

A randomized controlled trial of a peer-led pain management program for older adults: Baseline characteristics and preliminary results

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Abstract

Background Chronic pain is common among nursing home residents and they may have difficulty seeking out pain management strategies. Due to the limitation of healthcare resources, peer support model was proved with promising effect in managing chronic conditions. **Methods** It is a clustered randomized controlled trial. Peer-led pain management program was provided for the experimental group. Pain situation, depression, quality of life, non-drug strategies used and pain knowledge were measured. **Results** Totally 262 participants joined the study. Their overall pain score was 6.36. Leg was the most frequently reported site of pain and walking ability was interfered. Depression was also reported by the participants. The score for quality of life was 32.65 for physical component and 51.58 for mental component. The mean score for pain knowledge was 46.81 out of 100. No significant difference was shown between two groups at baseline. **Discussion** Severe pain intensity and low self-efficacy among the participants indicated it is necessary to provide pain management programs especially for this population. The frequency with strategies applied were significantly correlated with pain intensity, pain interference, depression, and quality of life. Pain knowledge also correlated significantly with some strategies.

Background

Chronic non-cancer pain is common among older adults and can lead to significant physical and psychosocial incapacities. Studies have reported that older people with chronic pain are often more depressed and anxious than those without pain[1][2][3]. Nursing home residents live in “closed” environments; thus, they may have difficulty seeking out pain management strategies. The prevalence of chronic pain among nursing home residents has been reported to be around 70–80%[2][3]. It is therefore necessary to provide them with pain-related knowledge and relief strategies.

Older adults often accept chronic pain as part of the process of aging, and have concerns about adverse reactions from using drugs[4]. This has boosted the popularity of non-drug strategies for dealing with pain, such as pain education, exercise, and visual stimulation[1].

A chronic pain management program developed by Ersek et al. was implemented among nursing home residents has been shown to be effective[5]. Using that program as a reference, we likewise designed a chronic pain management program (PAP). It includes education about pain, the use of drugs, and the practice of various non-drug techniques[6] and has been proven to be effective in reducing pain and improving the physical and psychological condition of nursing home residents.

With the scanty healthcare resources, healthcare professionals are difficult to carry out adequate pain management program in the caring process [7][8][9]. Peer support models focusing on the provision of emotional, informational, and relationship support are being used to help individuals manage their chronic conditions, and the results have been promising[10][11]. In this way, we are conducting an RCT to explore the effectiveness of this peer-led pain management program in nursing homes.

The paper is to report (1) to compare the pain situations and characteristics of two groups, (2) to explore the non-drug methods applied by the participants, and (3) to evaluate the participants' pain knowledge.

Methods

Study design

This study presents baseline analysis of a peer-led pain management program (PAP) which is randomized controlled trial and registered on the ClinicalTrials.gov platform (NCT03823495) and adheres to CONSORT guidelines. The study was collected in several nursing homes in Hong Kong. Ethical approval was obtained from The Hong Kong Polytechnic University and the participating nursing homes (Ref No. HSEARS20171218005).

Sample and procedure

Older adults were recruited from different government-subsidized nursing homes. Eligible nursing home residents had to satisfy the following the criteria for inclusion in the study:

- aged >60 years;
- scored >6 in the Abbreviated Mental Test;
- had been experiencing non-malignant physical pain or discomfort either all the time or on and off for >3 months, with a pain score of ≥ 4 (on a 0-10-point pain scale in the Brief Pain Inventory);
- scored >60 in the Chinese version of the Modified Barthel Index;
- able to speak and understand Cantonese.

Participants were excluded if they:

- scored ≥ 8 in the Geriatric Depression Scale (GDS);
- had a history of psychotic disorders, making them unable to understand and follow instructions;
- had cancer and were currently undergoing cancer treatment;
- had a condition that limited them from safely participating in exercise (had a fracture or had recently undergone surgery, suffered an acute stroke, etc.).

A letter was sent to the nursing homes for invitation to join in the PAP. Those with an interest in participating will be randomized into the experimental or control group according to a computer-generated list by a third person. Nursing homes served as the unit of allocation, intervention, and analysis. Before starting the program, the written informed consent was collected from all of the participants. Figure 1 shows a flow chart of the study.

