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SCIENTIFIC REVIEW

Determinants of Breast-Conserving Therapy in the Asian Population: A Systematic Review

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Abstract

Background Treatment guidelines recommend breast-conserving therapy (BCT) for patients with early-stage breast cancer. However, Asian patients choose mastectomy over BCT, and the factors influencing this choice are unknown. This review aimed to identify the factors most frequently reported in the Eastern and Southeastern Asian population influencing the choice of BCT for treatment of early-stage breast cancer.

Methods PRISMA guidelines were followed, and PubMed and EMBASE databases were used. The literature search initially identified 4619 articles; abstract screening and full-text screening were performed on 150 and 19 articles, respectively, and 9 articles were finally included in the study.

Results Selection of BCT was associated with sociodemographic factors, such as high socioeconomic status and education level and young age at diagnosis; clinicopathological factors, such as small tumor size and mammographically detected tumors; and healthcare provider factors, such as treatment from a female doctor or from a breast specialist. However, not selecting BCT was associated with personal factors, such as fear of recurrence and avoidance of further treatment.

Conclusions The process of making a treatment decision is complicated and involves many factors influencing patients' choice of surgery type. Exploring these factors helps to elucidate why patients do not choose BCT as their treatment option.

Introduction

Before the 1980s, the treatment of choice among patients with early-stage breast cancer was mastectomy with axillary clearance. However, evidence from several randomized trials [1–9] has indicated that breast-conserving therapy (BCT) and mastectomy have similar survival outcomes. Therefore, the National Comprehensive Cancer Network guidelines [10] recommend BCT, which is a two-step treatment, as an appropriate treatment for early-stage breast cancer. In BCT, the tumor is first completely excised (quadrant resection or quadrant resection plus axillary lymph node surgery). Second, radiotherapy is performed to eliminate any residual cancer cells and enforce local control.

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The evolution of BCT has not only improved treatment and cosmetic outcomes but also preserves the breast, thereby diminishing sexual problems and body image concerns as well as offering other benefits [11]. However, even after BCT was identified as the preferred treatment for early-stage breast cancer, the increase in prevalence of BCT selection has been slower than expected in developed countries [12].

Asian women choose BCT less often than Western women do [13]. Women who undergo BCT have better psychosocial outcomes than those who undergo mastectomy [14]. The results of a study in a Breast Center in Hong Kong showed that Western and Asian women equally benefit from BCT [14]. However, despite the advantages of BCT, Asian women prefer to undergo mastectomy, and the reason for this is unclear.

We narrowed down our included studies to focus on the sample from the Southeast and East Asian countries for their common culture. This culture is based on the Confucianism concept of the relational self as a lifestyle philosophy [15]. Confucianism believes that one's life is inseparable from its family [16], while in Western societies, one relies more on the concept of the individually centered self.

This Confucian-based philosophy may impact the health-seeking behaviors and decision-making on Asian patients. For example, such a collectivist culture emphasizes the importance of maintaining harmony in the family. Thus, being diagnosed with cancer and experiencing physical changes can lead to the patient having guilty feelings for being a burden to the family [17–19]. Moreover, according to Confucianism, women are inferior to men in the relationship and society [20]. Thus, women have to obey their husband and father the moment of making important decisions. Therefore, the Confucianism principles affect the health decision-making of Asian societies, this being very different from Western societies.

Several factors influence women's treatment choice, and Western and Asian cultures differ. We explored factors influencing Eastern and Southeastern Asian women's treatment decisions. An understanding of factors affecting the treatment of choice among Asian women can help to identify potential interventions for minimizing the mortality and morbidity of the disease.

To the best of our knowledge, no study has systematically examined the factors affecting the treatment of choice for early-stage breast cancer among Asian patients. The reasons for the under-utilization of this evidence-based recommendation are important, since they may lead to better health education and promotion. Therefore, this systematic review aims to present a synthesis of the most frequent factors in the Asian population.

Material and methods

Literature review

This review was performed in accordance with the PRISMA guidelines [21], focusing on identifying the reasons most reported by Asian patients for choosing BCT for early breast cancer treatment. A selective literature search was performed by two reviewers (P.G. and C.T.) on the PubMed and EMBASE databases in accordance with a validated search strategy (Appendix 1). The following medical subject search heading was used: "mastectomy, segmental." Filters were applied to obtain English-language human-based studies published since 1990. No other criteria were used.

