

Increased risk of heart failure in obese patients

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Abstract

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<p>Obesity has become a worldwide health concern, with studies showing that obese people had a twice-higher risk of heart failure. Therefore, it is well-established that effective heart failure prevention in obese individuals, including lifestyles modifications and physical activity, greatly lowers the incidence of heart failure.</p> <p>By literature review, the aim of this thesis is to broaden understanding of heart failure and obesity. In addition to providing information for nursing students and graduated nurses to avoid and recognize heart failure while caring for obese patients, the purpose of this thesis is to investigate and ascertain the relationship between obesity and heart failure in previous research. Regarding this matter, the thesis determined that heart failure has a connection to obesity through a significant number of studies. Furthermore, both obesity and heart failure can be prevented through a combination of lifestyle changes, physical activities and nursing intervention.</p> <p>The methodology used in this thesis is inductive qualitative data analysis. Cochrane and PubMed were used to access the research database. 12 articles that are relevant to the main concerns were chosen and examined. The data analysis revealed that the two main themes that came up were nursing approaches and definitions.</p>		
Keywords		
Heart failure, obesity, increased risk, prevention, pathophysiology, induced		

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Appendix 1. Summary of articles

1 Introduction

In 2016, over 1.9 billion individuals (18 years of age and older) were overweight. Among of these people, almost 650 million were obese. Globally, the prevalence of obesity almost quadrupled between 1975 and 2016. An improper or excessive accumulation of fat that may be hazardous to one's health is referred to as obesity. The body mass index and waist circumference were employed to characterize obesity. (WHO 2021) The Framingham Heart Study found that the risk of heart failure was twice among those who were obese. After adjusting for established risk variables, the risk of heart failure increased by 5% in men and 7% in women for every extra 1kg/m^2 in BMI. (Kinlen et al. 2018, 437-443.)

According to Centers for Disease Control and Prevention (CDC 2023), estimate that 6.2 million individuals in US have a heart failure diagnosis. Furthermore, heart failure was expected to be responsible for 379,800 death certificates worldwide, or around 13.4% of all death certificates. Heart failure is a dangerous ailment that occurs when the heart cannot pump enough blood or oxygen to other organs in the body. It is important to note that heart failure does not indicate that the heart stops pumping. (CDC 2023.) One of the heart failure risk factors that rises with time is obesity, which is thought to account for 14% heart failure cases in women and 11% in men (Dunlay et al. 2009 & Ebong et al. 2014).

These factors will determine that what may be learned about the relationships between obesity and heart failure in this study.

The purpose of this thesis is to increase the understanding of obesity and heart failure among nursing students and practicing nurses. Additionally, the goal of this research is to examine the relationships between obesity and heart failure based on earlier studies. This study aims to finding out about how to minimize heart failure in people who are fat as well.

2 Key concepts

2.1 Obese patients

2.1.1 Definition

According to WHO, obesity is described as an abnormal or excessive build-up of fat that causes a health concern (WHO 2021.) Obesity was classified by the World Obesity Federation as a chronic relapsing disease process. Genetic, socioeconomic, and cultural factors interact in intricate ways to cause obesity. The prevalence of obesity is influenced by lifestyle choices, urban planning, and consumption trends. The condition could be the outcome of a medical problem or drug therapy. Additionally, it can increase the chance of comorbid conditions. Obese individuals have lower rates of school attendance, lower earning capacity, and higher healthcare expenses, all of which could place a financial strain on society. (Apovian 2016,1.)

