International Journal of Recent Advances in Multidisciplinary Topics
Volume 5, Issue 11, November 2024
https://www.ijramt.com | ISSN (Online): 2582-7839

Controlling Hypertensive Episodes Among Obese Adults: A Systematic Review

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***Abstract*: Background: The growing prevalence of hypertension among obese individuals is a significant public health concern. Methods: Keywords were placed on PubMed, maintained by the National Center for Biotechnology Information (NCBI), Embase, and Science Direct as databases. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline was also used to eliminate other studies. The Critical Appraisal Skills Programme (CASP) and the Joanna Briggs Institute (JBI) Critical Appraisal Checklist. Findings: Of the 150 studies extracted from databases, only 6 studies were used. Diet, emotional wellbeing, stress management in working environments, improving activities of daily living, exercises, and sleep patterns were the means of controlling hypertensive episodes among obese adults. Conclusion: Adopting cardiovascular-friendly diets, integrating positive mental health practices, recognizing stress's impact on cardiovascular health, adopting healthier routines, emphasizing physical activity, and maintaining consistent sleep patterns were essential strategies for effectively controlling hypertension among obese adults.**

***Keywords*: obesity, hypertension, hypertensive obese adults.**

1. Introduction

This systematic review aims to analyse the effectiveness of various interventions in reducing blood pressure levels, controlling hypertension-related complications, and improving overall health outcomes among obese individuals with hypertension. The growing prevalence of hypertension among obese individuals is a significant public health concern (Litwin and Kułaga 2021). Effective management of hypertension in this population is crucial, given the compounded risks associated with obesity, such as cardiovascular diseases, type 2 diabetes, and stroke (Tsoi et al. 2021).

Obesity is a complex condition often defined as having a Body Mass Index (BMI) of 30 or higher (World Health Organization 2023). BMI, a measure of body fat based on height and weight, is widely used in clinical and research settings. However, other factors such as waist circumference and body composition also play a critical role in determining obesity. Waist circumference provides additional insights into the distribution of body fat, with excess abdominal fat being a significant predictor of obesity-related health risks. Moreover, body composition analysis, which distinguishes between fat mass and lean mass, offers a more comprehensive understanding of an individual's health status (Nicolaidis 2019).

Hypertension, or high blood pressure, is typically diagnosed when systolic blood pressure consistently exceeds 130 mmHg and/or diastolic blood pressure consistently exceeds 80 mmHg (Vallée et al. 2020). Systolic blood pressure measures the pressure in blood vessels when the heart beats, while diastolic blood pressure measures the pressure between beats when the heart is at rest (World Health Organization 2023). Persistent hypertension is a major risk factor for cardiovascular diseases, kidney disease, and other serious health conditions. It is often termed a "silent killer" because it typically presents no symptoms until significant damage has occurred (Israfil et al. 2022).

Interventions aimed at reducing blood pressure and managing hypertension in obese individuals encompass a variety of strategies (Turana, Tengkawan, and Soenarta 2020). These include dietary modifications, physical activity, stress management, improvement in sleep patterns, and behavioral changes to enhance emotional well-being. Dietary interventions often emphasize reducing sodium intake, increasing consumption of fruits and vegetables, and adopting heart-healthy eating patterns such as the DASH (Dietary Approaches to Stop Hypertension) diet (Cherian et al. 2019). Regular physical activity is encouraged to promote cardiovascular health, enhance weight loss, and improve overall fitness. Stress management techniques, such as mindfulness and relaxation exercises, play a vital role in reducing hypertension as stress is a known contributor to elevated blood pressure levels (Ajoolabady et al. 2022). Improving sleep quality is another crucial aspect, as poor sleep has been linked to both obesity and hypertension (Alkhaldi et al. 2023). Behavioural interventions that promote emotional well-being can help manage psychological stress and improve adherence to healthy lifestyle practices (Xiong et al. 2023). These multifaceted approaches are designed to work synergistically to control blood pressure, mitigate hypertension-related complications, and enhance the overall health and quality of life for obese individuals.

