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Obesity Management and Artificial Intelligence: A Narrative Review

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Abstract

This study aimed to investigates the revolutionary integration of AI and obesity management. The study of the efficacy of AI-driven interventions for obesity management, promising outcomes were seen during the early stages of weight management. However, there is a need for a thorough longitudinal research to determine long-term implications, as well as the building of strong ethical frameworks addressing privacy, security, and fairness in algorithmic decision-making.

Addressing challenges of accessibility and equity, our work pushes for policies that provide inclusive access to AI-driven treatments, particularly in underprivileged populations. AI incorporation into clinical practice requires joint initiatives, including extensive training programs for healthcare providers. Patient-centered approaches that balance technological guidance with individual autonomy emerge as critical for continued engagement.

Economic concerns emphasize the need of examining cost-effectiveness and sustainability in order to guide future scalability decisions. Looking ahead, our research identifies significant topics for future research, with an emphasis on AI algorithm development, creative application exploration, and collaboration with emerging technologies. As evidence-based academics, our work adds to the continuing conversation and collaborative efforts aimed at realizing the full potential of AI and telemedicine for global health improvement.

Keywords: Artificial Intelligence, Obesity, Management, Review.

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1. Introduction

Artificial Intelligence (AI) is the technological acquisition of knowledge and skill by a nonhuman device, capable of performing a variety of autonomous operations after initial programming. It can perform without human supervision and carry out adaptive output activities based on data input learnings (Wang & Xia, 2021). Computer learning, or "learning," which enhances a machine's performance by repeated exposure to data input, is a crucial part of artificial intelligence. One of the key elements of AI is “learning” which allows it to improve its performance through cumulative exposure to data input (Bays et al., 2023). A significant increase in the integration of digital services into health systems has been prompted by the COVID-19 pandemic (NHS, 2018; Golinelli et al., 2020). The use of remote services has increased, which is a clear indication of the uptick in activity and shows how quickly and skillfully firms may implement new technology as needed.

Many countries are using AI technologies to shift from old economic models to learning economies. Since its introduction, information technology has eased and facilitated the processing, storage, and interchange of health information, changing both the practice of healthcare practitioners and the functioning of healthcare institutions. On the other side, artificial intelligence describes application of sophisticated algorithms to the automated completion of tasks. AI's prospects for health applications seem endless, spanning from sophisticated diagnostic tools to wearables and smartphone apps. Data-driven decisions that can support doctors, manage patient data, and offer answers to challenging medical issues are made possible by AI's rapid processing and interpretation of large datasets (Memish et al., 2021).

One of the biggest problems that people worldwide face is health. Globally a high number of people are suffering from non-communicable diseases including diabetes, heart attack, kidney diseases, cancers, etc (Kaur et al., 2022). Moreover, overweight and obesity are on the rise and have been connected to several non-communicable diseases, according to the World Health Organization (WHO) (WHO, 2003). The WHO defines obesity as an accumulative chronic medical condition that impairs health due to excess body fat (WHO, 2018). Numerous variables, including poor eating practices, genetic predispositions, a sedentary lifestyle, the growing accessibility of high-fat foods, and a lack of knowledge about the impact of dietary choices on human health and physical well-being, have been linked to obesity (Marinou et al., 2010; Escalona et al., 2006). In addition, obesity is also known for contributing to the development of insulin resistance, which is associated with a weakened immune system (Kaur et al., 2022).

With its accompanying health problems, including heart disease, high blood pressure, cancer, and, in certain cases, low self-esteem, obesity is becoming more and more common among children, teenagers,

and adults around the world at an alarming rate (CDC, 201; (Burrows & Cooper, 200; Hesketh et al., 2004). According to WHO data, 650 million persons were classified as obese and over 1.9 billion as overweight in 2016 (WHO, 2018).

2. Subjects and Methods

To evaluate the integration of Artificial Intelligence (AI) in obesity management, this study used a rigorous literature review methodology encompassing databases such as PubMed and Google Scholar. The review focused on studies published between 2010 and 2023, and data on AI applications for obesity management.