2.1.2 Body mass index (BMI)

Obesity is identified using the body mass index (BMI), which is calculated by dividing weight in kilograms by height in square meters. Adults with a BMI of 25.0 to 29.9 kg/m² are considered overweight, and those with a BMI of 30 kg/m² or higher are considered obese. The standard cut-off points for identifying a patient at increased risk for obesity-related illnesses, including type 2 diabetes, hypertension, and cardiovascular disease, is 25 kg/m² BMI. Compared to the lowest risk category (BMI, 19.0 to 21.9 kg/m²), the risk of death starts to rise at a BMI of 23 kg/m². Gradually, medical risk increases with increasing levels of obesity, starting with overweight (defined as a BMI between 25.0 and 29.9 kg/m²), progressing through class I obesity (defined as a BMI between 30.0 and 34.9 kg/m²), class II obesity (defined as a BMI between 35.0 and 39.9 kg/m²), and class III or extreme obesity (defined as a BMI 40 kg/m²). (Aronne MD 2012,2.) A further note for the use of BMI as an obesity indicator put forward by WHO (WHO expert consultation 2004, according to Seidell and Halberstadt (2015, 8-9) indicates that BMI ranges for obesity can also vary depending on the population, particularly in Asian populations, where a BMI of 22-25 is considered overweight, while 26-31 clocks in at a high-risk case.

2.1.3 Waist circumference

Waist circumference (WC), which measures abdominal obesity, has been shown to predict obesity-related health risk, and the weighted evidence suggests that WC and BMI together predict health risk more accurately than BMI alone (Ian et al. 2004, 379-384). Abdominal fat

can be measured using waist circumference, which has a high correlation with the quantity of intra-abdominal fat. The distance between the superior iliac crest and the lower edge of the final rib is used to estimate the WC in a horizontal plane. The most current International Diabetes Federation agreement classified central obesity in Europeans as a WC of 94 cm in men and 80 cm in non-pregnant women. This condition is also referred to as visceral, android, apple-shaped, or upper body obesity. (Yumuk et al. 2015, 9.)

2.2 Heart failure

2.2.1 Definition

Rather than being a single illness, heart failure (HF) is a clinical disorder with a variety of aetiology and pathophysiology (Bozkurt et al. 2021, 389). In medical terminology, heart failure (HF) is a condition defined by the heart's incapacity to pump enough blood and oxygen to fulfil the metabolic demands of other organs (Castiglione et al. 2021, 926). Nevertheless, this standard only pertains to a small percentage of heart failure patients, is challenging to apply, and usually cannot be confirmed in practice (Bozkurt et al. 2021, 391 & Segovia et al. 2004, 252).

2.2.2 Risk factors

Recent research has revealed a number of risk factors for heart failure (HF), including high blood pressure (BP), diabetes, smoking and obesity (Meijers & de Boer 2019, 845). A population-based cohort using linked electronic health records was used to determine the risk factors for incident heart failure in age- and sex-specific strata. These factors included genetics, age, ethnicity, social deprivation, body mass index (BMI), physical activity, smoking, lipid measures, comorbidities (e.g., diabetes, hypertension, atrial fibrillation (AF)...), and the prescription of medications that decrease blood pressure and regulate cholesterol are also additional risk factors that lead to heart failure (Uijl et al. 2019, 644).

2.2.3 Signs and symptoms

Weakness, ankle edema, persistent coughing or wheezing, dyspnea, and coughing up blood due to cardiac malfunction are common signs of heart failure (Gardner et al. 2014, 11). Besides, peripheral edema, pulmonary crackles, and an increased heart rate are additional symptoms (Lainscak et al. 2017, 1556). Due to cardiac malfunction, patients with heart failure may also experience confusion, difficulty thinking clearly, nausea, and appetite loss (American Health Association 2017). Furthermore, the most common early-onset symptoms are shortness of breath and chest discomfort, which may be triggered by physical

activity such as dressing. The lower left chamber of heart thickens and become less able to pump blood as a consequence of heart failure (HF), which cause Edema and fluid retention in the ankles, legs and feet.

2.2.4 Preventions

The two main factors that prevent heart failure are good lifestyle choices and prescription drugs (CDC 2020). Heart failure risk factors may be reduced by eating a balanced diet, exercising, quitting smoking, and keeping a healthy weight. These risks include diabetes mellitus, heart disease, and hypertension. Furthermore, research indicates that moderate to light alcohol use is associated with a 40% to 50% decreased risk of heart failure. Although alcohol has also been shown to have positive effects on the risk for hypertension, myocardial infarction, and diabetes mellitus (Butler 2012, 391).

