

# The Converge Effects of the BeHaS Exercise Program on Health Status, Depression and Suicidal Ideation in Female Elderly Who Live Alone in Community

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## 베하스 운동프로그램이 지역사회 여성노인의 신체건강, 우울, 자살생각에 미치는 융합적 효과

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**Abstract** This study was conducted to evaluate the converge effects of the Be Happy and Strong (BeHaS) exercise program on female elders living alone, using a nonequivalent control-group pretest-posttest design. The BeHaS exercise program was conducted twice each week for 4 weeks (total 8 sessions). The outcome measures included pain, shoulder flexibility, grip strength, depression, and suicidal ideation. Independent t-test, Chi-square test, paired t-tests and ANCOVA were used for the statistical data analysis. A statistically significant improvement emerged in pain ( $t=4.044$ ,  $p=.000$ ) and right and left shoulder flexibility ( $t=2.192$ ,  $p=.038$  and  $t=2.568$ ,  $p=.016$ ) 4 weeks later. In a group comparison, a statistically significant difference arose in changed scores of suicidal ideation ( $F=7.32$ ,  $p=.010$ ) between groups. The BeHaS exercise program may effectively improve the physical and psychological health of female elders living alone.

**Key Words** : Female, Elderly living alone, Health status, Depression, Suicidal ideation

요 약 본 논문은 베하스 운동프로그램의 지역사회 여성독거노인에 대한 융합적 효과를 알아보고자 시행된 비동등성 대조군 전후설계의 유사실험연구이다. 실험군 대조군 사전사후 연구이다. 베하스 운동프로그램은 주 2회 시행되어 4주간 총 8회 실시되었고 통증, 어깨유연성, 악력, 우울과 자살생각에 대한 측정이 이루어졌다. 수집된 자료는 Independent t-test, Chi-square test, paired t-tests, 공분산분석 (ANCOVA)으로 분석되었다. 실험군의 4주의 실험 전후비교결과 통증( $t = 4.044$ ,  $p = .000$ )과 오른쪽 어깨 유연성( $t = 2.192$ ,  $p = .038$ ), 왼쪽어깨유연성( $t = 2.568$ ,  $p = .016$ )의 통계적으로 유의한 향상이 확인되었다. 실험군과 대조군의 그룹간 비교에서는 자살생각의 변화양상에서 통계적으로 유의한 차이가 확인되었다( $F = 7.32$ ,  $p = .010$ ). 본 연구를 바탕으로 베하스 운동프로그램의 지역사회 여성 독거노인에서의 신체적 정신적 건강증진에 대한 긍정적인 효과를 확인하였다.

주제어 : 여성, 독거노인, 신체건강, 우울, 자살생각

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## 1. Introduction

At present, concerns regarding elders' health and social issues have been ever increased. In South Korea, the proportion of elders, aged 65 and over, exceeded 13.1% of the total population in 2015[1]. Along with population aging, the number of older people living alone increased, accounting for 20.8% of people aged 65 and over [2]. Living alone in later life poses a great risk of poor health and social problems with higher levels of physical and psychological illness compared to elders who live with their families. The absence of a family member in the household who would provide health protection, older adults may not adequately seek preventative and appropriate medical treatment[3].

In addition to health issues, suicide among older people is another significant concern in South Korea. The rate of suicide has increased continuously since 2000 and reached 55.5 per 100,000 in adults aged 65 and older[4]. This is much higher than suicide in other age groups and is the highest among Organisation for Economic Co-operation and Development (OECD) countries. Elders living alone are more likely to have suicide ideation[5,6], which significantly aligned with a high prevalence of depression in this population.

The level of health and social risk aligns with living-alone status, education level, and female gender[7]. Although the suicide rate is much higher in male elders[5], depression and suicidal ideation are problems prevalent in female elders living alone[8]. Due to longer life expectancy, four of five elders living alone were women[1]. Along with the aging process, experiencing a multitude of losses, environmental isolation, and subjective feelings of loneliness eventually weaken elderly women's motivation to continue living[3]. Thus, proper interventions are required to prevent depression and to improve the health status of female elders who live alone.

Prior studies reported the positive influence of engagement in physical activities[9,10]. Exercise programs have been considered one the surest and

safest ways to improve the health status of elders. Old people, however, experience fewer physical and social activities due to changed health and socioeconomic status[11]. A relatively lower proportion of elders (13.1% ~ 42.3%) engaged in exercise programs compared to members of other age. Female gender also aligned with lower levels of social and physical activity compared with male elders[12].

