



PRACA POGLĄDOWA / REVIEW PAPER

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Role of selected self-monitoring techniques in treatment of overweight and obesity in adolescents

Rola wybranych technik samokontroli w terapii nadwagi i otyłości u młodzieży

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STRESZCZENIE

Wstęp. Samokontrola uważana jest obecnie za podstawową metodę stosowaną w profilaktyce oraz terapii otyłości i nadwagi u młodzieży i dorosłych pacjentów. Jej istota polega na bieżącym rejestrowaniu informacji dotyczących rodzaju i ilości spożywanego pokarmu, jego wartości kalorycznej oraz codziennej aktywności fizycznej. Podstawowa rola samokontroli polega na podnoszeniu świadomości pacjenta w odniesieniu do jego zachowań, myśli i emocji wpływających na kontrolę wagi ciała oraz całkowity sukces leczenia.

Cel pracy. Celem pracy jest przedstawienie korzyści związanych z zastosowaniem różnych metod samokontroli w procesie terapii nadwagi i otyłości u młodzieży.

Materiał i metoda. Autorzy dokonali systematycznego przeglądu literatury dotyczącej zastosowania samokontroli w przebiegu terapii nadwagi i otyłości ze szczególnym uwzględnieniem młodzieży. Większość prac objętych przeglądem została opublikowana w XXI wieku.

ABSTRACT

Introduction. Self-monitoring is regarded as a key technique of weight management applied in treatment of obesity and overweight both in adults and adolescents. It includes recording behaviours such as types and amount of food consumed, their caloric value, and daily physical activity. Self-monitoring is used to heighten awareness of behaviours, thoughts and emotions that influence weight control and overall treatment success.

Aim. This work is aimed at demonstrating the advantages of self-monitoring techniques regarded as facilitating factor in the treatment of overweight and obesity in adolescents.

Material and method. The authors have applied a systematic review of the literature on self-monitoring in behavioural weight control studies. This review included mostly papers published in XXI century and that reported on the association between weight loss and self-monitoring behaviours.

Results. The analysis of respective studies indicates that self-

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Wyniki. Analiza wybranych badań wykazuje, że samokontrola jest uważana za kluczowy element behawioralnej terapii nadwagi i otyłości u młodzieży. Pozytywne wyniki leczenia zależą od takich czynników, jak systematyczność w rejestrowaniu informacji, stosowanie urządzeń technicznych oraz motywacja prezentowana przez pacjenta.

Wniosek. Analizowane prace badawcze, pomimo różnorodności zastosowanych metod, dostarczają empirycznych dowodów na obecność istotnego związku pomiędzy samokontrolą a korzystnymi wynikami terapii nadwagi i otyłości u młodzieży. Istnieje potrzeba prowadzenia badań nad rolą czynników psychologicznych w determinowaniu wyników leczenia tego rodzaju zaburzeń.

Słowa kluczowe: samokontrola, nadwaga i otyłość, leczenie, młodzież

Introduction

In general opinion, self-monitoring is a key element of any behavioural treatment program related not only to obesity and overweight. Its main aim is to help an individuals in developing a set of skills to achieve a healthier weight. From historical perspective, behavioural treatment of obesity and overweight is based on the belief that these conditions are the result of maladaptive eating and exercise habits which could be changed by the use of learning principles [1]. Contemporary scientific investigations have provided evidences that body weight and shape are affected by many factors other than behaviour. These include hormonal, genetic and metabolic influences that predispose some individuals to obesity or overweight [2, 3]. As a result, some persons may never be thin despite their great efforts aimed on modification of eating and physical activity habits. An active participation in behavioural therapy programs can help such individuals to achieve healthier weight, even it is far from an ideal shape. Behavioural therapy programs usually involve decreased energy intake, increased physical activity, and use of behavioural strategies such as self-monitoring. They are primarily based on principles of classical conditioning which explain that maladaptive eating habits are often evoked by antecedent stressful events that become strongly connected with manners of food intake (e.g. family conflicts). Participation in the behavioural treatment programs helps patients identify some crucial factors that trigger inappropriate forms of eating and activity, and learn new ways of responding to them [4].

The global epidemic of obesity is especially affecting children and adolescents from low-income families [5]. For example, in Poland an excessive body mass affects 13.3% of adolescents aged 13–15 [6], while in Australia 23% of children and adolescents are above their healthy weight [7]. This population is at the greatest risk of developing in future a serious co-morbid conditions, such as hypertension, diabetes or related psychological problems. Also weight-loss interventions usually are less successful with children and adolescents that with adults what makes it especially urgent

monitoring is an important element behavioural treatment of overweight and obesity in adolescents. Positive outcomes of the treatment depend on such factors as adherence to self-monitoring, use of technical devices and motivation presented by the patients.

