



Women Catchball–Demographics, Physical Characteristics, and Injury Prevalence in Competitive Organized League Players

Sharon Tsuk^{1*}, Rey Yarden¹, Arie Rotstein¹, Refael Carasso² and Yoav Meckel¹

¹Life Science Department, The Academic College at Wingate, Wingate Institute, Israel

²Life Science Department, The Hillel Yaffe Medical Center, Hadera, Israel

*Corresponding author: Sharon Tsuk, Department of Life Science, The Academic College at Wingate, Wingate Institute, Israel, Tel: 972-9-8639-235, Fax: 972-9-8639-298; E-mail: sharonts@wincol.ac.il

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Abstract

Catch ball is a team ball game that is similar in its characteristics to the game of volleyball and had developed in recent years as an amateur competitive sport, mainly for middle age women. Our aim was to characterize injury prevalence, demographic background, and training profile of Cachibol female players' in high- and low-level leagues. A retrospective questionnaires study and quantitative evaluation of activity during a Cachibol match. A total of 493 female cachibol players, average age of 42.8 ± 6.1 years, players in a competitive organized league, participated in this study. In the lower leagues, most injuries were caused by ball impact (42.6%), with fingers being the most affected anatomical site (40.7%). The most prevalent injury cause in the upper leagues was overuse injuries (35.9%), with the ankle as the most affected site (27.1%). Upper league players were significantly taller, had more years of experience, and had higher training frequency than the lower league players. Match intensity was significantly higher in the upper league. Overall rate of injuries seems to be high for all players; the cause and the anatomical location of injuries are significantly different between players of different leagues.

Keywords: Team sport; Women; Catch ball; Injury

Introduction

Catch ball also known as Newcomb ball or cachibol, is generally a non-contact team ball game that is similar in its characteristics and basic rules to the game of volleyball [1,2]. In previous years, playing Catch ball served as an introductory stage in teaching volleyball among young children [3]. However, in the last two decades it has developed into an amateur competitive sport, played mostly by women at midlife. Thus, Catch ball training and participation has the potential to increase the level of physical activity in this relatively sedentary population [2]. Several factors may determine the game of Catch ball as suitable for this population. 1. As a team sport, players are more consistent in attending training sessions. 2. The social aspect of such a

team sport—Gathering with other women for training, make it an enjoyable physical activity modality. 3. Catch ball – As opposed to other ball games – has relatively simple rules and techniques, making it suitable even for novice players.

Being a relatively new ball game, the players' profile and injury risk factors need to be determined and characterized. Once these are established, appropriate training and injury prevention strategies may be developed. At present, information on Catch ball players' physical, social and demographics profile is scarce. Catch ball is played in the Israeli league by females at a wide age range of 22-64 years (average of 42.3 ± 7.9 years old) [4]. The players' relatively advanced average age and the wide age range are different from women volleyball players, who are mostly younger with an average age of 25 years [5]. Farkash et al. (2016) used a retrospective questionnaire to describe the prevalence and severity of injuries among adult female Catch ball players. The participants belonged to an organized league designated for mothers in Israel (Mamanet) and to women's teams from various workplaces. Among the 355 respondents, 190 (54%) reported sustaining at least one Catch ball-related injury; 34 players reported injuries to more than one part of the body. The three most injured part of the body were 148 finger injuries, 61 ankle and 19 knee injuries. Farkash and colleagues also published detailed clinical descriptions on injuries during a 3-day competition [6]. During the 3-day tournament, of the 612 amateur women players, 26 reported a total of 27 injuries. Fingers were the most frequently injured body part. They also reported players engaging in Catch ball activity for an average of 2.7 ± 1.5 hours per week for the previous 3.4 ± 3.3 years. From this study it seems that injury locations in Catch ball are somewhat similar to injury locations in volleyball, as the top three injuries in volleyball players are ankle, knee and finger injuries (31.9%, 17.38%, 13.44%, respectively) [7].

We found no data on injury prevalence in more competitive-oriented organized Catch ball competition leagues, nor did we find data concerning training activity and involvement in other sports in upper and lower leagues.

Thus, the aims of the present study were:

1. To collect anthropometric, physical activity and training characteristics of female Catch ball players and compare these variables in lower and upper national competitive leagues organized by the Israel Catch ball Association.
2. To re-examine and compare injury patterns in high- and low-level leagues of competitive players.
3. To evaluate activity patterns and intensity during a typical Catch ball match in an upper and lower league.