3 Aims, purpose and research questions

The aim of this thesis is to increase knowledge related to obesity and -heart failure. This study is done in a form of literature review.

The purpose of this study is to explore and determine the link between obesity and heart failure on earlier literature. Moreover, this thesis also provides knowledge for nursing students, and graduated nurses also to prevent and notice heart failure while taking care for obese patients.

Two primary questions about this matter are addressed in this thesis:

1. What are the connections between obesity and heart failure?
2. How to prevent heart failure which is caused by obesity?

4 Methods

4.1 Theory about literature review

The best approach for this thesis has been determined to be an integrated literature review. The integrated literature review summarizes the existing research or theoretical literature to provide a more comprehensive knowledge of a certain topic. Since it allows the blending of many approaches, it has the potential to contribute more than any other technique to the implementation of evidence-based practice in nursing. This methodology was broken down into five by Whitemore and Knafl (2005, 547): issue identification, literature investigation, data assessment, data analysis, and presentation (Sulosaari et al. 2011, 465-466). There are many databases to search for relevant materials, however, some popular and helpful databases to search for the medical nursing sector include EBSCO and Medline.

The nursing profession has an enormous and constantly growing body of medical knowledge. A literature review is thus a useful tool for providing a full overview and analysis of research subjects. The literature review seeks to locate, evaluate, and compile all empirical data that satisfies certain inclusion requirements in order to respond to a narrowly focused clinical issue, which is regarded as the benchmark (Smith & Noble 2016).

4.2 Data search and collection

To identify certain themes of relevance for this thesis, a literature search was conducted using pertinent keywords across many databases. Obesity, increased risk, prevention, heart failure, pathophysiology and induced were the keywords that were used. In order to identify the subject of the work, inclusion and exclusion criteria are used. These criteria were used in this research to gather more relevant data. Numerous variables, including date, language, publishing type, and articles, are employed as inclusion and exclusion criteria. To guarantee that the study findings are current and up to date, published publications are restricted to those that were written during the previous ten years. Since English is an international language and is also the language in which this study is conducted, only English resources were utilized for the research. Free full text access is much more significant than paid articles, and authors may save money and time by not having to create a new account and access the content. Books are seldom selected as study topics; instead, scientific journals are used more often to guarantee consistency and update with time.

Inclusion criteria	Exclusion criteria
Articles between 2013-2023	Articles before 2013

English	Other languages
Free full text articles	Paid articles
Scientific journals	Books

Table 1. Inclusion and exclusion criteria

Online resources from PubMed and Cochrane were used to gather data. The United States National Library of Medical (NLM) constructed the freely accessible database PubMed. In particular, PubMed is a useful resource for researchers to choose relevant articles by applying filters based on text availability, article genres, language, publication date, and so on. However, with its headquarters located in the UK, Cochrane is also a global resource in the healthcare sector. Your understanding and ability to make decisions about healthcare may be greatly improved by using Cochrane evidence.

Databased	Search words	Found articles	Used articles
PubMed	Heart failure AND Obesity	3128	7
	Increased risk of heart failure AND obesity	988	1
	Pathophysiology AND heart failure AND obesity	673	1
	Obesity induced heart failure	416	0
	Prevention AND obesity AND obesity	38441	4

Cochrane	Heart failure AND Obesity	9	0
	Increased risk of heart failure AND obesity	9	0
	Pathophysiology AND heart failure AND obesity	0	0
	Obesity induced heart failure	1	0
	Prevention AND obesity AND obesity	69	0

Table 2. Data search

PubMed has advantages since it offers several filters for gathering pertinent articles. There are drawbacks to Cochrane since it offers fewer articles without restrictions, such as time limits, and it was unable to locate any suitable articles on this topic. In order to elucidate the relationship between obesity and heart failure as well as the prevention of obesity and heart failure, a total of 13 articles were gathered and examined. The authors have thoroughly studied and investigated each article that has been chosen for examination.