Understanding the effectiveness of these interventions can inform clinical practices and public health policies, ultimately leading to better management of hypertension in obese populations (Yadav and Jawahar 2024). This systematic review synthesizes evidence from various studies to provide a comprehensive overview of the impact of these interventions, highlighting successful strategies and identifying areas where

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further research is needed.

2. Methodology

In conducting a systematic review on controlling hypertensive episodes among obese adults, the selection of appropriate databases and keywords is a critical step (Stemmer et al. 2022). This process ensures comprehensive and relevant literature coverage, which is essential for drawing accurate and reliable conclusions (Selcuk 2019). Table 1, shows the databases with keywords in this systematic review. This essay elaborates on the importance of each database and the rationale behind the chosen keywords.

PubMed is one of the most widely used databases for biomedical and life sciences literature (Ossom Williamson and Minter 2019). It provides access to a vast repository of research articles, clinical trials, and reviews, making it an indispensable resource for healthcare-related systematic reviews. The database is maintained by the National Center for Biotechnology Information (NCBI) and is freely accessible to the public. PubMed's comprehensive coverage of medical journals ensures that researchers can find high-quality and peer-reviewed studies relevant to hypertension and obesity.

Embase is another critical database for biomedical literature, particularly known for its extensive coverage of international journals and conference proceedings (Blaizot et al. 2022). It is maintained by Elsevier and offers advanced search features that enhance the ability to find specific studies related to medical and pharmacological research. Embase includes a unique indexing system called Emtree, which allows for precise retrieval of articles. This database complements PubMed by providing additional sources that may not be indexed in PubMed, thus broadening the scope of the review.

Science Direct, also maintained by Elsevier, is a leading full-text scientific database offering a vast collection of journal articles and book chapters (Escaldelai, Escaldelai, and Bergamaschi 2022). It covers a wide range of disciplines, including health sciences, physical sciences, and social sciences. For systematic reviews on medical topics like hypertension and obesity, Science Direct provides access to multidisciplinary research, including studies on the physiological, behavioral, and social aspects of health. This database helps ensure that the review encompasses diverse perspectives and research findings.

Selecting appropriate keywords is crucial for ensuring that the literature search is both comprehensive and focused (Petersen et al. 2021). The keywords chosen for this systematic review are tailored to capture studies that specifically address the intersection of obesity and hypertension. The keywords "obesity" and "hypertension" are fundamental to the research topic. Obesity is a medical condition characterized by excessive body fat, which is associated with an increased risk of various health issues, including hypertension. Hypertension, or high blood pressure, is a common cardiovascular condition that can lead to severe health complications. By combining these keywords, the search targets studies that explore the relationship between obesity and hypertension, interventions to manage these conditions, and their outcomes.

The key word "hypertensive episodes" refers to instances where an individual experiences elevated blood pressure levels, often to a dangerous degree. This keyword is specific and targets research focused on acute occurrences of high blood pressure, their triggers, and management strategies. Including this term helps identify studies that delve into the episodic nature of hypertension in obese individuals and the effectiveness of various interventions in preventing or managing these episodes (Abdalla et al. 2023). The combination of "obese" and "hypertension" as keywords in Science Direct emphasizes the specific population of interest—obese individuals with hypertension. This keyword pairing ensures that the search results are highly relevant to the research question, capturing studies that investigate how obesity contributes to the development and progression of hypertension, as well as interventions tailored to this demographic (World Health Organization 2023).

The careful selection of databases also included filters such as the inclusion of not more than 10 years published researches, commentaries, other literatures, and non-human subjects. This approach ensures that the systematic review is well-rounded, evidence-based, and provides valuable insights into managing hypertensive episodes among obese adults.

Table 1
Database with key words

PubMed	Obesity, hypertension
Embase	Hypertensive episodes
Science Direct	Obese hypertension

In the process of conducting a systematic review, adhering to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline in Fig. 1 is essential to ensure transparency, clarity, and comprehensiveness (Page et al. 2021). The PRISMA flow diagram, specifically, is a crucial component that visually represents the process of identifying, screening, and including studies in the review.