Methods

Participants

A total of 493 female Catch ball players answered the questionnaire, representing 41.08% of players in the league. The average age of 42.8 ± 6.1 years, volunteered to answer a questionnaire. Of these, 116 players were from the upper-level leagues (Leumit, Ul) competing in national level games and 377 were from the lower-level leagues (Ezurit, Artizit) competing in regional level games.

Procedures

A retrospective descriptive study was conducted after being approved by an institutional Helsinki Committee. All players in four national Catch ball leagues (1200 players) agreed to participate in the present survey study.

Questionnaire: The questionnaire was designed based on a questionnaire used in a retrospective study that evaluated injury rate reported by soccer players [8]. Questionnaire included 34 questions regarding demographic and sport training data, including: height, weight, BMI, age, number of children, years playing Catch ball, working status, Catch ball training frequency and past experience with other ball games or physical activity. The questionnaire also included questions regarding injury history in the previous year.

Statistical Analysis

Student t-tests were used to compare injured and non-injured players on the number of years playing Catch ball, BMI, the number

of training workouts per week, and age. Chi-square tests were used to compare injured and non-injured players and to compare players from the lower and upper leagues on the frequency of ball-impact injuries, contact injuries, and overuse injuries. Statistical procedures were performed using the SPSS 25. Significance level was set at $p \leq .05$.

Results

Anthropometric parameters and Catch ball experience and training of lower- and upper-level league players are presented in (Table 1). Upper-league players were significantly taller than the lower-league players. There were no statistically significant differences in weight or BMI between the two levels of players.

Catch ball experience and training characteristics were different between the leagues. The upper-league players had significantly more years of Catch ball experience (Table 1).

Variables	Lower leagues (N=377)	Upper leagues (N=116)	t (df)	Sig
Height (cm)**	167.6 (6.8)	170.4 (5.9)	-3.38 (267)	.00
Weight (kg)	67.9 (11.6)	68.2 (11.0)	-.46 (266)	.64
BMI (Kg/cm2)	24.1 (3.8)	23.5 (3.4)	1.10 (266)	.27
Age (yrs)	42.7±5.9	42.8 (6.3)	.23 (267)	.82
Number of children	2.6 (1.1)	2.5 (1.0)	.65 (267)	.51
Years playing catchball**	2.3 (0.9)	3.1 (0.9)	-5.33 (267)	.00
			χ^2 value (df)	Sig
Working status	91.7% (n=342)	96.5% (n=111)	3.96 (2)	.14
Catchball training freq**			42.23 (2)	.00
1/week	40.6% (153)	8.6% (10)		
2/week	51.5% (194)	82.8% (96)		
3/week and more	8.0% (30)	8.6% (10)		
Played ball in the past**	46.7% (176)	61.2% (71)		
Participation in another PA	43.8% (165)	43.1% (50)		

Table 1: Anthropometric characteristics and Catch ball experience and training of players in the lower and upper leagues (* $p \leq .05$; ** $p \leq .01$).

Also, training frequency for the upper-level leagues was significantly higher compared to the lower-level leagues. In the upper-level leagues, more players had played other ball games in the past, although most of them were amateur players and had not played professionally.

There were no statistically significant differences between the two leagues in the players' participation or the frequency of engaging in other physical activities (Table 1).

Injury characteristics in the lower and the upper leagues are presented in Table 2. Injuries among Catch ball players in both leagues were found to occur in more than 50% of players. For most of the

players (76.6%) these were new injuries, with no differences between the league levels in injury frequency. Most of the injured players were injured only once, however there were players who had been injured twice and even three times in the previous year, with no difference in the number of injuries between the leagues (Table 2). In the lower league the most prevalent cause of injuries was ball impact (42.6%), and the fingers were the anatomical site most affected (40.7%). However, this was not the prevalent cause of injuries at the upper-league level. The most prevalent injury cause in the upper leagues frequently involved the ankles (27.1%). In addition, contact injuries – usually caused by one player landing on another player's foot [9], had a higher frequency in the upper leagues compared to the lower leagues (Table 2).

