

The International Awareness of Breast Reconstruction

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Background: To our knowledge, this is the first and largest study conducted to collect data among surgeons worldwide about breast reconstruction. We have aimed to collect data about breast reconstruction worldwide, the most popular breast reconstruction techniques, and the barriers behind the low rate of breast reconstruction according to surgeons.

Methodology: A comparative cross-sectional design was used in this study. A prepared questionnaire, which was developed after reviewing the literature review conducted for this study, was used to collect data. The questionnaire is multiple choice. It was distributed among surgeons online.

Results: The study includes 812 participants who live all over the world, representing 79 countries. More than a third of surgeons perform less than 10 breast reconstructions per year (33.38%), and 45.86% of them think that immediate surgery is the most frequent practice. A higher percentage of participants prefer implants over autologous reconstruction as a technique for breast reconstruction (54.9%). Moreover, 39.02% of participants shared that a lack of knowledge about the availability of breast reconstruction was a reason for refusing the surgery.

Conclusions: This study demonstrates that the breast reconstruction rate is still low and that most surgeons prefer implants that are performed immediately. The lack of knowledge among patients about the availability of breast reconstruction is the most common reason for refusing reconstruction. Therefore, there is a need to increase patient awareness about the availability of this surgery. (*Plast Reconstr Surg Glob Open* 2023; 11:e5417; doi: 10.1097/GOX.0000000000005417; Published online 20 November 2023.)

INTRODUCTION

Medical care for breast cancer patients has significantly advanced in recent decades, encompassing surgical treatments, radiotherapy, chemotherapy, hormone therapy, and posttreatment rehabilitation.¹ Although various breast-conserving surgical techniques, such as lumpectomies and quadrantectomies, are available for breast cancer treatment, mastectomies remain the predominant procedure in certain countries. Combining mastectomy with plastic surgery for reconstruction, aimed at restoring volume, shape, and contour, can help mitigate the psychological impact and enhance women's self-esteem.²⁻⁴ Breast reconstruction yields several benefits, including the restoration of femininity, bodily

integrity, and rehabilitation from postoperative complications, ultimately improving physical, emotional, and social well-being.⁵

Several factors influence the acceptance of breast reconstruction among breast cancer patients. First, ongoing education has improved patient and healthcare provider awareness regarding the accessibility and significance of breast reconstruction. Second, the availability of skilled surgeons capable of performing breast reconstruction has led to its widespread adoption as a safe and effective option. Third, a country's income level affects the availability of these techniques. High-income countries allocate resources to support breast reconstruction as a critical component of breast cancer care, benefiting patients' psychological health.^{6,7} In contrast, low-income countries face challenges, including limited access to oncologic care, societal awareness deficits, insufficient education, a shortage of specialized surgical professionals, and restricted access to multidisciplinary specialty care, hindering progress in this area.⁷⁻¹⁰

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Although the rate of breast reconstruction surgery has increased in recent decades, it still remains relatively low, ranging from 5% to 42% according to various studies.^{11,12} A survey by the American Society of Plastic Surgeons revealed that 80% of women were unaware of the range and availability of breast reconstruction options. Only 22% were familiar with the importance of breast reconstruction and the quality of outcomes. Shockingly, some women were never informed of their breast reconstruction options, even after a breast cancer diagnosis.¹³

Low awareness of breast reconstruction’s availability is the primary reason for its low adoption rate. Thus, raising awareness is crucial for increasing the procedure’s utilization.¹⁴ Discussing these findings can promote an international effort to enhance Breast Reconstruction Awareness Day. Consequently, this study aims to gather global data on breast reconstruction, popular techniques, and the barriers contributing to its low adoption rate, as reported by surgeons.

METHODOLOGY

Our study employed a cost-effective comparative cross-sectional design to assess various breast reconstruction techniques. We gathered data through a carefully crafted 22-question questionnaire, developed after an extensive literature review. The questionnaire covered participants’ sex, practice country, years of experience, subspecialization in breast reconstruction, and surgical practices. We also explored the prevalence of breast reconstruction, referrals from breast surgeons, popular techniques, and regulatory permissions.