Intervention

Pain management program (PAP) for experimental group

A pain management program (PAP) using a teaching manual (**Appendix 1**) was provided for the participants in the experimental group which was led by peer volunteers (PVs). The PVs were recruited from an institute hosted by a local university in Hong Kong. Eligible volunteers had to satisfy the following criteria: 1) aged >55 years; 2) scored >6 in the Abbreviated Mental Test; 3) be willing to attend training workshops and biweekly meetings with the research team; 4) passed an exit test (including a knowledge test on pain management) showing their ability to demonstrate various non-pharmacological practices and use the teaching manual; 5) be willing to lead the PAP in a nursing home.

After the eligible PVs were recruited, four 2-hour training workshops conducted over 2 weeks were held for the PVs to learn the related knowledge. The topics of the workshops included: 1) what a peer is; 2) communication skills; 3) client safety and confidentiality; 4) managing crises and emergencies; 5) motivational strategies to enhance the compliance of the participants; and 6) demonstrations on the use of the teaching manual. All of the materials were uploaded to Google Drive for the PVs to review at any time. The workshops were conducted in small groups.

The PAP started with 20 minutes of physical exercises performed under the supervision of PVs which was followed by 30 minutes of pain management education, including information on pain situations, the impacts of pain, the use of drugs and non-drug strategies for pain management, and demonstrations and return demonstrations of various non-drug pain management techniques. At the end of the session, the PVs would help the participants make portfolio entries on the activities of the day, to help them recall the various pain relief methods learned in each class.

Control group

With reference to Ersek [5] the participants in the control group received the usual care and a pain management pamphlet distributed by the nursing home staff. We believed that reading the pamphlet could help the participants to manage their pain, but that this would be less efficacious than the PV-led PAP.

Outcome measures

Outcome measures were administered before the start of the program. A series of well-designed questionnaires were used.

Pain intensity & pain interference

Pain intensity and pain interference were measured using the Brief Pain Inventory Chinese version (BPI-C). The BPI-C consists of four questions related to pain severity and seven questions related to pain interference. The items are rated on a scale ranging from 0 (no pain at all) to 10 (pain as bad as you can imagine or interferes completely). The internal consistency and reliability of the questionnaire were reported in the previous study[12].

Pain self-efficacy

The pain self-efficacy questionnaire (PSEQ) is a valid and reliable questionnaire. It contains 10 questions regarding a patient's belief in his or her ability to accomplish daily tasks in spite of pain. The answers are rated on a 7-point Likert Scale, where 0 refers to not at all confident and 6 refers to completely confident. The total score is calculated and higher scores reflect greater pain-related self-efficacy[13].

Depression

Geriatric Depression Scale (GDS) was used in the present study to measure depression. It is a 30-item self-reported assessment used to identify depression. A total score of 0-9 is regarded as "normal," 10-19 as "mildly depressed," and 20-30 as "severely depressed." The validity and reliability of the scale have been tested [14].

Perceived quality of life

The Chinese version of the SF-12 Questionnaire, which has 12 items derived from the physical and mental domains of the SF-36, were used. A separate summary of scores was obtained for each physical and mental domain by summing the scores across all 12 items. Higher scores indicate higher levels of health.

Use of non-drug treatments

Information on the non-drug treatments (e.g., listening to music, deep breathing, exercises) that were used and the frequency (on a weekly basis) of usage were collected.

Pain knowledge

Eleven questions related to the pain education content were designed to assess the participants' pain knowledge. The questions included: "What is the effect of Paracetamol?", "Can listening to music help reduce pain?", "Is exercise effective in pain management?", "Is it appropriate to apply a hot/cold compress when sleeping?". The total score was calculated by counting the number of correctly answered questions (the number of correctly answered questions /11*100), with a higher score indicating a better knowledge of pain.

Statistical analysis

SPSS version 23 was used for handling and analyzing the data. Outcome variables and demographic characteristics were presented using descriptive statistics. The differences in the demographic characteristics and outcome variables of the two groups were compared using a Chi-Square test. A bivariate correlation was applied to assess the correlation between non-drug treatments and outcome variables. The reported significance level was set at 0.05 for a two-tailed test, and $p < 0.05$ was regarded as statistically significant.

