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Can traditional games be an option in increasing the physical activity of women following mastectomy?

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Summary

Study aim: the purpose of the present study was to investigate the potential of traditional games as a method of increasing the physical activity (PA) of women following mastectomy. A cross-sectional survey during the 20th ONCO Games was conducted and the sample included data from women divided into two groups: up to 50 years old (n = 26) and over 50 years old (n = 86).

Material and methods: PA was assessed using a questionnaire, and the number of steps taking during 30-minute periods was measured using pedometers during each of the games. Exertion was evaluated using Borg's Scale.

Results: there was no difference in levels of coherence between the age groups. The group of younger women were statistically more active (M = 3.34 days/week) than the older group (M = 2.77 days/week). All the games were evaluated to be of light intensity, with *ringo* perceived as being statistically more fatiguing in the over 50 age group. The highest number of steps was performed during the game of *ring-net-ball* (M = 1903 steps/30 min) in both age groups, with older women performing statistically more steps. Similar situations were observed in the cases of *pétanque* and *speedminton*. In *ringo*, the situation was reversed. The lowest number of steps was recorded in *pétanque* in the younger age group (M = 296 steps/30 min).

Conclusion: this study indicates that in the rehabilitation and recovery process after mastectomy, traditional games could be a bridging link between exercising and sports as they provide not just activity but also a unique and valuable social context.

Key words: Mastectomy – Rehabilitation – Physical activity – Traditional games

Introduction

Cancer can severely influence the functioning of every individual who faces such a diagnosis. Research findings [3, 5] indicate that patients' needs of autonomy and independence should be given major consideration in the recovery process, and the patient's sense of control should be supported. In addition to psychosocial consequences, the illness and recovery process also involves physical limitations. Unlike adjuvant chemotherapy, which, among other side effects, may result in weight gain during and after treatment [6, 12]. In the case of breast cancer, surgical intervention often promises the best chances of dealing with the problem, however, not without costs. Women who have undergone a breast mastectomy have reported pain (68%), enlarged lymph nodes (60%) and limitation of limb movements (52%) [18]. Others [4, 8, 16] have reported negative side effects from treatment for breast carcinoma, including fatigue, nausea, anxiety and pain. In a study by Irwin, Crumley, McTieman et al. [12], a statistically significant decrease in physical activity (PA) was observed among women who were treated with radiation and chemotherapy compared to those who underwent surgery only. The average decrease in PA by two hours a week was considered to be the cause of post-diagnosis weight gain. In the case of women, the adjusted relative risk of death from breast cancer was examined for its association with the level of PA by Holmes et al. [11], who estimated the risk to be 0.80 (95% confidence interval) for 3 to 8.9 MET-hours per week when compared with women who engaged in less than 3 MET-hours per week. However, the level was 0.56 (95% confidence interval) for 15 to 23.9 MET-hours a week, where three MET-hours were equivalent to walking at an average pace of 2 to 2.9 mph for one hour. The authors reported the greatest benefits in women who performed the equivalent of walking three to five hours per week at an average pace [11]. Another way to motivate adults to engage in PA is through recommended

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daily step counts. In their review of currently available pedometer-determined evidence, Tudor-Locke and Bassett [29] proposed the following classification in healthy adults: (i) <5000 steps/day may be used as a 'sedentary lifestyle index'; (ii) 5000–7499 steps/day is typical of daily activity excluding sports/exercise and might be considered 'low active'; (iii) 7500–9999 steps/day likely includes some volitional activities (and/or elevated occupational activity demands) and might be considered 'somewhat active'; and (iv) ≥10000 steps/day indicates the point at which individuals should be classified as 'active'. Individuals who take >12500 steps/day are likely to be classified as 'highly active'. With adults suffering from chronic or life-threatening diseases, the target number may be reduced appropriately to the physical condition of an individual, but the emphasis should be shifted to sustainability. There are no studies on the number of steps taken by women during various activities after mastectomy.

