

Exercise Preferences for People with Osteoporosis, Identifying Barriers, Facilitators, Needs and Goals of Exercise

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ABSTRACT

Purpose: It is challenging for many people with osteoporosis to initiate and adhere to an exercise program. Currently there is little evidence on exercise preferences of people with osteoporosis, yet these factors may contribute to improved exercise adherence. Therefore, this project surveyed patients with osteoporosis to understand their exercise preferences, barriers, needs, and goals.

Methods: The Personalized Exercise Questionnaire (PEQ) was used to gain insight into the barriers, facilitators, and goals related to exercise. Participants were recruited from a subspecialty metabolic bone disorder clinic, within the Greater Toronto Area, in Ontario, with a large population of osteoporotic patients. Data collection took place, inside the clinic, from December 2018 to June 2019

Results: Data on a total of 287 surveys were collected. The sample was 90% female with a mean age of 67 (SD: 10.7) years. Most participants preferred to exercise in the morning (n=208, 75%), on their own time (n=180, 65%), with exercise that were easy to perform (n=151, 55%), slow paced (n=133, 48%), and easy to remember (n=117, 43%). Home (n=171, 62%) was the most preferred location to exercise. The most important goal for the participants was to improve strength (n=241, 84%) and the least important goal was to reduce falls (n=129, 45%). Time was the most common barrier reported in 30% of participants and followed by pain in 23% of the participants.

Conclusion: This study provides insight into participant preferences for exercise. The major finding was between men and women were where they preferred to exercise. Men preferred to exercise at home or at the gym, and women preferred to exercise at home or outdoors.

Keywords: Osteoporosis; Exercise; Physical activity; Aging

INTRODUCTION

Osteoporosis (OP) affects a large proportion of the population, with 1 in 3 women and 1 in 5 men affected [1]. Osteoporosis is a decrease in bone mineral density that increases the risk of fragility fractures [1]. Osteoporosis is often associated with age-related declines in bone mineral density, which could be due to a decrease in bone mineral density, declines in hormonal signal regulation, bioavailability of nutrients like calcium and vitamin D, and lifestyle factors such as activity, alcohol consumption and smoking [2,3]. The most common sites of OP fracture are the vertebrae, hip and wrist. Osteoporosis can be managed pharmacologically and non-pharmacologically, with non-pharmacologic management important in preclinical and early OP, and both important in later stages of the disease. Clinical recommendations outline the timing and best practices for managing OP with medication, nutrition, and exercise [3,4].

OP guidelines provide recommendations on the mode, frequency, and intensity of physical activity, and how those factors can be modified in the presence of a chronic condition [3,5,6]. The Too Fit to Fracture physical activity and exercise recommendations provide guidance on effective exercise for fall and fracture prevention, and safe performance of physical activities of leisure and daily living for people with osteoporosis [5,6]. For example, it's recommended to participate in strength training exercises like squats or lunges, or any exercise that provides resistance against body weight. It is advised to prioritize strength training exercise rather than cardiovascular exercises. However, when doing cardiovascular exercises walking is preferred than swimming, for example, for the benefits of working against gravity. Finally, it is important to participate in balance training exercises to reduce the risk of fractures. More specific details can be found in a position statement, out of Australia, providing a comprehensive guideline

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Received: May 01, 2020; Accepted: July 24, 2020, Published: July 31, 2020

Citation: Ziebart C, MacDermid J, Bryant D, Szekeres M, Suh N, Khan A (2020) Exercise Preferences for People with Osteoporosis, Identifying Barriers, Facilitators, Needs and Goals of Exercise. J Osteopor Phys Act 8:221. doi: 10.35248/2329.9509.20.8.221

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on the type and intensity of exercise, taking into consideration osteoporosis disease progression [4].

Although the benefits of exercise are clear for osteoporosis, such as, attenuating bone loss, reducing the risk of sarcopenia, and reducing fall risk, it is still a challenge to get people with osteoporosis to adhere to an exercise program [2,7-10]. Kemmler et al. conducted a prospective cohort study that followed 55 people with OP for 16 years and found that exercise adherence decreased over the years [11]. It has also been reported that as people age, their engagement with exercise decreases [12]. Currently, most studies are still aiming to determine the benefits of exercise and which mode, frequency and intensity are best for maintaining bone mineral density, but few studies have asked individuals with osteoporosis their exercise preference [4,5,11,12].