Conclusion. The reviewed literature, despite of a wide range of methods used in particular studies, provides empirical evidences supporting significant association between self-monitoring and successful outcomes related to weight management in overweight and obese adolescents. Future investigations also should be aimed at the effects of psychological factors on treatment success and the design of cost-effective interventions that serve to maximize the success.

Key words: self-monitoring, overweight and obesity, treatment, adolescents

to evaluate comprehensive approaches to treatment of obesity in this population. A growing research literature points out that self-monitoring, i.e. systematic observation and recording of target behaviours, has significantly correlated with weight loss [8, 9]. Findings from respective studies have led researchers to view monitoring as a 'cornerstone' of modern treatment of obesity and overweight both in adults and adolescents and children. There are, of course, additional factors that generally improve weight-loss outcomes when treating obesity in children and adolescents, such as parental involvement. One potentially relevant form of parental involvement relates to self-monitoring. Through the parents' supervision and encouragement pertained to self-monitoring, their children become more aware of daily habits and antecedents to behaviors that may contribute to unhealthy choices. Increased awareness of diet and physical activity behaviors identified using self-monitoring may also change thoughts and decision-making skills related to weight control.

Self-monitoring techniques

In the past, self-monitoring has not been so popular method for people thinking about weight management as it is today. Now, because we know that self-monitoring is crucial for success, it is important to review its various techniques. The main goal of using them is to observe and record of eating and exercise patterns, followed by feedback on the related behaviours. Self-monitoring techniques can be regarded as an early warning system providing information about arising problems and successes. To commonly used self-monitoring techniques belong: regular self-weighing, food diaries, exercise diaries and use of technical equipment such as pedometers, accelerometers and metabolic devices.

Regular self-weighing

Self-weighing is a simple technique which can serve as a reminder of one's bad habits related to eating and physical activity. It is recommended to weigh yourself on the

same scale, possible accurate, at the same time of day and the same day of the week. The patients should write down the results of weighing on a table, calendar or graph what can be helpful in keeping track of his success or to get back on track quickly when it is a failure. It is assumed that self-weighing more often than weekly is not advisable because day to day changes are not precise indicators of actual weight [10]. In recent years, some researchers have recommended self-weighing as an effective mean to increase patients' awareness of their weight and energy intake and expenditure [11]. For example, Linde et al. [10] performed the survey at three time point of a weight gain prevention trial. They found that only daily self-weighing was associated with weight losses, more frequent self-weighing was associated with 24-month weight loss. Van Wormer et al. [12] administered a prospective cohort study aimed at assessment of the effect of a behavioural weight loss program with a scale that transmitted weight data daily to the researchers. Their study revealed that greater weight loss was related to increased frequency of self-weighing, especially among the subjects who performed it on weekly basis.

Food diaries

Another important and popular self-monitoring techniques in weight management is keeping a food diaries in which a patient records foods and beverages as soon as they are consumed. The minimum information includes type, amount and caloric content of consumed food or beverage. Another important information that may be recorded relates to time of day of eating, fat content and amount of carbohydrates. Such information is especially vital for patients with additional health problems, such as diabetes. Additionally, food diaries should include some information about behavioural and psychological reasons for excess eating, such as emotional stress, mood changes, feelings surrounding eating habits, and social influences. It should be emphasized that the more detailed is diary, the better the feedback. In recent years, some patients use computers and Internet in order to keep food diaries. Also it is possible to find special Web sites designed for tracking of foods and caloric intake throughout the day. Researchers use various approaches for assessment of effectiveness of food diaries, including those that used a structural Internet program. For example, Tate et al. [13] have found that the total number of submitted diaries was significantly associated with weight loss. In another study, Yon et al. [14] compared effectiveness of the use of paper food diaries and computer-based diaries in dietary self-monitoring. They found no significant differences in weight loss between compared groups of subjects.

Exercise diaries

Exercise diaries belong to the same group of the self-monitoring techniques as food diaries. They record

type, time and level of exertion of physical activity on daily basis. For example, an easy physical activity does not increase heart rate much, its moderate level is when a person is getting a mildly increased heart and breathing rate, while high level of physical exertion would be accompanied by sweating, increased heart and breathing rates. Popular physical activities include walking, riding a bicycle, also stationary, swimming at a slow pace, dancing and exercise videos. In the empirical literature some studies discussed the use of paper diaries to record exercise behaviours. For example, Carels et al. [15] asked the participants to record the type and duration of their daily physical exercises. In this study exercise self-monitoring was regarded as the number of weeks physical activity diaries were completed. The results of the survey revealed a significant correlation between this type of self-monitoring and achievement of greater weight loss.