5 Result

5.1 Connections between obesity and heart failure

Heart failure may result from involvement of the left, right, or both sides of the heart. Either right- or left-sided heart failure may be associated with systolic and diastolic dysfunction. Systolic and diastolic dysfunction cause elevated pressures in the left atrium and pulmonary venous system as well as reduced cardiac output in patients with left-sided heart failure. Blood oxygen levels are reduced by lung congestion brought on by the pressures. While obesity causes a hyperdynamic circulation, an increase in blood volume, and a higher cardiac output due to the increased metabolic demands brought on by an excess of adipose tissue and fat-free mass. The right and left ventricles see an increase in venous return due to the volume increase in blood, which causes these chambers to dilate and experience an increase in wall tension (Ebong et al. 2015, 2 & Lavie et al. 2013, 217).

In specifics, obese persons have cardiac fibers invaded by adipose tissue, which results in structural changes to the heart and malfunction of ventricles and atria. Because adipose fat puts pressure on the heart, it may actually cause the cardiac cells to deteriorate, making them more susceptible to fibrosis (Ashraf and Baweja 2013, 502). Patients who are very obese may experience changes in ventricular function, cardiac anatomical abnormalities, and central hemodynamic, all of which increase their risk of developing heart failure. Both individuals with simple (normotensive) extreme obesity and those with chronic systemic hypertension were often found to have predominant eccentric left ventricular hypertrophy (LVH). Under the condition known as left ventricular hypertrophy (LVH), the mass of the left ventricle increases, either as a result of expansion of the left ventricle or an increase in wall thickness, or both (Bornstein et al. 2023, 2). In addition, severe chronic inflammation of adipose tissue and evident molecular and cellular dysregulation in several organs are characteristics of obesity, as is adiposity of the bones and liver. The increased cardiac effort brought on by the extra adipose tissue's high metabolic needs also causes an increase in LV mass (Halade and Kain 2017, 7).

Even with a good metabolism, those who are overweight or obese are predicted to be around 23% and 52% more likely to have heart failure. Obesity may lead to metabolically harmful phenotypes of overweight or obesity because it causes metabolic abnormalities such as elevated blood pressure, hyperlipidemia, elevated fasting glucose levels, and insulin resistance worsening cardiac function and increasing heart failure severely (Wang et al. 2022, 3).

5.2 Preventions of obesity and heart failure

Obesity and heart failure is partly preventable as contemporary sources would have us believe. Although it is true to certain extents that obesity and heart diseases can sometimes be a result of genetics, it is also suggested that these conditions can be significantly minimized and prevented by lifestyle factors and other preventative measures taken consciously by each individual (Novelli et al. 2023, 2). This section highlights the possible approach that can be taken to reduce the risk of obesity and heart failure

5.2.1 Lifestyle changes

The first and most obvious means of reducing the likelihood and impact of obesity and heart failure is adjusting one's lifestyle and energy intake. Lifestyle habits that can often play a part in an uptick of obesity risk include unreasonable working days which do not make room for stable mealtimes, a high intake of energy without sufficient means of energy usage, leading to fat build up, excessive alcohol and tobacco consumption, as well as sleep deprivation and emotional stimuli (Mohammed et al. 2018, 4, Butler and Khan 2020, 1466, Shea and Blaha 2022, 3-4, Piepoli et al. 2022, 149-150). Additionally, an intensive study by Aggarwal et al. (2018, 2394-2395) concluded that, for Nordic and North American populations, a rich diet of red meat, dairy and eggs also increases the likelihood of strokes and heart failures. Conversely, the same study found that a diet rich in berries, fruits and vegetables will help reduce the risks as well as increase the chances of survival for stroke and heart failure patients. Furthermore, it is also advisable to reduce sodium intake, as salt is also considered a potential risk factor for obesity and its associated cardiovascular complications.

