

Tourette syndrome: exercise for obesity, a case report

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Анотація. Синдром Туретта (СТ) зазвичай супроводжується руховими та голосовими порушеннями. Було виявлено, що симптоми СТ зазвичай зменшуються у підлітковому віці та у час дорослішання. Діти також можуть мати проблеми зі сном, слабкі академічні досягнення, занижену самооцінку та складнощі у контролі поведінки. Причини виникнення СТ ще достатньо не вивчені. Ретельний аналіз спеціальної літератури свідчить про наявність багатьох досліджень з фармакологічного, поведінкового, психологічного та хірургічного менеджменту, проте не вивлено робіт з менеджменту підвищеної маси тіла серед дітей із СТ. **Мета.** Вивчити можливу ефективність програми, що включає вправи, націлені на зменшення ваги як додаток до фармакологічного лікування СТ, запропонованого у конкретному медичному випадку. **Методи.** Аналіз науково-методичної літератури, тестування, застосування вправ для зниження маси тіла. **Результати.** У ході дослідження пацієнт із синдромом Туретта отримував медикаментозне лікування, але в нього розвинувся такий медикаментозний побічний ефект, як збільшення маси тіла. Для цього пацієнта було розроблено відповідну програму, що складалася з аеробних вправ для зниження ваги та розвитку координації і спритності. Програма включала стаціонарне педалювання, ходьбу в гору і вниз на підніжжі висотою 30 см з двосторонніми рухами рук вгору і вбік. Регулярний моніторинг показав, що після 5 місяців, протягом яких суб'єкт дотримувався встановленої програми, його маса тіла зменшилася на 2,5 кг, а зі збільшенням зросту індекс маси тіла (ІМТ) знизився до 23,5 кг · м⁻². Хоча пацієнт все ще був у категорії ожиріння, але зниження маси та ІМТ показали хорошу позитивну динаміку. Його ліпідний профіль продемонстрував, що значення тригліцеридів знизилася з 210 до 178 мг · дл⁻¹. Рівні ALT та AST знизилася до 60,9 о · л⁻¹ та 47,1 о · л⁻¹ відповідно. Отже, програма інтервенції виявилася ефективною для цього медичного випадку.

Ключові слова: діти, синдром Туретта, ожиріння, контроль зайвої ваги.

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TOURETTE SYNDROME: EXERCISE FOR OBESITY, A CASE REPORT

Summary. Tourette's syndrome (TS) is typically accompanied by motor and vocal impairments. The symptoms of TS were found to typically decrease in adolescence and adulthood. Children may also have sleeping difficulty, poor academic performance, low self-esteem, and difficulty controlling behavior. The etiology of TS is not fully understood. A careful analysis of the special literature indicates the presence of many studies on pharmacological, behavioral, psychological, and surgical management, but no reports on the management of overweight among children with TS. **Objective.** To examine the possible effectiveness of a program that includes physical exercises aimed at weight loss as a supplement to the pharmaceutical treatment of TS prescribed in a particular case. **Methods.** Review of scientific and methodological literature, testing, and the use of exercises for weight loss. **Results.** During the study, a patient with Tourette syndrome received medical treatment, however he developed a side effect such as weight gain. An appropriate aerobic exercise program was developed for this patient to reduce weight and develop coordination and agility. The program included exercise on a stationary bike, stepping up and down a 30 cm high platform with lateral and front arm rises. Regular monitoring showed that, after 5 months of the program, his body weight decreased by 2,5 kg, and with increasing growth, the body mass index (BMI) decreased to 23,5 kg · m⁻². Although the patient still has obesity, weight loss and BMI showed good positive dynamics. His lipid profile showed that the triglyceride decreased from 210 to 178 mg · dl⁻¹. ALT and AST values decreased to 60,9 IU · L⁻¹ and 47,1 IU · L⁻¹, respectively. Thus, the intervention program proved to be effective for this case. **Keywords:** children, Tourette syndrome, obesity, excessive weight management.

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Introduction. Tourette syndrome is a neurological disorder, which involves involuntary motor tics and repetitive abnormal vocalizations (1). This condition can occur between the age of 2 to 21 years (1–6). Tourette syndrome is commonly presented with motor tics and vocal tics. Tics can be defined as sudden twitches, movements or sounds that occur repeatedly. Repetitive blinking, shoulder shrugs, repeated hand and leg movements are the examples for motor tics. Vocal tics are abnormal repetitive sounds made by the individual. It has been found that usually the symptoms of Tourette syndrome decrease during early adolescence and adulthood. Tourette syndrome can be diagnosed with the presence of both motor tics and vocal tics. Nine out of ten Children affected with Tourette syndrome also present with some mental, behavioral or developmental disorders (1, 7–10). Children can also be affected with sleeping problems, poor academic performance, low self-esteem, and difficulty in controlling temper. The causes for Tourette syndrome are yet being studied. There is a hypothesis suggesting causes such as bacterial infection, genetic predisposition and abnormal dopaminergic function in the brain (4, 8, 11). The management of the disease depends on the severity of the condition. In mild cases subjects can control the tics with intention. But in severe cases medication such as neuroleptics and specialized behavioral therapies are required. The medication begins with small doses and slowly increased until symptoms are relieved. Common side effects of these medications are depression, weight gain and tiredness (1, 4, 6, 9).