Research indicates that generally, in the diagnosis of cancer, PA is linked to improved quality of life [12, 21, 23]. However, patients often refrain from exercising, considering it to be monotonous and therefore an unattractive activity. However, there are some other activities which could be adapted in the process of recovery in women (and men) facing cancer-related problems. An interesting and relatively novel stimuli may come from traditional sports and games (TSG). According to the definition [20, p. 15]:

> *'traditional games are the creation of a culture and the fruit of history [...] They are generally seen as community heritage; but we should not forget forms of enjoyment, of sharing the pleasure of acting together [...] they reflect the deep social roots of different ways of behaving, of communicating with others and entering into contact with the environment. Linked to secular beliefs, performed according to traditional rites and ceremonies, inspired by practices from everyday life, physical games from part of cultural heritage [...] And this heritage is highly diverse and exuberant'.*

In a way, TSG represent a kind of transition activity between exercise and organized sports. Bearing in mind some limitations, along with the social and cultural context of traditional games, this opens new possibilities for motivating people to begin or return to being physically active, starting at a slow 'pace'.

What is important here is that TSG might help participants develop the attitudes, behaviours and cognitive strategies required to become 'healthy and competent', or more socially, emotionally and physically aware, as these three domains are closely related to one another [1]. Furthermore, TSG can increase people's emotional awareness, which is key to developing social skills [14]. These skills are, in turn, very helpful for coping with illness and coming to terms with one's morbidity. These variables influence the subjectivity of participants, their emotions and the degree to which they enjoy the activity [7]. In choosing TSG for the 20th ONCO Games (Oncologic National Competition of Amazons), their profile was considered as the main goal. The ONCO Games are a three-day national event hosted in different cities and dedicated to women who have undergone mastectomies. In previous editions of ONCO Games, the character of the event itself was competitive. Therefore, the focus was mostly on winning in the simple race activities or the most popular sports like volleyball [27]. Research has shown that the presence of a competitive element can influence the emotional experience of participants, but can lack some other socializing impact [9]. The motor skills involved in so-called traditional games could be used to produce positive experiences or to minimize negative emotions due to their social and cultural heritage. That is why the interaction between participants was also essential to the event's organizers in order to maintain and build positive social relationships amongst participating women through the 'family group' games (a specific category of games). There is a great relationship between TSG and emotions where sociocultural variables such as gender play a role [15]. Moreover, these 'family group' games are also referred to as a domain of motor-acting based on the motor communication that takes place between players. In this particular 20th ONCO Games, the selection of games was based on the following criteria: 1) the cooperative domain, in which participants shared a common language involving clear messages of assistance, as in a *kubb* or *pétanque*; 2) the opposition domain, in which participants shared the language of confusing signs and messages that hid their true intentions, as in a *ringo*; and 3) the cooperation-opposition domain, which characterizes TSG that combine opposition between rivals with collaboration among teammates, as in a *pierścieniówka (ring-net-ball)*, where motor communication must be transparent for teammates but confusing for opponents [15]. None of the women had any training in these games prior to the ONCO Games. These games were a complete novelty to them, although they were sent the rules of the games in advance. The simplicity of the rules and skills required allowed everyone to engage in smooth play.

Based on the abovementioned prerequisites and research findings, we designed a study which aimed to investigate the potential of traditional games in terms of physical efforts and perceived exertion in women after mastectomy.

Materials and methods

Participants

Participants were recruited from among women participating in the 20th ONCO Games organized in September in Poland. All of the participants were informed about the nature of the study and participation in the research was voluntary. One hundred and ten women were examined and divided into two groups: up to 50 years old (n = 26) and over 50 years old (n = 86). This division was based on the age criterion of the Polish Ministry of Health's requirement that women over the age of 50 get a mammography breast exam, as this is the age group with the highest breast cancer ratio. Anthropometric variables were measured according to the standard anthropometric protocols and are presented in Table 1. There were no statistically significant differences in body mass and height between the age groups. The only statistically significant difference (P = 0.0267) was observed in the BMI index. On average, the women over 50 years of age had a higher BMI index (M = 25.46) than the women under 50 years of age (M = 23.62). All of the women who took part in the Games underwent surgical intervention on their breasts no sooner than six months prior to the games. There were no women who were undergoing radiation or chemotherapy treatment during the study. The study protocol was approved by the local Bioethics Committee of The Karol Marcinkowski University of Medical Sciences in Poznan (decision no. 716/14 from 4 September 2014).

