.9	49.7	45.1
	Chinese	61.2	52.8	49.1
	Indian	68.3	58.3	54.2

*significant at alpha=0.05

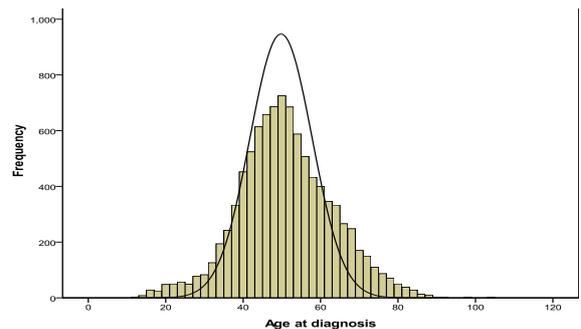


Figure 1. Distribution of Age at Diagnosis of Breast Cancer

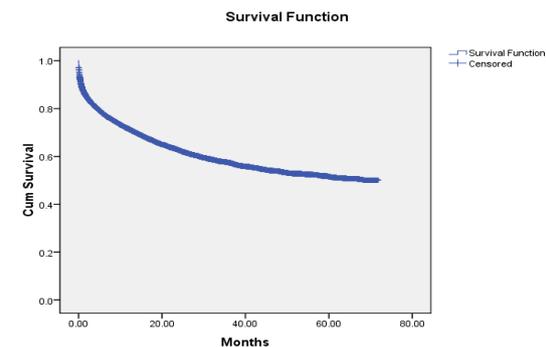


Figure 2. Overall 5-year Survival from Breast Cancer, Malaysia, 2000-2005

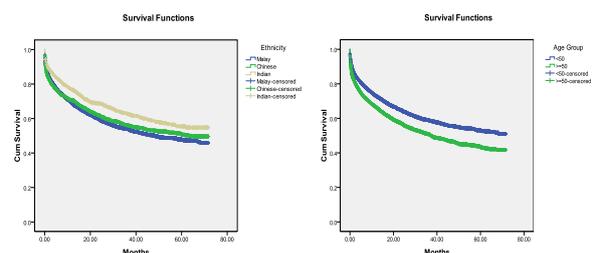


Figure 3. Five-Year Survival Based on A) Ethnic Group and B) Age Group

identified significant difference of 5-year survival rates among the three main ethnic groups (Figure 3). Table 2 showed that the Indian women have a higher survival rate of 54.2% compared to Chinese women (49.1%) while the Malays recorded the lowest 5-year survival rate of 45.1%. There was also a clear decreasing trend in observed survival with increasing age at diagnosis. We found that women aged less than 50 years old showed significantly better survival compared to women of 50 years old and above (Figure 4).

Discussion

The survival of patients with breast cancer depends on three main prognostic variables i.e. stage of the disease during the first diagnosis, size of the tumour, the menstrual status and the histopathology. In addition to that, it is also influenced by other complex underlying factors; the population structures which include the population age structure and ethnicity; socio-economic status, and the availability of effective health care system which include the screening programmes which enhance the early detection of cases and also accessibility to high quality treatment (Hortobagyi et al., 2005; Tan et al., 2007).

In this cohort study, the overall 5 years survival rate was 49% which was lower than recently published report by Pathy et al. (2011). They studied on 2545 cohort from two hospital-based and reported the 5-year survival rate of 79. The limitation in comparing with their study is that their cohorts were combined with the cohorts from Singapore. Singapore and Malaysia are varied in terms of population structure, ethnicity, culture and socio-economic status. Socio-cultural differences in life styles and health practices between the countries and ethnicity may influence their decision in health related matters. These factors may cause the variation in the reported survival rates.

Similarly as reported by Singapore and other Asian countries (Tan et al., 2009; Yip, 2009), the overall survival is still low as compared to western countries. The increasing 5-year survival rate of more than 80% has been reported in European countries (Berrino et al., 2007), United States (American Cancer Society, 2012) and developed Asian country like Japan (Tsukuma et al., 2006) and Hong Kong (Kwong et al., 2011).

Ethnicity or race has been documented as an important underlying factor that influence the survival rate in the US and European countries (Joslyn and West, 2000; Bowen et al., 2006; DeSantis et al., 2011; Maskarinec et al., 2011; Ooi et al., 2011). A review showed women of African descent have relatively lower of breast cancer but higher mortality rate as they exhibit a number of poor prognostic features whereby the genetic expression is one of the factors (Bowen et al., 2006). The ethnic disparities were also observed among the major ethnic groups in this country (Al-Naggar et al., 2009; Pathy et al., 2011; Taib et al., 2011). Our study showed that Indian women have a higher 5-year survival rate as compared to Chinese women and the Malays. The Malays showed relatively lowest overall survival rate. The result of this study is not consistent with other studies (Taib et al., 2008; Pathy

et al., 2011) that the Chinese had experienced a better survival rate. Their study included patients from Singapore Teaching Hospital, this may explain the discrepancy of the overall survival rate as the majority of their cohorts were Chinese. It has been reported that the Malays tend to present at the advanced stage of the cancer which may explained the lower survival rate as compared to other ethnic groups (Hisham and Yip, 2003; 2004). Delayed presentation was a known and important factor which influenced the prognosis and the survival rate. Some factors such as being a widowed, divorced and those who never perform breast self examination were identified as more likely to delay presentation for seeking treatment (Ghazali et al., 2013).