Background. In the present case study, our subject was a 12-year-old boy, who presented with motor and vocal tics and was diagnosed with Tourette syndrome. His symptoms have been persistent for more than five years. He was born through a caesarean section and had a low birth weight of 1,24 kg. He had good weight gain during

the following months and showed good developmental pattern. The child had been active but suffered anemia at 10 months for which he was on Iron supplements. He had repeated bouts of fever and lower respiratory tract infections and a couple of episodes of febrile convulsions in his early childhood.

The child complained of headache and chest pain at 9 years of age. Motor and vocal tics were noted by medical professionals. The mother stated that the family observed motor and vocal tics since the child was 7 years old and they considered it as effects of watching television for prolonged hours and as part of his misbehavior.

Medical records of the child revealed that he presented with repetitive movements such as eye blinking, sniffing and hand movements which worsened with stress and improved when relaxed. His vision and hearing were normal. He was not hyperactive and did not present with OCD.

In January 2020 he was prescribed with Haloperidol and Benzhexol. It was changed to Risperidone and Benzhexol after few months with expectation of better progress. The symptoms improved with Risperidone but its' side effects were challenging. The symptoms of motor and vocal tics reduced to a great extent.

Since weight gain is among known common side effect of antipsychotic drugs the child experienced increased appetite, and his body weight increased by 10 kg in seven months from a body weight of 50 Kg when his height was 161 cm with a BMI of 19,3 Kg/m². With the increased weight gain he was classified as obese with a BMI of 22,8 Kg/m² at the age of 12 years and 3 months, for which the cut off for 95th percentile is 22,3 Kg/m² (Weight – 60 Kg, Height 162,6 cm). He was classified as obese based on the BMI categories corresponding to percentile defined by Centers for Disease Control and Control. Accordingly, less than 5th Percentile is underweight, 5th to 85th percentile is healthy weight, 85th to 95th percentile is overweight and 95th percentile and above is considered obese (12, 13). In case of this patient, the body weight increased drastically,

and he developed hyperlipidemia with Triglyceride at 210 mg/dl, HDL at 36 mg/dl considered low and LDL at 108 mg/dl considered above optimal. The researchers decided it was essential to focus on managing side effects to prevent complications.

During his visit to the physiotherapy department, medical records revealed that vocal tics had diminished, and motor tics had reduced. His academic performance was considered below average. He had intermittent episodes of chest pains; ECG and echo cardiogram reports were normal.

The child was hyperlipidemic with high levels of alanine aminotransferase (ALT) at 88 U/L and aspartate aminotransferase (AST) at 42 U/L. He also presented with acanthosis nigricans, which was an alarming sign of being pre diabetic and obese. He was instructed on diet modification and physical activity. Medical management had brought about a lot of improvement and reduced involuntary movements in the patient. However, despite being instructed to involve in physical activity to reduce body weight, the child was not motivated and did not involve the physical activities instructed by the physicians. As physiotherapists our role was to address excess weight.

Treating obesity among children is a challenge, because of high non-compliance to indulge in exercise program (14). Especially in this patient, it was a greater challenge because of increased appetite as a side effect pharmacotherapy for TS that led him to overeat and feel drowsy, because of which he felt lazy and preferred sleeping during the day. Poor patient motivation and lack of time among parents to get their child to involve in exercise have been reported to be important factors and cause low treatment efficiency (15). This was very true in this patient's context. The treatment method for management of TS children needs to be a holistic one inclusive of: Medical, psychological, behavioral treatment etc. (16–19). A thorough literature search revealed there are ample studies about the pharmacological, behavioral, psychological and surgical management; however, there was no published litera-

ture about management of increased weight among children with TS.

The researchers developed an exercise program as an adjunct intervention to the medical and psychological treatment that the patient was undergoing. The objective was to reduce body weight in the patient and while formulating the exercise plan history of intermittent episodes of chest pain had to be considered to prevent any risks and hazard.

The objective of the study was to investigate the possible efficiency of an exercise program aimed at weight reduction in addition to pharmaceutical treatment of the Tourette Syndrome in a case study.

Methodology. In this case study, the patient diagnosed with the Tourette Syndrome had received medical treatment from the physician and developed a medicament side-effect which expressed in gaining weight. For this very condition, specific exercise intervention has been developed, which consisted of aerobic exercises for weight reduction, coordination, and agility. It included stationary cycling, stepping up and down on a 30 cm high footstool, with bilateral arm movements upwards and sideways with 250 gm sandbags.