5.2.2 Physical activity

In order to prevent or treat obesity, a healthy energy balance must be achieved, which can only be achieved via physical exercise as a means of using up excess daily energy intake. For those who are obese, exercise and physical activity may aid with weight reduction, body fat loss, visceral abdominal fat loss, and potentially even weight maintenance following weight loss (Oppert J et al. 2021, 8-9). It has been suggested that exercise may mitigate the correlation between obesity and subclinical cardiac injury. It has been revealed that risk polymorphisms in the fat-mass and obesity-associated gene (FTO), a gene closely linked to obesity, predisposed bearers to an increased risk of cardiovascular disease, but only in the case of sedentary individuals. An estimated 2,300 heart failure patients demonstrated that exercise training enhanced their capacity for activity and quality of life while lowering their

likelihood of hospitalization for heart failure. In a major victory for the heart failure community, the U.S. Centers for Medicare and Medicaid Services decided to pay cardiac rehabilitation for patients with heart failure had a lower ejection infraction (Ahmad and Testani 2017, 385-386 & Lavie et al. 2020, 93).

Not only does physical exercise require energy expenditure, but it also increases resting metabolic rate as well as an overall higher oxygen consumption and a high rate of circulation (Lindgren and Börjesson 2021, 5). Engaging in regular exercise may enhance one's physical composition. When losing weight, well-crafted physical exercise regimens may even help to maintain or grow lean muscle mass. Maintaining weight reduction has also been closely linked to physical exercise. For majority of obese people, walking is the most practical and sensible strategy to boost their physical activity levels. There are many ways that physical exercise might help prevent and manage obesity. Dietitians and other medical professionals who deal with obese patients should be knowledgeable about the role physical activity plays in an all-encompassing approach to treating obesity and how to include a prescription for physical exercise in treatment regimens.

5.2.3 Role of the medical institution

There is a moderate amount of evidence indicating that the hospital also plays a role in obesity and heart failure prevention for patients during and after admission. Ziaeeian and Fonarow (2016, 5) demonstrated that nursing intervention and patient education will significantly reduce the readmission rate of obese and heart failure cases post-treatment. Similarly, a cross-sectional literature review by Pearce et al. (2019, 14) also noted the importance of hospital intervention, and urged hospital and healthcare units to extend beyond their traditional stance of treatment and attempt to introduce obesity prevention to their care plan.

6 Discussion

6.1 Major findings

A large body of research suggests that body fat in particular, and body composition overall, are significant risk factors for health failure (HF). Numerous main cardiovascular disease risk factors are negatively impacted by obesity, including hypertension, plasma lipids, glucose metabolism, and metabolic syndrome and diabetes. It also raises systemic inflammation, all of which increase the risk of coronary heart disease, heart failure is definitely associated with high blood pressure and cardiac disease. But fat also worsens cardiac anatomy and function, particularly diastolic ventricular function, and promotes left ventricular hypertrophy, particularly in conjunction with hypertension.

Making lifestyle changes can be challenging to fraught with difficulties since unhealthy habits have a direct impact on the lives of those who practice and maintain them over. Therefore, maintaining a healthier lifestyle is an essential, valuable and positive effort for mental and physical well-being, particularly for those who are vulnerable. A healthy lifestyle is largely maintained by practicing healthy eating habits, such as eating balanced meals, consumption of fruits and vegetables, consuming less red meat, avoiding processed foods, salt, substance abuse, emotional stress, as well as cutting back on fat. These practices are essential in preventing obesity, heart failure and other diseases also. Everyone is encouraged to engage in physical exercise as another way to improve their well-being, and each person will choose an exercise program based on their lifestyle and current state of health. Additionally, it emphasizes that smoking and binge drinking are detrimental behaviours that have negative health consequences and enhance the risk of obesity and heart failure. For these reasons, it is imperative that people give up smoking. Behavioural therapy and pharmaceutical assistance have been proven to be helpful in lowering and eventually stopping alcohol use and smoking, despite the fact that several studies have shown how difficult it is to quit smoking and alcohol usage. Alongside these individual lifestyle changes, it is also imperative that the medical institutions play a role in patient education and nursing interventions to help prevent, rather than only treat obesity and heart failures.