Results

Demographic results

Peer Volunteers (PVs)

Forty-six PVs were selected and 73% of them were female. All of the PVs were below the age of 80. The occupations of the PVs included laborers, technicians, clerks, and housewives. Twenty-six percent of the PVs had a chronic disease, and of this group half had hypertension. Details are presented in **Table 1**.

Older adults

A total of 262 nursing home residents participated in the study. One hundred and forty-six were assigned to the experimental group and 116 to the control group. Around 74% were female. The mean age of the participants was 85.25. More than half of the participants were between 81 to 90 years of age. Sixty-eight percent were widowed. Approximately 40% had been living in a nursing home for 1 to 3 years. Hypertension was the most commonly reported chronic illness among the participants. No statistically significant difference was noted between the experimental group and the control group at baseline. Details are presented in **Table 2**.

Pain situation at baseline

The overall average pain intensity was 6.36 ± 2.77 out of 10 (shown in **Table 3**). Walking ability was most interfered with by pain, the mean score of which was 5.25 ± 3.75 out of 7, followed by mood (3.91 ± 3.35) and general activity (3.73 ± 3.29). The mean score for pain self-efficacy was 35.14 ± 12.83 out of 60. The results showed no significant difference between the experimental group and the control group.

Pain sites and pain intensity

The leg (68.32%) and the back (40.08%) were the two pain sites most frequently reported by the participants, with mean pain scores of 6.98 ± 2.43 and 6.82 ± 2.57 , respectively. The shoulder, head, and arm were also reported as sites of pain. Details are shown in **Figure 2**.

Psychological, psycho-social, and other characteristics

The mean depression score was 4.50 out of 15, with 4.84 for the experimental group and 4.08 for the control group. As for quality of life, the overall mean score for the physical component was 32.65, and

51.58 for the mental component when using the SF-12 health survey questionnaire. The reported pain score was 46.81 out of 100. None of the results of the two groups were significantly different at baseline. The results are shown in **Table 4**.

Non-drug methods used

The use of non-drug methods of pain relief by the two groups, and the frequency of the usage is shown in **Figure 3**. There was no difference between the two groups in the use of non-drug methods. Exercise, hot compresses, massages, and watching TV were the mostly reported methods applied by the participants.

The most frequently used non-drug strategies and their relationship with pain situations Details of the correlation between non-drug treatments and other outcome variables are presented in **Table 5**. The most frequently applied treatments (exercise) correlated positively with pain self-efficacy and quality of life (physical component). A significant negative correlation was shown between exercise and pain interference and depression. Hot compresses were negatively correlated with pain knowledge and quality of life (mental component). Massage was also shown to have a positive correlation with pain intensity and pain interference.

Discussion

The present study showed the baseline results of the peer-led pain management program (PAP), which is in progress. A total of 262 participants joined the study. Their overall pain score was 6.36 out of 10. The leg was the most frequently reported site of pain, and pain interfered very much with walking ability. Depression was also reported by the participants. The score for quality of life was 32.65 for physical component and 51.58 for mental component. The mean score for pain knowledge was 46.81 out of 100. No significant difference was shown between the experimental group and the control group before the start of the program.

Populations are aging worldwide, including the Hong Kong population[15]. It is noteworthy that the number of elderly people living in nursing homes is also increasing[16]. More than 40% of the participants in our study have been living in a nursing home for more than 3 years. Our results also showed severe pain intensity and low self-efficacy among the participants. As the need for elderly care for the large proportion of nursing home residents with severe pain rises, it is necessary to provide pain management programs, especially for this population. Our present study also reported that more females were experiencing pain than males, a finding that is consistent with that of a previous community-based study conducted in Hong Kong[17].

A population-based study carried out in Hong Kong in 2011 reported that the majority of the respondents indicated that, of all sites, pain was most prevalent in the legs[18]. Our results add insight to the pain situation of nursing home residents. The mean pain score reported in the present study was as high as 6.36 when scored on a 10-point Likert Scale. The high intensity of their pain very much interfered with the daily activities of the participants. Their ability to walk, for example, was restricted. Our finding is

consistent with that of a previous review of 15 epidemiological studies, which demonstrated that the lower extremities are the most common pain sites[19].