Having community based exercise programs for elderly women living alone would ensure easy access to physical activity on a regular basis[9]. Considering the lack of motivation in this population, programs should include strategies that encourage consistent participation. BeHaS is a community based group-exercise program for elders designed to promote physical activity and provide psychological support concurrently[13]. By participating in a group physical activity on a regular basis, elders experience vitality with improved physical fitness. Moreover, the BeHaS program consists of sessions that promote valuable and meaningful relationships.

As a way to improve the health status of female elders, researchers used a variety of physical activity program. These studies demonstrated the effects of various community based exercise programs to maintain health status and prevent declining physical functions; these programs conduct exercises on a consistent regular basis[14-16]. However, little research tested the converge effects of community based exercise programs for female elders who live alone in Korea. Moreover, most exercise programs involve physical activities alone, verifying only the effects on improved physical health. Given the difficulty experienced by female elders living alone to exercise and gain support, well-developed community based exercise programs should be tailored to the characteristics of this population. In addition, the program should promote physical and psychological health, as this population has a high risk for lacking both. This study was designed to test the effects of exercise and psychological support by conducting an

intervention implementing the 4-week BeHaS program. The purpose of this study was to determine the converge effects of the BeHaS program on pain, flexibility, depression, and suicidal ideation of female elders living alone.

## 2. Method

### 2.1 Study participants

In this study, a nonequivalent control-group pretest-posttest design was used. We recruited 62 female elders living alone who were registered at a community center in D city in Korea, in consideration of possible dropouts (Figure 1). Eligibility for study enrollment used the following inclusion criteria: (a) female, 65 years and older, living alone in the community, (b) could walk and did not have any disability preventing performance of an exercise program, (c) without severe cognitive decline (Mental Status Questionnaire[17] < 8), (d) agreed to participate in this study. Using the G\*power 3.0 program, the required sample size was 52. The effect size was based on previous studies examining the effects of BeHaS exercise on an elderly population[18,19].

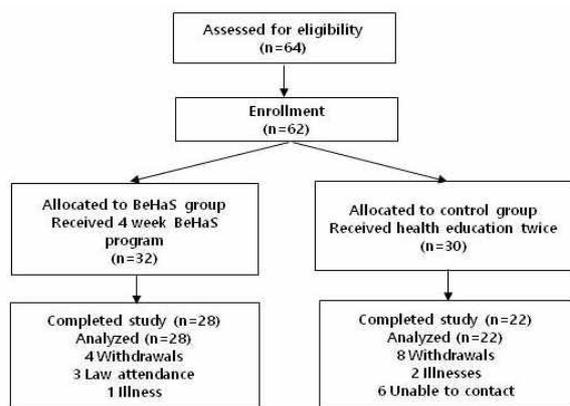


Fig. 1. Flow diagram of the study

### 2.2 Intervention

In this study, BeHaS exercise program was provided with a total of eight sessions, twice per week for 4

weeks, commencing from August 2, 2016. The program was conducted by a health professional—a qualified nurse—and each session lasted approximately 90 minutes. The overall program consisted of theme activities, health education, group support, and exercise. The program includes various strategies to motivate participants and to maintain a class attendance rate above 80%. Strategies included weekly phone calls, advertising awards for those with a good attendance rate, and providing name badges. A brief outline of the BeHaS exercise program appears in Table 1.

Table 1. Description of BeHaS exercise program

Program	Contents
Theme activity 30 min	Participants were encouraged to support themselves and each other using interactive activities.
Health education 15 min	Led by the main instructor Content: arthritis management, safety(home environment), self-care management, nutrition
Group support 15 min	Led by the instructor, participants were encouraged to share their life history. Designed to promote psychological health and to develop communication skill
Exercise 30~60 min	The exercise consists of the following: -Warm-up exercise(10min) -Main exercise(20min) -Cool-down exercise(10min)

### 2.3 Control

The participants in the control group and received health education twice, once before the pretest measurement and once again before the post-test measurement. The education session was held in the different floor of the senior center at the first day of BeHaS program and at the completion day, 4 weeks after. The control intervention was delivered by another health professional (a qualified nurse) that education encompassed the fall prevention and nutrition.

### 2.4 Ethical consideration

This study was approved by the institutional review board of the university (IRB No. 2016-14).

