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Staying Physically and Psychologically Healthy in Social Isolation: Video-Based Exercise Program for Adults: A Randomized Controlled Trial

Sosyal İzolasyonda Fiziksel ve Psikolojik Olarak Sağlıklı Kalma: Erişkinler İçin Video Tabanlı Egzersiz Programı: Randomize Kontollü Çalışma

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This study was presented as a summary orally in 8th National Physiotherapy and Rehabilitation Congress in May 8-9, 2021, Online.

ABSTRACT Objective: The study was to determine the physical activity (PA) levels of adults socially isolated at home due to the coronavirus disease-2019 pandemic and to search the effects of the video-based exercise program (VBEP). **Material and Methods:** Healthy individuals (n=128; 90F, 38M) aged 40-60 years have participated through online questionnaire software in social media. Participants were randomly divided into as study (n=65) and control (n=63). Their PA level, quality of life (QoL), emotional state, sleep quality, and functional status were evaluated by International Physical Activity Questionnaire (IPAQ), Nottingham Health Profile (NHP), Beck Depression and Anxiety Inventory (BDI) (BAI), Pittsburgh Sleep Quality Index (PSQI) and timed up-go test, respectively. Specially prepared 30-minute exercise videos (breathing, warm-up, aerobics, strengthening-cool-down exercises) were to the study group according to their PA levels (low, medium, high) determined by IPAQ, they were asked to perform these exercises daily for 6 weeks. No exercise program was given for the control group. **Results:** Groups were similar in terms of sociodemographic measures except for education level ($p>0.05$). In the study group all parameters and the control group only in the BDI, BAI, and NHP emotional reactions subscale scores ($p<0.05$) were significant. In group comparison, a significant difference was found in favor of the study group in IPAQ, BAI, PSQI, and NHP scores (except social isolation subscale score) ($p<0.05$). **Conclusion:** During social isolation, we found that VBEP is effective in improving the level of PA, QoL, sleep quality, emotional and functional status of the individuals. Therefore, we consider it effective in terms of preventive health. Also, VBEP can be used as an alternative method in the adult population.

Keywords: COVID-19; exercise; social isolation

ÖZET Amaç: Bu çalışmanın amacı, koronavirüs hastalığı-2019 pandemisi nedeniyle evlerinde sosyal izolasyonda olan erişkin bireylerin fiziksel aktivite (FA) düzeylerini belirlemek ve video tabanlı egzersiz programının (VTEP) etkilerini araştırmaktır. **Gereç ve Yöntemler:** 40-60 yaş arası sağlıklı bireyler (n=128; 90K, 38E) sosyal medya üzerinden çevrim içi anket yazılımı ile katılım sağladı. Katılımcılar rastgele olarak çalışma (n=65) ve kontrol (n=63) olarak ayrıldı. Katılımcıların; FA düzeyleri, yaşam kaliteleri, emosyonel durumları, uyku kaliteleri ve fonksiyonel durumları sırasıyla Uluslararası Fiziksel Aktivite Anketi (UFAA), Nottingham Sağlık Profili (NSP), Beck Depresyon ve Anksiyete Envanteri (BDE) (BAE), Pittsburgh Uyku Kalite İndeksi (PUKİ) ve zamanlı kalk-yürü testi ile değerlendirildi. Çalışma grubuna UFAA ile belirlenen FA düzeylerine (düşük, orta, yüksek) göre özel olarak hazırlanmış 30 dk'lık egzersiz videoları (solunum, ısınma, aerobik, kuvvetlendirme, soğuma egzersizleri) hazırlandı, 6 hafta her gün egzersizleri yapmaları istendi. Kontrol grubuna herhangi bir egzersiz programı verilmedi. **Bulgular:** Eğitim düzeyi dışında sosyodemografik ve sonuç ölçümleri özellikler açısından benzerdi ($p>0,05$). Uygulama öncesi ve sonrası çalışma grubunda ölçülen tüm parametrelerde, kontrol grubunda ise sadece BDE, BAE ve NSP duygusal reaksiyonlar alt ölçek puanında istatistiksel olarak anlamlı bir fark vardı ($p<0,05$). Gruplar arası karşılaştırmalarda ise UFAA, BAE ve PUKİ ve NSP puanlarında (sosyal izolasyon alt ölçek puanı dışında) çalışma grubu lehinde istatistiksel olarak anlamlı bir fark bulundu ($p<0,05$). **Sonuç:** Sosyal izolasyon sürecinde, VTEP'nin bireylerin FA, yaşam kalitesi, uyku kalitesi, duygusal ve fonksiyonel durumunu iyileştirmede etkili olduğunu, bu nedenle koruyucu sağlık açısından etkili olduğunu düşünüyoruz. Ayrıca VBEP erişkin popülasyonda alternatif bir yöntem olarak kullanılabilir.