An exercise preference questionnaire has been developed to better understand the perspective of people with osteoporosis, to better design exercise programs [12]. This cross-sectional survey aimed to understand the exercise goals and preferences of people with osteoporosis and the barriers and facilitators to engaging in exercise.

METHODS

A cross-sectional survey was conducted among people with osteoporosis from December 2018 to June 2019. Ethical approval for this study was granted by Western University Research Ethics Board.

Survey

The Personalized Exercise Questionnaire (PEQ) was developed by I.B. Rodrigues to assess barriers, facilitators and goals related to exercise in people with OP [13,14]. The survey has high content validity in an osteoporotic population [13,14]. The survey used in this study can be found in Appendix A.

Briefly, the survey consists of five sections related to support and access to exercise facilities, goals related to exercise, exercise preferences and barriers to exercise. The participants were asked to complete a paper copy of the survey while waiting for their appointment with an osteoporosis specialist physician. They survey was administered throughout the work hours of 9 am to 4 pm on weekdays. The survey could not be randomized or alternated, as it was a paper survey with the questions transitioning in a chronological order. The survey was nine pages long with approximately 5 questions per page.

Participants

Participants were recruited from one clinic, specializing in working with people with bone disorders, with a primary focus on osteoporosis. This was a closed survey. Participants were recruited, in person, to participate if they were over the age of 18, could read and write English and were undergoing treatment for osteoporosis. No information was gathered on whether it was the participant's first or follow-up visit. Participants were informed that the survey should take approximately 10 min to complete, and that participation was voluntary. They were provided with the letter of information, which explained the data storage, introduced the investigators and purpose of the study. Consent was assumed if the participant returned the survey. They survey was advertised using an informative poster in the physician's clinic.

Data protection

No person, other than the participant's physician or therapist and the study co-investigator had access to participant records

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without participant permission. No identifying information was collected, so there is no way to link the survey with the participant. All electronic files were password protected and paper copies were stored in a locked filing cabinet.

Incentives

Participants were offered a five-dollar food gift card incentive for completing the survey.

Data analysis

A sample size calculation was performed based on pre-specified levels of precision. At a 10% margin of error and 95% CI for a large population size (approximately 5,000), it was determined 220 responses were needed [15]. Data was input from all surveys received, including surveys that had components of missing data. Completeness checks were conducted randomly when the surveys were submitted, and participants had the opportunity to review their survey before submitting it. The lead author and a research assistant performed quality checks. Descriptive statistics and percentages were used to summarize data for questions having categorical response options.

RESULTS

Data on a total of 287 surveys were collected. The sample was 90% female and had a mean age of 67 (29-91) years. Full demographic descriptions are provided in Table 1.

Exercise support and access

Of the 287 survey respondents, 119 (43%) participants said that they wanted supervision while exercising. Most participants wanted supervision from a healthcare professional (n=47, 17%), followed by a personal trainer (n= 46, 17%). When asked whether having a healthcare professional with a good attitude was important, 167 (58%) participants said yes. However, when disaggregating the data by men and women, men preferred a personal trainer to a healthcare professional, whereas women preferred to work with healthcare professionals. All of the participants felt that they had a place to exercise, with most participants being able to exercise from home (n=154, 54%). Several had an exercise location less than 5 km away (n=107, 37%), with some of the participants having more than one option. Many of the participants were able to get to their exercise facility on their own (n=208, 72%), and had access to transportation to get to the facility (Table 2). Most of the participants felt that they had a safe place to exercise (n=260, 91%), an encouraging place to exercise (n=203, 71%), and access to an exercise facility with a reasonable price (n=174, 61%) (Table 2).

Exercise goals

Participants were asked to rank goals of exercise between very important to not important or not applicable. The most important goal for the participants was to exercise to improve strength (n=241, 84%), and the least important goal was to exercise to reduce falls (n=129, 45%). Reducing falls was listed as "not applicable" most frequently (n=97, 34%). When disaggregating the data by men and women the goals listed as "very important" were similar. However, men ranked flexibility as the second most important goal, whereas women ranked improving balance as their second most important goal (Figure 1).