Intervention included 30 minutes of stationary cycling. Thereafter, there were exercises for 30 minutes which included step up and step down on a footstool 30 cm high, bilateral arm movements upwards and sideways with 250 gm sandbags and a walk of total 15 minutes duration with 30 seconds rest between every 1-minute walk across a 3-meter distance, whereby he was encouraged to achieve more laps within a minute. The child followed the exercise sessions in the physiotherapy department for 3 months, 5 days a week until schools re-opened. Thereafter he visited the department every other week. When at home, he was instructed to cycle for an hour, be active and to avoid naps during the day. During this period when the patient followed the exercises at home, regular monitoring was done via phone calls and the patient was encouraged to continue exercises and the body weight was used as feedback to keep him motivated.

The effectiveness of the suggested exercise program was assessed through the resulting weight stabilization or weight reduction.

Results. Just before the start of the exercise program, at the age of 12 years and 5 months, the patient's body weight was 65,5 Kg, height was 163 cm and his BMI was 24,7 Kg/m², he was in the obese category beyond the 95th percentile (12, 13).

Regular monitoring revealed that his body weight did not increase after following exercises for 2 weeks. After 5 months, during which he adhered to the prescribed exercise program, the child's body weight reduced to 63 Kg, his height was 163,8 cm and the BMI had reduced to 23,5 Kg/m². He was 12 years and 10 months old and the cut-off for 95th percentile at this age is 23 Kg/m². Hence, he was still in the obese category but the reduction in weight and BMI was a positive finding showing good positive dynamics. In addition, his lipid profile tests revealed that the Triglyceride value had reduced from 210 mg/dl to 178 mg/ dl Triglycerides. The ALT and AST Levels have reduced to 6,9 U/L and 47.1 U/L respectively. Hence, the intervention program happened to be effective during this case study.

Discussion. Tourette syndrome is a neurodevelopmental disorder characterized by motor and vocal tics, and comorbidities such as attention-deficit/hyperactivity disorder (ADHD) and obsessive-compulsive disorder (OCD). In this case the child presented with motor and vocal tics with no hyperactivity or OCD (10).

Majority of treatment options to treat tics among children with TS is pharmacological and the commonly prescribed drugs are dopamine antagonists, such as neuroleptics or atypical antipsychotics. The side effects most encountered by these patients include weight gain, drowsiness, sedation and difficulty in performing cognitive tasks (20). Among children with TS, it is stated that tics typically start at the age of 5 or 6 and its peaks in severity between 10–12 years of age and decreases or weans off by the end of adolescence (21, 22). In a study it is stated that long-term medication to treat tics in patients TS, leads to

increased appetite which may result in significant weight gain (23). Despite the evidence that tics may wean off by the end of adolescence, it is also stated that pharmacological management leads to common side-effects, one of which is weight gain. This is alarming information because if this weight gain will not be addressed and reduced, the child may grow into adolescence and early adulthood as an "obese" individual. Obesity is a well-known health problem, associated with several complications such as: risk of premature death, diabetes, cancer, heart diseases, many other physical and social diseases in adulthood (24–26).

In the present case study, the patient had experienced increased body weight as a side-effect of medication for treating TS. A thorough literature search revealed that there are various studies about the different management methods for TS itself. However, there was no published research to address the side-effects arising from the medical management of the condition.

Therefore, there were no studies to compare the findings of the present study. However, there are studies about treating obesity among children that suggest involvement in physical activity and exercise program to be good strategies. The recommended exercise levels among children are expected to be higher with participation in moderate-high intensity physical activity at least 60 min/day (15). A systematic review was conducted including previous meta-analyses addressing the effects of exercise (aerobic, strength training, or both) in the treatment of overweight and obesity in children and adolescents. It was revealed that exercise reduce weight in overweight and obese children and adolescents (27). It was stated that any type of exercise leads to weight loss, if it is performed for at least 4–10 hours weekly, and children may adapt better to frequent and short-term exercises (28).

Conclusions. In the present study the patient followed the exercise program for 1 hour on 5 days a week, which focused on aerobic fitness, agility and co-ordination. It was revealed that there was weight stabilization and weight

reduction in the patient resulting from suggested intervention.

The medical management led to lot of improvement in motor and vocal tics. However, as a side effect of the medication the subject had increased appetite and gained excess weight. He has attended physiotherapy sessions for the 5 months and reduction in weight was noted and the exercises will be continued. The case report of this patient intends to convey that it is essential to address the side effects of medication as a team in patients with Tourette syndrome to prevent complications such as hyperlipidemia, diabetes, obesity etc. associated with excess weight.

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