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The Effectiveness of the Sport “Dragon Boat Racing” in Reducing the Risk of Lymphedema Incidence

An Observational Study

KEY WORDS

Dragon boat
Lymphedema
Mastectomy
Quality of life
Sports

Background: Upper extremity lymphedema is a complication that often occurs in women with breast cancer as a result of surgery and/or radiotherapy. Some studies report that a boating activity known as the “dragon boat” sport can benefit these women. **Aim:** The aim of this study was to assess whether this type of sport prevents or reduces lymphedema, its impact on quality of life (QoL), and the possible predictors of this condition. **Methods:** This was an observational study of 2 groups: group A (women who participated in dragon boat racing for at least 6 months) and group B (women who participated in other forms of physical exercise biweekly). Data were collected at the National Cancer Institute of Rome and the lake of Castel Gandolfo from June to October 2016. The instruments used were a questionnaire created for sociodemographic and clinical data, the European Organisation for Research and Treatment of Cancer Core Questionnaire for evaluating QoL, and a tape measure applied to estimate the local lymphedema. **Results:** One hundred women participated in the study. Lymphedema incidence in group A was 4.0% (2 of 50), whereas in group B it was 26.0% (13 of 50). Women who participated in dragon boat racing also reported a healthier lifestyle, lower body mass index, and a better QoL (set point: 61.8 group B vs 80.0 group A). **Conclusions:** The dragon boat sport participants had more positive clinical and QoL outcomes than did the

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S.M., and A.P. wrote the manuscript. All authors read and approved the final manuscript.

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women who did not participate in that sporting activity. **Implications for Clinical Practice:** It would be important to make women with breast cancer aware of the practice of dragon boat racing.

Breast cancer is the leading cause of cancer death (14%) in women worldwide, and the most frequently diagnosed disease in women (1 woman in every 8), with an incidence of 1.38 million new cases per year, where 40% of cases occur in women older than 65 years.^{1,2}

Treatment, which varies according to the stage of the disease, is associated with abnormal physical and psychological adverse effects that may adversely affect women's quality of life via complications including lymphedema, fatigue, insomnia, pain, depression, and fear of recurrence.³

Lymphedema is a chronic and incurable disease that leads to the retention of lymphatic fluid in the interstitial tissue. It is therefore the result of an obstruction or interruption of the lymphatic system that can occur secondary to tumors, surgery, trauma, or radiotherapy.^{4,5}

Integrated surgical treatment with lymphadenectomy and/or radiation therapy is the main cause of lymphedema,⁶ appearing from a few days up to 30 years after treatment,⁷ although in the majority of cases (80%) appearing 3 years from surgery.⁸ Incidence of cancer-related lymphedema is 20% after axillary lymphadenectomy and 3% after sentinel lymph node biopsy.⁹

The criterion standard for the treatment of this condition is physical therapy, known as complete decongestive therapy, which includes manual lymphatic drainage, gentle exercise, bandaging, meticulous skin care, and self-care.^{9,10}

There is mounting evidence that regular physical exercise is an important element in preventing lymphedema and in improving the quality of life in women following a mastectomy.^{11,12} Nevertheless, Brown et al¹⁰ reported how adherence to self-care modalities was nonoptimal.

Today, a very popular sporting activity among women after mastectomy is "dragon boat racing," which is a tiresome and repetitive exercise of the upper limbs, performed in teams.

The Dragon Boat Practice for Breast Cancer Women was introduced in 1996 by US physician Dr Donald C. McKenzie.¹³ Working with a pioneering women's group, he experienced how, in contrast to the theories of the period, the rhythmic and cyclic movement of the paddling was a kind of natural lymph drainage, favoring the prevention of lymphedema. McKenzie's¹³ contribution has been pivotal and now counts tens of thousands of women working around the world, mainly in the United Kingdom. The dragon boat is a boat with the head and tail of a dragon; it measures 12.66 m in length and 1.06 m in width, for a total weight of 2250 kilos (including that of the paddlers).¹⁴ The paddles (oars) are similar to those of Canadian canoes and weigh about a kilo. There are 20 paddlers on the hull, whereas in the bow, facing the crew, there is a tambourine (capo-vogue) that beats time on a big drum, a legacy of an ancient Chinese tradition. On the stern, exactly where the dragon's tail is, stands the helmsman with an oar 3 m long. Its spade is 18 cm wide and sets the boat's direction. Positioning on the boat is based on the height of the woman; generally, the tallest are positioned in the

center, whereas the shortest and more experienced women are located at the head of the voga. The training has a total duration of 1 hour, with a change of side halfway through, so as to exercise the muscle bands of both upper limbs symmetrically. Physical activity is usually performed twice a week in the winter and thrice in the summer. Before participating in competitive races, some women engage in an intensive training program with gym practice.¹⁴