## 2.5 Measures

### 2.5.1 Cognitive impairment

We used the MSQ to evaluate the mental status of participants. The MSQ consists of 10 items and lower scores indicate severe cognitive impairment with a maximum score of 10[17]. In this study, we used this tool to screen elders with cognitive impairment such that we excluded participants who scored 7 or less.

### 2.5.2 Pain

We used the Numeric Rating Scale to measure the pain severity of participants. Participants scored their level of pain on a Likert scale ranging from 0 (absence of pain) to 10, with higher scores indicating higher pain levels.

### 2.5.3 Flexibility

We measured upper body flexibility using the back-scratch test. We measured the distance between the middle fingers of both hands, recorded in cm. Shorter distance indicates participants' better upper body flexibility.

### 2.5.4 Suicide Ideation

We assessed suicidal ideation using a 5-item measure developed by Harlow et al[20]. This tool was revised and translated to Korean by Kim[21]. Using the 5-point Likert-type scale, each item was scored from 1 (never) to 5 (very frequently). Higher scores mean more suicidal thoughts with a maximum score of 25.

### 2.5.5 Depression

We assessed the level of depression using the Korean version of the Geriatric Depression Scale-Short Form[22]. The Geriatric Depression Scale consists of 15 items and each response was scored either 0 or 1. A higher score means greater depression with a maximum score of 15.

## 2.6 Statistical Analysis

Using SPSS (version 21; SPSS, Chicago, IL), we analyzed data. For demographics, we used descriptive

statistics for continuous variables, calculating means and standard deviations. We summarized categorical variables using frequencies and percentages. We used Chi-square test and independent t-tests to examine differences from baseline data between groups. For each group, we calculate score differences between pretest and posttest values. To normalize group difference of pretest values, ANCOVA was used adjusting for the baseline values and covariates including level of pain and grip strength in pre-test. We determined statistical significance with  $p < .05$ .

## 3. Results

### 3.1 Demographic characteristics

The mean age of participants of the BeHaS group was 75.04 years and it was 73.77 years in the control group. Participants were all women living alone and the majority were undereducated. Of the BeHaS group, 35.7% and of the control group, 59.1% perceived their health as good to very good. No significant group difference emerged in general characteristics (Table 2).

Table 2. Homogeneity tests for general characteristics

Variables		BeHaS (n=28)	Control (n=22)	t( <i>p</i> )
		Mean (SD)		
Age (yr)		75.04 (5.12)	73.77 (15.82)	.398 (.683)
N(%)				X <sup>2</sup> ( <i>p</i> )
Sex	Female	28(100)	22(100)	
Living status	Living alone	28(100)	22(100)	.000 (1.000)
Level of education (yr)	Uneducated	4(14.3)	3(15.8)	3.057 (.548)
	0~6	17(60.7)	8(42.1)	
	6~9	3(10.7)	4(21.1)	
	≥10	4(14.3)	4(21.1)	
Current health status	Very poor	5(17.9)	2(9.1)	2.881 (.410)
	Poor	13(46.4)	7(31.8)	
	Good	8(28.6)	11(50.0)	
	Very good	2(7.1)	2(9.1)	

### 3.2 Homogeneity Test

Group comparisons for baseline measures revealed no significant difference in the outcomes of pain, flexibility, suicidal ideation and depression (Table 3).

Table 3. Homogeneity tests for study variables

Variables	BeHaS (n = 28)	Control (n = 22)	t	p
	Mean (SD)			
Pain	6.54 (2.53)	4.23 (3.10)	2.90	.006
Grip strength	18.09 (5.50)	14.46 (5.99)	2.229	.031
Flexibility (Rt)	19.14 (14.72)	13.96 (10.40)	1.397	.169
Flexibility (Lt)	23.71 (14.13)	17.02 (9.57)	1.904	.063
Suicidal ideation	6.39 (2.13)	6.04 (1.65)	.630	.531
Depression	8.29 (3.62)	6.14 (3.94)	2.004	.051