In the identification phase, 150 records were identified through database searching. The screening phase involved removing 50 duplicates, resulting in 100 records to be screened. After assessing the titles and abstracts, 70 records were excluded, leaving 30 full-text articles to be assessed for eligibility. Of these, 11 articles were excluded for various reasons, such as not meeting the inclusion criteria or having significant methodological issues. Ultimately, 6 studies were included. The detailed and systematic approach outlined by the PRISMA guidelines ensures that the review process is transparent, reproducible, and comprehensive. This methodology provides a clear and structured pathway for conducting high-quality systematic reviews and meta-analyses, enhancing the reliability and credibility of the findings.

3. Findings

Of the 150 studies extracted from databases, only 6 studies were used (table 2). Diet, emotional wellbeing, stress management in working environments, improving activities of daily living, exercises, and sleep patterns were the means of controlling hypertensive episodes among obese adults.

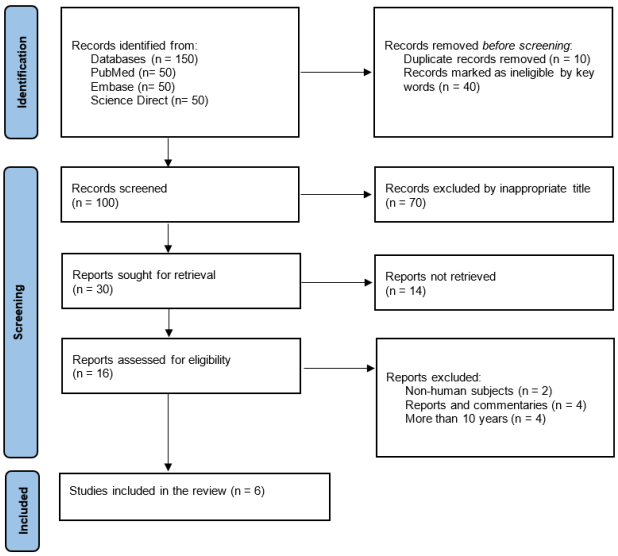

Fig. 1. PRISMA guidelines

The Fig. 1 provides a comprehensive analysis of various lifestyle factors and their correlation with controlling hypertension among obese adults. The findings are drawn from a series of studies that examine different aspects of lifestyle, illustrating how these factors play a crucial role in managing cardiovascular health.

The first variable, "Diet as a Lifestyle," is highlighted by Mohammadi et al. (2019). The study emphasizes the importance of adopting a diet that prioritizes cardiovascular health to control hypertension in obese adults. This finding underscores the necessity for dietary interventions that focus on heart-healthy foods, such as fruits, vegetables, whole grains, and lean proteins, while reducing the intake of sodium, saturated fats, and sugars. By adhering to these dietary guidelines, obese adults can significantly mitigate the risk of hypertension.

Next, the concept of "Emotional Well-being as a Lifestyle" is explored by Gmmash et al. (2023). This study finds that integrating positive mental health practices into daily routines is effective in controlling hypertension among obese adults. The focus here is on the psychological aspect of health, suggesting that mental well-being is intricately linked to physical health. Techniques such as mindfulness, meditation, and stress-reducing activities contribute to emotional stability, which in turn supports cardiovascular health.

"Stress Management in Working Environments," as investigated by Alosaimi et al. (2018), reveals that recognizing and addressing the impact of stress on cardiovascular health can control hypertension. This study highlights the critical role of stress management in the workplace, advocating for strategies that reduce work-related stress. Techniques such as time management, relaxation exercises, and creating a supportive work environment are essential in mitigating stress and its adverse effects on blood pressure.

The study by Javeed et al. (2023) examines "Improving Activities of Daily Living" and concludes that adopting healthier routines contributes to controlling hypertensive episodes among obese adults. This finding indicates that making small, consistent changes in daily habits, such as incorporating regular physical activity, maintaining a balanced diet, and ensuring adequate rest, can collectively have a significant impact on managing hypertension.

"Exercise as a Lifestyle," explored by Althumiri et al. (2021), emphasizes the role of physical activity in cardiovascular health. The study indicates that regular exercise is pivotal in controlling hypertension. Engaging in activities like walking, cycling, or swimming for at least 150 minutes per week can enhance cardiovascular fitness, reduce body weight, and lower blood pressure, thereby contributing to overall heart health.