Exercise preferences

Participants were asked to provide feedback on their exercise preferences related to receiving feedback, giving feedback, tracking

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Table 1: Demographics.						
N (%)	Mean (SD)	Min, Max				
279	67.6	29,91				
220	46 (11.6)					
74	1.7d (1.4)	1,10				
83 (29)		-				
142 (50)	-	-				
255 (89)	-	-				
Sex						
259 (90)		-				
28 (10)		-				
Residence						
39 (14)	-	-				
223 (78)		-				
18 (6)						
Diagnosis						
197 (69)		-				
56 (20)		-				
7 (2)						
Fracture Risk						
62 (22)						
69 (24)						
31 (11)		-				
	N (%) 279 220 74 83 (29) 142 (50) 255 (89) Sex 259 (90) 28 (10) Residence 39 (14) 223 (78) 18 (6) Diagnosis 197 (69) 56 (20) 7 (2) racture Risk 62 (22) 69 (24) 31 (11)	N (%) Mean (SD) 279 67.6 220 46 (11.6) 74 $1.7d$ (1.4) 83 (29) $-$ 142 (50) $-$ 255 (89) $-$ Sex $-$ 259 (90) $-$ 28 (10) $-$ 39 (14) $-$ 223 (78) $-$ 18 (6) $-$ Diagnosis $-$ 197 (69) $-$ 7 (2) $-$ racture Risk $-$ 62 (22) $-$ 69 (24) $-$ 31 (11) $-$				

 Table 2: Support and access to an exercise facility.

	Total population N=287	Males N=28	Females N=259
	n (%)	n (%)	n (%)
	Participant preference fo	or exercise supervision	
Healthcare Provider	47 (16)	3 (11)	45 (17)
Personal Trainer	46 (16)	4 (14)	41 (16)
Other	26 (9)	1 (4)	23 (9)
	Number of participants that sa	iid "yes" this was important	
A HCP with a good attitude	167 (58)	10 (36)	157 (61)
Support from Friends and Family	211 (74)	18 (64)	191 (74)
	Distance to a pla	ace to exercise	
Home	154 (54)	15 (54)	139 (54)
<5 km	107 (37)	8 (29)	99 (38)
5-10 km	34 (12)	7 (25)	27 (10)
	The type of support to ge	t to an exercise facility	
Getting to exercise on their own	208 (72)	19 (68)	189 (73)
Family member/ partner	24 (8)	3 (11)	21 (8)
Friend	5 (2)	0 (0)	5 (2)
Other	6 (1)	1 (4)	5 (2)
	The type of transportation to	o get to an exercise facility	
Motor Vehicle	165 (57)	13 (46)	152 (59)
Public Transport	12 (4)	1 (4)	11 (4)
Walking	43 (15)	6 (21)	37 (14)
Other	13 (5)	1 (4)	12 (5)
	Number of participants that sa	aid "yes" they have access to	
A safe place to exercise	260 (91)	25 (89)	235 (91)
An encouraging place to exercise	203 (71)	20 (71)	183 (71)
Access to reasonably priced exercise facility	203 (71)	19 (68)	155 (60)

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Figure 1: Frequency of participants selecting "very important" for the exercise goal.

Table 3: Survey response to exercise preferences related to preferred time to exercise, scheduling exercise, class size and difficulty.

	Total population N=287	Males N=28	Females N=259			
	n (%)	n (%)	n (%)			
	Preferred time to exercise					
Morning	203 (71)	17 (61)	186 (72)			
Afternoon	89 (31)	11 (39)	78 (30)			
Evening	52 (18)	5 (18)	47 (18)			
Preferred schedule to exercise						
Multiple Drop-in times	65 (23)	8 (29)	57 (22)			
Fixed times	100 (34)	2 (7)	98 (38)			
On their own time	180 (63)	18 (64)	161 (62)			
	Preferred class size					
Alone	119 (41)	17 (61)	102 (39)			
With a partner/trainer	60 (21)	4 (14)	55 (21)			
In a small group	105 (37)	6 (21)	98 (38)			
In a large group	25 (9)	1 (4)	24 (9)			
Level of	difficulty					
Easy to perform	151 (53)	16 (57)	135 (52)			
Slow paced	133 (46)	16 (57)	116 (45)			
Fast paced	55 (19)	5 (18)	49 (19)			
Easy to remember	117 (41)	12 (43)	104 (40)			
Challenging to perform	98 (34)	5 (18)	93 (36)			

their progress, the best time to exercise, exercise schedule, class size and level of difficulty of the exercises. A total of 177 participants said that they would like to receive or provide feedback on their exercise, and 17 participants did not respond to the question, leaving 93 participants not wanting to receive or provide feedback related to their exercise. Most participants wanted to receive feedback about their exercise through email (n=106, 60%) and wanted to receive feedback on the proper exercise technique (n=138, 78%), or on their exercise progress (n=124, 70%), and wanted to receive that feedback daily (n=10, 6%), weekly (n=66, 37%), monthly (n=96, 54%), or yearly (n=6, 3%). Participants also wanted to give feedback to their exercise professional, and the primary preference was to give feedback through email (n=88, 50%). Participants wanted to track their exercise through wearable technology (n=74, 42%), through a cellphone (n=60, 34%), with a diary/logbook (n=60, 34%) or other (n=7, 4%) (Table 3).