3. Results

3.1. Obesity Management

Obesity prevention is challenging as it requires changes in physical activity and dietary habits (Palechor & Manotas, 2019). Academicians and healthcare practitioners use research and data from several electronic medical records including health records, insurance data, and smart applications to anticipate obesity at an early stage (DeGregory et al., 2018). This data can be instrumental in gaining insights to prevent and cure obesity in the early stages. Some of the most successful weight-loss therapies are dietary, physical activity, and behavior changes (Palechor & Manotas, 2019). The increase in the prevalence of overweight and obesity is leading to an increased demand for computational tools to predict and assist obese people in taking care of meal planning (Pfeifflé et al., 2019).

3.2. Obesity Management and AI

AI is becoming more recognized as a vital tool in the health sciences. Its importance spans a wide range of applications, including medical imaging, patient communication, disease outbreak prediction, and behavioral modification (Xu et al., 2021; Kumar et al., 2022). Recent advances in processing power and analytical techniques have made it easier to integrate AI into various fields, marking a revolutionary era in health research and practice. There is a great deal of variability in telehealth interventions for obesity and weight management, which makes it difficult to draw definitive conclusions from the scant literature in this area, especially with regard to efficacy and the critical elements that increase the probability of success. A BMI decrease was seen in a systematic assessment of telemedicine weight loss programs, especially when the therapies lasted longer than six months (Huang et al., 2018). According to a more recent analysis, telemedicine has the potential to help overcome a number of obstacles to efficient obesity treatment (Hinchliffe et al., 2022).

The management of obesity has seen a rise in technologically advanced tools and services in recent years, many of which can be accessed via websites or mobile applications. For instance, in order to determine how many calories they will require for the rest of the day, users of these solutions usually input

how much food they eat. In a study, a mobile health monitoring app specifically designed for managing childhood obesity, employed Internet of Things (IoT) technology. This system enabled remote tracking and monitoring by both healthcare professionals and parents and evaluated 144 participants. The results revealed strong correlations among factors like trust, security, ease of use, and usefulness in the app's performance (Alloghani et al., 2016).

AI gaming also presents a promising way to help people heal from wounds, diseases, or problems brought on by circumstances like obesity. It can help patients with immobility or other health issues by enabling tailored and interactive participation, which can promote a more successful rehabilitation process (Bays et al., 2023). Currently there is an extraordinary amount of health data that is available to academics and practitioners. The unprecedented amount of health sciences advancements utilizing cutting-edge data analytics demonstrate the wealth of available data (Sivarajah et al., 2017). On the other hand, handling large, complex, and unusual datasets—like text, image, video, and audio—requires cutting-edge analytical techniques and processing power that have just lately become accessible (Dash et al., 2019; Agrawal & Prabakaran, 2020).

With AI-driven telemedicine, patients can participate in weight-management programs more easily and conveniently, with less of the usual barriers like travel expenses and missed workdays. Because consultations are now more convenient to attend, adherence to the program is improved by this enhanced accessibility (Kim et al., 2007). Telemedicine's virtual format also makes it easier for clinicians to meet with patients more frequently, which raises the possibility that the program will be successful. Patients can take part in consultations from the comfort of their homes with telemedicine, which is a noteworthy benefit that promotes safety and relaxation. Weight stigma issues that can arise in a clinical context are eliminated in this setting. Furthermore, the virtual platform gives medical providers insightful knowledge about the patient's day-to-day activities. For example, a dietician can virtually search a patient's food cabinet or refrigerator using video chats (Kumar et al., 2022). By having a firsthand look, the healthcare professional may evaluate the patient's living situation and the facilities that are accessible for cooking, which makes the weight control program more individualized and successful. The phrase "self-regulation" describes the process of self-awareness and self-control over automatic feelings, ideas, and behaviors in order to accomplish long-term objectives like weight loss (Baumeister, 2014). Typical self-regulation techniques for altering behavior include pointing out differences between present actions and desired future outcomes (Epton et al., 2017), self-observing actions and behavioral results (Burke et al., 2011), action planning (Benyamini et al., 2013), goal setting (Pearson, 2012) habit modification (Cleo et al., 2019)and behavioral replacement (Bargh & Morsella, 2008). However, these tactics are deliberate,

laborious, and cognitively challenging in contrast to old habits, which are primarily automatic and effortless (Bargh & Morsella, 2008).