Research tools

The level of PA was determined with the Physical Activity Screening Measure [22]. The initial version for adolescents consisted of items used to quantify the intensity of PA and number of days in which individuals engaged in PA for at least 60 minutes per session during a normal week. Taking into consideration the age of participants for the present study, the intensity of PA was not considered. Only the information about the number of days and daily time of PA (if it exceeded 30 minutes) was recorded. Teixeira, Vasconcelos-Raposo, Fernandes and Brustad [28] have found this procedure to be suitable for elderly age groups. This measure corresponds to the average number of days per week that participants spent at least 30 minutes engaging in various forms of PA and during which, in the participants' subjective opinion, their heart rates increased and they experienced a shortness of breath (higher breathing frequency). The moderate-to-vigorous physical activity (MVPA) index was calculated based on the formula MVPA = (P1 + P2)/2, where MVPA is PA index, P1 – the number of physically active days during the past seven days and P2 – the number of physically active days during a typical week. Both of the abovementioned questionnaires were distributed during the first day of the games and collected on the same day. During the three-day event, each woman had to take part in at least three out of the five games. There was a step count measure carried out during 30 minutes of each activity for every participant. The number of steps was measured with the use of a Yamax Digi-Walker SW 701 pedometer, which has been found to be a reliable instrument for measuring walking-type movements [25]. Data from the pedometers were collected after the activity and recorded by a technical research assistant on a special form.

Participants were also asked to evaluate the intensity of the activity. For this purpose, the Borg Scale for Rating of Perceived Exertion was used [2]. The validity of the scale has been evidenced by Grant et al. [10]. The scale does not require any special skills or equipment, although a board with the range of the Borg scale was provided. Exertion was rated on a scale of 6–20, where 6 is 'no exertion at all' and 20 is 'maximal exertion'. Each woman rated the level of perceived exertion immediately after completing the activity and the score was recorded by a technical research assistant on a special form.

Statistics

The means and standard errors of examined characteristics of the study participants were calculated separately for the under 50 and over 50 groups. Differences in the means were compared using the U-Mann-Whitney test, with $P < 0.05$ considered to be statistically significant. Statistical analysis was performed with the use of the Statistica 10.0.

Description of traditional games used in the study

1. *Pétanque* (sometimes It. *boccia*, Fr. *boules*) – a ball game played one-on-one or in teams. In the one-on-one variety, each competitor has four balls and the team game is played by two teams of between two and four players, each having two balls. The aim of the game is to throw

Table 1. Mean and SD anthropometric characteristics of the examined group

	Age [years]	Body mass [kg]	Body height [cm]	BMI
Up to 50 years old (n = 26, 23.6%)	44.08 ± 4.30	64.42 ± 7.67	165.30 ± 4.32	23.62 ± 3.08
Over 50 years old (n = 83, 75.4%)	59.96 ± 4.61	68.01 ± 10.06	163.49 ± 5.80	25.46 ± 3.64
P value		ns	ns	0.0267

one's balls as close as possible to the smaller target ball called *pallino* or *boccino*. The participant whose ball is the closest to the *pallino* wins the round. The game is played for up to nine rounds. The major health gains may be found in the characteristics of the movements involved, such as picking up objects (the *bocce* ball), each weighing approximately 650-800 grams. The game also involves swinging the arms and maintaining balance while throwing the ball, walking to the location where the balls have landed, bending the body (engaging the spine and knees) to measure the distance between the *bocce* and *pallino,* and eventually lifting up the balls for the next round. All of these acts require muscle control and mental readiness to cope with some basic competition, not to mention socialization.

