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MOBILE APPLICATIONS AS AN AID IN TREATING OBESE AND OVERWEIGHT PEOPLE

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ABSTRACT:

Background:

Improper body weight is a serious problem among adults, adolescent and children nowadays. In 2022 approximately 43% of the world's population aged 18 and over was overweight and about 16% were obese.

Objectives:

This review aims to provide information about effectiveness of using mobile apps as an aid in treating obese and overweight people.

Material and methods:

Literature available in January 2025 was searched using Pubmed with keywords: „obesity", „obese", „app", „ai". 20 articles were selected to write main part of the review.

Mobile applications effectiveness:

Apps use can benefit to improve body weight, body mass index and body fat percentage. The effectiveness is increasing with the older age and duration of the intervention. Using Ai assisted app can improve overeating habits, snacking habits, immediate thinking, self-regulation, depression and physical activity with no improvement of the anxiety. Digital lifestyle coaching, in comparison to usual care, can induce weight loss in obese people with and without type 2 diabetes. App users are more likely to attend health check. Early app engagement and self reported dietary adherence are predictors of weight loss. By using machine learning and an app it is possible to identify and predict weight loss trajectories.

Combining the use of the app with the new technologies (smart band, glucose monitor, motion based classifier) benefits in weight loss, improve body composition, physical activity and provide complementary information. Adding push notifications as a feature of mobile apps have positive impact in body composition variables.

Mobile health intervention can help women with obesity to manage their gestational weight gain, body weight before childbirth and newborns birth weight. It may also help reduce caesarian section rate and increase physical activity of pregnant women. Adding a digital intervention to standard care increases it efficiency.

Mobile apps for parents can be helpful in reducing childhood obesity by reducing consumption of sweet and salty treats, sweet drinks. Most important information that app should be conveying are feeding tips and recipe content, while the most desirable features where that which allowed tracking child growth and setting feeding goals. The desirable features and content differ between mothers, fathers and people with lower and higher income.

In some research mobile apps appeared to be ineffective in increasing physical activity and improving diet in adolescents, while in the other quite the opposite. The lack of effectiveness in the studies selected in this review was probably due to low adherence to the research program and small groups. The deficits in initiating application are a negative predictor of attrition in adolescents.

Conclusion:

Mobile applications are a useful tool as an additional aid in standard care for obese and overweight people. However, the effectiveness of the application varies depending on the target group to which it is intended. Additional features of the application and its substantive content also affect its effectiveness.

Keywords: app; effectiveness; healthy lifestyle; mobile applications; obesity; overweight

INTRODUCTION

Overweight and obesity results from imbalance of calories consumed and expended which leads to excessive fat accumulation. Improper body weight presents a risk to health and is a serious problem nowadays.[1] Adipose tissue secretes inflammatory cytokines, adipokines and chemokines, which causes chronical low-grade inflammation.[2,3] According to information posted on the WHO website, in 2022 approximately 43% of the world's population aged 18 and over was overweight and about 16% were obese. Even among children and adolescents aged between 5 and 19, obesity is a significant issue, affecting about 8% of them. The matter of improper body weight is associated with the occurrence of many complications and diseases such

as cardiovascular diseases, diabetes, cancers, neurological disorders, chronic respiratory diseases and digestive disorders.[4] Obesity increases risk for venous thromboembolism.[3] Children and adolescents with severe obesity compared to those with mild obesity are at greater risk for type 2 diabetes, hypertension, fatty liver disease and dyslipidemia.[5] Youth obesity may lead to major risks of excess and premature morbidity and mortality.[6] Reducing the percentage of obese people in the world could help reduce the occurrence diseases connected to it. Economic burden of obesity is substantial, that's why prevention and control over it are important. These goals should be a public health priority, especially in countries where there is a high percentage of people with abnormal body weight.[7]

Modern technologies and applications are popular topic. Mobile apps already proved to be effective or at least promising tools in many fields such as: managing blood glucose, blood pressure, reducing depression symptoms and improve outcomes concerning patient's physical activity, motor ability, cognition, quality of life and education for patients with Parkinson's disease, multiple sclerosis and stroke.[8,9,10]

This work aims to summarize the effectiveness of using mobile applications as a means of helping obese and overweight people to improve their eating habits, increase physical activity, acquire healthy lifestyle and thus reduce body weight.