Furthermore, we investigated why some patients decline reconstruction and strategies to enhance awareness. The survey was distributed online to a global audience, with the questionnaire prepared in English. Our target was 2000 surgeons, exclusively members of the International Society of Aesthetic Plastic Surgery (ISAPS).

Ultimately, 812 surgeons, constituting 40.6% of our target group, participated. We focused exclusively on plastic surgeons who were ISAPS members. Ethical approval and informed consent were secured through the Prince Sultan Military Medical City Scientific Research Center.

Takeaways

Question: Do we have a high rate of breast reconstruction worldwide? What is the preferred technique among surgeons?

Findings: This cross-sectional study among 812 plastic surgeons worldwide demonstrates that the breast reconstruction rate is still low and that most surgeons prefer implants that are performed immediately. The lack of knowledge among patients about the availability of breast reconstruction is the most common reason for refusing reconstruction.

Meaning: To our knowledge, this is the first and largest study conducted to collect data among surgeons worldwide about breast reconstruction, and it showed that there is a need to increase patient awareness about the availability of breast reconstructive surgery.

Participants had the option to decline participation without sharing personal information.

Following data collection, we organized and coded the data in MS Excel (Microsoft Corp, Redmond, Wash.), transferring it to SPSS 22.0 (IBM, Armonk, N.Y.) for descriptive analysis. Categorical variables were expressed as numbers and percentages. To evaluate relationships among categorical variables, we employed the chi-square or Fisher exact test when expected cell frequencies were less than 5. A *P* value less than 0.05 signified statistical significance.

RESULTS

In this study, we collected responses from 812 questionnaires. Most of the participants are male, with a ratio of almost 3:1 (male to female). Moreover, most of the participants have been in practice for more than 20 years [332 (41.04%)], whereas 228 (28.18%) have been in practice for 11–20 years. Furthermore, 335 (44.04%) have a subspecialty in breast reconstruction, 734 (90.62%) have done a breast reconstruction before, and 572 (71.14%) reported that other specialists in their area do breast reconstruction (Table 1).

Table 1. Demographic Factors of Participants (N = 812)

Variable		Frequency	Percentage	<i>P</i>
Sex	Male	604	74.38	<0.001
	Female	207	25.62	
Country				
How many years have you been in practice?	1–5	109	13.47	<0.001
	6–10	140	17.31	
	11–20	228	28.18	
	More than 20	332	41.04	
Do you have a subspecialty in breast reconstruction?	Yes	355	44.04	<0.001
	No	451	55.96	
Do you do breast reconstruction?	Yes	734	90.62	<0.001
	No	76	9.38	
Are there any other specialists in your area or region doing breast reconstruction?	Yes	572	71.14	<0.001
	No	232	28.86	