2. *Kubb* (Eng. *cube*) – a form of skittles. Two teams with six participants on each side (if necessary, the game may be played with fewer than six players). Players divide into two teams and mark the playing field with cons/pools and five kubbs on one baseline and five kubbs on the opposite baseline. They must then position the 'king' at the centre of the field. The main object of the game is to knock over all the kubbs of the opponent so that players have a clear shot to knock over the king and finish the game. If the throwing team successfully topples the king, they win the game. Similar to *pétanque*, the activity includes swinging the arms and maintaining balance while throwing the wooden batons and kubbs, walking to the place where the kubbs have landed and bending the body (engaging the spine and knees) to collect the batons and placing the kubbs in the right positions on the playing field to set up for the next round. All of these activities require hand-eye coordination combined with whole-body muscle control and decision-making along with tactics which may develop the social skills of the players.

3. *Ring-net-ball* – a game involving two teams of four players on each side. This game is played on a volleyball court equipped with a special net with three ring-holes in it (two on the side and one in the middle of the net). At the beginning of the game, a player serves the ball over the net; this is the only situation in which s/he can serve in this manner. The main aim of the game is to pass the ball through one of the three ring-holes in the net in such a way that the ball strikes the ground within the other team's boundary. Once on a team's side, the ball may not touch the ground. It can only be passed between teammates a maximum of three times. If the ball touches the ground or goes out of bounds, the opposing team scores a point. All players can move during a game, but only without the ball. There is a rotation of players after each change of service (as in volleyball). The team which scores the required number of points first (usually 15) wins the set. The game is over after a team wins three sets. During this game, players must have hand-eye coordination to follow the catching and throwing of the ball. It is important also to be fast, accurate and flexible enough to pass the ball to a teammate or through one of the net's rings to the opponents' side. Teamwork is also necessary to maintain the play.

4. *Speedbadminton* (abbreviated: *speedminton*) – a racket game. The field consists of two squares measuring 5.5 meters on each side. The normal distance between the squares is 12.8 meters; however, at the ONCO games, participants played with 'fun speeders' (recreation shuttle cocks) over a smaller distance of 8.80 meters due to the participants' health. The aim of the game is to reach the square of the opposite player with the speeder. If the speeder falls outside the opposite square, the other side gains a point. Both players are allowed to step outside or anywhere inside their square during play. The game ends when one team has at least 16 points and has at least a two-point advantage over their opponent. During the 20th ONCO Games, women were playing a doubles match on a single court. In the doubles game, both players stand in the same court. The serving player stands behind the back line, and his partner stands on the front line. The serves are shared among all players after every three serves. The first serve in the following set goes to the loser of the previous one. This game requires speed, hand-eye coordination and teamwork.

5. *Ringo* – a Polish game. It was invented and introduced to the public in 1959. It is played on a volleyball court equipped with a string on the centre line of the court (divides the court into two halves). The main aim of the game is to score 15 points by throwing the *ringo* (rubber ring) over the net to the opponent's side. It can be an individual (1 × 1) or team game (2 × 2, 3 × 3). The idea is to deliver the *ringo* in a way that the opponent cannot manage to get a hold of it before it touches the floor. The serving player starts with a service from behind the end line, while the opponents are awaiting the ring in their half of the court. When a player grabs the ring, s/he cannot move with it but can only throw it over the net to score a point. Play continues until one of the players makes a mistake or doesn't manage to catch the ring. This game requires hand-eye and general body coordination; balance skills are also involved, as well as speed skills and team cooperation.

Results

Table 2 presents a comparison of the levels of MVPA between the two age groups. Women younger than 50 declared on average being physically active M = 3.34 days/week, whereas those who were older than 50 engaged in PA in their leisure time M = 2.77 days/week. The difference was statistically significant (P = 0.0138) between the groups.