MATERIAL AND METHODS

Literature available in January 2025 was searched using Pubmed database, with keywords: „obesity", „obese", „app", „ai". The phrase „((obesity) OR (obese)) AND ((app) OR (ai)) NOT (review)" was used. 20 articles were selected to write the main part of the work, mainly from last year. To form the introduction part of the review, a literature search was conducted in the PubMed bibliographic database, using the key words: obesity, morbidity, mobile application, effectiveness. 8 articles were selected in this way, and 2 more were cited from the WHO website.

MOBILE APPLICATIONS EFFECTIVENESS

1.1 Impact of apps on weight and adherence of users to the weight loss program

Yen HY, Jin G, Chiu HL meta-analysis showed that smartphone apps are feasible and have small-to-moderate effects on body weight, body mass index, and body fat percentage. The

effectiveness increased with the older age of the participants and a longer duration of the intervention. This study also shows that interventions were more effective on body weight among participants with a disease or disability, and on body mass index of those who were obese or overweight.[11] The one week long test made on a Southeast population show that using AI-assisted, weight loss app was effective for improving overeating habits, snacking habits, immediate thinking, self-regulation of eating habits, depression, and physical activity with no significant improvement in symptoms of the anxiety. The app consisted of AI local food image recognition, chatbot conversations considering eating lapse triggers, automated time-based nudges and meal stopwatch.[12] 12-months randomized Controlled Trial conducted in 2022 showed that digital lifestyle coaching, in comparison to usual care, can induce significant weight loss for people living with obesity, both with and without type 2 diabetes.[13]

The research conduct by Buss VH, Barr M, Parker SM, et al. (in which participants could choose a practice nurse–led health check; additionally, with a lifestyle app, a telephone coaching program, or both) showed that, Australians who were using app, were more likely to attend health check and participate in telephone coaching. It suggests that, people who opted for several intervention components, felt more committed to this study compared to those who choose only a practice nurse–led health check with a telephone coaching program. However, except for that, there weren't any significant difference in other outcomes between groups. Participants health literacy and diet improved in app and no app groups.[14] Early app engagement is a predictor of weight loss, with higher engagement (based on app usage) yielding more weight loss than lower engagement.[15] Falkenhain K, Locke SR, Lowe DA, et al. in the results of their study highlighted that app-related and adherence-related user behaviors offers insight into factors associated with successful weight loss in the context of mobile health interventions. Especially, self-reported dietary adherence was the most important metric predicting weight loss.[16] In the 16-week study conducted by Kim, Ho Heon et al., the researchers found that, by using a machine learning and clustering shape-based time series similarities, it is possible to identify weight loss trajectories in a mobile weight management app (sharp decrease, moderate decrease, yo-yo, stable or increase, other). Furthermore, adherence and early adherence related to self-monitoring were taken into consideration as potential predictors of these trajectories.[17]

1.2 New technologies and additional features

In randomized controlled trial conducted by Lugones-Sanchez C, Recio-Rodriguez JI, Agudo-Conde C, et al., sedentary adults from Spain, with overweight or obesity, received healthy lifestyle smartphone app and the smart band. After 3 months in the intervention group, compared to control group, there were observed benefits in weight loss, some body composition variables and time spent in light physical activity. However, once the devices were collected, the downward trend was not maintained at the 12-month follow-up.[18] To prevent and treat obesity, with related to it health complications, it is important to accurately identify eating patterns. Meals can be recorded in the app manually by the user, but by using a combination of new technologies such as continuous glucose monitor and motion-based wrist classifier, it is possible to detected meals and provide complementary information to self-reported eating occasions.[19] Adding a feature such as push notifications to mobile app, prove to be effective in increasing body fat loss (by following proposed weight loss program) and helped to maintain or gain muscle mass. Although incorporation of push notifications have positive impact in body composition variables, there was no significant change in weight loss between the group with app containing notifications and app without it.[20]

1.3 Apps as aid for pregnant women, parents and their children

A trial conducted in Taiwan found that mobile health interventions in addition to standard antenatal care helps women with obesity to manage their gestational weight gain, body weight before childbirth and newborns birth weight. However, using apps did not result in further weight loss six months after delivery.[21] The smartphone app which aims to control the gestational weight gain may help reduce caesarean section rate in overweight women, but not obese ones.[22] Digital intervention delivered with a smart band and app with midwife counseling, except from helping obese women in obtaining adequate gestational weight gain, is also increasing their physical activity during pregnancy.[23]