Psychological and psycho-social problems may arise as a result of severe pain. The participants reported experiencing depression and complained that the physical aspect of their quality of life was poor. In our study, the physical component score (PCS) for quality of life was 32.25 ± 7.84 and the mental component score (MCS) was 50.98 ± 11.88 . The PCS of the participants in this study was much lower than that found in a study conducted in 2013 involving over 2,000 participants from the general population. In that study, the PCS was 50.02 ± 8.93 and the MCS was 49.99 ± 9.12 [20]. It was illustrated that pain is negatively correlated with quality of life and that it is a predictor of the quality of life of nursing home residents. The low physical component score for quality of life in our study is perhaps a result of the severe pain experienced by the participants.

Pain self-efficacy refers to a patient's belief in his or her ability to accomplish daily tasks in spite of pain[21]. In the present study, the average score for pain self-efficacy was 35.14 out of 70. The low pain self-efficacy reflects the participants' lack of belief in their ability to deal with pain. As for pain knowledge, the score for the participants was 46.81 out of 100. A higher score indicates more knowledge. Insufficient knowledge about pain may lead to low pain self-efficacy, which is consistent with the low pain self-efficacy found in our study.

Peer support models have proven to be an effective approach to managing chronic conditions[22][10][11]. Using peer volunteers to lead the program has several benefits. PVs are not constrained by time and are readily available. Drawing upon this resource can help to save on healthcare resources. Once PVs are trained, they can be empowered and remain involved in the program. Being a peer volunteer is a good way for them to continue contributing to society. It can help to improve their emotions and feelings, and to achieve satisfaction.

With regard to non-drug use, the results of our present study showed that exercise, hot compresses, massages, and watching TV were the most frequently reported strategies. The strategies are convenient and easy for nursing home residents to follow. We also found that the frequency with which these strategies were applied correlated significantly with pain intensity, pain interference, depression, and quality of life. Pain knowledge also correlated significantly with some strategies. Yet the score for pain knowledge was not high. Thus, providing the participants with a pain education program could help them to learn more related knowledge on pain and self-management strategies.

Therefore, we hypothesize that the participants will improve their pain self-efficacy in daily life after participating in a pain management program led by PVs. In addition, we also expect post-treatment changes in terms of improved scores on physical and psychological outcomes.

Conclusion

The peer-led pain management program is in progress. A total of 262 participants with high pain scores prior to the program were successfully recruited. Pain very much interfered with their ability to walk. The peer volunteers involved in the program will teach relevant pain knowledge and pain management strategies to help our participants. The results of this program will be reported in a future study.

Abbreviations

PAP

Peer-led Pain Management Program

PV

Peer Volunteer

BPI-C

Brief Pain Inventory - Chinese Version

PSEQ

Pain Self-Efficacy Questionnaire

GDS

Geriatric Depression Scale

PCS

Physical Component Score

MCS

Mental Component Score

SD

Standard Deviation

Declarations

Ethics approval and consent to participate: The study was approved by the Ethics Committee of The Hong Kong Polytechnic University (Ref. HSEARS20171218005). Written consent was collected from all subjects before they participated in the study.

Consent for publication: Not Applicable

Availability of data and material: The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Competing interests: The authors declare no competing interests.

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Authors' contribution: Data collection, S.K.T., Y.LI, and P.H.L.; Formal analysis, P.H.L. and M.T.; Funding acquisition, M.T.; Project administration, M.T.; Resources, R.LO; Supervision, M.T., S.S.M.N., X.B., and R.LO;

Writing – original draft, M.T and Y.LI; Writing – review and editing, M.T. and Y.LI.. All authors have read and approved the manuscript