Table 2. Mean and SD scores in moderate-to-vigorous physical activity among women after mastectomy

Variables	MVPA [days/week]
Up to 50 years old	3.34 ± 2.08
Over 50 years old	2.77 ± 1.73
P value	0.0138

There were also some statistically significant differences between the two age groups of women in the number of steps measured during 30 minutes of activity during various traditional sports (Table 3). The highest number of steps was recorded during *ring-net-ball* in both age groups, with the older group covering significantly more steps (P = 0.0028) than the younger one. Among all the traditional sports examined in the study, the lowest number of steps was noticed in *pétanque*. During this game, there was also a statistically significant difference (P = 0.0359) between the groups, with more steps taken by the over 50 group. In *ringo*, it was women younger than 50 who performed more steps than the other group and the difference between this group and the older group was statistically significant (P = 0.0002). In *speedminton,* the pattern was reversed: women aged 50 years or older performed more steps than those from the younger group. The difference here was also statistically significant (P = 0.0410). There was no statistical difference in the number of steps taken between the age groups in *kubb*.

In the case of perceived exertion (Borg's scale), there were no statistically significant differences, except for one in the case of *ringo*. Women from the over 50 group perceived this activity to be more fatiguing (P = 0.0359) than their colleagues in the younger group. All of the results are presented in Table 3.

Discussion

Engaging patients in PA is an integral part of most rehabilitation programmes. Despite this, women who have undergone breast cancer surgery tend to decrease their PA level [13]. Findings from Sagen et al. [24] suggest that patients who undergo breast cancer surgery with axillary node dissection should be encouraged to maintain daily living activities with no restrictions on PA involving the affected limb and without fear of developing arm lymphedema. Generally, patients suffering from cancer-related problems and those who are in the process of recovery should be encouraged to lead an active life and engage in activities that foster a positive mental attitude in order to regain their life balance. There are some previously proven positive effects of regular PA leading to higher levels of aerobic (cardiovascular) fitness, stronger muscles and bones, reduction of body fat mass and lower anxiety or depression levels [30]. Intervention using PA resulted in strong positive effects in terms of upper and lower body strength, moderate effects on fatigue and breast cancer-specific concerns and small-to-moderate positive effects on PA level, aerobic fitness, muscular strength, quality of life, anxiety and self-esteem [26]. PA has been also linked to lower levels of circulating ovarian hormones. As Holmes et al. [11] claim, lower estrogen levels among physically active women with breast cancer could potentially improve their chances of survival.

A prescription of carefully designed exercise programmes is vital. However, it does not always lead to sustainable changes in attitudes towards physical self-development and the formation of regular habits of PA. Exercising, which requires numerous repetitions and a constant focus on details, can be monotonous as it is based on repeated movements. However, a majority of sports include so-called 'open skills' of movements, usually requiring a high sporting competence. This brings about fundamental psychological differences. 'Sports' are often related to activities demanding extensive skills and tactical competences in the context of intense competitiveness. However, this does not concern traditional games and this could open up rehabilitation processes to new areas and stimuli, not only in the case of cancer, but also other diseases, specifically chronic diseases or diseases of civilization.

In our study, we used forms of specially selected traditional games. In the case of the women participating in

Table 3. Mean and SD scores in five traditional activities among women after mastectomy

	Steps in 30 minutes (Mean ± SD)			Borg Scale for Perceived Exertion scores (Mean ± SD)		
	Up to 50 years old	Over 50 years old	P	Up to 50 years old	Over 50 years old	P
Ring-net-ball	1378 ± 421	1903 ± 772	0.0028	8.00 ± 1.46	7.95 ± 1.47	ns
Ringo	1178 ± 643	698 ± 437	0.0002	7.88 ± 2.17	8.84 ± 2.30	0.0359
Pétanque	296 ± 149	402 ± 211	0.0359	6.62 ± 1.36	6.77 ± 1.36	ns
Speedminton	832 ± 411	1084 ± 524	0.0410	7.94 ± 2.39	7.56 ± 1.86	ns
Kubb	568 ± 330	562 ± 376	ns	8.05 ± 1.90	7.53 ± 1.55	ns

the ONCO Games, all of whom had suffered from a life-threatening disease, the individuals' readiness to take care of their own health can be regarded as being independent of the level and type of resources at the individuals' disposal. When combined with PA, this could have a positive effect on health in the long run. In case of PA, it is worth mentioning that it was observed that the younger the women were, the more active they reported being and the difference was statistically significant between the age groups. Other studies also support this tendency. In a study by Pentelić et al. [19], when the type of PA was considered, the results indicated that there was a significant difference between young-old and old-old in total walking MET and total vigorous MET. Among older women, the value of MET in total PA, as well as in moderate and vigorous activity, significantly decreases. The findings showed that moderate PA is dominant compared to walking and heavy PA, and accounts for almost half of the energy expanded, regardless of age category. Overall, the research of Pentelić et al. [19] proved the young-old group to be more physically active than the old-old group.