Anahtar Kelimeler: COVID-19; egzersiz; sosyal izolasyon

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The coronavirus disease-2019 (COVID-19) infection is caused by SARS-CoV-2, a recent coronavirus that first appeared in Wuhan, China in December 2019. The virus spread throughout the world and the World Health Organization (WHO) proclaimed a pandemic on March 11, 2020. The Ministry of Health announced the presence of the first case in Türkiye, and it was soon detected in all of Türkiye's provinces.[1] To prevent further spreading of the virus, every country in the world took the following measures to protect public health; self-isolation, mandatory lockdowns, and quarantines.[2] Such measures restrict social interaction, usually precipitating a sedentary lifestyle and leading to physical inactivity, increased depression, and anxiety while jeopardizing the physical and psychosocial health of the individual.[3]

WHO defines physical activity (PA) as an activity that is manufactured by the contraction of skeletal muscles and requires energy expenditure. In order to achieve health benefits, adults aged 18-64 years should have at least 150 minutes of moderate PA (30-min/5 days a week) or at least 75 minutes of intense PA per week.[4] PA is directly related to protection from chronic diseases, strengthening muscles, increasing vitality, and increasing quality of life (QoL). Insufficient PA has been reported as one of the ten main risk factors for mortality in the world.[5] One study reported that only 25% of the Turkish population shows a sufficient PA level. According to the International Physical Activity Questionnaire (IPAQ) classification, Türkiye has the lowest level of PA (54.5% and 23.1%) and the lowest intensity of PA (10.5% and 39.4%) compared to other European countries.[6] Worldwide expenditures for health problems caused by physical inactivity and malnutrition constitute approximately 2% of average total health expenditures. Increasing PA is one of the most applicable, cost-effective, and most basic measures to reduce health expenditures.[7] Studies on the relationship between social isolation and healthy behavior show that people with smaller social networks report a healthy diet, excessive alcohol consumption, and reduced PA.[8]

Due to the pandemic, many workplaces and schools have initiated remote operations. Additionally, governments have imposed curfews, canceled or postponed sports activities and competitions, and closed gyms, beaches, and parks. Attempts to prevent the spread of the coronavirus, restricted activity outside the home, changing the daily activities of individuals, including regular PA and exercise. When people stay home for prolonged periods, they become inactive, playing digital games, watching television, and over-using mobile devices.[9] An easily accessible video-based home exercise program used during social isolation and home quarantine may alleviate this shift. Exercise with videos without the need for any additional equipment may increase the PA levels of individuals.

The literature contains studies showing that telerehabilitation improves clinical outcomes in disease states but there are not many studies that demonstrate the effects of video-assisted home-based exercise programs on healthy adults.[10,11]

Our study is to first determine the PA levels of adults aged 40-60 years who are socially isolated at home due to the COVID-19 pandemic; then to assign them video-based exercise program (VBEP) according to their fitness; and finally determine the effects of these on their PA, quality of sleep, anxiety, depression, and QoL.

MATERIAL AND METHODS

PARTICIPANTS

A prospective, randomized controlled study was performed. Before participating in the study, subjects were informed and signed a consent form (date: June 25, 2020, no: 64) approved by the Institute of Human Research Ethics, University of İstinye, and the study was conducted by the principles of the Declaration of Helsinki.

