

CASE REPORT

Kanserden sađ kalan çocukta COVID-19 pandemisi sırasında sanal egzersiz programının depresyon düzeyine ve ailenin algısına etkisi: olgu sunumu

Effect of virtual exercise program on depression level and family's perception during COVID-19 pandemic in child cancer survivor: a case report

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Öz

Bu çalışmada, çocukluk çađı kanserinden kurtulan bir hastada COVID-19 pandemisi sırasında sanal egzersiz programının depresyon düzeyine etkisini arařtırmak amaçlandı. Yaklařık 4 yıl önce Akut Lenfoblastik Lösemi (ALL) tanısı konulan ve tedavi sonrası sađ kalan 8 yařındaki erkek hastaya, yüzyüze yapılan deđerlendirme sonuçlarına göre 5 haftalık alt-üst ekstremiteler ve gövdeyi kapsayan sanal aerobik egzersiz programı uygulandı. 5 haftanın sonunda Çocuklar İçin Depresyon Ölçeđi (ÇDÖ)'ne göre depresyon düzeyinde azalma olmadı ancak aileye bu programın etkililiđi hakkında sözlü sorular soruldu. Aile, COVID-19 pandemisi sürecindeki karantina dönemine rađmen bu egzersiz programının çocuklarının aktivite düzeyini artırdığını ve programın çocuklarının duygusal durumlarına olumlu etkileri olduğunu bildirdi. Gelecekteki çalışmalar için, sađ kalan çocuklarda uygulanan aerobik egzersizler sonrası ağrı ve depresyon düzeyi gibi parametreleri ölçen daha ayrıntılı sorular içeren parametrelere ihtiyaç vardır.

Anahtar kelimeler: Lösemi, Çocuk, Egzersiz, Depresyon, COVID-19.

Abstract

This study aimed to investigate the effect of a virtual exercise program on depression level during the COVID-19 pandemic in a patient who survived childhood cancer. An 8-year-old boy who was diagnosed with Acute Lymphoblastic Leukemia (ALL) about 4 years ago and survived after the treatment underwent a virtual aerobic exercise program tailored to face-to-face evaluations covering the lower and upper extremities and trunk under 5-week supervision. At the end of 5 weeks, his depression level did not decrease according to the Children's Depression Inventory (CDI), but the family was asked verbal questions about the effectiveness of this program. The family reported that despite the quarantine period during the COVID-19 pandemic, this exercise program increased the activity level of their children and that the program had positive effects on their children's emotional state. For future studies, inventories containing more detailed questions that measure parameters such as pain and depression level after aerobic exercises applied in surviving children are needed.

Keywords: Leukemia, Child, Exercise, Depression, COVID-19.



INTRODUCTION

According to the World Health Organization, 300,000 new cases diagnosed with cancer every year in children aged between 0 and 19 years. In the United States, 11,050 new cancer cases were seen in children aged between 0 and 14 years old in 2020 alone.² However, as a result of the improved treatment options, it has been shown that the 5-year survival rate has increased from 50% to approximately 80% since the 1970s.³

In the report published by the National Cancer Institute in 2014, it was stated that the most common type of cancer in children aged 0-14 is leukemia and the most common of these leukemia subgroups is acute lymphoblastic leukemia (ALL).^{4,5} Studies have shown that anxiety problems can often be seen in children with ALL due to the chemotherapy (CT) and also long-term hospitalization, especially in the first year of treatment.⁶ In addition, it has been shown that a large percentage of ALL cases whose treatment is terminated experience post-treatment depression problems.⁷

As of November 2020, the number of confirmed cases in the global COVID-19 outbreak is 55,064,128 people.⁸ This epidemic affected individuals in the community in different ways. With the closure of schools, problems such as uncertainty, anxiety, socialization, decreased physical activity emerged in children. In some studies, children were reported to show symptoms such as sleep problems, and attention problems due to anxiety.⁹

After the COVID-19 pandemic, physical activity levels in pediatric cancer survivors decreased further as a result of quarantine and social isolation. It has been thought that prolonged quarantine could make children more prone to sedentary lifestyle, and being depressed, and anxious.¹⁰

There has been growing interest on tele rehabilitation interventions during the COVID-19 pandemic. Tele rehabilitation provides rehabilitation services by informing, evaluating, treating, and following up individuals in their home or work environment by using technologies such as telephone or video.¹¹

When the studies in the literature were examined in the period of COVID-19, it was seen

that there were some rehabilitation studies implemented through tele rehabilitation in adults diagnosed with breast cancer¹² or other chronic diseases.¹³ However, studies on children during the pandemic are limited.¹⁴⁻¹⁵ Therefore, in this study, in order to reduce the negative effects of ongoing inactivity due to treatment and long-term hospitalization in a child who will go through such a period. In order to increase the level of physical activity and reduce the level of anxiety, it is planned to implement a supervised exercise program via video conferencing. As far as is known, this is one of the few conducted on childhood cancer patients through virtual exercise sessions.