Studies have found that this type of sport provides a number of benefits physically, socially, emotionally, and spiritually, contributing indirectly to a significant improvement in quality of life^{13,15} in comparison to the self-care modalities of exercise.¹⁰

Specifically, dragon boat training, in addition to reducing limb lymphedema, significantly decreases the risk of myocardial disease.¹⁶ Being a team sport, it promotes the development of social relations¹⁷ that help women to better address stress after the disease.¹⁸ Women can find the support they need from one another to face common challenges,¹⁹ hoping to regain control over their lives.²⁰

To date, there are not many studies illustrating the effectiveness of this sport for the overall well-being of women with breast cancer and in the prevention of lymphedema. The primary aim of this study was to verify the effectiveness of dragon boat racing in the prevention and/or reduction of lymphedema by comparing a group of patients who regularly practiced dragon boat racing with patients who used alternative therapies or practiced other sports. A secondary outcome was the assessment of the impact of dragon boat practice on quality of life and the search for possible predictors of lymphedema through the analysis of lifestyles in both groups.

Theoretical Framework

The functional-descriptive model of posttraumatic growth²¹ was the conceptual model for our study. Women consider participation in the dragon boat sport²² as an opportunity (*a*) for social support and personal control, (*b*) to develop interpersonal relationships with people facing the same situation, and (*c*) to create a new identity (from patient to athlete), indispensable to overcoming the physical challenges associated with oncological disease and its treatments.²²

Materials and Methods

Study Design

Observational study, 2-group design was used.

Sample

The study sample, composed of elderly women who underwent the removal of the sentinel lymph node or an axillary

lymphadenectomy, was divided into 2 groups: group A was made up exclusively of women who had been doing the dragon boat sport for at least for 6 months twice a week, and group B was made up of women who did other types of sports (other than dragon boat racing) with the same frequency and for at least 6 months and/or underwent alternative treatments such as compression therapy on lymphatic drainage. Women who had undergone chemotherapy and/or radiation therapy for more than 3 years and who had cognitive deficits or disorders that prevented their participation in the study were excluded.

Recruitment of the sample took place at the Lake of Castel Gandolfo (Rome) for patients in group A, as a part of the events organized by the association Pink Butterfly; on the other hand, women in group B were enrolled at the Day Hospital A, Oncology and Physiotherapy Surgery Units of the Regina Elena National Cancer Institute in Rome.

The study was approved by the Central Ethics Committee IRCCS Lazio sect., IFO (Istituti Fisioterapici Ospitalieri), Bietti Foundation of Rome (notification n.ro708/15).

Women who met the study inclusion criteria were informed about the objectives of the survey and the data collection methods.

Once the informed consent was obtained, data collection took place. Data were then stored in an anonymous form, in order to guarantee confidentiality and participant privacy.

The degree of lymphedemas for each participant was assessed by measuring both upper limbs with a tape measure. Measurements were made of the hand, wrist, forearm, and arm by placing the limb at right angles and parallel to the floor. For the latter, the evaluation of the humeral epicondyle was done at a 10-cm distance. The measurements were carried out at 2 different times: at T0, that is, before both groups would start to practice sports, and T1, or after 6 months from the beginning of the sport. Finally, the difference in limb volume between the 2 measurements was recorded.

After compilation, all data were collected in a database and then analyzed by SPSS (version 19; SPSS, Chicago, Illinois). Student *t* test was used to analyze the mean, and χ^2 test was used to study the associations between categorical variables. In this case-control study, the sample size of 100 women was chosen in order that the power of the test was 80% at a significance level of 5% to identify a 20% difference in the incidence of lymphedema (from 5% to 25%).