Table 4. The effects of BeHaS intervention

Variables		Baseline	Week 4	Intra group	Between group
		Mean (SD)	Mean (SD)	T (p)	F* (p)
Pain*	E	6.54 (2.53)	4.68 (2.18)	4.04 (.000)	.20 (.655)
	C	4.23 (3.10)	4.36 (2.44)	-0.19 (.849)	
Grip strength*	E	18.09 (5.50)	20.13 (3.62)	-1.92 (.066)	3.63 (.063)
	C	14.46 (5.99)	16.57 (5.64)	-2.21 (.038)	
Flexibility (Rt)	E	19.14 (14.72)	14.13 (12.23)	2.19 (.037)	0.45 (.505)
	C	13.96 (10.40)	15.06 (11.57)	-0.45 (.655)	
Flexibility (Lt)	E	23.71 (14.13)	17.66 (12.14)	2.57 (.016)	0.39 (.533)
	C	17.02 (9.57)	16.32 (11.53)	0.34 (.735)	
Suicidal ideation	E	6.39 (2.13)	6.04 (2.01)	1.02 (.316)	7.32 (.010)
	C	6.04 (1.65)	7.00 (3.21)	-1.66 (.112)	
Depression	E	8.29 (3.62)	7.57 (3.87)	0.86 (.399)	.472 (.496)
	C	6.14 (3.94)	7.09 (4.78)	-1.26 (.221)	

\*Data were obtained from ANCOVA, after adjusted by pain and grip strength in pre-test value

\*E:experimental group, C:control group

Statistically significant differences did emerge in two variable, levels of pain (t=2.90, p=.006) and grip strength (t=2.229, p=.031).

### 3.3 Effects of the BeHaS Program

Participants had a high attendance rate, completing seven of eight sessions, on average. Statistically significant improvement emerged at the completion of

the 4-week BeHaS program in program participants' pain (t=4.04, p=.000), right shoulder flexibility (t=2.19, p=.037), and left shoulder flexibility (t=2.57, p=.016). In the control group, no statistically significant changes emerged in all variables except grip strength (Table 4).

## 4. Discussion

In this study, we examined the converge effects of the 4-week BeHaS exercise program on health status (pain, shoulder flexibility, and grip strength), depression, and suicidal ideation of older female adults living alone. A previous review of the effectiveness of exercise program found that the effect is greater when participants conduct exercise while supervised, rather than performing exercise alone[23]. The BeHaS program was led by experts in nursing and exercise and each session was fully supervised. Participants' compliance increases with appropriately qualified supervision as well as encouragement and psychological support [24]. The high attendance rate of this program (87.5% participants completed seven of eight sessions) indicates good compliance with this program. The supportive activities may enhance participants' engagement in the program.

The present study identified significant improvement in health status when measuring pain and flexibility after the 4-week BeHaS program. Despite no statistical significance, results showed increased mean scores for increased grip strength and decreased mean scores for depression and suicidal ideation at the completion of the 4-week BeHaS program. Of the variables examining health status, the level of pain of the female elders living alone who participated in the 4-week BeHaS program was the most significantly improved. This result is in line with previous literature that the effects of the exercise intervention on physical health status in the elderly group are well supported[14-16]. This study did not test effects on falls; however, prior review found that exercise programs can prevent falls effectively with improved reaction time, gait, and

balance[25]. The consequence of falls in elders, especially those living alone, is devastating. When no one can assist in daily life, the only solution is institutionalization, which imposes severe burden on elders living alone. Considering the low socioeconomic status of women living alone[26], community based exercise programs may produce preventative effects on falls.

From the within group analysis, we were unable to find any statistically significant improvement in scores for depression and suicidal ideation. One possible explanation could be the short intervention period; a longer intervention may be needed to affect psychological health. A previous systematic review found superior outcomes in long-term interventions (>5 months) [25]. In addition, intervention duration should be at least 9 weeks for depression[24]. In a previous study by Seo et al,[19] 8 weeks BeHaS exercise for institutionalized elders with CVA reported improved mental health (depression and life satisfaction) along with improved physical function (grip strength). Moreover, a previous study identified the effectiveness of the BeHaS exercise program in improving self-esteem after an 8-week program [26]. BeHaS exercise with more sessions over a greater duration may better reduce levels of depression in female elders living alone.

For the psychological parameters, we did not achieve satisfactory results after 4 weeks, although findings from the group comparison indicated statistically significant differences in score on suicidal ideation. The scores of the experimental group diminished by 0.36; however, that of the control group increased unexpectedly by 0.96. In conducting a study over a period of a month, the weather change may have influenced the psychological condition of study participants. Participants reported depressive mood and having more thoughts of suicide due to hot weather. Daily environmental temperature is a risk factor of suicide mortality that suicide rate increases with temperature[27]. Further studies should take this factor

into account when designing interventions.