Participants were asked when and where they would prefer to exercise. Ten participants did not respond to this question (n=277). Most participants preferred to exercise in the morning (n=208, 75%), and on their own time (n=180, 65%), or in a small group (n=105, 38%). When asked about the intensity of the exercise (n=274), most participants want the exercise to be easy to perform (n=151, 55%), but also slow paced (n=133, 48%) and easy to remember (n=117, 43%). Most participants preferred to exercise at home (n=171, 62%), outdoors (n=114, 41%), or at the gym (108, 40%). These trends were similar when disaggregating the data by men and women, the major difference was that men preferred to exercise at home (n=16, 57%) or at the gym (n=13, 46%), whereas



Figure 2: Barriers for why participants are not able to exercise as often as they would like to. The common "other" reason was related to time and commitments to family, work or chores.

women preferred to exercise at home (n=155, 60%) or outdoors (n=104, 40%).

Exercise barriers

Participants did experience barriers related to being able to exercise, with 160 participants expressing that they do have barriers, and 110 saying that they do not have barriers to exercise. When considering sex, 64% of men said that they had barriers that stopped them from exercising, and 54% of women had barriers stopping them from exercising. Participants were asked to rank how often the barriers stop them from exercise and 21 participants did not respond to the question (n=266), while those that did respond, responded with: sometimes (n=84, 32%), very often (n=53, 20%), rarely (n=20, 8%), and always (n=14, 5%). Participants were then asked the most common reason for not being able to exercise, and 17 participants did not respond to this question (n=270). The most common reason for not being able to exercise was because participants felt pain when exercising (n=63, 23%), do not like exercise (n=41, 15%), or do not want to injure themselves (n=34, 13%) (Figure 2). Time (n=80, 30%) was reported as the most common need to being able to overcome the barriers, followed by needing to learn how to perform the exercises (n=35, 13%). The weather was sometimes (n=108, 40%) a barrier for participants bu was never a barrier (n=52, 19%), or always a barrier (n=14, 5%) for others. When evaluating differences between men and women, weather was more of a barrier for women than men, with one man (3%) indicating that weather always stopped him from exercising, compared to 44 (17%) women saying weather always stopped them from exercising. Weather never stopped 8 (29%) men from exercising, compared to 46 (18%) women. Most participants did not report a medical condition as being a barrier to exercise (n=146, 56%), which was similar for men and women. For those that did report a medical condition, arthritis was the most common (n=73, 28%), followed by lung disease (n=12, 5%) and mental health issues (n=11, 4%), which was similar for both men and women.

DISCUSSION

This study provides insight into the exercise preferences for men and women with osteoporosis, finding that participants would like support from their friends and family, preferred to exercise at home, in the morning, on their own time, alone and wanted exercises that were easy to perform. Most participants had a primary goal of wanting to improve strength. Participants ranked the least important goal of exercise were to reduce the risk of falls. This finding is interesting as falls are a common cause of fracture for people with osteoporosis and although balance was identified as a concern, falls were not a concern, suggesting a missed link between balance and falls.

It was not surprising that 90% of the respondents were women, however, this study was able to obtain a reasonable sample size for the perspective of men. When disaggregating the data for men and women there were little differences in the preferences of exercise. The major difference found between men and women was where they preferred to exercise. Men preferred to exercise at home or at the gym, and women preferred to exercise at home or outdoors. With consideration of the results, we recommend that 1) exercise education be provided to individuals with osteoporosis, but that educators should also provide information to the individual's social support network to facilitate support of the individual as they try to maintain a life-long program 2) both men and women should be targeted for exercise, but the approach may be different, with men preferring to exercise in the gym and women preferring to exercise outdoors 3) exercise programs should include a component that can be transferred to a home setting, and 4) more education is required to highlight the importance of falls prevention for all adults, not just older adults.