Instruments

The following instruments were used:

- A card data collection contained epidemiological data (age, marital status, number of children, education level, occupation) and anthropometric measurements (weight, height, body mass index [BMI]), as well as data related to lifestyle (smoking, physical activity, alcohol, nutrition) and clinical status (date of diagnosis, tumor stage, menopausal status at diagnosis, type of surgery, number of positive lymph nodes, if any lymphadenectomy, chemotherapy, radiotherapy, and hormone therapy).
- The European Organisation for Research and Treatment of Cancer Core Questionnaire (EORTC QLQ-C30) (version 3.0) questionnaire²³ was self-administered. It consists of 9 multi-

item scales: 5 functional scales (physical, role, cognitive, emotional, and social function), 3 symptomatic scales (fatigue, pain, and nausea/vomiting), and a global health status/quality-of-life scale. There are also 6 scales with individual items (dyspnea, insomnia, loss of appetite, constipation, diarrhea, and financial difficulties). The EORTC QLQ-C30 is designed in such a way as to be used on a large population and by combining other cancer-specific modules, such as that for breast cancer (QLQBR23).²⁴ All scales had a range of scores between 0 and 100. The overall scores were calculated on the basis of the average scores in the individual entries within each scale. A high score for a functional scale represents a high/healthy functional level, whereas a high score for a symptom scale represents a high level of symptoms and/or problems.²⁵ The properties of the questionnaire have been assessed using standard psychometric techniques, and the results were correlated with demographic and clinical independent variables. The data collected are evidence of psychometric reliability and validity of the questionnaire (Cronbach α coefficient $>.70$).²⁶

- A tape measure was used for measuring the upper limbs of women in both groups.

The centimeter measurement was done by making the patient sit with his upper arm (first the right and then the left one) abducted at 90 degrees, not supported and free of clothing and bandages.

The measurements were taken with a distance of approximately 10 cm from one another, in correspondence of 5 predefined points. Therefore, point 0 was detected at the level of the wrist and point 1 at the level of the principal skin fold of the elbow, and an imaginary line was traced, passing by the 2 points. Point 3 was marked halfway along this line.

Subsequently, point 4 was detected in correspondence of the peak of the acromion process. Thus, an imaginary line was traced, passing from point 2 to point 4, whereas point 3 was found in the middle of it. Once the points of measurement were identified, they were traced on the skin with a fine-pointed permanent marker. While measuring, the border of the meter was always positioned above or below the mark. The operator's accuracy in the reading of the measurement was essential so the measurement is not rounded (eg, to more or less of half centimeter).²⁷

The measurements were carried out at 2 different times: at T0, that is, before both groups would start to practice sports, and T1, or after 6 months from the beginning of the sport. Finally, the difference in limb volume between the 2 measurements was recorded.

■ Results

One hundred breast cancer survivors were selected; 50 women of group A and 50 women of group B were selected in consecutive days. The majority of them are married, with 1 or 2 children, and employed.

The women in group A have a medium to high level of education (52.0% group A vs 24.0% group B), are younger

❁ **Table 1 • Sociodemographic Data**

	Group B	Group A
	Women Who Did Other Types of Sports	Women Who Had Been Doing the Dragon Boat Sport
Age		
<40y	0.0%	2.0%
41–50y	22.0%	36.0%
51–60y	32.0%	48.0%
>60y	46.0%	14.0%
Marital status		
Maiden	6.3% ^a	18.0%
Conjugated	66.7% ^a	56.0%
Widow	8.3% ^a	4.0%
Separated or divorced	18.7% ^a	20.0%
Cohabitant	0.0% ^a	2.0%
No. of children		
0	10.0%	30.0%
1–2	78.0%	62.0%
3–4	12.0%	8.0%
Qualification		
Primary school certificate	8.0%	0.0%
Middle school certificate	32.0%	12.0%
High school certificate	36.0%	36.0%
Graduate/university degree	22.0%	42.0%
PhD/postgraduate specialization	2.0%	10.0%
Working activity		
Employed	53.3% ^b	72.0%
Unemployed	42.2% ^b	20.0%
Seeking employment	4.4% ^b	8.0%

^aPercentage calculated on 48 persons.