One hundred thirty four healthy individuals aged between 40-60 years were randomly divided into 2 groups. Two individuals in the study group and 4 individuals in the control group were excluded from the study. Thus we analyzed 128 individuals at the end of the study (study group n=65, control group n=63) (Figure 1). The randomization was made using a randomization table created by a web-based computer program. The inclusion criteria were as follows;

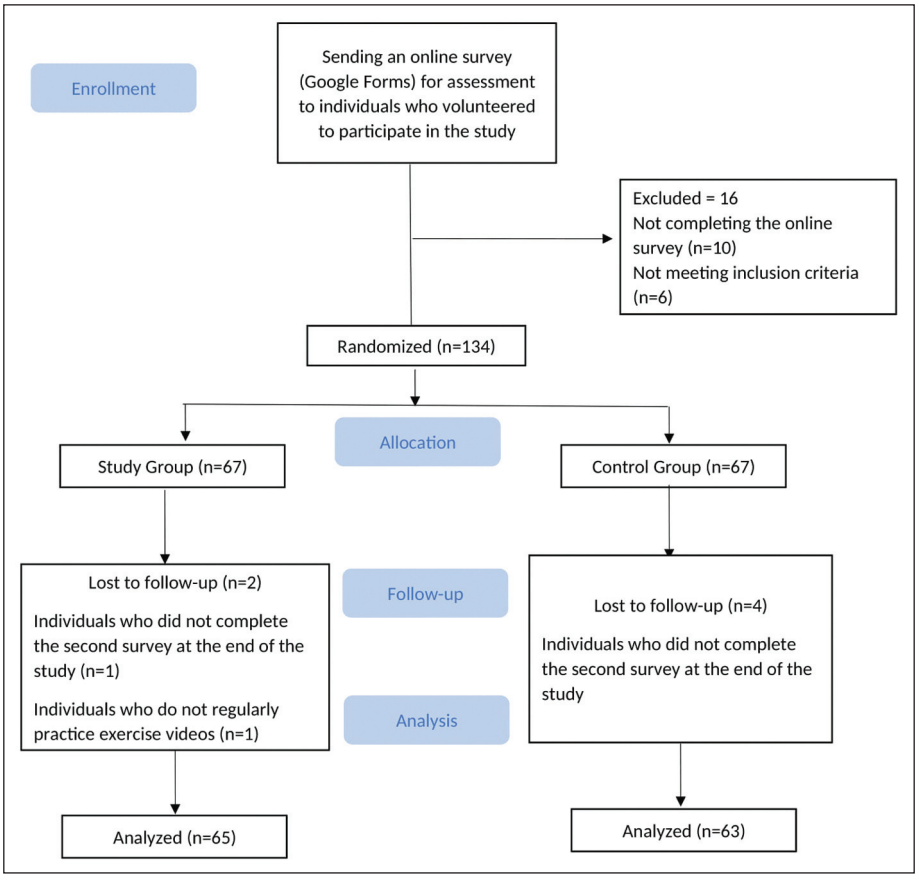

FIGURE 1: Flow Chart of the Study.

being in social isolation, having no barriers to PA, and having access to exercise videos.

Individuals with severe cognitive impairment, severe hearing and vision problems, vestibular disorders disrupting balance, diabetes and/or hypertension, and/or neurological disease were excluded. Participants were recruited with online survey software (Google Surveys) and social media communication (WhatsApp) (Meta, Inc., Kalifornia, USA).

Assessment

The data of all study participants was recorded with online survey software (Google surveys) before and after the intervention.

Short Form IPAQ

Self-administered short form IPAQ was used to assess PA level. The validity and reliability study of IPAQ in Türkiye was conducted. The questionnaire consists of seven questions asking the following PA in the last seven days; duration (min) of vigorous PA (fast cycling, football, aerobics, basketball, weight lifting, carrying loads, etc.), duration (min) of moderate PA (cycling at normal speed, table tennis, folk dances, light load carrying, dancing, bowling, etc), walking and sitting duration for one day (min). The total PA score was calculated [metabolic equivalent of task (MET)-min/week] by converting vigorous, moderate activity and walking times to MET, which corresponds to the basal metabolic rate. According to the MET levels obtained, the PA levels of the individuals were as follows:

1. Low-level activity: Under 600 MET-min/week.

2. Moderate level activity: 600-3,000 MET-min/week.

3. High-level activity: 3,000 MET-min/week.[12]

Thus three PA levels of the participants in our study were classified as low, moderate, or high activity levels, and exercise videos were sent to the individuals by these levels.

Timed Get Up and Go Test

We used Timed Get Up and Go Test (TUG) to evaluate mobility. In the TUG, patients are seated upright on a standard chair. They are asked to stand, walk 3 meters, return and sit again on the chair, and the time is recorded.[13] The videos demonstrating this test were sent to participant, and the physiotherapist recorded the time using the tele-tracking system.