The search yielded 4619 articles. After the elimination of duplicates, 3120 articles remained. The titles of the articles were reviewed to gauge their relevance to our study. Furthermore, the abstracts of the relevant articles were screened, and those that met the inclusion criteria underwent a full-text analysis to confirm their relevance. Two researchers independently screened all articles in the aforementioned three screenings steps.

Eligibility criteria

The inclusion criteria for selecting the studies were as follows: inclusion of breast cancer patients with no previous history of cancer or metastatic disease, data obtained from an Asian population, full-length article, English text, published in or after 1990, and a focus on breast cancer and particularly factors related to undergoing or not undergoing BCT or mastectomy. Articles were required to be independent studies and not duplicate results published in another article.

Study selection

Overall, 4619 articles were identified using the aforementioned search strategy. From these, 151 were selected for abstract review, and among those, 19 were considered for full-text review. Finally, ten articles were excluded: One study from China did not provide access to the full-text, two did not involve a comparison between BCT and mastectomy, one only included systemic treatment, one grouped BCT and mastectomy patients together, and five studies did not use data from East and Southeast Asian countries (Brazil, Saudi Arabia, Iran, South Africa, and India). Finally, 9 articles were included for review. The study flowchart is provided in Fig. 1.

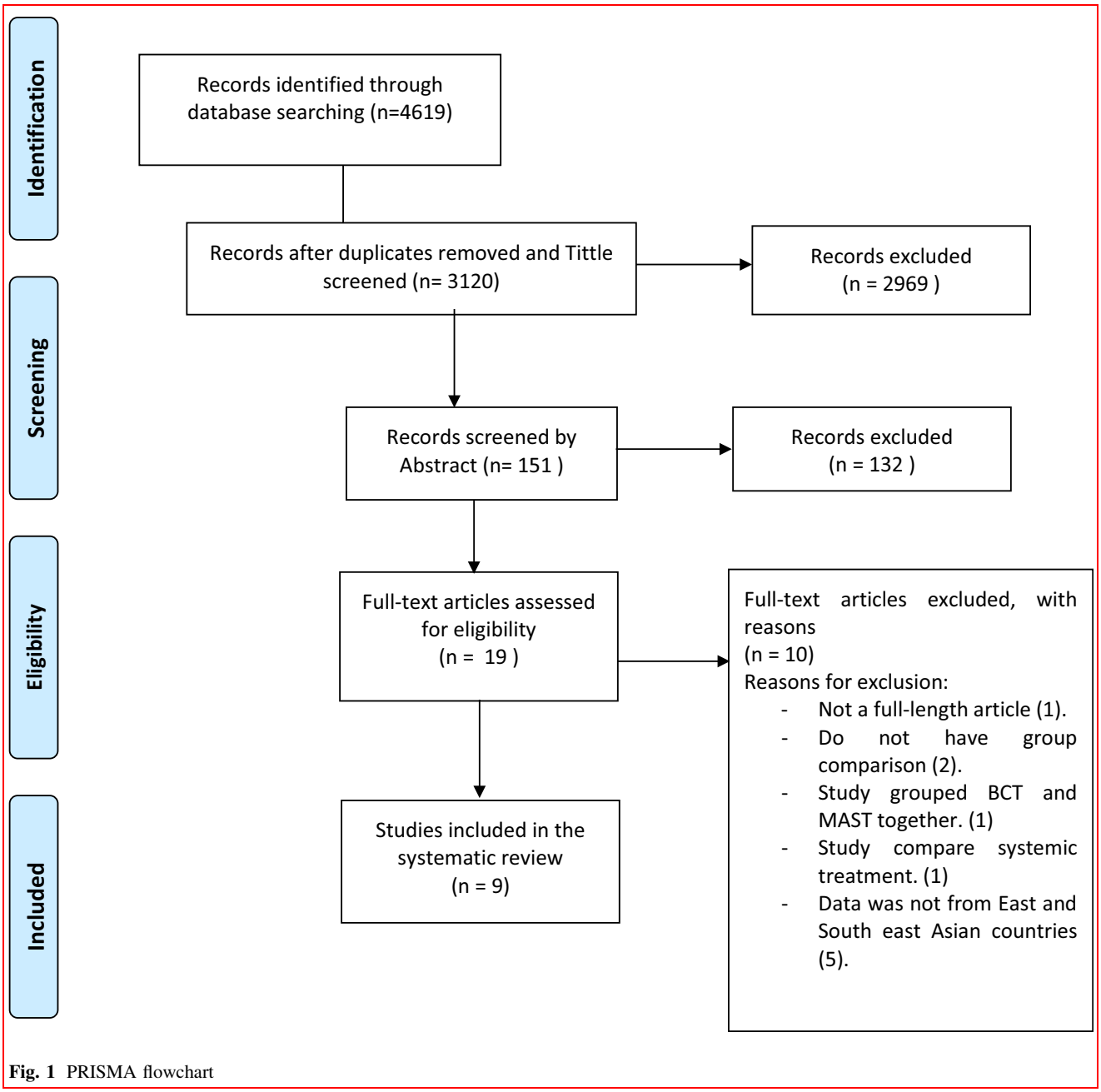

Fig. 1 PRISMA flowchart

Results

Table 1 summarizes the characteristics of studies included in this review. From the selected articles, seven were cross-sectional studies, one was a case–control study, and one was a descriptive study. Mastectomy was the outcome of interest in two studies and BCT was that in five studies. One study used ANOVA to compare three groups of patients, namely BCT, mastectomy, and mastectomy + reconstruction groups. Another study used a Chi-square test to identify differences between groups, and the others used univariate and multivariate logistic regression to predict factors related to choosing between BCT and mastectomy. Four studies were from Hong Kong, and one each was from China, Singapore, Korea, Japan, and Malaysia.