^bPercentage calculated on 45 persons.

in age (14.0% group A vs 46.0% group B), and have a lower BMI ($P<.0001$) (Tables 1 and 2).

Most women included in group B had alternative therapies such as compression therapy (36.0%) and lymphatic drainage (28.0%), whereas fewer practiced sports such as pilates, yoga, tai-chi (20.0%), or jogging or walking (16.0%) (Table 3).

With reference to lifestyle, patients in group A smoked less (Table 4), performed regular physical activity (Table 3), and followed a more balanced diet. They consumed greater amounts of vegetable protein (20% group A vs 10.2% group B; eat legumes >4 times a week) and cereals (72% group A vs 54.8% group B; consume 1–3 servings of grains a week) and have a moderate intake of red meat (do not consume red meat: 50.0%

❁ **Table 2 • Body Mass Index**

	n	Average	SD	P
BMI Group B (women who did other types of sports)	48	25.83	5.16	<.0001
Group A (women who had been doing the dragon boat sport)	50	22.56	2.71	

❁ **Table 3 • Physical Activity Data**

	Group B	Group A
	Women Who Did Other Types of Sports	Women Who Had Been Doing the Dragon Boat Sport
Sport activity/alternative treatment		
Dragon boat racing	0.0%	100.0%
Compression therapy	36.0%	0.0%
Lymphatic drainage	28.0%	0.0%
Pilates/yoga/tai-chi	20.0%	0.0%
Jogging/walking	16.0%	0.0%

group A vs 32.6% group B), a high-sugar carbohydrates (do not eat croissants for breakfast: 82.0% group A vs 55.3% group B; do not consume rusks: 34% group A vs 56% group B), sauces (eg, mayonnaise) (4% group A vs 23.4% group B), and fruit juices (10.0% group A vs 20.8% group B) (Table 5). However, women in group A consumed more milk (66.0% group A vs 36.0% group B), tea (78.0% group A vs 36.0% group B), and alcohol (wine, beer, spirits, or aperitifs) (52.0% group A vs 30.0% group B), with the latter being consumed during meals (Table 6).

Water retention appears to be lower in group A (20.4% group A vs 36.0% group B), despite the fact that water intake in both groups equals 2L per day or more (32.0% group A 16.0% vs group B) (Table 6).

As for clinical data, the entire sample underwent surgical treatment (quadrantectomy 50.0% group A vs 54.0% group B, or mastectomy 50.0% group A vs 46.0% group B). At the same time, a high frequency of women treated with lymphadenectomy (72.3% of group A and 75.5% of group B), chemotherapy (85.4% of group A and 48% of group B), radiotherapy (69.6% of group A and 69.4% of group B), and hormone therapy was observed in both groups (81.2% of group A and 75.5% of group B). Moreover, in group B (unlike group A), diagnosis occurred in the period before menopause (Table 7).

Lymphedema incidence in group A was 4.0% (2 of 50), whereas in group B it was 26.0% (13 of 50) (Table 1). By assessing the difference between the before- and after-exercise measures (Tables 8 and 9), we noted a marked improvement in the degree of lymphedema in group A women (Table 9); a better quality of life ($P<.0001$); a reduction in symptoms such as fatigue ($P=.02$), insomnia ($P=.001$), and dyspnea ($P=.03$);


❁ **Table 4 • Smoking Consumption**

		Group B	Group A
		Women Who Did Other Types of Sports	Women Who Had Been Doing the Dragon Boat Sport
Do you smoke?	Yes	34.0%	14.0%
	No	66.0%	86.0%
Have you ever smoked?	Yes	47.4%	52.1%
	No	52.6%	47.9%