Flamingo Balance Test

Flamingo Balance Test (FBT) was used to assess the static balance of the participants in the study. In this test, participants try to balance with their preferred leg. The other leg is flexed at the knee and the foot of that leg is kept near the buttocks. Participants try to hold their balance for 1 minute while they keep this position. When the balance is broken (if the subject releases his foot while holding it, touches the ground with any part of his body, etc.), the test is paused, then resumes if/when the individual regains his balance. The test continues in this way for 1 minute. When the time is finished, every try and stability is counted and the score is recorded.[14] The videos demonstrating this test were sent to participant and the scores were recorded by the tele-tracking system by the physiotherapist.

Pittsburgh Sleep Quality Index

In our study, we used self-managed Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality. The survey evaluates the following topics: sleep onset latency, hypnotic use, sleep time, daytime dysfunction, sleep disorders, and habitual sleep efficiency. Agargun et al. completed the validity and reliability study of scale in Türkiye.[15] Each item on the questionnaire receives a score between 0-3 and a total score between 0-21. A total score on a scale less than 5 indicates "good sleep quality". A score of 5 or higher indicates "poor sleep quality".

Beck Depression Inventory

In our study, a self-administered short Beck Depression Inventory (BDI) becomes used to assess the depression degrees of individuals. BDI, that's the frequently implemented scale measuring depression all around the world, contains 21 questions. Each question gets a rating between 0 and 3. A score of 11-17 points suggests moderate depression, 18-29 points suggest moderate depression and 30-63 points suggest severe depression.[16] Hisli has found the Turkish version of the BDI to be a reliable and valid instrument.[17]

Beck Anxiety Inventory

In our study, self-administered BAI was used to assess anxiety levels. The BAI used to assess the anxiety symptoms individual experiences due to social isolation contains 21 items and is scored between 0-3. Scores between 0-21 indicate less anxiety, between 22-35 indicate moderate anxiety, and a score of 36 or higher indicates high anxiety. Ulusoy et al. made the first research on BAI's validity and reliability in Türkiye.[18]

Nottingham Health Profile

QoL, assess by using self-administered Nottingham Health Profile (NHP). The health problems of individuals and the extent to which the problems affect their activities of daily living can be evaluated. In 2000, Küçükdeveci et al. completed its Turkish validity and reliability, looking at patients with osteoarthritis.[19] NHP consists of 38 questions and 6 subscales. Sub-headings were classified as energy (3 items), social isolation (5 items), pain (8 items), sleep (5 items), PA (8 items), and emotional reactions (9 items). The answers to the questions are defined as Yes/No. Each subscale is scored between 0-100. A high total score indicates a diminished QoL due to poor health.

Procedure

VBEP: 65 individuals who participated in the study group were first determined by IPAQ and grouped by their PA levels (low, moderate, and high PA level). An exercise program was created for each group according to PA level and exercise videos were prepared. The duration of the videos is designed to be 30 minutes. Individuals were asked to use the video to perform the exercises in these programs for 30 minutes per day for 6 weeks. Individuals were asked to do the exercises in these programs using video for

APPENDİX 1: Exercise program for adults.

	Low Level	Medium Level	High Level
Breathing	Breathing control	Breathing control	Breathing control
	Diaphragmatic breating	Diaphragmatic breating	Diaphragmatic breating
	Thoracic expansion	Thoracic expansion	Thoracic expansion
Warm Up	Shoulder rolling	Shoulder rolling	Shoulder rolling
	Pectoral and rhomboid stretching	Pectoral and rhomboid stretching	Pectoral and rhomboid stretching
	Sit and reach	Reaching to toes with hands on standing	Quadriceps stretching on standing and calf stretching next to the wall
Loading	Rowing	Rowing with theraband/weight	Push-up next to the wall
	Mini squat	Deep Squat (next tot the wall)	Deep Squat/lunge
	Crunch (scapula level)	Bridge Exercise	Crunch (scapula inferior angle getting out of bed)
	Bridge Exercise	Crunch (scapula inferior angle getting out of bed)	Bridge Exercise (One leg on the bed)
Cool Down	Prostration position	Cat and camel position	Quadriped position
	Hamstring and Calf Stretching	Hamstring and Calf Stretching	Hamstring and Calf Stretching
	Neck rotation	Neck rotation	Neck rotation

*10 repetitons of each exercises; *10 minutes rest between breathing, warm up, loading, cool down section; **In stretching exercises, the target muscles will be stretched in the same position for 30 seconds.