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Tables

Table 1. Demographic characteristics of the PVs

Variables	N(%)	Mean (SD)
Gender		
F	34(73.9)	
M	12(26.1)	
Age		60.95 (5.07)
<60	22(64.7)	
60-70	22(64.7)	
71-80	2(4.3)	
Marital status		
Single	4(8.7)	
Married	34(73.9)	
Divorced	5(10.9)	
Widowed	3(6.5)	
Education level		
Primary School	1(2.2)	
Secondary School	17(37.0)	
University or above	28(60.9)	
Occupation		
Physical laborer	2(4.3)	
Technician	23(50.0)	
Housewife	3(6.5)	
Clerk	17(37.0)	
Any chronic illness		
Yes	12(26.1)	
No	34(73.9)	
Chronic diseases		
Heart disease	2(4.3)	
Diabetes	1(2.2)	
Hypertension	6(13.0)	
Cancer	2(4.3)	
Cataract	2(4.3)	
Stroke	1(2.2)	
Arthritis	1(2.2)	
Other chronic disease	1(2.2)	
Chronic pain		
Yes	31(67.4)	
No	15(32.6)	
Pain sites		
Head	6(13.0)	
Shoulders	8(17.4)	
Arms	9(19.6)	

Back	10(21.7)	
Legs	17(37.0)	
Pain intensity (Lowest)		2.37 (2.04)
Has voluntary experience	40(87.0)	
Self-rated confidence in volunteering		78.7 (16.3)
Self-rated pain knowledge		40.0 (20.5)
Pain knowledge score		86.1 (10.6)

Table 2. Demographic characteristics of older people

Variables	Total (N=262) (N, %)	Experimental Group (n=146) (n, %)	Control Group (n=116) (n, %)	P-value ^a
Gender				0.216
F	195(74.43)	113(77.40)	82(70.69)	
M	67(25.57)	33(22.60)	34(29.31)	
Age: Mean(SD)	85.25(8.12)	86.20(7.77)	84.04(8.42)	0.589
<60	3(1.15)	1(0.68)	2(1.72)	
60-70	7(2.67)	3(2.05)	4(3.45)	
71-80	48(18.32)	23(15.75)	25(21.55)	
81-90	136(51.91)	75(51.37)	61(52.59)	
91-100	65(24.81)	42(28.77)	23(19.83)	
>100	1(0.38)	1(0.68)	0	
Marital status				0.256
Single	14(5.34)	7(4.9)	7(6.03)	
Married	47(17.94)	28(19.18)	19(16.38)	
Divorced	20(7.63)	7(4.79)	13(11.21)	
Widowed	179(68.32)	102(69.86)	77(66.38)	
Education level				0.889
Uneducated	111(42.37)	63(43.15)	48(41.38)	
Primary School	105(40.08)	56(38.36)	49(42.24)	
Secondary School	40(15.27)	23(15.75)	17(14.66)	
University or above	6(2.29)	4(2.74)	2(1.72)	
Occupation				0.999
Physical labor	119(45.42)	67(45.89)	52(44.83)	
Technical job	74(28.24)	41(28.08)	33(28.45)	
Housewife	30(11.45)	17(6.49)	13(11.21)	
Clerk	19(7.25)	11(4.20)	8(6.90)	
Others	17(6.49)	10(3.82)	7(6.03)	
Nursing home studying				0.657
<1 year	51(24.76)	30(20.55)	21(18.10)	
1-3 years	103(39.31)	54(36.99)	49(42.24)	
4-5 years	38(14.50)	18(12.33)	20(17.24)	
6-10 years	34(26.98)	21(14.38)	13(11.21)	
>10 years	16(6.11)	10(6.85)	6(5.17)	
Others	1(0.38)	1(0.68)	0	
Chronic diseases				
Hypertension	110(41.98)	58(39.73)	52(44.83)	0.460
Cataract	73(27.86)	41(28.08)	32(27.59)	0.874
Diabetes	65(24.81)	35(23.97)	30(25.86)	0.773
Heart disease	45(17.18)	25(17.12)	20(17.24)	0.980
Arthritis	39(14.89)	23(15.75)	16(13.79)	0.625
Stroke	28(10.69)	17(11.64)	11(9.48)	0.548
Other chronic disease	23(8.78)	10(6.85)	13(11.21)	0.229

Tracheal disease	9(3.44)	5(3.42)	4(3.45)	0.992
Parkinson disease	4(1.53)	2(0.76)	2(1.72)	0.827
Physical disability	4(1.53)	1(0.68)	3(2.59)	0.218