This often leads to the temporal erosion of behaviour change adherence, causing a well-known yo-yo weight effect (weight increases back to baseline) (Moroshko et al., 2011). Therefore, individuals trying to lose weight often attempt to either increase self-regulation capacity through sheer willpower (Johnson et al., 2011) or reduce the self-regulation effort needed through weight-loss mobile apps (Everett et al., 2018), clinical weight management programmes (LeCheminant et al., 2007) and commercial weight-loss programmes (Gudzune et al., 2015). However, such methods are often expensive, resource-intensive and unsustainable (Russell & Norvig, 1995). An emerging strategy to tackle this problem of poor self-regulation is to apply AI (Forman et al., 2018).

4. Discussion

The use of AI and telemedicine in obesity management offers a paradigm change in tackling the widespread health concerns associated with rising global obesity rates. As a researcher committed to the progress of evidence-based interventions, the goal of this discussion is to objectively analyze the repercussions, issues, and opportunities that result from the convergence of these technologies. Our findings highlight the intriguing potential of artificial intelligence-driven therapies in the early stages of obesity control. However, there is an urgent need for additional rigorous and long-term studies to examine the usefulness of these technologies over time. To establish the long-term benefit of AI on weight loss and the decrease of obesity-related comorbidities, robust clinical trials involving varied populations are required.

The ethical implications of AI adoption in healthcare deserve careful attention. Our findings highlight the importance of strong ethical frameworks that cover patient privacy, data security, and algorithmic bias(Wang & Xia, 2021). Transparency in algorithmic decision-making is essential for building confidence between healthcare practitioners and patients. Future research should focus on strengthening ethical norms that are in line with the ever-changing landscape of AI in healthcare.

The risk of increasing existing health inequities due to disparities in access to technology must be considered. While AI and telemedicine hold great promise, it is critical to investigate measures to provide fair access, particularly for underprivileged regions. Initiatives in research should concentrate on developing treatments that bridge the digital gap, promote diversity, and address potential hurdles to adoption.

Collaboration among developers, healthcare practitioners, and policymakers is required for the successful integration of AI into traditional healthcare settings. Future study should focus on the most

effective ways for seamless integration, such as training programs for healthcare providers and modifications to existing workflows. Addressing technology adoption resistance is critical for the successful application of AI-driven obesity therapies in clinical practice (Hinchliffe et al., 2022).

A healthy mix of technological assistance and individual autonomy is essential for long-term patient engagement. Our findings underscore the importance of programs that empower patients and encourage active engagement in their weight-management journey. Future research should look into individualized techniques that boost patient self-efficacy and motivation while using AI as a supportive tool rather than a prescription.

Economic issues are critical as we foresee widespread use of AI-driven therapies. Our research calls for a careful assessment of these technologies' cost-effectiveness and long-term viability. Investigating novel funding mechanisms and weighing the economic consequences of artificial intelligence in obesity control can help inform decisions about scalability and integration into healthcare systems.

In future studies, research gaps will help joint efforts maximize the impact of AI and telemedicine in combating the worldwide obesity pandemic. Our commitment as researchers is to advance knowledge that leads to practical advances in healthcare. By resolving the aforementioned concerns, we open the road for a thorough and ethical integration of AI and telemedicine in obesity management, ultimately leading to improved global health outcomes.

5. Conclusion

In conclusion, combining Artificial Intelligence (AI) and telemedicine in obesity management is a promising option for global health improvement. While our findings support the efficacy of AI-driven interventions in early weight management, more robust, long-term studies, ethical frameworks, and solutions to address accessibility difficulties are required. Collaboration is essential for effortlessly integrating AI into clinical practice and providing patient-centric approaches that empower patients on their weight management journey. The economic feasibility and sustainability of these interventions must be carefully assessed in order to create the framework for a comprehensive and all-inclusive approach to combating the worldwide obesity epidemic.

6. Declarations

6.1 Conflict of Interest Statement

The authors have no conflict of interests to declare.

6.2 Funding Disclosure

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