Finally, "Sleep Patterns as a Lifestyle," investigated by Wang et al. (2019), points out that consistent and restorative sleep patterns are aligned with controlling hypertension. The study underscores the importance of sleep hygiene, suggesting that quality sleep is vital for cardiovascular health. Establishing a regular sleep schedule, creating a restful sleeping environment, and avoiding stimulants before bedtime are crucial steps in ensuring adequate and restorative sleep, which in turn helps in managing hypertension.

The Fig. 2 provides a detailed examination of how different lifestyle factors are essential in controlling hypertension among obese adults. Each study offers valuable insights into the interconnectedness of diet, emotional well-being, stress management, daily activities, exercise, and sleep patterns in maintaining cardiovascular health. By addressing these variables, individuals can adopt a holistic approach to managing hypertension, ultimately leading to improved overall health and well-being.

Figure 2 shows the synthesis of new knowledge from this systematic review. This presents a conceptual diagram emphasizing the analyzed role of health promotion in managing and preventing hypertension and obesity.

Health promotion, as indicated in the diagram, is central to

Table 2
Findings

Variables	Studies	Findings
Diet as a Lifestyle	(Mohammadi et al. 2019)	adopting a diet that prioritizes cardiovascular health is essential in controlling hypertension among obese adults
Emotional Well-being as a Lifestyle	(Gmmash et al. 2023)	efforts to control hypertension among obese adults integrating positive mental health practices into daily routines
Stress Management in Working Environments	(Alosaimi et al. 2018)	recognizing the impact of stress on cardiovascular health can control hypertension
Improving Activities of Daily Living	(Javeed et al. 2023)	adopting healthier routines contribute to controlling hypertensive episodes among obese adults
Exercise as a Lifestyle	(Althumiri et al. 2021)	emphasizing the role of physical activity in cardiovascular health can control hypertension
Sleep Patterns as a Lifestyle	(Wang et al. 2019)	consistent and restorative sleep patterns align with controlling hypertension

addressing issues related to both hypertension and obesity (Phillips 2019). The diagram suggests a direct relationship between health promotion activities and the control of these two conditions. By focusing on improving lifestyle factors such as diet and exercise, individuals can mitigate the risks associated with hypertension and obesity. The arrow between "Health promotion" and "Control hypertension" indicates that efforts in promoting healthy living directly influence the management of hypertension. Similarly, another arrow connects health promotion with "Control obesity," highlighting the critical role lifestyle interventions play in managing body weight.

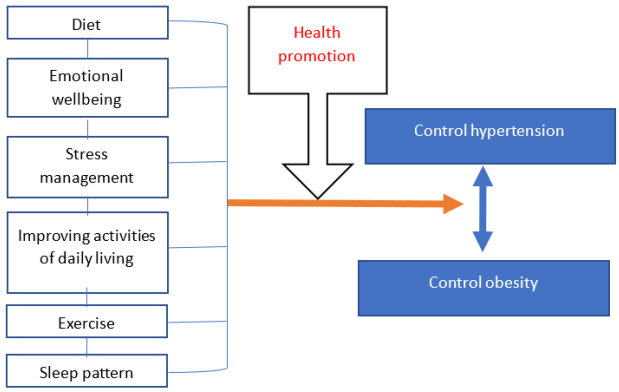

Fig. 2.

The relationship between controlling hypertension and obesity is depicted as a bidirectional arrow, illustrating that these two health issues are interrelated (Wahabi et al. 2023). Hypertension and obesity often coexist and can exacerbate each other. For instance, obesity is a major risk factor for hypertension because excess body weight increases the strain on the cardiovascular system. Conversely, hypertension can make it more challenging to manage weight, as certain antihypertensive medications may contribute to weight gain (Parrettini, Caroli, and Torlone 2020). Therefore, effective management of one condition can positively impact the other, creating a beneficial cycle of health improvement.