An interesting finding from this study is that 74% of women and 64% of men felt that it was important to have the support from their friends and family to exercise. A mixed method study looking at the importance of physical activity for people with osteoporosis found that the social connection is a very important component of exercise for people with osteoporosis [16]. Interestingly, although the participants wanted social support, they also preferred to exercise alone. Support may come from encouragement or helping with other responsibilities to provide the participant with time to exercise. However, that is speculation and a more in depth understanding of how family and friends can support people with osteoporosis and their exercise needs to be conducted. The mixed method study mentioned above found that engaging in exercise and physical activity require consideration of psychological and social factors as well, emphasizing that exercise engagement is multifactorial and complex [16].

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A primary focus of osteoporosis management is to reduce risk of falling. In people with osteoporosis, five percent of falls have been reported to result in a fracture [17-19]. However, our study found that reducing the risk of falls was the lowest priority goal with 45% of people ranking reducing the number of falls as very important. It may have been that the current study's cohort of participants were younger (mean age 67.6) and had not yet experienced a fragility fracture, so they did not appreciate the risk of falls. Further, the participants did select working on balance (78%) and strength (84%) as two very important goals, which are components that would prevent falls through physical activity and exercise, which align with exercise recommendations [5,19-21].

The results from the current study suggest that participants would like support from their friends and family, exercise at home, exercise in the morning, and on their own time (rather than a fixed time), exercise alone and wanted exercises that were easy to perform. Most participants had a primary goal of wanting to improve strength. With these findings it suggests that more tools may be required to facilitate at home guidance for exercise for people with osteoporosis. However, despite the preference to exercise at home, most participants wanted to learn how to exercise from a healthcare professional or personal trainer, but time and money were consist barriers limiting exercise participation. Exploration into technology based forums or applications may be a strategy to allow for virtual instruction while facilitating at home independent exercise. Some success has been seen in using virtual exercise in a stroke population, to reduce the risk of falls and fear of falling, and to improve muscle strength [22-24]. However, as with any exercise programs, caution needs to be considered to ensure safety. For people with osteoporosis, the risk of fracturing is multi-factorial and those factors need to be considered when providing exercise advice [4].

There are a few notable strengths and limitations to address for this study. Firstly, this study is strengthened by the large sample size. As well, the study was able to sample a wide variety of individuals with osteoporosis, including a good proportion of men, and of individuals across a variety of age groups [25]. A limitation of this study was that the data were collected from a single clinic, reducing the external validity of results. The clinic is run by an endocrinologist and often consists of individuals with more complex disease, which may explain why some participants are less inclined to exercise. We did not have bone mineral density scores to estimate the severity of their OP, or FRAX scores to estimate fracture risk. It is possible that OP severity affects exercise goals and preferences.

This study was also limited by not asking participants whether they were currently exercising, which could have provided insight into the participant responses. As well, since the survey did not ask participants current exercise practice, some responses may be biased, for example, if people responded that they prefer to work with a personal trainer, we do not know if they are currently working with a personal trainer or have ever worked with a personal trainer. Finally, participants completing the survey suggested that investigators should have provided a definition of exercise, asked for information on current employment status, and if whether they currently use technology when participating in exercise. This feedback will be incorporated into future iterations of the survey and demographic form.

CONCLUSION

In conclusion, this study presented the exercise preferences of people with osteoporosis. The major finding was between men and women were where they preferred to exercise. Men preferred to exercise at home or at the gym, and women preferred to exercise at home or outdoors.

DECLARATIONS

Disclosure of funding

Authors received no specific funding for this work.

Acknowledgements

Christina Ziebart is supported by the CIHR Doctoral Award. Joy C MacDermid was supported by a CIHR Chair in Gender, Work and Health and the Dr. James Roth Research Chair in Musculoskeletal Measurement and Knowledge Translation.

Conflicts of interest/Competing interests

None of the authors have conflicts of interest or competing interests to disclose.

Ethics approval

Ethical approval for this study was granted by Western University Research Ethics Board.

Consent to participate

All participants were provided with a letter of information, and consent was assumed with a completed, submitted survey.

Consent for publication

All participants were provided with a letter of information, which included information about using the data for publication.

Authors' contributions

Christina Ziebart initiated the project, collected the data, collated the data and drafted the manuscript. Joy MacDermid, Dianne Bryant, Mike Szekeres and Nina Suh assisted with initiating the project, and provided feedback on the manuscript. Aliya Khan assisted with the data collection and provided feedback on the manuscript.

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