30 minutes a day, every day of the week. The training period lasted 6 weeks.

Exercise programs started with warm-up and breathing exercises to prepare for the session and ended with cool-down exercises. The exercise program was determined as a combination of aerobic and strengthening exercises (Appendix 1). An exercise diary was requested from the patients, in addition we called the participants by phone every Monday during the study and we checked whether there was a negative situation.

The patients were asked to start with low repetitions and intensity despite having difficulties in the exercises in the first weeks. In weekly phone calls, they were asked to increase the intensity when they felt pain as visual analogue scale<5 points during exercise. When they reached the determined repetition and intensity, they were tasked to continue exercises.

No exercise program was created for the individuals in the control group (n=63). These individuals were informed about the benefits of PA. The same exercise videos were sent to the participants in the control group after 6 weeks.

STATISTICAL ANALYSIS

SPSS 22.0 statistical package (SPSS Inc., USA) was used for all statistical analyses. The normality of the distribution of the continuous variables was investigated using Kolmogorov-Smirnov/Shapiro-Wilk test. The descriptive data were given as the mean±standard deviation for the continuous variables and percent (%) for the categorical variables. The chi-square test was used to test differences in nominal variables between groups. Student t and Mann-Whitney U test were used for between-group comparisons and Wilcoxon test was used for within-group comparisons. To define the differences in the related treatments, the effect size between-groups differences were calculated using the Cohen's d test and classified as small ($d \geq 0.20$ and <0.50), medium ($d \geq 0.50$ and <0.80), and large ($d \geq 0.80$). $p<0.05$ was regarded as statistically significant.[20]

G*Power 3.0.10 (Universitat-Düsseldorf; Almanya) was used for power analysis. Based on the medium effect size (0.50) and with the bidirectional hypothesis, we calculated a sample size of 64 healthy adults in each group to have a power of 80% to detect differences between two independent groups in the PA level.[21]

RESULTS

One hundred and twenty eight healthy adults participated in the study. Sixty-five healthy adults were included in the study group and sixty-three participants

in the control group. The participant's mean age in the study group was 48.57±5.26 and 50.26±6.53 in the control group. 70.8% of the subjects in the study group were women and 69.8% of the subjects in the control group were women; gender distribution was similar between the groups. The study and control groups were similar regarding age, smoking, history of alcohol use, and sociodemographic features (p>0.05); the only marked difference between the groups was education level (p<0.05) (Table 1).

Baseline data showed no statistically significant difference between the groups (p<0.05) (Table 2). TUG and FBT scores and waist circumference were not significantly different (p>0.05) (Table 2).

In the study group, there was a statistically significant change in all parameters measured before and after the intervention. However, in the control group, there was a statistically significant change only in the BDI and BAI scores and in the emotional reaction subscale score of the NHP QoL questionnaire in the second evaluation (p<0.05) (Table 3, Table 4).

Comparing the change between groups after the intervention, we found IPAQ, PSQI, and BAI scores to be significantly different between the groups (p<0.05) (Table 3). TUG and FBI scores and waist circumference were not significantly different between the groups (p<0.05) (Table 3). Comparing the QoL between the groups after the intervention, the

TABLE 1: Sociodemographic features of the participants (n=128).