 **Table 5 • Eating Habits**

Dominant Macronutrient	Food	Weekly Portion	Group B		Group A	
			Women Who Did Other Types of Sports	Women Who Had Been Doing the Dragon Boat Sport	Women Who Did Other Types of Sports	Women Who Had Been Doing the Dragon Boat Sport
Carbohydrates	Cookies	None	36.0%	36.0%		
		1–3 times	32.0%	38.0%		
		>4	32.0%	26.0%		
	Croissant (or similar)	None	55.3%	82.0%		
		1–3 times	34.1%	16.0%		
		>4	10.6%	2.0%		
	Cereal flake	None	75.5%	44.0%		
		1–3 times	17.8%	24.0%		
		>4	6.7%	32.0%		
	Rusks	None	34.0%	56.0%		
		1–3 times	36.2%	30.0%		
		>4	29.8%	14.0%		
	Bread	None	16.3%	16.0%		
		1–3 times	24.5%	34.0%		
		>4	59.2%	50.0%		
	Crackers/breadsticks	None	59.6%	68.8%		
		1–3 times	34.1%	30.0%		
		>4	6.4%	2.0%		
	Cold cuts	None	42.6%	50.0%		
		1–3 times	51.0%	46.0%		
		>4	6.4%	4.0%		
	Pasta	None	2.0%	12.0%		
		1–3 times	59.2%	60.0%		
		>4	38.8%	28.0%		
	Pizza	None	16.7%	24.0%		
		1–3 times	81.3%	74.0%		
		>4	2.0%	2.0%		
	Rice	None	27.7%	14.0%		
		1–3 times	68.1%	80.0%		
		>4	4.2%	6.0%		
Legumes	None	12.2%	12.0%			
	1–3 times	77.6%	68.0%			
	>4	10.2%	20.0%			
Cereals	None	33.2%	16.0%			
	1–3 times	54.8%	72.0%			
	>4	12.0%	12.0%			
Potatoes	None	19.6%	24.0%			
	1–3 times	73.9%	76.0%			
	>4	6.5%	0.0%			
Vegetables	None	2.0%	2.0%			
	1–3 times	28.6%	20.0%			
	>4	69.4%	78.0%			
Fruit	None	4.1%	8.0%			
	1–3 times	16.3%	6.0%			
	>4	79.6%	86.0%			
Confectionery	None	26.5%	28.0%			
	1–3 times	55.1%	50.0%			
	>4	18.4%	22.0%			
Sandwiches	None	74.5%	76.0%			
	1–3 times	25.5%	24.0%			
	>4	0.0%	0.0%			
Fats	Cheese	None	16.3%	18.0%		
		1–3 times	75.5%	74.0%		
		>4	8.2%	8.0%		

(continues)

 **Table 5 • Eating Habits, Continued**

Dominant Macronutrient	Food	Weekly Portion	Group B	Group A
			Women Who Did Other Types of Sports	Women Who Had Been Doing the Dragon Boat Sport
Protein	Snacks	None	85.1%	86.0%
		1–3 times	14.9%	10.0%
		>4	0.0%	4.0%
	Olive oil	None	6.1%	4.0%
		1–3 times	8.2%	8.0%
		>4	85.7%	88.0%
	Other oils	None	66.6%	70.0%
		1–3 times	27.1%	30.0%
		>4	6.3%	0.0%
	Animal fats	None	80.9%	82.0%
		1–3 times	17.0%	16.0%
		>4	2.1%	2.0%
	Sauces (like mayonnaise)	None	76.6%	96.0%
		1–3 times	21.3%	4.0%
		>4	2.1%	0.0%
Protein	Red meat	None	32.6%	50.0%
		1–3 times	67.4%	50.0%
		>4	0.0%	0.0%
	White meat	None	6.1%	22.0%
		1–3 times	93.9%	78.0%
		>4	0.0%	0.0%
	Fish	None	6.3%	4.0%
		1–3 times	87.4%	90.0%
		>4	6.3%	6.0%
Eggs	None	10.2%	18.0%	
	1–3 times	83.7%	80.0%	
	>4	6.1%	2.0%	

and a significant reduction in physical-related disorders ($P < .0001$), emotional ($P = .001$), cognitive ($P = .01$), and relational/role ($P = .005$) (Table 10). When considering BMI, we also observed that in group A lymphedema was not documented in the group with a BMI greater than 25 kg/m^2 , whereas it had a 5% incidence rate in the group with a BMI of less than 25 kg/m^2 . These rates in the control group were 30% and 20%, respectively, suggesting no interactions among factors.