For further interpretation, we divided the results into four groups according to factors influencing the selection of BCT among patients with early-stage breast cancer, namely sociodemographic characteristics, clinicopathological characteristics, personal beliefs, and healthcare provider factors.

Table 1 Study characteristics

	Author, year	Country	*N*	Study Design	Study Duration (y)	Outcome	Analyses
1	Chan et al. (2017)	HONG KONG	4519	CROSS-SECTIONAL	2007–2013 (7)	BCS	Multivariate logistic Regression Univariate Logistic Regression
2	Kurebayashi et al. (2015)	JAPAN	>250,000	TREND STUDY	2004–2011 (8)	Trend	Descriptive study
3	Teh et al. (2014)	MALAYSIA	184	CROSS-SECTIONAL	2008–2010 (3)	Mastectomy	Chi-square test
4	Liu et al. (2012)	CHINA	268	CASE-CONTROL	2005–2007 (2)	BCT	Chi-square test Multivariate Logistic Regression
5	Lee et al. (2010)	KOREA	1893	CROSS-SECTIONAL	1993–2002 (10)	Mastectomy	Multivariate Logistic Regression Univariate Logistic Regression
6	Yau et al. (2009)	HONG KONG	2375	CROSS-SECTIONAL	1994–2007 (13)	BCT	Multivariate Logistic Regression Chi-square test
7	Suen et al. (2008)	HONG KONG	680	CROSS-SECTIONAL	2001–2005 (5)	BCS	Multivariate Logistic Regression Univariate Logistic Regression
8	Woon and Chan (2005)	SINGAPORE	389	CROSS-SECTIONAL	2000–2002 (3)	BCS	Multivariate Logistic Regression Univariate Logistic Regression
9	Lam et al. (2005)	HONG KONG	198	CROSS-SECTIONAL	2001–2003 (1.3)	BCS Mastectomy Mastectomy + Reconstruction	One-way ANOVA test Chi-square test Multiple Linear Regression

BCS Breast-conserving surgery; *BCT* breast-conserving therapy; *ANOVA* analysis of variance; *Y* years.

Sociodemographic factors

Seven studies considered sociodemographic factors [11, 12, 22–26] (Table 2). Age was the most frequently considered, followed by socioeconomic status (SES), and education level. All studies that considered age as a potential factor concluded that young women select BCT, whereas older women select mastectomy as their first treatment option. Moreover, high education level and SES were associated with a high likelihood of selecting BCT. One study by Liu et al. included residence location as a factor and showed that patients living in urban areas had an increased likelihood of choosing BCT over mastectomy.