BeHaS is an exercise-based and multicomponent intervention that involves psychological support, interaction, and mutual support through group activities. In terms of physical functions, a previous meta-analysis of 48 trials concluded that the intervention using single-type exercise was more efficacious than programs combining different types of exercise[28]. For depressions, on the other hand, multicomponent exercise program can result in clinically meaningful effects. Activities tailored to individual's ability are more likely to reduce the symptom, especially those with severe depression[29]. Although this study used a structured exercise program with a group intervention, individuals with severe depression may not experience the same effects as those with mild or no symptoms of depression. Further research is needed to identify the effects of a group exercise program on female elders with severe symptoms with strategies to tailor training according to the symptom severity.

We found a significantly higher level of pain in the BeHaS group than the control group in the study's homogeneity test. One possible explanation is that considering the quasi experimental design of this study, it might be the motivational factor that enabled female elders to participate in exercise program. For elders with chronic pain, exercise is important in the management of persistent pain, which can prevent further physical deterioration[29]. A previous study found that the BeHaS exercise program improved physical function of community-dwelling elders who were experiencing pain [27]. People are ambivalent toward changing behavior. It is likely that older people recognize the factors influencing their poor health outcomes; however, they should be motivated first to initiate and continue taking part in an exercise program[30]. Thus, we suggest conducting a combined program of motivational and exercise interventions for those elderly with poor motivation to take part in physical activities.

In terms of implementation of intervention, a previous systematic review emphasized the importance of frequent exercise sessions, at least 3 times per week, rather than high intensity and duration per session[28]. Although, this study attempted to provide sessions with the highest frequency, we were unable to provide more than two sessions per week, due to limitations such as an available place and instructors' or participants' schedules. Thus, further studies should ensure ways to encourage participants to perform exercise on their own with provision of DVDs that can guide exercise. Such personal exercise may produce better outcomes, especially in the dimension of health status.

This study had several limitations that should be considered when interpreting the findings. First, using a quasiexperimental pre- posttest design, the potential confounding variables were not controlled by random allocation of participants into each group. However, in conducting a homogeneity test, similar distributions between groups were ensured for most variables. Second, considering that depressive mood may reduce the appeal of exercise, participants in this exercise trial may not be representative of the population of older women living alone. We did not specify depression among study participants; thus, it is unclear whether our findings are equally applicable to those with a diagnosis of depression or elevated symptom of depression.

## REFERENCES

- [1] Statistics Korea. (2016). *Statistics Korea 2015*. <http://kosis.kr>.
- [2] Korea Centers for Disease Control and Prevention. (2014). *Fifth Korea National Health and Nutrition Examination Survey*. Seoul: Korea Centers for Disease Control and Prevention.
- [3] C. E. Coyle & D. Elizabeth. (2012). Social isolation, loneliness and health among older adults. *Journal of Aging and Health, 24(8)*, 1346-1363.
- [4] K. Ha et al. (2015). *A multi-center study on the causes and precipitating factors of suicidal behavior in suicidal attempters*. Seoul: Korean Association for Suicide Prevention.
- [5] J. M. Bertolote & A. Fleischmann. (2015). A global perspective in the epidemiology of suicide. *Suicidology, 7(2)*, 6-8.
- [6] Y. Choi, M. Kim, A. R. Seo, H. O. Kim & K. S. Park. (2017). Effects of Depressive Symptom and Health Status on Several Factors that Affect Suicidal Ideation among the Elderly Living Alone in Rural Area: The Fully Mediating Effect of Depressive Symptom. *Korean Journal of Health Promotion, 17(3)*, 193-198.
- [7] K. Kharicha, S. Iliffe, D. Harari, C. Swift, G. Gillmann, A. E & Stuck, A. E. (2007). Health risk appraisal in older people I: are older people living alone an 'at-risk'group?. *British Journal of General Practice, 57(537)*, 271-276.
- [8] J. W. Lee. (2016). Converged Factors Influencing epression of Community Dwelling Elderly. *Journal of The Korean Convergence Society, 7*, 237-246.
- [9] C. H. Chou, C. L. Hwang & Y. T. Wu. (2012). Effect of exercise on physical function, daily living activities, and quality of life in the frail older adults: a meta-analysis. *Archives of Physical Medicine and Rehabilitation, 93(2)*, 237-244.
- [10] P. W. Ku, K. R. Fox, L. J. Chen & P. Chou. (2012). Physical activity and depressive symptoms in older adults: 11-year follow-up. *American Journal of Preventive Medicine, 42(4)*, 355-362.
- [11] J. J. Huang, H. S. Lin, B. O. Lee & C. H. Chen. (2016). Perceived exercise barriers and their associations with regular exercise across three age groups of rural women in Taiwan. *Journal of Women & Aging, 28(1)*, 68-79.
- [12] K. N. Shah, F. V. Lin, F. Yu & J. M. McMahon. (2017) Activity engagement and physical function in old age sample". *Archives of Gerontology & Geriatrics, 69*, 55-60.
- [13] J. I. Kim. (2006) *BeHaS exercise program*. Daejeon: Chungnam National University,.
- [14] H. So, K. Ju, I. Park, R. Song, H. Kim & S. Ahn. (2013). Effects of tai chi exercise on muscle strength, balance, flexibility and bone mineral density of community dwelling elderly women, *Korean Journal of Adult Nursing, 25(1)*, 105-112.
- [15] Y. H. Choi & S. Y. Hong. (2015). Developing a Community Capacity Builded Exercise Maintenance Program for Frail Elderly Women. *Korean Journal of Rehabilitation Nursing, 18(2)*, 153-164.
- [16] J. Yu & J. Kim. (2015). Effects of a Physical Activity