Table 3. Pain situation at baseline

Group	Total	Experimental group	Control group	<i>P</i> -value ^a
Variables	Mean (SD)	Mean (SD)	Mean (SD)	
Pain intensity (BPI)	6.36±2.77	6.39±2.75	6.33±2.81	0.854
Pain interference (BPI)				
Walking ability	5.25±3.75	5.15±3.70	5.38±3.82	0.629
General activity	3.73±3.29	3.85±3.32	3.59±3.27	0.515
Mood	3.91±3.35	4.19±3.33	3.56±3.27	0.134
Work	3.60±3.50	3.81±3.53	3.34±3.47	0.286
Entertainment	2.95±2.94	3.28±3.10	2.55±2.68	0.177
Sleep	3.30±3.49	3.43±3.52	3.15±3.46	0.515
Relationship	1.68±2.63	1.95±2.81	1.34±2.34	0.064
Pain self-efficacy (PSEQ)	35.14±12.83	35.01±12.31	35.30±13.50	0.855

Table 4. Psychological, psycho-social and other characteristics

Group	Total	Experimental group	Control group	<i>P</i> -value ^a
Variables	Mean (SD)	Mean (SD)	Mean (SD)	
Depression (GDS)	4.50±3.66	4.84±3.94	4.08±3.22	0.096
Quality of life (SF-12)				
Physical component score (PCS)	32.65±8.13	32.35±7.84	33.01±8.50	0.518
Mental component score (MCS)	51.58±11.37	50.98±11.88	52.36±10.71	0.343
Pain knowledge (0-100)	46.81±19.04	47.01±19.62	46.55±18.50	0.847

Table 5. Correlation between different outcome variables

r	Correlation							
	Pain efficacy	self-	Pain intensity	Pain interference	Depression	Quality of life		Pain knowledge
						Physical	Mental	
	0.249**		-0.087	-0.195*	-0.205**	0.299**	0.085	0.016
ress	0.115		0.186	0.074	0.106	-0.060	-0.232*	-0.229*
	-0.088		0.328**	0.218*	-0.186	-0.132	-0.012	0.168
	-0.151		-0.121	-0.157	0.037	0.196	-0.119	-0.034
press	-0.057		0.500	-0.344	-0.803	-0.459	0.918*	0.395
	-0.276*		0.055	0.029	0.259*	-0.091	-0.286*	0.010
music	-0.283		0.449**	0.080	-0.004	0.230	-0.205	0.345
	0.056		-0.181	-0.530**	-0.005	0.154	-0.078	-0.043
on	--		--	--	--	--	--	--
	0		-0.544	-0.816	0.775	0.258	-0.775	0

^a The correlation is significant at the 0.05 level (2-tailed).

^b The correlation is significant at the 0.01 level (2-tailed).

r is calculated using Pearson's correlation.

Guideline:

Small $r=0.10$ to 0.29

Medium $r=0.30$ to 0.49

Large $r=0.50$ to 1.0

Appendix

Appendix 1. Teaching manual for experimental group

Pain management program (PAP) outline

Content		Pain Management Program (PAP)	
Week	Physical Exercise (20 minutes)	Interactive teaching and sharing of pain management education (30 minutes)	Portfolio Entry (10 minutes)
1	Correct body posture and alignment, Stretching of arms, legs, and body muscles; Balancing exercise; Shoulder & neck exercise; Hip exercise; Knee exercise; Towel dancing	Pain situations among themselves; Effects of pain in their daily life; Can we do something?	Peer volunteers worked with the participants to make entries on the activity of the day in the "I can do it" booklet.
2		The use of an oral drug: effects & side-effects; labels of oral drugs	
3		The use of a non-drug therapy: Hot pad & cold pad; how to use & safety issues	
4, 5		The use of a non-drug therapy: listening to music	
6, 7		The use of a non-drug therapy: massage	
8, 9		The use of a non-drug therapy: visual stimulation - watching the natural environment, & making a photo album	
10, 11		The use of a non-drug therapy: sense of smell & taste - making a bag of dried flowers & tasting tea	
12		Revision & Wrapping Up	

The teaching manual was developed and used in the pilot study. The content was validated by the research team, a geriatric physician consultant specializing in pain, registered physiotherapist and an advanced practice nurse experienced in elderly care. This manual will be given to PVs and all participants in the beginning of the PAP for their information and retention.