Clinicopathological factors

Four studies considered clinicopathological characteristics [12, 22, 23, 27]. Most considered tumor size and mammographically detected tumors as influencing factors. All these studies reported a high rate of mastectomy for large tumors. Chan et al. and Yau et al. found that in Hong Kong, a tumor size of < 2 cm was associated with an increased likelihood of choosing BCT [12, 22]. Similarly, Teh et al. from Malaysia reported that large tumors increased the likelihood of patients opting for mastectomy [23]. Additionally, the aforementioned studies in Hong Kong and a study from Japan reported that for mammographically detected tumors (usually smaller than self-detected ones), the likelihood of choosing BCT was high (Table 3) [12, 22, 27].

Personal belief factors

For a proper analysis of the influence of patients' personal beliefs, comprehensive questionnaires or interviews are required, but these are challenging to employ in large-scale studies. Little research has focused on individual beliefs. Three studies that considered personal beliefs were included in our study [23, 25, 26] (Table 4). Among them, the fear of cancer recurrence was the most prevalent, followed by concerns related to body image and loss of femininity and avoidance of radiation or prolonged treatment.

Patients' concerns based on their belief system shape their decision-making process. Lee et al. [25] and Lam et al. [26] observed that women chose mastectomy over BCT because of their fear of recurrence and desire to avoid prolonged treatment. Moreover, Lam et al. reported that patients choosing mastectomy were more concerned with cancer recovery than with body image or sexuality. However, Teh et al. [23] found that Malaysian women were more concerned with loss of femininity and their partner's

Table 2 Sociodemographic factors

Author, year	Country	*N*	Findings
Chan et al. (2017)	HONG KONG	4519	Age < 40 years = BCS
			Higher education level (undergraduate/post-graduate) = BCS
			Never married = BCS
Teh (2014)	MALAYSIA	184	Chinese ethnicity = Mastectomy
			Lower education level = Mastectomy
			Age > 60 years = Mastectomy
Liu et al. (2012)	CHINA	268	Age ≤ 40 years = BCT
			Live in urban area = BCT
			Higher education level = BCT
			Higher family income = BCT
Lee et al. (2010)	KOREA	1893	Premenopausal = Mastectomy
			Stage IIB = Mastectomy
			Comorbidities = Mastectomy
			Lower education level = Mastectomy
Yau et al. (2009)	HONG KONG	2375	Age < 50 years = BCT
Suen et al. (2008)	HONG KONG	680	Age < 50 years = BCS
			Single = BCS
			High education level = BCS
			Employed = BCS
Lam et al. (2005)	HONG KONG	198	Older age = Mastectomy

BCT Breast-conserving therapy; *BCS* breast-conserving surgery

Table 3 Clinicopathological factors

	Author, year	Country	*N*	Findings
1	Chan et al. (2017)	HONG KONG	4519	Regular mammography screening = BCS
				Mammographically detected tumors = BCS
				Small tumor size (≤2 cm) = BCS
2	Kurebayashi et al. (2015)	JAPAN	>250,000	Mammographically detected tumors = BCT
3	Teh et al. (2014)	MALAYSIA	184	Larger tumor size (>2 cm) = Mastectomy
4	Yau et al. (2009)	HONG KONG	2375	Mammographically detected tumors = BCT
				Small tumor size (≤2 cm) = BCT
				Negative nodal status = BCT

BCT Breast-conserving therapy; *BCS* breast-conserving surgery

opinion and more likely to select BCT compared with Chinese women.

Healthcare provider factors

Eight studies considered healthcare provider factors [12, 22–28] (Table 4). Woon et al., using data from Singapore, showed that BCT was more frequently provided by breast specialist surgeons than by general surgeons [28]. Moreover, Liu et al. revealed that in China, female physicians perform BCT more frequently than do male physicians [24].

Among other healthcare provider factors, breast cancer screening has been associated with an increased likelihood of selecting BCT [12, 22, 27]. Chan et al. [22] and Yau et al. [12] from Hong Kong reported that treatment at a private hospital was associated with an increased likelihood of selecting BCT. Moreover, Liu et al. [24]