	Lower leagues (N=377)	Upper leagues (N=116)	χ^2 value (df)	Sig
Injury last year	54.4% (205)	55.2% (64)	.02 (1)	.88
How many injuries:			3.08 (2)	.21
1 injury	57.1% (117)	56,3% (36)		
2 injuries	29.3% (60)	21.9% (14)		
3 injuries	13.7% (28)	21.9% (14)		
New injury	76.6% (156)	76.6% (49)		
Reinjury	23.4% (48)	23.4% (15)		
Cause of injury:*			22.60 (13)	.047
Ball impact	42.6% (86)	23.4% (15)		
Overuse	25.7% (52)	35.9% (23)		
Self-falling	13.9% (28)	14.1% (9)		
Player contact	10.9% (22)	21.9% (14)		
Part of body injury:*			22.04 (13)	.05
Finger	40.7% (83)	23.7% (14)		
Ankle	23.5% (48)	27.1% (16)		
Knee	11.8% (24)	23.7% (14)		
Shoulder	10.3% (21)	15.3% (9)		
Leg	8.8% (18)	11.9% (7)		
Break from training:			1.38 (3)	.71
Didn't stop training	36.8% (70)	39.0% (16)		
Stop training less than a week	13.7% (26)	12.2% (5)		
Stop training 2-4 weeks	24.2% (46)	17.1% (7)		
Stop training more than a month	25.3% (48)	31.7% (13)		
Lost work days			3.67 (4)	.45
Did not lose days	68.0% (138)	63.5% (40)		
Lost 1-2 days	11.8% (24)	17.5% (11)		
Lost 3-7 days	10.3% (21)	11.1% (7)		
Lost 2-4 weeks	6.4% (13)	7.9% (5)		
Lost more than a month	3.4% (7)	0% (0)		

Table 2: Injury prevalence in lower and the upper League players (* $p \leq .05$; ** $p \leq .01$).

Anthropometric and training characteristics of injured players in the lower and upper leagues are presented in (Table 3).

	Lower league	Upper league		
	injured (N = 205)	injured (N = 64)	t (df)	Sig
Age (years)	43.1 (5.8)	42.9 (5.1)	.229 (267)	.82
Height (cm)**	167.4 (6.9)	170.6 (5.3)	-3.337 (267)	.00
Weight (Kg)	67.8 (11.9)	68.6 (11.8)	-.461(266)	.65
BMI (Kg/cm2)	24.1 (3.8)	23.5 (3.8)	1.096 (266)	.27
Number of children	2.5 (1.1)	2.4 (0.9)	0.652 (267)	.10
Years play Cachibol**	2.4 (0.8)	3.0 (0.9)	-5.328 (267)	.00
			χ2 value (df)	Sig
Participation in another PA-yes	57.1% (117)	65.6% (42)	4.98 (6)	.22
Played ball in the past:				
Basketball	17.6% (36)	21.9% (14)	.60 (1)	.44
Volleyball	13.2% (27)	21.9% (14)	2.86 (1)	.09
Catchball	6.8% (14)	12.5% (8)	2.09 (1)	.15
Role in the game:			3.23 (4)	.52
Not specified	22.0% (45)	18.8% (12)		
Attack	34.1% (70)	45.3% (29)		
Libero	10.7% (22)	6.3% (4)		
Pass	7.3% (15)	7.8% (5)		
More than one role	25.9% (53)	21.9% (14)		
Injury prevention:			4.98 (6)	.55
Not using	42.6% (86)	41.0% (25)		
Finger brace	8.4% (17)	6.6% (40)		
Bandaging	21.3% (43)	13.1% (8)		
Knee brace	10.9% (22)	14.4% (10)		
Ankle Brace	14.9% (30)	21.3% (13)		

Table 3: Anthropometric and training characteristics of injured players in the lower vs. the upper leagues (* p ≤ .05; ** p ≤ .01).

To identify risk factors for injuries, we analyzed injured players' characteristics at the upper- and lower-league levels. No differences were found between the injured players regarding their age, weight, BMI, number of children, role in the game, past experience in ball games, number of injuries in the past year, or in participation in other physical activities.