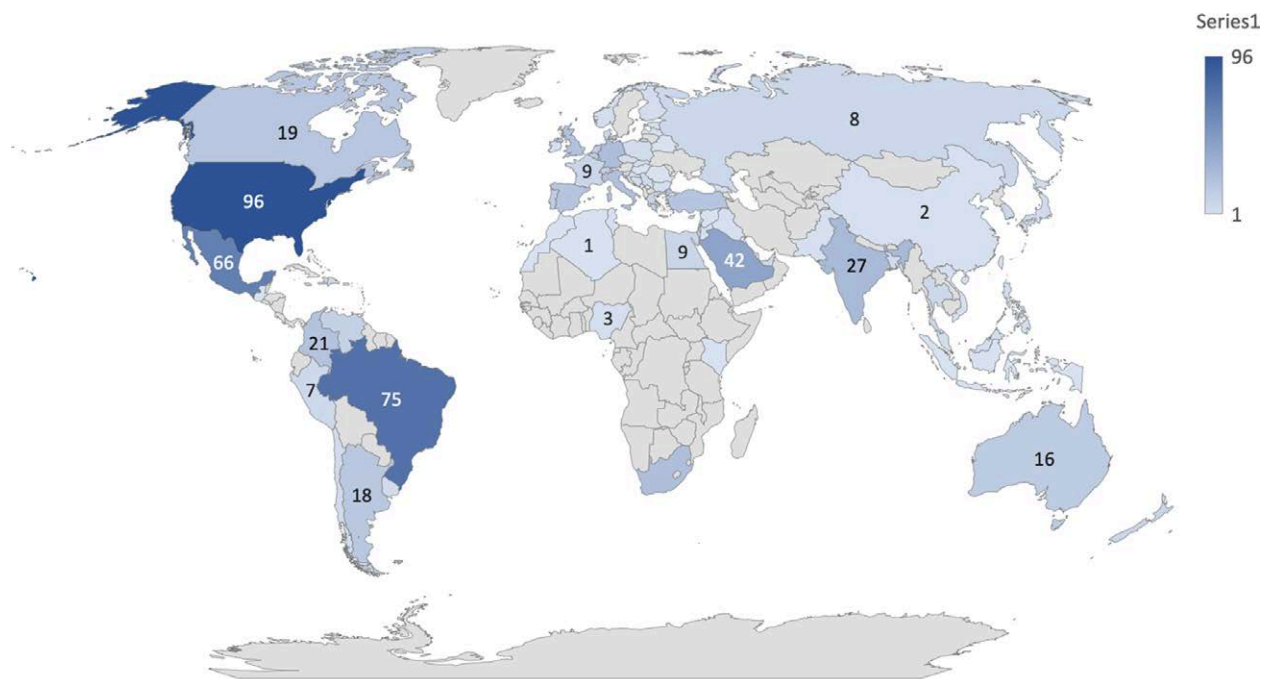


Fig. 1. Distribution of participants in this study over countries. Powered by Bing, Australian Bureau of Statistics, GeoNames, Microsoft, Navinfo, TomTom, Wikipedia.

The study includes 812 participants who live all over the world, including the known five continents (with Australia included as part of the Asian continent) and representing 79 countries. Figure 1 presents the distribution of participants over continents and countries. Europe has the largest number of participants [278 (34.5%)], followed by North America, then South America, whereas Africa has the lowest number of participants [41 (5.1%)]. Saudi Arabia represented 5.2% of the total samples (N = 42). (See Appendix, Supplemental Digital Content 1, which displays the distribution of participants from each country, <http://links.lww.com/PRSGO/C879>.)

Moreover, we discovered that more than a third of surgeons [264 (33.38%)] perform less than 10 breast reconstructions per year, whereas 173 (21.87%) of them perform more than 50 reconstructions per year. In addition, 360 (45.86%) said that immediate surgery happens most frequently in their practice, whereas 292 (37.2%)

stated that delayed surgery happens most often. The rest said that the frequency of immediate and the frequency of delayed surgery are about the same. However, according to our participants, breast surgeons refer patients for delayed reconstruction more often than for immediate reconstruction (Table 2).

A slightly higher percentage of participants said that they prefer implants over autologous reconstruction as a technique for breast reconstruction [431 (54.9%)]. Moreover, 341 (43.06%) indicated that they never use acellular dermal matrix, 78 (9.8%) indicated that they never use round implants, and 186 (23.37%) said that they never use anatomical implants. The most commonly reported technique is round implants, where 196 (24.62%) always use them (Table 3).

Most participants reported that they are aware of anaplastic large cell lymphoma (ALCL) [761 (95.13%)], and 687 (85.77%) stated that they inform their patients about

Table 2. Rate of Breast Reconstruction and the Most Frequent Type

Variables		Frequency	Percentage, %	P
How many cases of breast reconstruction do you do in a year?	Less than 10 cases/y	264	33.38	<0.001
	11–20 cases/y	168	21.24	
	20–50 cases/y	186	23.51	
	More than 50 cases/y	173	21.87	
Which is more frequent in your practice: immediate or delayed?	Immediate	360	45.86	<0.001
	Delayed	292	37.2	
	About the same	133	16.94	
Do breast surgeons refer patients to you for immediate reconstruction?	Yes	582	72.93	<0.001
	No	216	27.07	
Do breast surgeons refer patients to you for delayed reconstruction?	Yes	663	83.29	<0.001
	No	133	16.71	