Table 4 Personal belief and healthcare providers factors

	Author, year	Country	*N*	Healthcare providers findings	Personal belief findings
1	Chan et al. (2017)	HONG KONG	4519	Surgery at a private medical service facility = BCS	–
				Regular mammography screening = BCS	
2	Teh et al. (2014)	MALAYSIA	184	Surgeon recommendation = BCT	Patients less concerned about loss of femininity = Mastectomy
3	Kurebayashi et al. (2015)	JAPAN	>250,000	Mammographically detected tumors = BCT	–
4	Liu et al. (2012)	CHINA	268	Female physicians = BCT	–
				Having medical insurance = BCT	
5	Lee et al. (2010)	KOREA	1893	Surgeon recommendation = BCT	Fear of cancer recurrence = Mastectomy
6	Woon and Chan (2005)	SINGAPORE	389	Surgery done by a breast specialists = BCS	–
7	Yau et al. (2009)	HONG KONG	2375	Surgery at a private medical service facility = BCT	–
				Mammographically detected tumors = BCT	
8	Lam et al. (2005)	HONG KONG	198	Surgeon recommendation = BCT	Fear of cancer recurrence = Mastectomy
					To avoid further treatment = Mastectomy
					Patients less concerned about body image issues = Mastectomy

BCT Breast-conserving therapy; *BCS* breast-conserving surgery

considered patients' insurance status and concluded that in China, patients with insurance were likely to choose BCT over mastectomy.

Another factor mentioned was surgeon recommendation. Three studies, from Malaysia, Korea, and Hong Kong, indicated that patients who received physician advice regarding their treatment options and adjuvant therapies had an increased likelihood of choosing BCT.

Discussion

Our systematic review of the literature concerning early-stage breast cancer in Asia suggests that decisions regarding breast cancer treatment are influenced by sociodemographic factors (such as the patient's age and SES), clinicopathological factors (such as tumor size or stage), the patient's personal beliefs (such as fear of cancer recurrence), and healthcare provider factors (such as surgeon recommendations).

Sociodemographic factors

Overall, Western and Eastern studies have identified similar sociodemographic factors affecting decisions regarding surgical treatment for breast cancer. Western studies have reported that young women favored BCT, whereas older women favored mastectomy [13, 29–33]. Similarly, Suen et al. reported that young Chinese women are more likely to select BCT than mastectomy [11]. Notably, in a study conducted in Hong Kong, women in the youngest age group tended to choose mastectomy plus immediate reconstruction, whereas those in the intermediate age group tended to choose BCT. Lam et al. suggested that very young women have greater survival concerns and therefore tend to choose mastectomy plus immediate reconstruction [26]. A biphasic age distribution for preference, with old women and young women choosing mastectomy and intermediate age groups (40–64 years or 50–64 years) choosing BCT, was also seen in Western studies [34] [35].

Clinicopathological factors

Among clinicopathological factors, tumor size is directly associated with surgical decisions. Theoretically, a large tumor size involves a challenging surgery, wide incision, and sometimes poor cosmetic outcomes. Additionally, large tumor size is associated with an increased rate of local recurrence [36–38] and might influence patients' perception of severity. Furthermore, patients' knowledge regarding the effectiveness of BCT treatment may influence their treatment decisions. These findings are similar in Western studies [39].

Breast size in Asian populations must be considered. Asian women tend to have relatively small breasts. Therefore, when choosing a treatment, patients inevitably consider whether their breasts are large enough for some breast tissue to be preserved after tumor excision [23]. In comparison with Western patients, BCT offers few cosmetic advantages because it involves a substantial loss of breast tissue for Asian women with small breasts [26].

Personal belief factors

In the literature, various hypotheses have been formulated regarding the health-related beliefs of treatment choice. For some cultures or communities, BCT can sometimes be incorrectly perceived as ineffective compared with mastectomy [24]. Researchers have suggested that women choose mastectomy mainly because of the fear of recurrence [25, 26]. Additionally, women might choose prophylactic mastectomy for the same reason. Another suggested reason is the desire to avoid long-term treatment, such as radiotherapy [26].

In Western studies, breast loss is often associated with changes in body image and a sense of loss of femininity or female identity. Therefore, women in the West tend to choose BCT. Although breast loss is also not preferred in the East, the motivation may be different; it is based on the Confucius belief that because the body, hair, and skin are given by parents, any damage to them should be avoided [40]. In that sense, preservation of the hair, healthy skin, and an overall healthy image may be more important than the preservation of breasts in Asian societies, which contrasts with the case in Western cultures. Adjuvant cancer treatment, such as radiotherapy associated with BCT, visibly changes the appearance, causes hair loss, weight loss or gain, and skin-related changes; therefore, Eastern patients may consider it to have more severe consequences compared with mastectomy. This may explain their motivation for choosing mastectomy plus immediate reconstruction [26].