Discussion

Catch ball is a relatively new team sport in which women can take part. Catch ball has the potential to increase the participation of women at midlife in a healthy recreational aerobic activity. The main purpose of the present study was to characterize female Catch ball players' injury patterns and physical activity profile in high- and low-level national leagues playing in the Israel Catch ball Association. The findings of the present study indicate that upper-level players were significantly taller, had higher training frequency, and had more experience playing Catch ball (Table 1) than the players in the low-level national league. There were no differences in the players'

demographics characteristics between the two leagues. These differences are not surprising, as these factors may contribute to improved performance in Catch ball. It was previously shown that upper-level volleyball players were taller than lower-level players [10]. Given the playing rules, height seems to be an important physical attribute in Catch ball, as well as in volleyball. Being tall may help players score points around the net (net height is 2.24 m, as in volleyball), and at the same time may prevent opposing players from scoring points by blocking their attack over the net. Another prominent characteristic of the upper league is that many of the players had been involved in other ball games in the past (Table 1). The past athletic involvement of the upper-level players may have established a higher starting point for them in Catch ball.

The overall prevalence of reported injuries in the previous year was very high—more than 50% of the players and was similar between the two league levels (Table 2). The high prevalence of injuries among Catch ball players may be related to the age of the players. The mean age of players in this study was 43 years, which is much higher than the average age of female players in other competitive team sports [11].

Though the prevalence of injuries was similar between the leagues, there were differences in the patterns (type, cause and anatomical location) of the injuries reported. Most injuries among the lower-league players were caused by ball impact, in particular when attempting to catch the ball. Accordingly, the most common anatomical location of injury among the lower-level players was the fingers (Table 2). The high finger-injury rate in the lower leagues is most likely the result of poor technique used by the players when attempting to catch a flying ball. Similar findings were shown in Farkash and colleagues (2016), who found that most of the injuries among female Catch ball players indeed occurred in the fingers. However, their report did not distinguish between players of different league levels. The high prevalence of finger injuries should be taken into consideration by coaches, especially of low-level teams. The finding indicates the importance of technique and ball handling training for Catch ball players.

Interestingly, in the upper leagues, most injuries were the result of overuse, and not related to the fingers (Table 2). It was speculated that overuse injuries are the result of repetitive low-grade forces on the tissues [8]. The overuse injuries related to the ankles, shoulders, legs and knees reported by the upper league players are in line with the activity profile of the players, as they were found to have more training a week and longer years of trainings. In the present study the upper league players also reported participating in a greater number of practice sessions. These, together with the higher number of years practicing Catch ball, may explain the higher rates of overuse injuries, especially considering the players' relatively advanced age.

These findings are in accordance with overuse injuries found in volleyball, and is probably due to the repetitive high jumps that characterize that game [7]. It was previously shown that the most common cause of shoulder pain in volleyball players was caused by overuse of the rotator cuff, presumably a result of a large number of training hours [12].

Another interesting point raised in the present study was the higher rate of contact injuries in the upper leagues compared to the lower leagues (Table 2). While Catch ball is regarded as a non-contact game, contact injury may occur when jumping vertically near the net and landing over the net line onto another player's foot. This kind of faulty landing was shown to be a major cause of injuries in volleyball [13].

There are no data regarding volleyball players at midlife, however some differences regarding the effect of age on injuries in volleyball were found. Bere et al showed that senior elite volleyball players had a higher incidence of injuries, and the time lost from training was longer compared to junior players [14]. In addition, Beneka et al showed that senior volleyball players were injured more than junior players [15]. Thus, training programs for Catchball players need to include technical ball handling practice as well as strength and coordination training for relevant muscle groups, in order to prevent overuse and contact injuries.

Some limitations of the study need to be noted regarding the internal validity. Our design was a retrospective cross-sectional analysis; therefore, a direct cause-effect relationship between injuries and league levels cannot be established. Another limitation is data regarding injuries was being reported by participants and was not evaluated directly by the researchers. Future research should consider monitoring injuries through Catch ball season, and not retrospectively.

Conclusions

Catch ball is a relatively new game for women, often presented as a non-contact, social and fun game that may enhance women's participation in physical and social activity. While this may indeed be true, it seems that at least when played in a competitive league system, the game may involve significant exercise intensities and a risk for injuries, as is often the case in other competitive ball games. Thus, a clinical goal will be design proper training for increasing physical capacity, as well as technical ball handling and coordinating training, to minimize injury.

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