Technical equipment

Pedometers. In recent years the use of advanced technical devices in self-monitoring becomes more and more popular. Among them, pedometers belong to the simplest tools. They provide patients with objective and accurate data related to physical activity throughout the day. While many people make an average about 3,000 steps per day, in order to burn off extra calories for weight loss it is recommended to walk about 10,000 steps per day. Research suggests that for a good health a minimum of 6,000 steps per day is required [16]. In this context, it seems be very useful to keep track of somebody's daily steps. Patients who use pedometers are encouraged to find ways to add more steps during the day. Growing popularity of step counting boosted advances in the technology behind pedometers. The newest forms of pedometers are able to count steps precisely and display them on the screen. Because they are small and comfortable to wear, they can be used all day. More advanced sorts also calculate speed using GPS and offer additional options like calorie estimation timer, clock, week-long memory and pulse rate reader.

Accelerometers. Despite of their advantages, the use of pedometers is encountered with some important limitations, because they do not record intensity and frequency of movements. From this point of view, accelerometers provide much higher level of accuracy when assessing this aspect of physical activity. Patients who use accelerometers can objectively measure frequency, duration and intensity of their movements. Accelerometers are also more complex than pedometers because they store and display more information. Some of them can be used for estimation of calories burned or energy expenditure. There are accelerometers designed to cooperate with computers for analysis of physical activity patterns and intensity levels. More advanced versions are able to measure parameters along three planes: vertical, medial-lateral and anterior-posterior.

Metabolic devices. This type of appliances has more sophisticated monitoring and interpreting sensors for calories burned. They apply not only accelerometers technology but also flux sensors, galvanic skin conductivity and skin temperatures patterns in order to measure physical exertion and emotional stimuli. Additionally, some devices are designed to monitor heart rate.

All above mentioned technologies can be used by individual patients or by hospital-based research programs. In this second case, patients wear the hospital's armband and track their nutrition and physical activity usually for one to two weeks. After that time, they come back to the hospital where the researchers take objective data on physical activity metabolic life style patterns. These data can be successfully used to set individual programs for the patients. The application of such technical devices as pedometers, accelerometers and metabolic devices proves that technological advancement also is helping to defeat some of the major obstacles to patient's compliance. These tools are able not only to help objectively monitor nutritional and physical behavior of patients but also influence a positive attitudes with regard to diet and exercise. It is especially important in relation to children and adolescents involved in the treatment of overweight and obesity.

Technical devices are showing their usefulness to facilitate these self-monitoring efforts in adolescent patients. In the scientific literature there are some studies aimed to analyze and compare the efficiency and feasibility of the mobile devices with the paper and pencil registers of dietary and physical activity of adolescents with overweight and obesity. For example, the study performed in group of 30 Spanish overweight adolescents seeking for obesity treatment showed that paper and pencil registers produced more incomplete dietary records than personal digital assistant (PDA). The authors concluded that PDA is a reliable system that allows the clinician to be more confident in the data recorded, but some improvements are needed in order to be implemented in standard treatment. They also postulated that more studies should be performed on efficacy and feasibility of modern self-monitoring techniques in the specific field of assessment and treatment of childhood and adolescent obesity [17].

Effectiveness of self-monitoring techniques

As it was discussed, the main aim of self-monitoring techniques is to heighten awareness of behaviours, thoughts and emotions that influence weight control and overall treatment success. The patients are helped to track, evaluate and modify these behaviours, thoughts and emotions throughout the course of treatment, thus contributing to successful treatment results. The use of self-monitoring in behaviour change has a strong theoretical foundations. It is based on self-regulation theory (SRT) which states that self-monitoring precedes self-evaluation of progress made towards one's goal and self-reinforcement for the prog-

ress achieved [18]. According to this theory, the process of changing unhealthy habits requires highly developed self-regulatory abilities. Thus, self-monitoring is a crucial element of this process and includes change of attitude to some aspects of individual's behaviour and deliberated recording of that behaviour. In order to change it, individuals need to observe and evaluate their own actions and their consequences related to health. From point of view of the SRT, successful self-regulation depends, in significant part, on the consistency and discipline of self-monitoring in relation to the performance of the target behaviour, e.g. weight loss, change of eating habits [19].