CASE

The patient, 8 years old, diagnosed with Precursor B ALL (Pre-B ALL) as a result of incidental examinations around 4 years ago. He hospitalized immediately after the diagnosis and received intravenous (IV) CT treatment for about 6 months according to the ALL Berlin-Frankfurt-Munich 90 Protocol (ALL BFM 90 Protocol). He continued maintenance CT for 2 years after he discharged from the hospital. He referred to the Hacettepe University Faculty of Physical Therapy and Rehabilitation to increase muscle strength, gross and fine motor functioning. In order to conduct the study, separate consent was obtained from the child and the parent.

The patient was referred to our clinic before COVID-10 pandemic. His needs were determined by the face to face measurements made by the physiotherapist. An exercise program suitable for the patient was prepared by the physiotherapist after muscle strength¹⁵, muscle shortness tests, and balance evaluations.¹⁶ In our interviews with the family, they reported that their child's physical activity level was low. In addition, the Child Depression Inventory (CDI) was used to measure depression that may arise due to low physical activity and the psychological effects of the COVID-19 pandemic, and then to determine the effect of exercise on depression level.¹⁷

The CDI was created by Kovacs in 1981, based on the Beck Depression Scale (BDS) to measure the level of depression in children and adolescents aged 6 to 17 years. The inventory is

answered with the help of a professional or directly by the child. The questions in the inventory should be answered considering the last 2 weeks. The inventory consists of 27 items and each item consists of 3 sub-items. For example; 1) All bad things are my fault 2) Some bad things are my fault 3) Bad things are usually not my fault. In this way, situations suitable for the child are scored as 0,1,2 according to the severity of the depression. The highest score that can be obtained from the inventory is 54 and the cut-off point is set at 19 points. The higher the score in the inventory, the higher the level of depression. The validity and reliability of this inventory was made in 1991 in Turkey.¹⁸ The evaluation was repeated after the program.

At the end of the exercise program, some questions were asked to the family, and they were asked to score these questions according to the Visual Analogue Scale (VAS).¹⁹ These questions include: [1] Was this program efficient for your child? [2] Do you think that the physical activity level has increased in your child's daily life with the virtual exercise program? [3] Have you observed a difference between tele rehabilitation and face-to-face rehabilitation? [4] Which exercise mode (face to face versus virtual) do you think was more advantageous and efficient?

Face-to-face evaluations were made by a physiotherapist, but since the pandemic occurred we had to do the exercise program using tele rehabilitation during the quarantine. Exercise sessions were applied with the Zoom application. The research was conducted between May and June 2020.

Intervention

Aerobic exercise program was applied as 5 minutes of warm-up, 30 minutes of loading, 5 minutes of cool-down. While the child was exercising, the therapist accompanied the exercise so that the child could see him. This program includes: stepping on the spot as warm-up movements, jogging on the spot with arm movements, lateral trunk stretching with arms up, cat-camel exercise; During the loading phase, up and down stairs, balance exercise on bosu ball, sit-ups exercises, shoulder flexion-abduction-external rotation pattern with yellow Thera band were applied. In the cooling phase of the exercise, quadriceps, hamstring, and gastrocnemius stretching were applied in

addition to trunk rotation in the sitting position and the study was completed. Exercises were arranged in 10 repetitions and 10-15 seconds of rest was given between each exercise. In studies conducted with these patients with these findings, exercise intensity was applied as 50–70% with respect to heart rate²⁰ and 13-15 points in the perceived effort scale (RPE) rating²¹, approximating a subjective intensity of “moderate” to “high”. Since this study was carried out with tele rehabilitation, it was planned to be 13-15 points according to the rating of the RPE instead of exercise intensity heart rate in terms of comfortable measurement.

Before the implementation, two trial lessons were given to help the child become accustomed to video conferencing. The exercise program was applied 3 days a week for 40 minutes in total for 5 weeks. The child could not attend only one lesson in this 5-week exercise program. Overall, the child's participation in supervised exercise sessions was high, but towards the last weeks of the exercise program, the child's desire to participate decreased.

As a result of the virtual exercise program, only CDI could be re-evaluated among pre-exercise measurements. While the depression level measured after 5 weeks according to CDI was 4, this depression level was recorded as 5 at the end of the exercise study. Due to COVID-19, muscle strength, muscle shortness tests and balance evaluations could not be measured.