- Program using Exergame with Elderly Women, *Journal of Korean Academy of Nursing*, 45(1), 84-96.
- [17] L. Robert et al. (1960). Brief objective measures for the determination of mental status in the aged. *American Journal of Psychiatry*, 117(4), 326-328.
- [18] S. A. Kim. (2011). The effects of BeHaS exercise program on muscle strength and flexibility in institutionalized elders. *Journal of Muscle and Joint Health*, 18(1), 93-102.
- [19] E. H. Seo, S. I. Park & J. I. Kim. (2012). Effects of the BeHaS Exercise Program on Hand strength, Depression and Life Satisfaction in Institutionalized Elders with CVA. *Journal of Korean Academy of Fundamentals of Nursing*, 19(4), 416-424.
- [20] L. L. Harlow, M. D. Newcomb & P. M. Bentler. (1986). Depression, self derogation, substance use, and suicide ideation: Lack of purpose in life as a mediational factor. *Journal of Clinical Psychology*, 42(1), 5-21.
- [21] H. S. Kim. (2002). A Study on Epistemology of Korean Elder's Suicidal Thought. *Journal of Korean Gerontology Society*, 22(1), 159-172.
- [22] B. S. Kee & S. Y. Kim. (1996). A Preliminary study for the standardization of geriatric depression scale form-Korea version. *Journal of Korean Neuropsychiatry Association*, 35(2), 298 - 307.
- [23] C. Bridle, K. Spanjers, S. Patel, N. M. Atherton & S. E. Lamb. (2012). Effect of exercise on depression severity in older people: systematic review and meta-analysis of randomized controlled trials. *The British Journal of Psychiatry*, 201(3), 180-185.
- [24] R. Stanton & P. Reaburn. (2014). Exercise and the treatment of depression: a review of the exercise program variables. *Journal of Science and Medicine in Sports*, 17(2), 177-182.
- [25] Y. Okubo, S. Daniel & R. L. Stephen. (2016). Step training improves reaction time, gait and balance and reduces falls in older people: a systematic review and meta-analysis. *British Journal of sports medicine*, 51(7), 586-593.
- [26] J. I. Kim & S. K. Kim. (2015). Effects of the BeHas Exercise Program on Self-Esteem, Balance, and Flexibility in Community-Dwelling Adults Experiencing Pain. *Indian Journal of Science and Technology*, 8(S7), 624-629.
- [27] Y. Kim, H. Kim & D. S. Kim. (2011). Association between daily environmental temperature and suicide mortality in Korea. *Psychiatry Research*, 186(2), 390-396.
- [28] C. Juhl, R. Christensen, E. M. Roos, W. Zhang & H. Lund. (2014). Impact of Exercise Type and Dose on Pain and Disability in Knee Osteoarthritis: A Systematic Review and Meta Regression Analysis of Randomized Controlled Trials. *Arthritis & Rheumatology*, 66(3), 622-636.
- [29] M. M. Tse, S. K. Vong & S. K. Tang. (2013). Motivational interviewing and exercise programme for community dwelling older persons with chronic pain: a randomized controlled study. *Journal of Clinical Nursing*, 22(13-14), 1843-1856.
- [30] A. Abdulla et al. (2013). Guidance on the management of pain in older people. *Age and Ageing*, 42(S1), i1-i57.

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