Table 3. The Most Frequently Used Breast Reconstruction Technique

Variable	Frequency	Percentage, %	P	
What is your preferred technique?	Implants	431	54.9	0.005
	Autologous reconstruction	354	45.1	
Do you use an acellular dermal matrix?	Always	53	6.69	0.07
	Usually	90	11.36	
	Sometimes	147	18.56	
	Rarely	161	20.33	
	Never	341	43.06	
Do you use round implants?	Always	196	24.62	<0.001
	Usually	196	24.62	
	Sometimes	188	23.62	
	Rarely	138	17.34	
	Never	78	9.8	
Do you use anatomical implants?	Always	93	11.68	<0.001
	Usually	220	27.64	
	Sometimes	158	19.85	
	Rarely	139	17.46	
	Never	186	23.37	

Table 4. Awareness of ALCL and Its Risks

Variable	Frequency	Percentage	P	
Are you aware of ALCL?	Yes	761	95.13	<0.001
	No	39	4.88	
Do you inform your patients about the risk of ALCL?	Yes	687	85.77	<0.001
	No	49	6.12	
	I do not know	65	8.11	
Has the ALCL risk changed your practice?	Yes	454	67.7	<0.001
	No	216	32.3	

the risk of ALCL. Additionally, 454 (67.7%) have changed their practice because of ALCL risk (Table 4).

In considering the different countries participating, we found that 379 (46.65%) participants indicated that there is a Breast Reconstruction Awareness Day in their countries, 482 (59.4%) reported that their countries support these activities, and 453 (55.79%) contribute to these activities (Fig. 2).

Moreover, 317 (39.02%) participants shared that a lack of knowledge about the availability of breast

reconstruction is a reason for refusing reconstruction. Other reasons mentioned include worries about complications [209 (25.72%)]; tiredness concerning health services [135 (16.68%)]; and religious reasons, which were reported by only 2 (0.25%) participants (Fig. 3).

Most participants [655 (80.68%)] thought that social media and the news media could help increase the level of awareness about breast reconstruction. Society campaigns [436 (53.7%)] and compulsory referrals for consultation for all patients [355 (43.79%)] were also mentioned (Fig. 4).

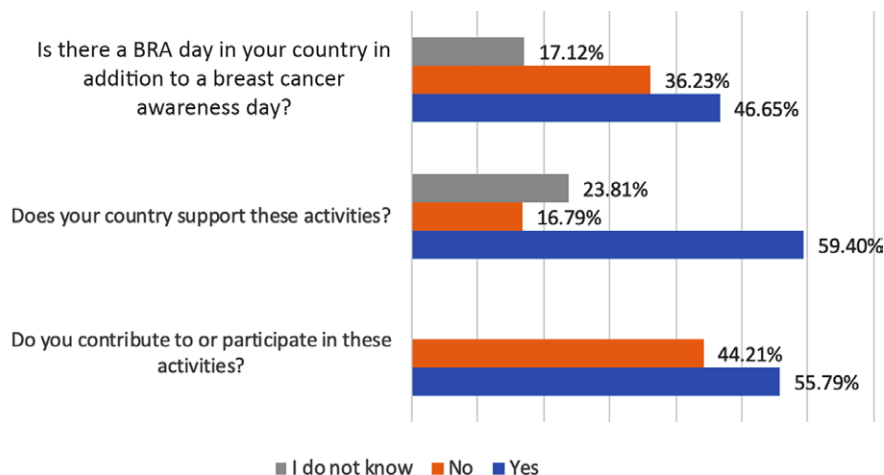


Fig. 2. Countries and Breast Reconstruction Awareness Day.

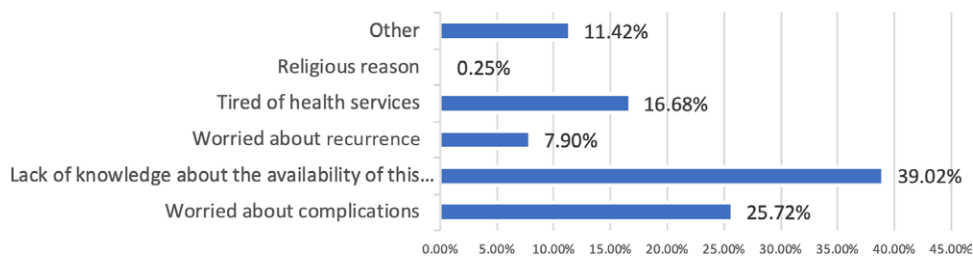


Fig. 3. Main reasons that patients refuse reconstruction.