Adding a digital childhood obesity prevention intervention, in the form of an application designed for parents, to health behavior counseling (delivered by pediatric primary care clinicians) is more effective than clinic-based health behavior counseling alone. The app providing health literacy-informed and personalized text messages to families was effective in a racially and

ethnically diverse population. It helped to improve child weight-for-length trajectory and reduced childhood obesity at 24 months.[24] In a research study conducted in Sweden, parents of children aged 2.5–3 years were assigned to a group with a mobile application (intervention group) or a control group (conversation about healthy lifestyle, pamphlet). The application gave parents access to variety of healthy lifestyle topics, food recipes, self-monitoring, audio/video-feature. Materials were added regularly every 2 weeks. The study, which took 6 months, found that using the app helped reduce the consumption of sweet and salty treats, sweet drinks, and reduced the amount of screen time spent by children. Moreover, parents from intervention group reported higher parental self-efficacy for promoting healthy lifestyle behaviors.[25] The research conducted by Mobley, Amy R et al. was helpful in determining parental preferences for mobile health app content and features. According to it most important information that app should be conveying are feeding tips and recipe content, while the most desirable features where that, which allowed tracking child growth and setting feeding goals. Fathers preferred content on first foods, choking hazards, and nutrition information. On the other hand, mothers were most interested in breastfeeding, picky eating, and portion sizes. Parents with lower incomes were curious about nutrition guidelines, breastfeeding and introducing solids. Non-low-income parents wanted to know about food allergies, portion sizes, and picky eating.[26]

1.4 Obese and overweight adolescent

The study with an initial sample of 50 adolescents aged between 12 and 16 years which was conducted by Mateo-Orcajada, Adrián et al. supposed to determine the changes after a 10-week intervention using step tracker mobile apps in out-of-school hours physical activity, adherence to the diet, body composition and the physical condition of adolescents who were overweight and obese. Mobile app usage does not appear to be effective in producing improvements in the previously mentioned aspects as it does not appear to significantly increase their physical activity. The researchers state that the lack of benefits could be because adherence to the program was very low. Therefore, future testing is needed to select the optimal mobile apps to achieve benefits in this population.[27] Small randomized controlled trial of 32 adolescents aged 12-18 years showed that there was no improvement in dietary intake between control group (was instructed to take photos of food using their phone) and group using a mobile app that determines the nutritional content of meals from photos and incorporates nutritional goals setting.[28] The

deficits in initiating application are a negative predictor of attrition in adolescents with obesity.[29] According to "eHealth Intervention to Improve Health Habits in the Adolescent Population: Mixed Methods Study.", digital interventions are able to modify behaviors, exert a positive influence in relation to diet and physical exercise in the adolescent population. In addition, this research showed that social network is important in acquiring healthy lifestyle by young people and how leaders influenced their peers by increasing the physical activity of the rest of the group.[30]

DISCUSSION

Mobile applications, depending on their structure, complexity, functionality and adaptation to a given target group, can be a significant help in increasing the effectiveness of the fight against obesity and overweight. However, the use of apps as an addition to conventional methods such as clinical advice, telephone calls, leaflets, etc. does not always increase their successfulness. The effectiveness of the apps varies depending on their target group, additional features, substantive content. Therefore, further research into the creation of personalized applications, tailored to the appropriate target groups and their effectiveness could bring significant benefits in this field.

CONCLUSION

Mobile applications are a useful tool as an additional aid in standard care for obese and overweight people. They can be useful in addressing behaviors and habits that contribute to weight gain, such as snacking and other unhealthy habits. However, the effectiveness of the applications varies depending on the target group it is intended for. Mobile applications have shown some effectiveness in controlling weight in obese and overweight pregnant women. They help increase their physical activity and may be useful in reducing the number of cesarean sections in overweight women. In parents group, most important information that app should be conveying are feeding tips and recipe content, while the most desirable features where that allowed tracking child growth and setting feeding goals. Differential effects were present in the adolescent group. This was probably due to low adherence to the research program and small groups. In addition, not all literature on obese adolescents has been reviewed. Adding new technologies to applications can increase their efficiency and possible functionality. The

effectiveness is also influenced by additional features, such as push notifications, and substantive content of the application. Undesirable features are deficits in initiating app.

AUTHOR CONTRIBUTIONS

Conceptualization: Gutowska M; Methodology: Kosińska A., Karczmarz J.; Formal analysis: Orzechowska J., Kalinowska K.; Investigation: Orzechowski M., Paprocka A.; Writing - rough preparation: Gutowska M; Writing - review and editing: Gutowska M., Belcarz W.; Supervision: Fijałek P., Świrk U.

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