■ Discussion

The results support the data reported in literature^{13,26,28} on the effectiveness of dragon boat practice in preventing lymphedema and improving the mental well-being of women with breast cancer after surgical treatment. Group A was found to have a lower presence of symptoms such as fatigue, insomnia, pain, and dyspnea and a better perception of quality of life. This outcome was confirmed by several studies in the literature, reporting that regular physical exercise, typical of female dragon boat rowers, improves breathing capacity and reduces fatigue,^{29,30} feeling of heaviness and tension of limbs,³¹ and concerns related to cancer, improving, consequently, quality of sleep and life.³²

A low intake of carbohydrates, sugars, and red meat and constant physical activity of the women belonging to group A contributed to their BMI being within the optimum values. A

low-protein and low-fat diet with a high nutritional value helps to maintain normal body weight and not load the lymphatic system with slag that might prevent fluid drainage. Energy intake exceeding the body's daily requirement determines an accumulation of body fat that in the long run can lead to being overweight and obesity, with all the consequences that result from these conditions. Furthermore, an increase in BMI can be associated with reduced lymphatic function and therefore with a greater risk of onset of lymphedema.^{9,33,34}

Multiple studies indicate how sport can help overcome the physical discomforts (increasing cardiovascular endurance and strength at the level of the shoulders and arms) and negative attitudes, increasing self-esteem and self-confidence, and facilitating integration of the patient's cancer experience in the daily routine.^{32,35–37} This finding was also confirmed by the women in our sample who carry out dragon boat racing; they had fewer physical ailments, along with role, emotional, and cognitive difficulties, compared with group B.

The most common symptoms of depression, related to change in one's body image, fear of early menopause, infertility, and/or recurrence occur in women who have had breast cancer at a young age.³⁸ In our study, the women in group A were found to have a higher level of emotional well-being than those in group B, despite their younger age.

By comparing the results on quality of life (EORTC QLQ-C30) in our study with the reference values of the EORTC

 **Table 6 • Drinking Habits**

Drinks	Daily Portion	Group B	Group A
		Women Who Did Other Types of Sports	Women Who Had Been Doing the Dragon Boat Sport
Do you drink alcohol?	Yes	30.0%	52.0%
	No	70.0%	48.0%
If so, when?	At meals	100.0%	80.8%
	Between meals	0.0%	3.8%
	Both	0.0%	15.4%
Coffee	None	14.0%	26.0%
	1–4	80.0%	68.0%
	>4	6.0%	6.0%
Cappuccino	None	55.1%	70.0%
	1–4	36.7%	30.0%
	>4	8.2%	0.0%
Tea	None	66.0%	22.0%
	1–4	29.8%	64.0%
	>4	4.2%	14.0%
Soft drinks (eg, Coca-Cola)	None	89.4%	92.0%
	1–4	10.6%	8.0%
	>4	0.0%	0.0%
Fruit juice	None	79.2%	88.0%
	1–4	20.8%	10.0%
	>4	0.0%	2.0%
Milk	None	36.0%	66.0%
	1–4	56.0%	30.0%
	>4	8.0%	4.0%
Water (average volume/day)	0–0.5 L	8.0%	2.0%
	1–1.5 L	76.0%	66.0%
	≥2 L	16.0%	32.0%
Do you feel like you are holding a larger amount of liquid compared with what you have actually drank during the day?	Yes	36.0%	20.4%
	No	64.0%	79.6%

 **Table 7 • Clinical Data**

		Group B	Group A
		Women Who Did Other Types of Sports	Women Who Had Been Doing the Dragon Boat Sport
Menopausal status	Premenopause	38.8%	87.2%
	Postmenopause	61.2%	12.8%
Type of surgery	Quadrantectomy	54%	50%
	Mastectomy	46%	50%
Lymphadenectomy	Yes	75.5%	72.3%
	No	24.5%	27.7%
Chemotherapy	Yes	48.0%	85.4%
	No	52.0%	14.6%
Radiotherapy	Yes	69.4%	69.6%
	No	30.6%	30.4%
Hormone therapy	Yes	75.5%	81.2%
	No	24.5%	18.8%
Lymphedema	Yes	26.0%	4.1%
	No	74.0%	95.9%

Table 8 • Upper Extremities Measurements—Group B (Women Who Did Other Types of Sports)