In early scientific literature related to the subject of this paper, self-monitoring was referred mostly to controlling diet in paper food-diaries [20]. More recently, self-monitoring includes both dietary and physical activity and self-weighing being well-established components of treatment of overweight and obesity [10]. The medical literature provides empirical evidences supporting the effectiveness of self-monitoring for treatment outcomes with overweight adolescents and adults. For example, Kirchenbaum, Germann and Rich [21] found that adolescent patients who self-monitored an average more than 5 days per week lost significantly more weight than those who monitored less than 3.5 days per week. In this example evaluations were based on the assessment of the quantity of self-monitoring completed, such as the number of days on which self-monitoring was performed or the number of items that have been recorded or a combination of these. On the other hand, the psychological studies exploring the efficacy of behaviour change strategies pay more attention on the quality of self-monitoring. From this point of view, the correctness and regularity is more important than quantity in predicting treatment effectiveness in cognitive-behavioural therapy [22]. However, studies aimed at importance of the qualitative aspects of self-monitoring for behavior change in overweight and obesity treatment are still relatively scarce. Anyway, the review of recent publications points out, as predicted, that both quality and quantity of self-monitoring were associated with results of treatment. The patients who lost larger per cent body fat usually completed more self-monitoring and the quality of their monitoring was higher than those who gained per cent body fat [23].

Family influence

Since family members influence food intake and physical activity patterns, an effective therapy of overweight and obesity must be family-oriented. If individuals with overweight and obesity are to adopt a healthier lifestyle, they need to have a family environment that can stimulate and support these healthier behaviour patterns. In other words, people do not change behaviour style just because they are told that another one is better. In fact, they change behaviour because they are properly motivated and have promises generated by their social milieu for establishing the new

behaviours. For example, the study performed by Lindelof et al. [24] revealed a discrepancy between obese adolescents and their parents related to the health and the food served at home: the former believed the food could be healthier, while the latter disagree with this opinion. Also, it was found that many parents were themselves overweight or obese which might indicate that the family diet was not healthy. Some parents need change in their opinion in regard to the amount of unhealthy food the adolescents are exposed to in their family. Altering an unhealthy family diet is especially important because the eating patterns learned as a child will be brought into adulthood. The same argument relates to shaping a healthy diet habits such as consumption of fruits and vegetables by children and youth [25].

Another important issue that should be taken into consideration is the family understanding of what characterises healthy food. Respective studies showed that in family members understanding a healthy diet usually is associated with meals low in fat, sugar and white flour, but not with portion size. What interesting, most of the parents do not discuss with their obese adolescents quantities of food consumed. It seems to be a real problem when we consider that during the recent decades the portion sizes have increased with a parallel increase in energy [26]. Additionally to the food consumed at home, children and adolescents eat a large amounts of unhealthy meals being outside with friends or when being alone and feeling depressed or sad. Doing this, they are aware that this kind of behaviours increase their weight and sometimes they are ashamed of having such needs. Therefore, the future intervention strategies directed to family, besides dietary guidelines, should implement basic behavioural skills in order to help the obese adolescents to make healthier choices in everyday life. For example, parents could teach their obese children different coping strategies aimed on handling peer pressure or avoiding emotionally motivated eating. This proposal is supported by findings of recent research [27].

Adherence to self-monitoring

Behavioural change in treating overweight and obesity in adolescents is responsibility both of the patients and the health care providers who facilitate change through effective counselling. Although most of the patients are fully aware of what kind of food they should eat or avoid, some of them do not follow suggestions and advices given by health practitioners about healthy methods of weight control. Thus effective managing non-adherence becomes an important issue for both patients and health care providers. Actually, adherence to self-monitoring is a learning skill and, like in the development of any other skill, some difficulties are to be expected. It is assumed that lack of skills rather than a lack of motivation is responsible for non-adherence in most of the cases [28]. Therefore, when a problem arises, it is important to focus on what can be done in terms of planned behaviours and coping

skills of the patients. The emphasis on developing a new skills seems to be more important than ineffective and boring discussions about patient's motivation. Also the therapist should discuss with the patient what happened when things did not go as planned, and how it can be prevented in the future. In addition to having patients advices how they would deal with same situation in the future, it is important to give them hope and increase of responsibility for their actions. Although some patients may attribute non-adherence to external factors being beyond their control, the identification of behaviours that can be managed by them should increase feeling of self-efficacy and responsibility for problem solving.