	Study group (n=65)	**Control group (n=63)**	
	X±SD	**X±SD**	**p value**
Age, (years)	48.57±5.26	50.26±6.53	0.082
	n (%)	**n (%)**	**p value**
Gender			
Female	46 (70.8)	44 (69.8)	0.909
Male	19 (29.2)	19 (30.2)	
BMI (kg/m^2)	26.89±4.11	26.15±4,54	0.839
Marital status			
Married	57 (87.7)	61 (96.8)	0.096
Single	8 (12.3)	2 (3.2)	
Dominant side			
Right	63 (96.9)	62 (98.4)	0.574
Left	2 (3.1)	1 (1.6)	
Smoking			
Yes	15 (23.1)	15 (23.8)	0.461
No	39 (60)	42 (66.7)	
Quit	11 (16.9)	6 (9.5)	
Alcohol use			
Yes	5 (7.7)	3 (4.8)	0.390
No	55 (84.6)	58 (92.1)	
Quit	5 (7.7)	2 (3.2)	
Education status			
Primary school	10 (15.4)	27 (42.9)	0.008*
Secondary school	13 (20)	9 (14.3)	
High school	22 (33.8)	15 (23.8)	
University/postgraduate	20 (30.8)	12 (19)	
Working status			
Housewife	25 (38.5)	35 (55.6)	0.070
Retired	19 (29.2)	9 (14.3)	
Working	21 (32.3)	19 (30.2)	

Chi-square test. Student t-test. *p<0.05. Statistically significant values are given in bold; SD: Standard deviation; BMI: Body mass index.

TABLE 2: Comparison of all measurements taken before treatment between groups.

	Group	n	X±SD	p value
Waist circumference (cm)	Study	65	92.24±15.03	0.336
	Control	63	92.96±16.92	
Flamingo Balance Test (sec)	Study	65	9.62±6.11	0.337
	Control	63	8.35±4.94	
Timed Up and Go Test (sec)	Study	65	12.41±5.85	0.867
	Control	63	14.03±9.01	
IPAQ-SF	Study	65	2087.66±3580.69	0.753
	Control	63	2527.42±3182.25	
Beck Depression Inventory	Study	65	8.09±8.19	0.708
	Control	63	8.76±9.22	
Beck Anxiety Inventory	Study	65	9.43±8.27	0.674
	Control	63	10.62±9.82	
Pittsburgh Sleep Quality Index	Study	65	5.73±3.04	0.063
	Control	63	4.93±3.25	
NHP total score	Study	65	118.54±80.69	0.773
	Control	63	132.40±101.94	

*p<0.05. Statistically significant values are given in bold. SD: Standard deviation; IPAQ-SF: International Physical Activity Questionnaire-Short Form; NHP: Nottingham Health Profile.

TABLE 3: Comparison of outcomes between the groups.

	Study group (n=65)		Within group	Control group (n=63)		Within group	Group difference	Cohen's	
	Pre	Post	p value	Pre	Post	p value	p value	d	95% CI
BMI (kg/m^2)	26.89 (4.11)	26.62 (4.05)	0.002**	26.15 (4.54)	26.14 (4.66)	0.993	0.077	0.216	-0.34 to 0.06
Waist circumference (cm)	92.24 (15.03)	91.35 (14.47)	0.000**	92.96 (16.92)	91.87 (15.51)	0.861	0.076	0.024	-2.37 to 0.39
Weight (kg)	73.98 (15.65)	73.23 (15.39)	0.001**	75.57 (13.21)	75.42 (13.13)	0.992	0.069	0.177	-1.02 to 0.14
Flamingo balance test (sec)	9.62 (6.11)	9.89 (6.21)	0.042*	8.35 (4.94)	8.46 (4.88)	0.779	0.198	0.109	-0.06 to 0.44
TUG (sec)	12.41 (5.85)	10.55 (5.08)	0.000**	14.03 (9.01)	13.69 (8.09)	0.178	0.052	0.471	-1.68 to -0.51
IPAQ-SF	2087.66 (3580.69)	3239.06 (4293.08)	0.000**	2527.42 (3182.25)	2617.36 (2636.04)	0.314	0.000**	0.651	330.87 to 927.04
BDI	8.09 (8.19)	4.58 (6.74)	0.000**	8.76 (9.22)	6.46 (5.96)	0.003**	0.068	0.197	-3.97 to -1.84
BAI	9.43 (8.27)	5.04 (7.20)	0.000**	10.62 (9.82)	8.11 (8.85)	0.001**	0.021*	0.331	-4.46 to -2.45
PSQI	5.73 (3.04)	3.72 (2.75)	0.000**	4.93 (3.25)	4.38 (3.01)	0.059	0.000**	0.649	-1.70 to -0.87

*p<0.05; **p<0.001. Statistically significant values are given in bold. CI: Confidence interval; BMI: Body mass index; TUG: Timed Up and Go Test; IPAQ-SF: International Physical Activity Questionnaire-Short Form; BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory; PSQI: Pittsburgh Sleep Quality Index.

study found the change in the total and all subscale scores of NHP, except for the social isolation subscale score, to be significantly different between the groups (p<0.05) (Table 4).