The mean age of diagnosis was 50.6 years old. This finding is consistent with the previous studies (Hisham and Yip, 2003; Al-Naggar et al., 2009; Pathy et al., 2011) even though their studies were only on a hospital-based cancer registry and hospital cases. There was slightly a higher proportion of premenopausal compared to menopausal group of women when they were first admitted to the hospital (which was taken as a proxy of first time diagnosed). Many reported that tumour among the young and older patients are biologically different as it depends on the presence of oestrogen receptor and progesterone receptor positivity/hormone sensitivity, it progresses faster and may present at higher grade during the first diagnosis (Yildirim et al., 2000; Anders et al., 2008; Peng et al., 2011).

Breast cancer prevention programmes had been introduced by Public Health program, Ministry of Health, Malaysia in conjunction with healthy life style campaign series which was launched in 1990. It was focusing on health education to women of reproductive age group to practice breast self examination (BSE) and the importance of early intervention. It would be beneficial to investigate the temporal changes of survival rate as an impact from those interventions.

The strength of this study is that it is using a population-based data which were collected nationwide. Therefore, this study is novel in providing an overall baseline data on the survival rate of breast cancer patients in Malaysia. However, incomplete or missing data was a great challenge due to the use of the secondary data and registries in constructing the population database. Therefore, we were not able to evaluate the influence of covariates such as stage of cancer at time of diagnosis, the histopathology, the present of hormone receptors and the type of treatment on the survival rate. In addition to that, based on the declared cause of death obtained from the National Registration Department, it is difficult to determine the direct or indirect cause of death related to breast cancer.

In conclusion and recommendation, the overall 5-year survival rate of breast cancer patients among Malaysian women is still low compared to survival rates in developed nations. Ethnicity was an important determinant. It is crucial to further explore the risk factors that affecting the survival rates among the Malaysian patients in order to assist the stake holders in planning and implementing the breast cancer prevention and control programmes. It

is therefore necessary to enhance the strategies cancer registry for breast cancer and effort to increase the level of case ascertainment and the completeness of the data. Further research on survival rate is recommended to observe the temporal changes in survival rate among Malaysian breast cancer patients, which reflect the impact of the effectiveness of prevention programmes.

Acknowledgements

We would like to thank the Director General of Health, Malaysia for his permission to publish this paper. We also acknowledge the Director of Disease Control Division and the Health Informatics Centre Ministry of Health Malaysia for their cooperation, and last but not least we express our sincere gratitude to the Director of Institute for Medical Research for her technical and administrative support. This work was supported by NIH grant NMRR 08-2561411.