DISCUSSION

As a result of this study, which investigated the effect of supervised virtual exercise program on depression levels in childhood cancer survivors during COVID-19, it was found that the exercise program applied caused a slight increase in the level of depression. Coinciding with the COVID-19 pandemic during the disease period may also have caused this increase. The family's answers to the questions asked after the end of the study were that this 5-week exercise period was both emotionally and physically productive for their children.

Survivors of childhood cancers are at greater risk of a sedentary lifestyle²², anxiety²³ and depression²⁴ in the future than their healthy peers. This causes impairments in the

Table 1. Questions directed to the family.

Questions	Visual Analogue Scale score / Answers
How much was exercise program efficient for your child? (0-10)	9/10
Do you think that the physical activity level has increased in your child's daily life with the virtual exercise program?	"Physical activity level of my children increased compared to the pre-exercise period and he woke up more vividly in the mornings."
Have you observed any difference between tele rehabilitation and face-to-face rehabilitation?	"Telerehabilitation application was no different from face-to-face application and it was more efficient than we expected." "This application was safer than face-to-face application during the COVID-19 period."
Which exercise mode (face to face versus virtual) do you think was more advantageous and efficient?	"There is no significant advantage between telerehabilitation practice and face-to-face rehabilitation practice."

Table 2. Child Depression Inventory (CDI) of the patient.

Child Depression Inventory (CDI)	Score
Pre-training	4/56
Post-training	5/56

healthy development of children²⁵ and decreases their quality of life.²⁶ In the light of all these findings, this study aimed to determine the effect of exercise on depression level with the effect of the COVID-19 pandemic in children who survived cancer. When studies in the literature are reviewed, it has been proven that the depression levels of survivors of childhood cancers decrease as a result of regular exercise.²⁷⁻²⁸ However, as a result of the measurements made in this study, it was observed that the exercise program applied did not reduce the level of depression in children. This may be because children recovering from cancer are at risk of depression, separated from their social environments, going through an uncertain process during the COVID-19 pandemic. Additionally, CDI was thought to have serious questions measuring depression level. This scale may be more suitable for children who are intensively treated in hospital. However, for children whose treatment was over and returned to social life, it included questions of severe depression such as death, suicide. This is seen as the reason why the child's depression level does not fully reflect the result.

Studies have proven that exercise contributes to good sleep quality and increased

levels of physical activity in children.²⁹ As a result of the answers they gave to the questions asked to the family, they said that their children spent this period efficiently, sudden emotional state changes decreased, the level of physical activity at home increased and their children woke up more energetic in the morning. This led us to think that exercise has an observed effect on daily activities and mood, but its effects on depression level need to be studied in more detail.

Although tele rehabilitation applications have become more popular with the COVID-19 pandemic, in fact, with the development of technology, it has become a useful tool for evaluation, treatment and follow-up programs of patients. These technology-based apps have been used for many years in exercise studies in both adults³⁰⁻³¹ and children.³² Since the tele rehabilitation application requires only an internet connection and a video camera, it is both cost-effective and easy to access. In addition, it is an easier and safer tool for individuals who have difficulty reaching the hospital or are worried about the COVID-19 pandemic. This method also provides an advantage in terms of providing isolation conditions and continuation of rehabilitation in children who continue to receive chemotherapy. All of these are thought to be a factor for the family to find the application of tele rehabilitation useful and that there will be an increase in the future studies to be carried out with tele rehabilitation.

The first limitation of the study was related to participation in the exercise program. The boy's participation in the 5-week supervised

exercise program was good, but his participation has declined slightly in recent weeks. Studies in the literature have proven that prolonged screen use causes a decrease in brain functions such as attention.³³ The reason for this reluctance is thought to be that exercise is done through tele rehabilitation, and this result is seen as a disadvantage of tele rehabilitation. The second limitation is that the CDI used to evaluate the depression level is not suitable for determining the emotional state in the case. It was concluded that the questions posed in the inventory were suitable for measuring the level of severe depression, but not very suitable for discriminating the mild depression level. For future research, inventories containing more detailed questions can be developed in measuring depression in children. The third limitation is that because other measurements could not be repeated, only a measurement of depression could be made and the study could be concluded with this result.

Conclusion

As a result, this study is thought to be the first to investigate the effect of supervised exercise on depression through tele rehabilitation in childhood cancer survivors in the COVID-19 pandemic. According to the CDI, the level of depression slightly increased. However, looking at the symptoms, the family's observations were that the child's physical activity increased and his mood improved. It was thought that the cancer burden given by the disease period and the treatment process may have reduced the recovery with isolation. For this reason, more detailed tests are needed to evaluate the level of depression in children who survived cancer in future studies.

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Conflicts of Interest: *None*

Ethical Approval: Informed consent was obtained from the case in this study.

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