DISCUSSION

Social isolation is the best tool to stop the spread of COVID-19, but its potential side effects can threaten the physical and psychological health of all and should be a source of concern. Even in an active population, isolation at home can adversely interfere with daily PA. Identifying benefits and barriers to the exercise helps professionals and the public prepare for quarantine and other restrictions.[22] VBEPs are an option for people who cannot participate in conventional forms of exercise because of social isolation or who find it difficult to exercise for any reason at all. The premise of our study was that "VBEPs" might provide positively affect parameters such as PA,

TABLE 4: Comparison of quality of life between the groups.

	Study group (n=65)		Within group	Control group (n=63)		Within group	Group difference	Cohen's	
	Pre	Post	p value	Pre	Post	p value	p value	d	95% CI
Energy	19.77 (25.60)	11.82 (20.13)	0.000**	29.87 (33.19)	26.92 (31.01)	0.518	0.040*	0.235	-9.20 to -1.77
Pain	22.00 (24.55)	12.00 (16.98)	0.000**	26.35 (27.54)	24.54 (26.81)	0.497	0.002**	0.559	-8.59 to -3.01
Emotional reactions	24.43 (23.04)	10.30 (16.65)	0.000**	26.26 (26.12)	21.17 (23.64)	0.014*	0.001**	0.603	-12.37 to -6.71
Sleep	27.19 (26.42)	15.43 (21.56)	0.000**	21.88 (24.83)	18.73 (24.46)	0.129	0.001**	0.540	-10.40 to -4.65
Social isolation	9.28 (18.65)	3.47 (10.78)	0.001**	10.41 (19.62)	8.51 (18.56)	0.313	0.173	0.243	-6.69 to -1.06
Physical mobility	15.85 (15.10)	8.53 (12.63)	0.000**	19.51 (16.45)	17.72 (16.48)	0.065	0.003**	0.499	-6.58 to -2.61
NHP total score	118.54 (80.69)	61.57 (62.50)	0.000**	132.40 (101.94)	117.61 (100.02)	0.120	0.000**	0.732	-47.16 to -25.75

*p<0.05; **p<0.001. Statistically significant values are given in bold. CI: Confidence interval; NHP: Nottingham Health Profile.

QoL, quality of sleep, and emotional state. Although the literature reflects investigations of the effectiveness of home-based exercise programs such as telerehabilitation, there was no study of the effectiveness of a video-based home exercise rehabilitation program for adults before this study; that is the first such randomized controlled study in the literature and shows that video-based home exercise programs have positive effects on PA and physical fitness, sleep quality, QoL, depression and anxiety levels.

To our knowledge, all of the studies in the literature show that PA programs applied in cases of illness are effective. In a systematic review by Suso-Martí et al. in 2021, it was revealed that technology-based home exercise programs offer positive clinical results and similar face-to-face traditional rehabilitation regarding PA.[23] Kline et al. in 2019 evaluated the effectiveness of telerehabilitation intervention to improve PA in patients after total knee arthroplasty.[24] Brouwers et al. in 2017, investigated the effects of cardiac telerehabilitation on PA levels in patients with coronary artery disease using a personalized patient-centered web application.[25] Similar to these, our study also investigated the effect of video-based home exercise programs on PA levels in adults. We assessed PA levels with the IPAQ and the PA subscale of NHP, found that PA levels increased significantly in the study group receiving video-based exercises program and with significant differences between the study and control groups. Therefore, we concluded that the video-based home exercise program was effective on the PA level.