The diagram's focus on holistic health promotion activities underscores the importance of a comprehensive approach to health (Iriarte-Roteta et al. 2020). A balanced diet can help reduce blood pressure and control weight, while regular exercise not only aids in weight management but also improves cardiovascular health. Emotional wellbeing and stress management are crucial as stress can lead to behaviors that contribute to obesity and hypertension, such as overeating or physical inactivity. Improving activities of daily living can enhance overall physical fitness and mobility, which are vital for maintaining a healthy weight and blood pressure. Lastly, maintaining a healthy sleep pattern is important because poor sleep is linked to both hypertension and obesity.

The diagram conveys that health promotion is a multifaceted approach essential for controlling hypertension and obesity. By addressing diet, emotional wellbeing, stress, daily activities, exercise, and sleep, individuals can significantly improve their health outcomes. The interplay between these factors and the conditions of hypertension and obesity emphasizes the need for integrated and sustained health promotion strategies.

4. Discussion

The Critical Appraisal Skills Programme (CASP), (2020) and the Joanna Briggs Institute, (2024) (JBI) Critical Appraisal Checklist are essential tools for evaluating the quality and reliability of analytical cross-sectional studies. These tools provide structured and systematic approaches for appraising research studies to determine their validity, relevance, and applicability in clinical practice.

The CASP tool comprises a series of questions designed to help users systematically examine the methodology, results, and implications of a research study. For example, in the study by Alosaimi et al. (2018), which explores stress and coping mechanisms among consultant physicians in Saudi Arabia, the CASP checklist would guide the appraisal process through questions focusing on the study's aim, design, methodology, ethical considerations, data analysis, results, and overall contribution to the existing body of knowledge on occupational stress among healthcare professionals. Specifically, the tool would assess the clarity of the research question, the appropriateness of the study design, the validity of the measurements, the recruitment strategy, and the robustness of the data analysis, among other aspects.

Similarly, the JBI, (2024) Critical Appraisal Checklist for Analytical Cross-Sectional Studies provides a comprehensive framework for evaluating the methodological quality of studies. This checklist includes criteria such as the clarity of the study objectives, the definition and measurement of variables, the appropriateness of the sampling strategy, the reliability and validity of data collection methods, and the rigor of statistical analysis. Applying the JBI checklist to the study by Althumiri et al. (2021) on weight stigma in Saudi Arabia, one would examine the precise definition and consistent measurement of weight stigma, the representativeness of the sample, the adequacy of the data collection instruments, and the appropriateness of the statistical methods used to analyze the relationship between weight stigma and its impacts on the population.

In the study by Gmmash et al. (2023), which investigates the influence of an exercise program on physical, emotional, and mental health among Saudi adolescents, the CASP tool would evaluate the alignment of the study's objectives with the research design, the appropriateness of the intervention and control groups, the robustness of the outcome measures, and the significance of the results in contributing to the understanding of the benefits of exercise on adolescent health. The JBI checklist, on the other hand, would focus on the detailed appraisal of the study's sampling technique, data collection methods, and the integrity of the statistical analysis, ensuring that the study's findings are both reliable and valid.

Both tools emphasize the importance of critical thinking and a systematic approach to assessing research. The CASP, (2020) tool, with its structured questions, and the JBI, (2024) checklist, with its detailed criteria, help researchers, practitioners, and policymakers determine the trustworthiness and relevance of research findings. For instance, in evaluating the study by

Javeed et al. (2023) on intelligent ADL recognition via IoT-based multimodal deep learning framework, the CASP tool would assess the clarity and significance of the research question, the rigor of the research methodology, and the implications of the findings. The JBI checklist would similarly ensure a thorough evaluation of the study's design, data collection methods, and statistical analysis, confirming the reliability of the conclusions drawn.

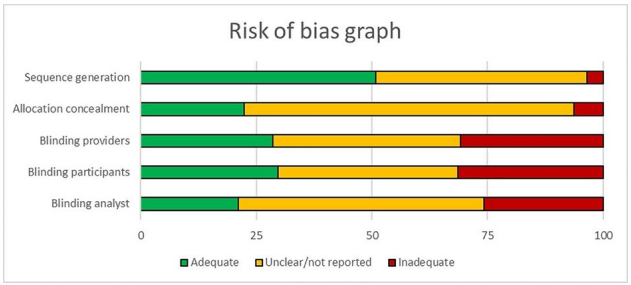

Fig. 3. Risk of biases analysed

It is also essential to meticulously evaluate various aspects of the research methodologies to assess the risk of biases. Figure 3, illustrates the risk of bias graph, that is particularly useful for understanding how different elements such as sequence generation, allocation concealment, and blinding are assessed for adequacy, unclear/not reported, or inadequacy.