References

- Al-Naggar RA, Isa ZM, Shah SA, et al (2009). Eight year survival among breast cancer Malaysian women from University Kebangsaan Malaysia Medical Centre. *Asian Pac J Cancer Prev*, **10**, 1075-8.
- American Cancer Society (2012). Cancer Facts and Figures. Atlanta: American Cancer Society.
- Anders CK, Hsu DS, Broadwater G, et al (2008). Young age at diagnosis correlates with worse prognosis and defines a subset of breast cancers with shared patterns of gene expression. *J Clin Oncol*, **26**, 3324-30.
- Berrino F, Angelis RD, Sant M, et al (2007). Survival for eight major cancers and all cancers combined for European adults diagnosed in 1995-99: results of the EUROCARE-4 study. *Lancet Oncol*, **8**, 773-83.
- Ghazali MG, Othman Z, Cheong KC et al. (2013). Non-Practice of breast self examination and marital status are associated with delayed presentation with breast cancer. *Asian Pac J Cancer Prev*, **14**, 1141-5.
- Pathy NB, Yip CH, Taib NA, et al (2011). Breast cancer in a multi-ethnic Asian setting: Results from the Singapore-Malaysia hospital-based breast cancer registry. *The Breast*, **20**, 75-80.
- Blamey RW, Ellis IO, Pinder SE, et al (2007). Survival of invasive breast cancer according to the Nottingham Prognostic Index in cases diagnosed in 1990-1999. *Eur J Cancer*, **43**, 1548-55.
- Bowen RL, Stebbing J, Lones LJ, et al (2006). A review of the ethnic differences in breast cancer. *Pharmacogenomics*, **7**, 935-42.
- Coleman M P, Quaresma M, Berrino F, et al (2008). Cancer survival in five continents: a worldwide population-based study (CONCORD). *Lancet Oncol*, **9**, 730-56.
- DeSantis C, Siegel R, Bandi P, Jemal A (2011). Breast cancer statistics, 2011. *CA Cancer J Clin*, **61**, 409-18.
- Hirabayashi Y, Zhang M (2009). Comparison of time trends in breast cancer incidence (1973-2002) in Asia, from cancer incidence in five continents, Vols IV-IX. *Jpn J Clin Oncol*, **39**, 411-2.
- Hisham AN, Yip CH (2003). Spectrum of breast cancer in Malaysian women: overview. *World J Surg*, **27**, 921-3.
- Hisham AN, Yip CH (2004). Overview of breast cancer in Malaysian women: a problem with late diagnosis. *Asian J Surg*, **27**, 130-3.
- Hortobagyi GN, de la Garza Salazar J, Pritchard K, et al (2005). The global breast cancer burden: variations in epidemiology and survival. *Clin Breast Cancer*, **6**, 391-401.
- Joslyn SA, West MM (2000). Racial differences in breast carcinoma survival. *Cancer*, **88**, 114-23.
- Kwong A, Mang OWK, Wong CHN, Chau WW (2011). Breast cancer in Hong Kong, Southern China: the first population-based analysis of epidemiological characteristics, stage-specific, cancer-specific, and disease-free survival in breast cancer patients: 1997-2001. *Ann Surg Oncol*, **18**, 3072-8.
- Maskarinec G, Sen C, Koga K, Conroy SM (2011). Ethnic differences in breast cancer survival: status and determinants. *Womens Health (Lond Engl)*, **7**, 677-87.
- Medina VM, Laudico A, Mirasol-Lumague MR, Brenner H, Redaniel MT (2010). Cumulative incidence trends of selected cancer sites in a Philippine population from 1983 to 2002: a joinpoint analysis. *Br J Cancer*, **102**, 1411-4.
- Mohd Taib NA, Yip CH, Mohamed I (2008). Survival analysis of Malaysian women with breast cancer: results from the University of Malaya Medical Centre. *Asian Pac J Cancer Prev*, **9**, 197-202.
- Ooi SL, Martinez ME, Li CL (2011). Disparities in breast cancer characteristics and outcomes by race/ethnicity. *Breast Cancer Res Treat*, **127**, 729-38.
- Park SK, Kim Y, Kang D, Jung EJ, Yoo KY (2011). Risk factors and control strategies for the rapidly rising rate of breast cancer in Korea. *J Breast Cancer*, **14**, 79-7.
- Peng R, Wang S, Shi Y, et al (2011). Patients 35 years old or younger with operable breast cancer are more at risk for relapse and survival: a retrospective matched case-control study. *Breast*, **20**, 568-73.
- Sim X, Ali RA, Wedren S, et al (2006). Ethnic differences in the time trend of female breast cancer incidence: Singapore, 1968-2002. *BMC Cancer*, **6**, 261.
- Taib NA, Akmal MN, Mohamed I, Yip CH (2011). Improvement in survival of breast cancer patients - trends over two time periods in a single institution in an Asia Pacific country, Malaysia. *Asian Pac J Cancer Prev*, **12**, 345-9.
- Takiar R, Srivastav A (2008). Time trend in breast and cervix cancer of women in India - (1990-2003). *Asian Pac J Cancer Prev*, **9**, 777-80.
- Tan BK, Lim GH, Czene K, Hall P, Chia KS (2009). Do Asian breast cancer patients have poorer survival than their western counterparts? A comparison between Singapore and Stockholm. *Breast Cancer Res*, **11**, 4.
- Tan SM, Evans AJ, Lam TP, Cheung KL (2007). How relevant is breast cancer screening in the Asia/Pacific region? *Breast*, **16**, 113-9.
- Tsukuma H, Ajiki W, Oshima A, et al (2006). Survival of cancer patients diagnosed in 1993-1996: collaborative study of population-based cancer registries in Japan. *Jpn J Clin Oncol*, **36**, 602-7.
- Webb PM, Cummings MC, Bain CJ, Furnival CM (2004). Changes in survival after breast cancer: improvements in diagnosis or treatment? *Breast*, **13**, 7-14.
- Yildirim E, Dalgic T, Berberoqlu U (2000). Prognostic significance of young age in breast cancer. *J Surg Oncol*, **74**, 267-72.
- Yip CH (2009). Breast cancer in Asia. *Methods Mol Biol*, **471**, 51-64.