We also investigated the effect of video-based home exercise programs on mobility and balance with TUG and FBT respectively in adults. Mobility and balance levels improved significantly in the study group. There was no difference between the groups in terms of TUG and FBT scores. Our results showed that there was no significant difference between the groups in terms of TUG and FBT scores after the interventions. Duruturk et al. investigated the effect of telecommunications on physical fitness. Participants in the study group performed breathing and calisthenic exercises, 3 times a week, for 6 weeks, at home by internet-based video conferences. They concluded that telerehabilitation improves mobility, similar to our results.[26] Ortiz-Piña et al. found that a 12-week tele-rehabilitation program in elderly individuals had a positive effect on physical function as assessed by TUG.[27] A randomized controlled study by Chen et al. evaluated the effects of home-based tele-supervising rehabilitation on balance. They found that home-based tele-supervising rehabilitation is as effective as conventional rehabilitation for improving functional balance.[28] Another study investigating the effects of home-based tele-exercise on body composition and physical fitness in older adults found that video-conference-based exercise had effects on physical fitness-related parameters such as chair sit-reach and 2-minute step test.[29] Based on the results of our study and the data in the literature, we concluded that video-based exercise applied to adults living in social isolation in their homes is an effective method to increase physical fitness levels.

Kepenek-Varol et al. investigated the effects of exercise performed via telerehabilitation on sleep quality of individuals without COVID-19 during the ongoing pandemic. They found exercise performed via telerehabilitation to be effective and feasible for sleep quality.[21]

The results of our study show that video-based home exercise programs statistically improve the quality of sleep. In addition, the improvement in the study group that applied video-based exercises was observed in the intergroup comparison to being statistically significantly better than the control group.

Social isolation and loneliness are associated with increased responsiveness to stressors, leading to anxiety, depression, cognitive decline, adverse health effects, and an increased risk of mortality.[30] A recent study examined depressive symptoms and psychological distress in older adults during the COVID-19 pandemic due to objective and subjective social isolation from family and friends and recommended measures to reduce the negative effects of social isolation on emotional status, taking into account personal differences.[31] It is known that PA can cure and prevent depressive symptoms. Exercise, a form of PA, affects biological and psychosocial processes that are also involved in the pathophysiology of depression.[32] In addition, telerehabilitation approaches could be an alternative method for managing emotional status by using technologies such as telephone, video, and computer.

According to the results obtained from the BAI and BDI, improvement was achieved in both assessments in the study group. In addition, when the results obtained in BAI were compared with the control group, a statistically significant difference was obtained between the study group and the control group.

There is evidence in the literature that regular exercise has a significant impact on improving functional outcomes and QoL in adults.[33] Therefore, in our study, we used NHP to investigate the effect of VBEP on QoL. When the change in QoL between the groups was compared, the change in the total and all subscale scores of NHP (except for the social isolation subscale), were significantly different between the groups. When the change in QoL between the groups was compared, the change in the total and all subscale scores of NHP, except for the social isolation subscale score, were significantly different between the study and control groups. Similarly, Türkmen et al. reported that a video-based home exercise program is effective on QoL, pain, and functionality and can be used as an alternative method in their recent study on patients with rotator cuff tears.[34] In another study investigating the effectiveness of a VBEP to reduce falls and improve health-related QoL in older adults discharged from the hospital, it was stated that VBEP contributed to an increase in QoL during the 6-month follow-up period.[35]

Our study has limitations. The duration of the exercise intervention was only 6 weeks, and we did not conduct follow-ups; future studies thus are needed to evaluate the long-term effects of an exercise intervention. In addition, we choose relatively safe exercises, and we ac- companied the participants and asked them to have a companion with them during the exercise sessions, in order that we could not address physiological problems and physical difficulties (dizziness, low blood pressure, falling, etc.) that individuals may have encountered during exercise. We also evaluated only strength and balance as physical fitness parameters. In addition to these, we think that it is useful to evaluate other recognized health-related parameters, including flexibility and grip strength.

Superior aspects of our study included offering an alternative treatment and support opportunity for adults in social isolation. Our study has created a new mechanism for physiotherapy applications that otherwise ceased during the pandemic period.

When it was time to resume personal contact and interactions and reintegrate into life as it had been before the epidemic, various pathologies resulting from forced closure and restrictions surfaced. “Cave syndrome” or “agoraphobia” (fear of open spaces) affects people around the world. Exercise may help in reducing anxiety and depression associated with this phenomenon. A video-based home exercise program may mitigate this syndrome.

CONCLUSION

In conclusion, a "VBEP" appears to be an effective method to improve PA level and maintain QoL in individuals restricted to their homes. Such a program may reduce anxiety and depression and improve the quality of sleep. Thus VBEPs can be used as an alternative method to encourage PA in the adult population during periods of isolation and when rehabilitation services are not accessible on an outpatient basis.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

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