	Right Hand	Right Wrist	Right Forearm	Right Arm	Left Hand	Left Wrist	Left Forearm	Left Arm
Time	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
T0	22.69±4.44	20.38±4.74	27.85±4.56	32.38±4.29	22.08±4.35	19.77±4.76	27.08±6.02	32.31±6.43
T1 (6 mo)	21.92±4.35	19.96±4.33	27.31±4.17	32.21±4.92	21.85±3.76	19.38±3.84	26.82±5.25	31.82±5.99

Table 9 • Upper Extremities Measurements—Group A (Women Who Had Been Doing the Dragon Boat Sport)

	Right Hand	Right Wrist	Right Forearm	Right Arm	Left Hand	Left Wrist	Left Forearm	Left Arm
Time	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
T0	25.00±7.07	22.00±8.49	28.50±6.36	31.50±7.78	25.00±7.07	22.50±6.36	27.00±4.24	30.50±6.36
T1 (6 mo)	24.03±7.07	21.21±7.78	27.43±6.36	32.80±8.49	23.83±6.36	21.54±7.07	26.00±5.66	29.00±8.49

QLQ-C30,³⁹ females who participated in dragon boat sport (group A) presented with a better quality of life (set point 61.8 vs group A 80.0) compared with group B (62.3), in the operational and symptoms areas (Table 6). Our results indicate that the possible predictors of lymphedema are a high BMI, reduced physical activity, and a diet high in protein and rich in carbohydrates and fats.

■ Limitations

The limitations of the study are definitely related to the small and monocentric sample and to group B that was not matched. Furthermore, if the tape measure is too large or too tight on the skin, it can lead to bias.

Further studies are needed in the future to widen the survey into a numerically larger sample and multicentric study,

so as to make the results generalizable over an entire population and have more accurate estimates of the impact of the dragon boat sport on the overall recovery of patients with breast cancer and lymphedema.

■ Conclusion

This study was intended to highlight how the dragon boat sport, along with an appropriate lifestyle, can help to prevent lymphedema, thereby improving the quality of life of patients. In Italy, there are now 15 associations, mostly nonprofit, which allow women with breast cancer to practice dragon boat racing for free, requiring only a small voluntary membership fee for self-financing. This enables many patients to participate in this activity and enjoy the benefits associated with it. The dragon boat racing requires special environmental settings (lake, river, sea).

Table 10 • EORTC QLQ-C30 Questionnaire

	Group B ^a	Group A ^b	P
	Mean±SD	Mean±SD	
Physical functioning	75.83±12.25	90.93±18.83	<.0001
Role functioning	75.53±23.79	88.33±20.27	.005
Emotional functioning	67.73±19.55	80.27±16.90	.001
Cognitive functioning	74.82±22.75	85.67±18.75	.01
Social functioning	79.17±23.19	85.67±22.08	.16
Quality of life	62.33±21.05	80.00±17.25	<.0001
Fatigue	32.64±19.90	22.67±23.95	.02
Nausea and vomiting	6.25±13.14	11.00±23.95	.23
Pain	28.01±23.08	14.62±19.13	.003
Dyspnea	22.70±27.01	12.00±19.93	.03
Insomnia	38.30±32.58	18.67±25.34	.001
Loss of appetite	4.17±11.14	4.67±17.83	.87
Constipation	15.97±27.50	13.33±22.34	.60
Diarrhea	6.94±15.31	10.67±20.69	.32
Financial difficulties	18.75±27.42	14.67±21.42	.41

Abbreviation: EORTC QLQ-C30, European Organisation for Research and Treatment of Cancer Core Questionnaire.

^aWomen who did other types of sports.

^bWomen who had been doing the dragon boat sport.

Yet, it is also possible to practice the same movements even in more easily accessible settings such as equipped gyms. Alternatively, it is possible to practice sports that are clinically beneficial in women who underwent a mastectomy, such as sustained walking, aerobics, and swimming, as long as they are consistently practiced. For example, studies suggest that regular weight lifting can reduce the number and severity of arm and hand symptoms, increase muscular strength, and reduce the incidence of lymphedema exacerbations as assessed by a lymphedema specialist.⁴⁰

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