Despite of its important significance in the treatment process, adherence to self-monitoring has been reported infrequently in the literature. The measures of adherence being a subject of investigation include the number of diaries submitted [29], therapist' ratings of the completeness of diaries [30] or the number of self-reported weights during a specific period [31]. There are very few studies that objectively assessed adherence to self-monitoring. For example, in one of such studies the electronic data were compared to the self-reported records of self-monitoring. Analysis of the results revealed a little dependence between the self-reported and electronically recorded data. What is also important, the timing of the self-monitoring in relation to eating was significantly associated with weight loss [32].

Based on the material aggregated from the studies on self monitoring, it is possible to formulate some guidelines that can help adolescent patients improve their adherence to the behaviours necessary for effective weight control:

- therapist should be ensured that patients fully understand the rationale for a specific behaviour change and see important value in regular record keeping,
- the treatment plan should include short- and long-term goals aimed at permanent behaviours change and described in concrete terms,
- both the therapist and patient should identify the factors facilitating and disturbing in execution of the treatment plan,
- therapist should review regularly the patient's records and discuss their implementation,
- therapist should avoid criticizing patient because usually it has adverse effect on mutual relations,
- therapist should reinforce the patient's self-esteem and patience, especially when frustrated because of failure [33].

In many cases, one of the most important reason for non-adherence is frustration caused by disparity between actual and expected weight losses. According to some professionals, a 10% weight loss can be regarded as successful one, but patients usually expect weight loss about 30% of body mass [34]. In such cases therapist should help patients accept less weight loss results as successful. Also, focus can be directed on other aspects of patients' life, as

improvement of quality of life, and in biological health indicators such as blood pressure and glycemic control.

Managing overweight and obesity in disabled adolescents

Since a high percentage of disabled adolescents are overweight or obese, effective strategies for prevention and managing excess weight need to be developed for this special group. It is especially important in regards to disabled adolescents with additional diseases such as neuromuscular and neurological disorders. Many studies performed in different countries have shown that children and adolescents with various disabilities are more vulnerable to gain excessive body mass than their healthy peers [35, 36]. Some differences in prevalence of overweight between adolescents with and without developmental disorders are apparent from an early age and this trend continues into adulthood [37, 38, 39, 40]. For disabled children and adolescents, obesity represents a vital risk factor for development additional health problems and deterioration of the primary disability, such as fatigue and pain on joints and muscles caused by excessive weight. These and other consequences of obesity in disabled adolescents can lead to a complete loss of independence and restriction of existing chances for exercise, leisure activities and future employment. In some cases, a lack of knowledge and low awareness of family members about a healthy lifestyle predispose the disabled to a higher risk for obesity. Also overprotective parents may be an obstacle for physical activity of their disabled children for they think that outdoor exercises make a greater risk of accidents. For these reasons, it is not surprising that children and adolescents with disability spend much of their time on TV and computer games what is associated with excess weight. Frequent lack of outdoor activity poses in disabled adolescents feeling of isolation and increases risk of excessive eating being a compensatory mechanism in response to social exclusion. For example, children with cerebral palsy are often not accepted by their peers, have fewer social interactions and face a higher rate of annoying

[41]. To other factors that limit social activity of the disabled belong negative prejudices from the healthy persons, architectural barriers and low ability to socialize.

The complexity of the underlying problems in the disabled patients with obesity often precludes participation in the outpatient and inpatient treatment activities, including self-monitoring. Nonetheless, the disabled adolescents should be enabled to participate in control of their weight possibly in an independent way. If it is not possible in view of the limited abilities, they should be helped by parents, siblings or other persons, such as dieticians and exercise specialists. If the interventions performed at home environment remain unsuccessful, monitoring measures are required in health institutions that specialize in obesity treatment.

Conclusions

- The reviewed literature, despite of a wide range of methods used in particular studies, provides empirical evidences supporting significant association between self-monitoring and successful outcomes related to weight management in overweight and obese adolescents.
- Growing use of advanced technology, such as pedometers, accelerometers, metabolic devices and exercise software programs, might lessen the burden of self-monitoring and significantly improve adherence in adolescent patients with overweight and obesity.
- Obesity in disabled children and adolescents worsens the conditions arising from the disability itself and should be treated according to specially structured prevention and intervention programs.
- Since present studies suggest that patient success with behavioral weight management treatment is often affected by a variety of psychological factors, future investigations on the effects of psychological factors on treatment success and the design of cost-effective interventions that serve to maximize the success are needed.

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