Figures

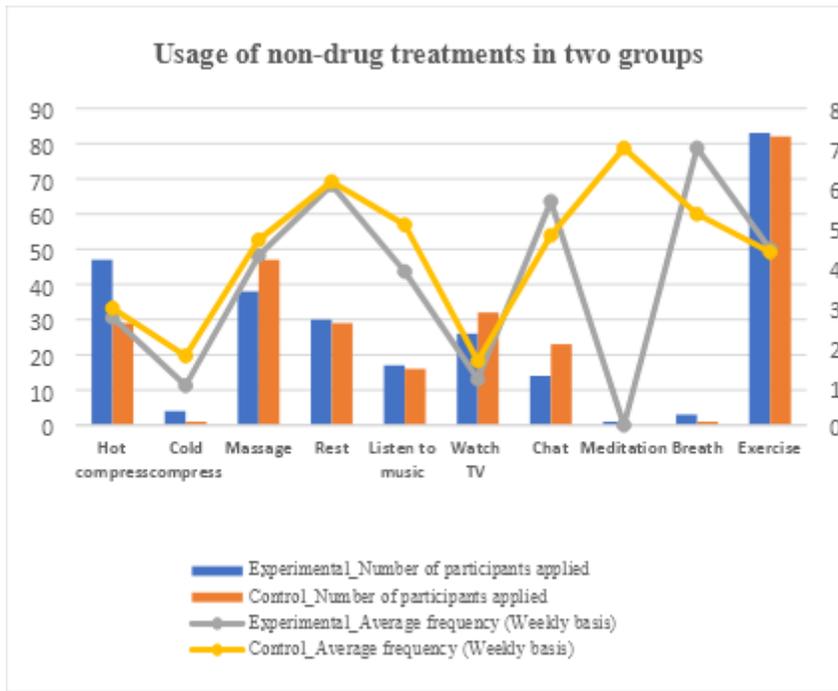


Figure 1

Usage of non-drug treatments

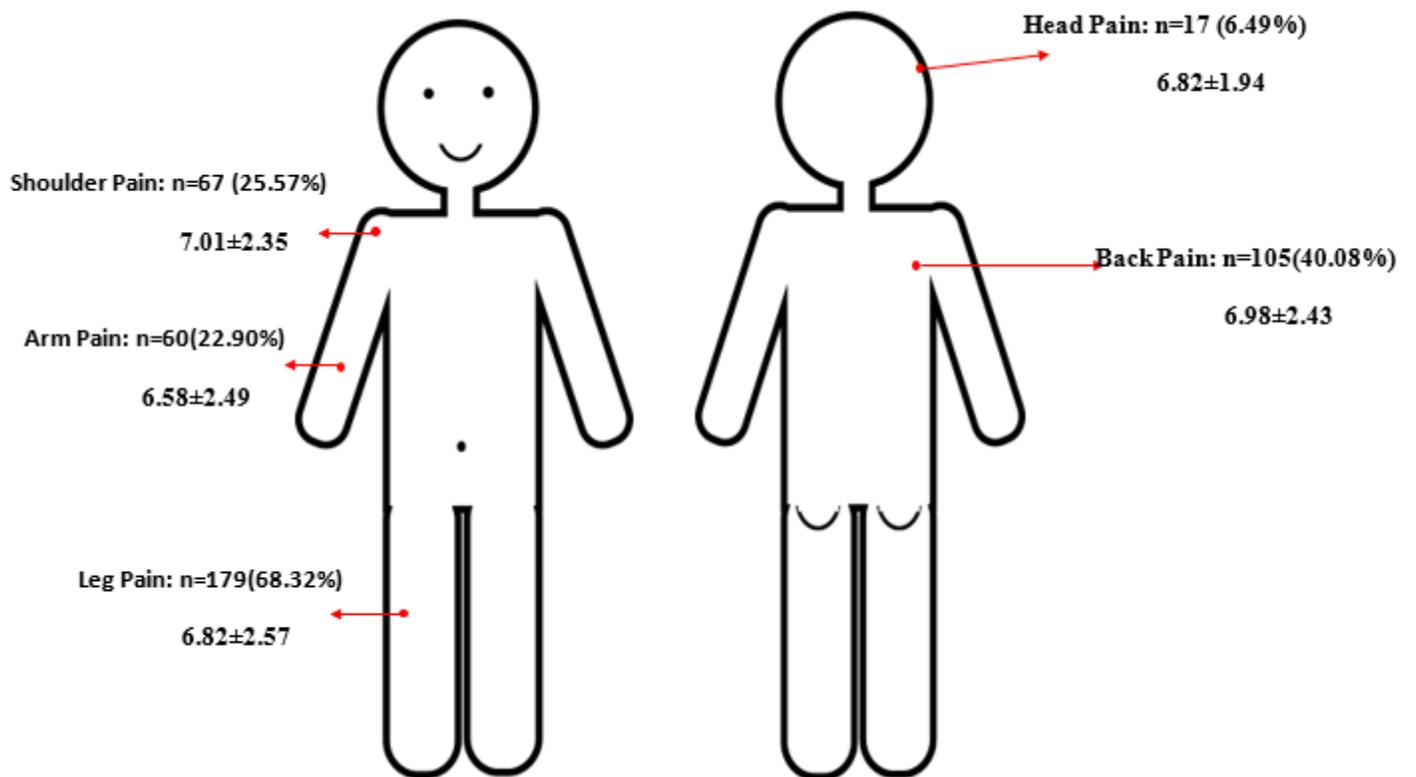


Figure 2

Pain intensity at different sites