In our study there were no major differences in Borg's Perceived Exertion scores. The only statistically significant differences were noticed in the case of the game of *ringo*: the older age group declared the activity to be more exhausting than the younger group. This may have been caused by the demanding tempo of the game, which is more suitable for those with a more reasonable level of fitness. The results showed that the older women could not maintain the tempo of the game, and this could have influenced the decreased number of steps. Specific type of movements requiring arm swinging above the shoulder level could have also been discouraged.

Younger women, being generally more fit, performed twice as many steps in the same time period as their older colleagues. Significant differences in the number of steps were also found in the case of *ring-net-ball, pétanque* and *speedminton*. In all three games, more steps were performed by the women from the older group. Perhaps the limited range of movements and their simplicity, originating in traditional, often ludic forms of skills, along with the relatively slow tempo of those games, encouraged them to perform as many steps as they felt able to at their own pace. The social context (low competitiveness factor and similar medical case histories) may have also added to the friendly atmosphere of the ONCO Games.

In adults recovering from cancer treatment, PA programmes need to be tailored very carefully, preferably in consultation with a specialist, such as a doctor or physiotherapist (especially shortly after treatment), and they should not exceed a moderate level of exertion. Traditional games seem to fall into this category as a majority of the examined women assessed the games to be of light intensity. At the same time, the number of steps performed in 30 minutes, up to 400 steps, appeared to be quite reasonable. In a study by Moy et al. [17], a group of patients with chronic obstructive pulmonary disease performed around 3500 steps per day. A sixteen-week intervention programme increased that number by 1000 steps on average. It appears that traditional games, especially the game of *ring-net-ball,* can provide between a few hundred to a couple thousand steps in 30 minute periods of PA. This team game, which is reminiscent of volleyball but has more simplified rules and requires simpler skills, seemed to be the most attractive to the participants. A friendly and socially valuable environment (usually games are performed in an open space situation) can enhance affective attitudes and, as such, can be an interesting option for both physiotherapists and doctors prescribing rehabilitation programmes and those willing to start or restart their PA after the treatment.

The limitation of our study is the group of women who participated in the ONCO Games. As all of them voluntarily agreed to take part in the study, there was no chance to obtain a control group. We have to presume that most of them were acquainted with PA and most of them had previously engaged in fairly regular physical activity. Both a more general group of cancer survivors and an interventional design of study (based on a few weeks of such a training program) could provide more detailed information about long-term health-related effects. Bringing traditional games to the attention of rehabilitation specialists is the key strength of the study. Additional studies are required with a focus on cancer survivors of both sexes and all ages to assess the health effects of such games. Larger, randomized trials with an intervention programme minimizing fatigue and aimed at enhancing physical fitness and the quality of a patient's life could provide additional empirical evidence.

Conclusions

It seems that the activity of the Amazons, as a skilful combination of psychotherapy, physical rehabilitation and recreation, brings beneficial effects to women in rehabilitation. If performed with precaution, traditional games can be used in the rehabilitation and recovery process in patients during after-cancer treatment, specifically in women after mastectomy. The most attractive games of *ring-net-ball, ringo* and *speedminton* require the use of the upper limbs in an extended swing. Because of this, these games should be introduced after consulting a doctor or physiotherapist. However, in *kubb* and *pétanque,* the swing of the arms can be easily controlled. These forms of activities, and similar traditional, and perhaps regional, games can also be used if the rules and equipment are carefully adjusted in order to adhere to the requirements of rehabilitation centres. They

also seem to be attractive forms of PA for competitions consisting of people with cancer-related problems.

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