6.2 Ethical considerations

Research misconduct may be avoided by following the Responsible Conduct in Research (RCR) guidelines provided by the Finnish Advisory Board on Research Integrity (TENK), which are used by all Finnish universities of applied sciences (TENK 2012). This thesis adheres completely to ethical guidelines to avoid research misconduct, including fabrica-

tion, falsification, plagiarism, and misappropriation. It was created using the bachelor's thesis handbook from LAB University of Applied Sciences. All researchers who have written for any of the information sources in this article are acknowledged for their contributions to the field. The appendix, the list of references and each paragraph appropriately identify the sources from which the findings information was derived. Moreover, the primary conclusions are read several times, objectively assessed, and examined without altering the significance or outcomes from the publications. The research process is carried out with honesty, correctness, and meticulousness at every step. There is a clear description of the procedure for gathering, examining, and assessing data that complies with ethical and scientific standards. Furthermore, every step of this thesis is assessed, observed by the supervising instructor, and provided the necessary guidance to prevent unforeseen errors.

6.3 Validity and reliability

The present information sources are developing so quickly that people are searching for information often, which breeds mistrust. It is also difficult to assess the reliability of the information source. Validity and dependability are crucial considerations for this thesis. Therefore, all of the sources included in this research are trustworthy sources of information since they were all overseen by supervisory professors and LAB University of Applied Sciences. The World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC), and a few more reliable medical data systems including PubMed, Cochrane are the sources of all search data. To discover material pertinent to the major issue of this thesis, all information sources are reviewed thoroughly examined, and filtered. Through data gathering and analysing procedures were followed; they began with terms associated with the thesis's keywords, such as "heart failure", "obesity", "prevention", "increased risk". Even when the title contains the same keywords the search results display several variances that are unrelated.

Although obesity may contribute to the development of heart failure, the majority of research indicates that obesity, particularly as determined by body mass index (BMI), is linked to higher rates of hospitalization but also improved survival; however, in multivariate analysis, it was linked to lower survival.

6.4 Suggestion for further research

This thesis's primary conclusions will serve as a foundation and set of recommendations for further research on the relationship between obesity and heart failure as well as strategies for preventing heart failure in obese people. Subsequent research endeavors might go

deeper and focus on the function of nurses in averting heart failure and identifying the elevated risk of heart failure while tending to fat patients. Heart failure and obesity are worldwide costs, especially for individuals, healthcare providers, and health systems. Although there are now detailed guidelines for preventing heart failure in obese patients, there are still many obstacles and difficulties in putting them into practice. This means that more research is needed to support and develop targeted solutions that can be tailored to the unique circumstances of the economy, society, and culture, as well as the healthcare system.

7 Conclusion

In short, a firm link has been established through a large body of research between obesity and heart failure, as obesity has been suggested to be a strong factor accelerating and worsening cardiovascular conditions, including heart failure and its various risk factors as well as worsening heart function overall through cholesterol buildup within the blood stream.

As obesity and heart failure can be prevented, it is important that the patients adjust their lifestyles accordingly and, through early detection via BMI, should try to increase their level of physical activity and improve their energy balance throughout their lives in order to reduce the risk of heart failure and all its associated risks. Recommended diets include those that are low in red meat, salt, eggs and cheese, as well as a lower overall intake of alcohol, nicotine, and other substances. An ideal diet should contain a high composition of fruits and vegetables and accompanied by regular exercise and other strenuous activities so as to burn up excess energy.

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Appendix 1. Summary of articles

Author(s), Year of publi- cation Journal infor- mation	Title of arti- cles	The objec- tives of arti- cles	Methodology used in the research	Main results
Björck L, Novak M, Schaufelberger M, Giang K. E, Rosengren A. 2015.	Body weight in midlife and long-term risk of developing heart failure-a 35 year-follow-up of the primary prevention study in Gothenburg, Sweden.	The study ascertain if heart failure (HF) throughout a prolonged follow-up into old age is predicted by obesity in midlife.	Meta-analysis	By tracking and examining over 7500 men in Sweden between the ages of 47 and 55, the article showed a clear link between obesity and the risk of HF.
Ashraf M. J, Baweja P. 2013.	Obesity: The 'huge' Problem in Cardiovascular Diseases.	The pathogenesis of cardiovascular disease, its clinical implications in obese individuals, and the effects of weight reduction on the circulatory system are all covered in detail in this article, which also discusses the relationship between obesity and illness.	Literature review and meta-analysis	This article focuses on how obesity affects the cardiovascular system both directly and indirectly. The primary forms of therapy are also covered, along with their beneficial effects on the cardiovascular system