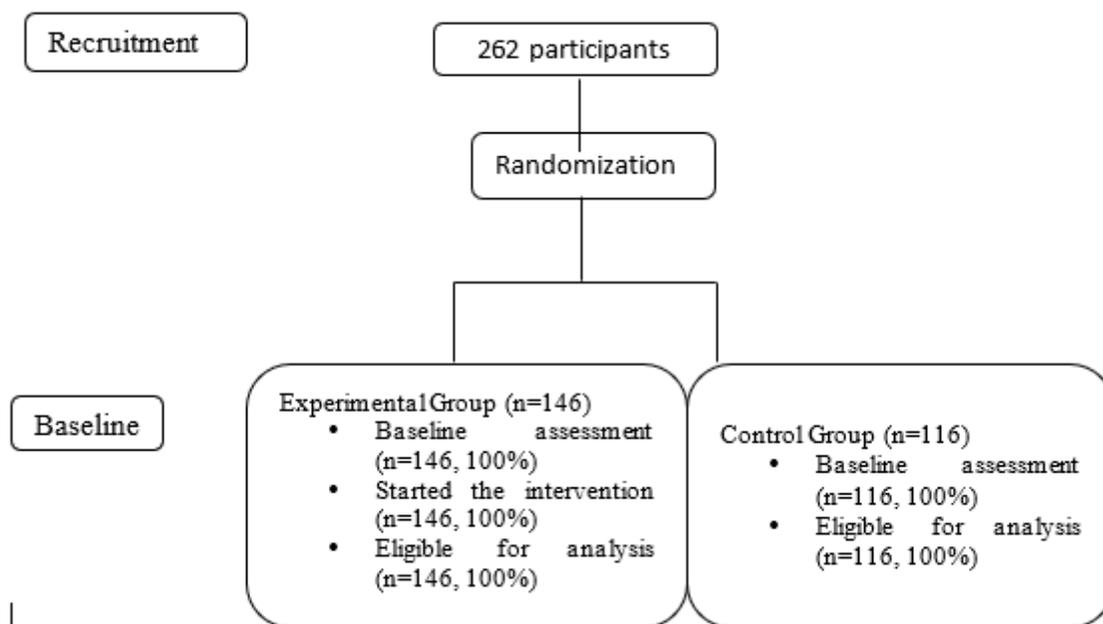


Figure 3

Study flow chart.

Supplementary Files

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- [BMCGeriatricsCONSORT2010Checklist.doc](#)