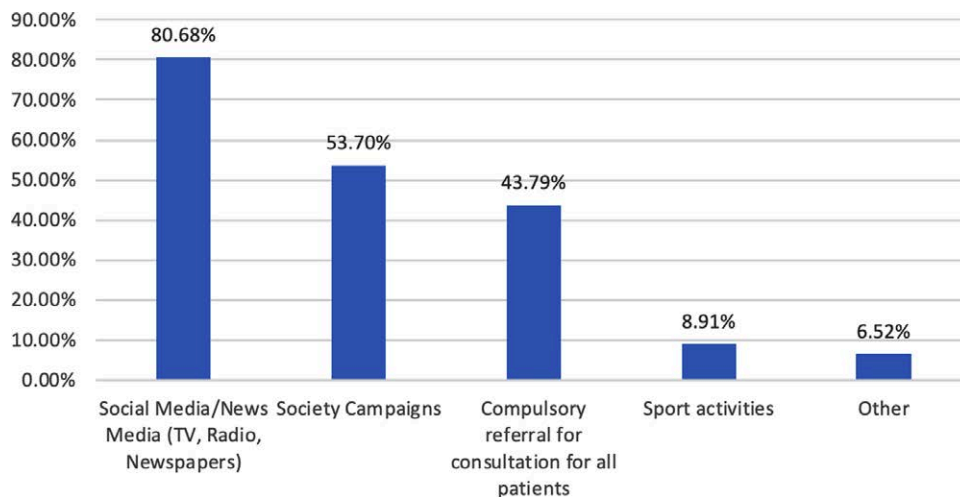


Fig. 4. Factors that could increase awareness.

We determined that the sex of participants has no significant effect on their thoughts; however, men reported that immediate surgery is more frequent than delayed surgery (1% higher than women), and 327 (56.3%) men reported that they prefer implants over autologous reconstruction [as opposed to 103 (50.7%) women]. We did find a significant difference in thoughts among participants of different continents, where 109 (40.5%) participants in Europe said that immediate surgery happens most frequently compared with 15 (38.5%) in Africa, 71 (50.0%) in South America, 100 (56.8%) in North America and 62 (40.0%) in Asia. However, only five (11.9%) participants in Saudi Arabia reported that immediate surgery is the most frequent in their country. We determined that only participants from North and South America prefer using implants over autologous reconstruction. Moreover, the highest percentage of participants who do not inform their patients about the risks of reconstruction are located in South America [16 (11.1%)]. We also found that a greater number of participants with more experience prefer implants over autologous reconstruction in their practice: 192 (61.0%) surgeons who have been practicing for more than 20 years prefer implants, whereas 115 (51.3%) surgeons with 11–20 years, 68 (50.0%) with 6–10 years, and 55 (50.9%) with 1–5 years of practice prefer implants, with a significant difference ($P=0.05$). Finally, we determined that the number of cases of breast reconstruction done

by participants only affected their thoughts about the most popular practice, whereas participants who have performed fewer reconstructions said that immediate surgery is less frequent (Table 5).

DISCUSSION

Over the last two decades, breast cancer management has been increasingly guided by the objective of aesthetically conserving breasts.¹⁵ Breast reconstruction (including implants, tissue expanders, and autologous reconstruction) has a significantly positive psychological effect on patients’ self-esteem, femininity, and sexuality. However, it does not influence the oncological consequences of breast cancer and its recurrence.^{16,17} Previous studies have demonstrated that almost 80% of women refuse breast reconstruction.¹⁵ Moreover, the clinical data that inform decision-making are comparable across nations, and the evidence base supporting this approach is a worldwide resource. Oncologists and surgeons are expected to be similarly impacted globally by the lack of high-quality data to guide decision-making, despite differences in the range of available treatments and personal decision-making factors. Therefore, our study aimed to collect data about breast reconstruction worldwide, the most popular breast reconstruction techniques, and the barriers behind the low rate of breast reconstruction according to surgeons. Based on our knowledge, this is