Healthcare provider factors

Patients with breast cancer who are eligible for BCT should be evaluated by a specialized surgical team because some tumors may be too large or located in an unfavorable location for surgery. Training techniques and surgeon specialization enable physicians to offer personalized treatment options to women [22]. One study conducted in Singapore [28] provided evidence that a surgeon's specialty plays a crucial role in the likelihood of patients selecting BCT, with increased BCT rates noted in hospitals after the introduction of a breast specialist to the surgical team. Studies showing that women living in rural areas are more likely to choose mastectomy over BCT than those living in urban areas support access to specialist care as a key determinant in treatment choice [24, 41]. In rural areas, variations in BCT usage may indicate a lack of accessibility to radiotherapy, and traveling to urban centers for radiotherapy seems to be a major barrier that prevents patients from choosing BCT.

The association between breast cancer screening and increased prevalence of BCT may be due to the higher likelihood of small tumors being found during breast cancer screening. In Malaysia and Hong Kong, no population-based cancer screening is performed; hence, at diagnosis, patients present with palpable tumors that are already too large for BCT [22, 23]. By contrast, Japan offers breast cancer screening, and this has led to an increased number of identified cases of early-stage breast cancer, which is associated with an increased likelihood of selecting BCT [27].

Physician–patient relationships can greatly influence patients' decisions. In Asia, surgeons' recommendations influence patients' treatment choice because people perceive doctors as authority figures. By contrast, Western countries value patient autonomy and shared decision making. Some studies have demonstrated that patients' treatment decisions are majorly based on physicians' recommendations. A study in Malaysia [23] revealed that most patients follow their physician's recommendations regarding the choice of mastectomy or BCT. Similarly, Mastaglia et al. [30] found that surgeon recommendation highly influenced patients' decisions. Moreover, Liu et al. [24] found that female physicians provided more information and better explanations regarding the different treatment options available than did male physicians, which led to an increased likelihood of choosing BCT over mastectomy among patients with female doctors. Similarly, in Western studies, Gu et al. [39] found that patients with female physicians tended to opt for BCT.

Conclusions

Our study revealed the factors that contribute to the prevalence of mastectomy being higher than that of BCT in the Asian population, which is contradictory to the prevalence in the USA and Europe. This review provides a valuable summary of the factors associated with choosing BCT among the Asian population. The process of making a treatment decision is a complicated one and involves many factors that influence patients when choosing a surgery type. A better understanding of these factors can help physicians to identify patients who are less inclined to choose BCT as their treatment option.

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Compliance with ethical standards

Conflict of interest The authors declared that they have no conflict of interest.

Appendix 1

Search Strategy PubMed.

((((((((((Breast neoplasm*[MeSH Terms]) OR Breast cancer[Title/Abstract]) OR neoplasm*[Title/Abstract]) OR tumor[Title/Abstract]) OR tumors[Title/Abstract]) OR tumour[Title/Abstract]) OR cancer*[Title/Abstract]) OR carcinoma[Title/Abstract]) OR mammary[Title/Abstract]) OR breast[Title/Abstract])) AND (((“mastectomy, segmental”[MeSH Terms]) OR breast conserv*[Title/Abstract]) OR lumpect*[Title/Abstract])) AND (((((((Predictors[Title/Abstract]) OR determinants[Title/Abstract]) OR Associated factors[Title/Abstract]) OR factors[Title/Abstract]) OR Predict*[Title/Abstract]) OR related factors[Title/Abstract]) OR factors associated[Title/Abstract]) AND ((“1990/01/01”[PDat]: “2019/12/31”[PDat]) AND Humans[Mesh] AND English[lang]).

Search Strategy EMBASE.

’breast cancer’/de OR ’breast tumor’/de OR neoplasm:ab,ti OR ’malignant neoplasm’:ab,ti OR carcinoma:ab,ti OR ’breast tumor’:ab,ti OR ’breast cancer’:ab,ti) AND (’partial mastectomy’/de OR ’partial mastectomy’:ab,ti OR ’breast conserving therapy’:ab,ti OR ’breast conserv*’:ab,ti) AND (predictors:ab,ti OR determinant:ab,ti OR determinants:ab,ti OR ’associated factors’:ab,ti OR ’related factors’:ab,ti OR ’factors associated’:ab,ti) AND [humans]/lim AND [english]/lim AND [1990–2019]/py.

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