The study by Althumiri et al. (2021) exploring weight stigma in Saudi Arabia utilized a nationwide cross-sectional survey methodology. The study's sequence generation, which refers to how the study population was selected, appears to be adequate as the study adopted a proportional quota-sampling technique to ensure a representative sample across different regions, ages, and sexes in Saudi Arabia. However, allocation concealment, or the process by which participants were assigned to different groups, may be unclear or not reported as this detail is not explicitly mentioned in the methods section. The blinding of providers, participants, and analysts is also a crucial aspect. In this study, since it involved self-reported data through phone interviews, blinding of participants and analysts might not have been feasible, introducing a potential bias.

Similarly, Alosaimi et al. (2018) investigated stress and coping among consultant physicians in Saudi Arabia using a cross-sectional design. This study's risk of bias can be assessed similarly. Sequence generation seems adequate as the study included a comprehensive sample of physicians across various specialties and regions. Allocation concealment and blinding details, however, might not be fully addressed in the study, potentially leading to biases in how responses were reported and analyzed. Blinding of participants and analysts would be particularly challenging in this context as the study involved self-reported stress levels and coping mechanisms, which are subjective and prone to reporting biases.

The study by Gmmash et al. (2023) on the influence of an exercise program on adolescents' health in Saudi Arabia also follows a cross-sectional design. The sequence generation appears adequate with a specific population of adolescents participating in an 8-week exercise program. However, like the previous studies, details on allocation concealment and blinding are not thoroughly addressed, which may affect the study's internal validity. Given that this study involves physical and mental health assessments, the blinding of providers (those administering the exercise program) and analysts (those assessing the outcomes) is crucial but may not be adequately reported.

In contrast, Javeed et al. (2023) employed a cross-sectional approach in developing an IoT-based multimodal deep learning framework for intelligent ADL recognition. The sequence generation in this study is likely adequate as it involved a structured dataset for deep learning. However, allocation concealment and blinding, especially of the analysts, are critical as the study outcomes heavily rely on data interpretation by the algorithms and researchers. Any inadequacies in blinding could lead to biased results.

Mohammadi et al. (2019) on dietary and physical activity patterns among Malaysian adolescents provides another perspective on assessing biases. While systematic reviews often have stringent methodologies, assessing sequence generation, allocation concealment, and blinding in the included studies is crucial. The review itself might adequately address these biases, but the individual studies' methodologies need to be scrutinized for any potential bias.

Finally, Wang et al. (2019) studied the association of sleep duration and naps with mortality and cardiovascular events across multiple countries. This extensive study's sequence generation appears robust, but as with other large-scale studies, details on allocation concealment and blinding are vital to ensuring unbiased results. The large sample size and diverse population improve the study's external validity, but internal validity could be affected if these methodological aspects are inadequately addressed.

Using tools like the CASP and JBI checklists allows for a detailed evaluation of the risk of biases in cross-sectional studies. The attached risk of bias graph illustrates the importance of assessing sequence generation, allocation concealment, and blinding to ensure the reliability and validity of study findings. By meticulously applying these tools, researchers and readers can better understand the potential biases and limitations inherent in these studies.

5. Conclusion

Adopting cardiovascular-friendly diets, integrating positive mental health practices, recognizing stress's impact on cardiovascular health, adopting healthier routines, emphasizing physical activity, and maintaining consistent sleep patterns were essential strategies for effectively controlling hypertension among obese adults.

The synthesis of new knowledge is analysed that health promotion encompassed several key areas: diet, emotional wellbeing, stress management, improving activities of daily living, exercise, and sleep patterns. Each of these components contributes to an overall strategy aimed at enhancing an individual's health.

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