Table 5. The Relation between Some Demographic Factors of Participants and Their Answers about What Is the Most Frequent Practice, Preferred Technique, and If They Inform Patients about Risks

Variable		The Most Frequent Practice			Preferred Technique		Informing Patients about Risks		
		Delayed	Immediate	About the Same	Implants	Autologous Reconstruction	No	Yes	Only High-risk Patients
Sex	Male	210 (36.1%)	275 (47.3%)	97 (16.7%)	327 (56.3%)	254 (43.7%)	29 (4.9%)	565 (95.1%)	0 (0.0%)
	Female	82 (40.6%)	84 (41.6%)	36 (17.8%)	103 (50.7%)	100 (49.3%)	10 (4.9%)	195 (95.1%)	0 (0.0%)
	<i>P</i>	0.530			0.261		0.051		
Continent	Europe	109 (40.5%)	109 (40.5%)	51 (19.0%)	126 (47.4%)	140 (52.6%)	12 (4.4%)	262 (95.6%)	0 (0.0%)
	Africa	15 (38.5%)	15 (38.5%)	9 (23.1%)	16 (42.1%)	22 (57.9%)	0 (0.0%)	41 (100.0%)	0 (0.0%)
	South America	50 (35.2%)	71 (50.0%)	21 (14.8%)	92 (64.3%)	51 (35.7%)	16 (11.1%)	128 (88.9%)	0 (0.0%)
	North America	55 (31.3%)	100 (56.8%)	21 (11.9%)	129 (73.3%)	47 (26.7%)	5 (2.8%)	175 (97.2%)	0 (0.0%)
	Asia	62 (40.0%)	62 (40.0%)	30 (20.0%)	65 (40.9%)	92 (59.1%)	6 (3.3%)	150 (96.2%)	0 (0.0%)
	<i>P</i>	0.000*			0.00*		0.00*		
How many years have you been in practice?	1–5	46 (42.6%)	40 (37.0%)	22 (20.4%)	55 (50.9%)	53 (49.1%)	4 (3.7%)	105 (96.3%)	0 (0.0%)
	6–10	47 (34.1%)	67 (48.6%)	24 (17.4%)	68 (50.0%)	68 (50.0%)	4 (2.9%)	134 (97.1%)	0 (0.0%)
	11–20	82 (37.1%)	106 (48.0%)	33 (14.9%)	115 (51.3%)	109 (48.7%)	12 (5.3%)	215 (94.7%)	0 (0.0%)
	More than 20	116 (36.7%)	146 (46.2%)	54 (17.1%)	192 (61.0%)	123 (39.0%)	19 (5.9%)	305 (94.1%)	0 (0.0%)
	<i>P</i>	0.570			0.05*		0.519		
How many cases of breast reconstruction do you do in a year?	Less than 10	140 (54.5%)	63 (24.5%)	54 (21.0%)	156 (59.8%)	105 (40.2%)	13 (4.9%)	250 (95.1%)	0 (0.0%)
	11–20	64 (38.3%)	88 (52.7%)	15 (9.0%)	79 (48.2%)	85 (51.8%)	10 (6.0%)	157 (94.0%)	0 (0.0%)
	20–50	56 (30.1%)	102 (54.8%)	28 (15.1%)	98 (53.3%)	86 (46.7%)	6 (3.2%)	179 (96.8%)	0 (0.0%)
	More than 50	31 (17.9%)	106 (61.3%)	36 (20.8%)	95 (55.2%)	77 (44.8%)	9 (5.3%)	162 (94.7%)	0 (0.0%)
	<i>P</i>		0.00*			0.127		0.665	

**P* < 0.01.

the first and largest study that has been conducted to achieve this aim.

The first finding of this study is that more than a third of surgeons (33.38%) perform less than 10 breast reconstructions per year, whereas 21.87% of them perform more than 50 of these reconstructions per year. This is different from what was reported by Duxbury et al. This study shared that only about 13% of surgeons in the United Kingdom had performed less than 10 reconstructions per year, whereas 45% of them reported performing more than 20 breast reconstructions per year.¹⁸ A study from the United States determined that 50% of surgeons reported performing 11–50 reconstructions in a year; however, more than 33% of these surgeons performed fewer than 10 reconstructions.¹⁹ A study by Momoh et al indicates that 20.15% of surgeons in two US states had performed more than 50 reconstructions per year and that less than 12% reported performing fewer than 10 reconstructions per year.²⁰

Immediate breast reconstruction was reported to be the most popular practice by 45.86% of our participants. This is lower than what was reported by Momoh et al, who shared that 79% of surgeons would perform surgery with immediate timing and 20.45% with delayed timing.²⁰ However, this result disagrees with the results of Duxbury et al, who reported that delayed reconstruction is more common than immediate.¹⁸ This difference in results among studies can be explained by the different geographic locations of each study, as even our results vary significantly among continents regarding the most popular approach used: 40.5% of participants in Europe said that immediate surgery is more frequent compared with 38.5% in Africa, 50.0% in South America, 56.8% in North America, and 50.9% of participants in Asia.

In our study, implants are preferred among surgeon participants over autologous reconstruction as a technique for breast reconstruction. This resembles the results of Duxbury et al¹⁸ and the study from Momoh et al, who reported that 73% of surgeons use implants compared with 14.8% who use autologous reconstruction.²⁰ Although most African (22; 57.9%) and Asian (92; 59.1%) plastic surgeons who participated in our study preferred autologous reconstruction over implants, there is a potential limitation due to the questionnaire’s restriction to members of the ISAPS. This limitation could impact the accuracy of the results, as we do not have information regarding how many of them are microsurgeons or have specialized training in microsurgery. Unfortunately, our questionnaire did not include a specific question addressing this issue. Therefore, further studies may be necessary to determine which countries have a higher rate of microvascular reconstruction compared with implant-based reconstruction.

Furthermore, 43.06% of participants indicated that they never use acellular dermal matrix, 9.8% never use round implants, and 23.37% never use anatomical implants. The most common technique reported is round implants (where 24.62% always use them).

In this study, we attempted to understand the factors prompting patients’ refusal to undergo breast reconstruction. Alderman et al revealed that some such factors include older age, late-stage cancer, fear of complications, psychological problems, socioeconomic status, and frustration about the operation.²¹ In our results, most surgeons [317 (39.02%)] thought that a lack of knowledge about the availability of breast reconstruction is the main reason that patients refuse reconstruction. Other reasons include worries about complications (25.72%); tiredness regarding health services (16.68%); and religious reasons,

which were reported by only 0.25% of participants. This resembles the results of Ozinko et al, who reported that the hurdles to breast reconstruction surgery include those related to accessibility, availability, affordability, awareness, expense, and public attitudes toward the procedure.²² Moreover, according to a Canadian study, information gaps and false beliefs held by patients and referring doctors are two controllable barriers to breast reconstruction.¹² Most of our participants (80.68%) said that social media and the news media could help in increasing the level of awareness about breast reconstruction. Society campaigns (53.7%) and compulsory referral for consultation for all patients (43.79%) were also mentioned. Increasing awareness among patients about the availability of these types of surgery would help in increasing the rate of breast reconstruction surgery. In turn, this would raise the positive psychological effect on patients with breast cancer, thus increasing the efficacy of such procedures.

This study had some limitations, including our dependence on the self-reported questionnaire, which contains some questions that require the use of memory (including the question concerning the number of cases in the last few years), which may cause some memory bias. Moreover, this could create some personal bias, where some participants may report higher or incorrect data or even randomly choose their answers. Furthermore, this study was conducted during the COVID-19 pandemic, during which many procedures were canceled or delayed, which may affect the results of this study.

In conclusion, this study demonstrates that the breast reconstruction rate is still low and most surgeons prefer implants that are performed immediately. The lack of knowledge among patients about the availability of breast reconstruction is the most common reason for refusing reconstruction. Therefore, there is a need to increase patient awareness about the availability of this surgery. Moreover, more investigations to determine the factors associated with patients' refusal to undergo breast reconstruction should be conducted.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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ETHICAL APPROVAL

Ethical approval and informed consent were secured through the Prince Sultan Military Medical City Scientific Research Center (1652).

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