<p>Ndumele E. C, Matsushita K, Lazo M, Bello N, Blumenthal S. R, Gerstenblith G, Nambi V, Balantyne M. C, Solomon D. S, Selvin E, Folsom R. A, Coresh J. 2016.</p>	<p>Obesity and Subtypes of Incident Cardiovascular Disease.</p>	<p>The results underscore the significance of weight control for the best possible prevention of heart failure and the need of identifying non-conventional routes that connect obesity to heart failure incidents in order to guide the creation of new preventive measures.</p>	<p>Observational study</p>	<p>This article examines 13,730 people in the Atherosclerosis Risk in Communities (ARIC) research to demonstrate that obesity is a risk factor for cardiovascular illnesses, including heart failure.</p>
<p>Lavie J. C, Alpert A. M, Arena R, Mehra R. M, Milan V. R, Ventura O. H. 2013.</p>	<p>Impact of obesity and the obesity paradox on prevalence and prognosis in heart failure</p>	<p>The evidence on obesity in relation to cardiopulmonary exercise testing in heart failure will be discussed in this review.</p>	<p>Literature review</p>	<p>This article explores the detrimental effects of obesity on cardiac anatomy as well as the direct and indirect relationships between obesity and heart failure.</p>
<p>Halade V. G, Kain V. 2017.</p>	<p>Obesity and Cardiometabolic Defects in Heart Failure Pathology</p>	<p>The review examines the effects of obesity on cardiovascular pathobiology</p>	<p>Literature review</p>	<p>Through research and a comparison of overweight or obese people</p>

		<p>within the framework of issues and difficulties, focusing mostly on the various models, and examines how obesity affects cardiac remodeling.</p>		<p>with normal weight people with healthy metabolism and normal weight people who are metabolically unhealthy, it has been demonstrated in this article that people who are overweight or obese have a higher risk of heart failure even when they have a healthy metabolism.</p>
<p>Wang X, Dong J, Du Z, Jiang J, Hu Y, Qin L, Hao Y. 2022.</p>	<p>Risk of Heart Failure between Different Metabolic States of Health and Weight: A Meta-Analysis of Cohort Studies</p>	<p>Even among those who are metabolically fit, who are metabolically fit, those who are overweight or obese are more likely to develop heart failure, according to the current meta-analysis of earlier cohort studies.</p>	<p>Systematic reviews</p>	<p>This study demonstrates that being overweight and obese have considerable negative effects on the cardiovascular system through a variety of neurohumoral and cytokine pathways, the majority of which</p>

				include inflammatory mediators.
Hamzeh N, Ghadimi F, Farzaneh R, Hosseini K. S. 2017.	Obesity, Heart Failure, and Obesity Paradox	The study aims to address several pathophysiological pathways that may contribute to heart failure in the obese condition.	Literature review	In order to show that obesity is linked to heart failure, this article addresses the numerous physiological processes that may cause heart failure in obese people, including the molecular mechanisms behind cardiac lipotoxicity. Future increases in heart failure may be predicted by heart disease and rising obesity rates.
Jung M, Shin M. 2023	Mechanisms of heart failure in obesity	The review Explore the diagnostic complexities, pathophysiological aspects, and available treatment strategies for heart failure with preserved	Literature review	This review shows that heart failure with preserved ejection fraction associated with obesity represents a distinct form of heart

		ejection fraction in the context of obesity through a clinical scenario.		failure with preserved ejection fraction characterized by a unique underlying pathophysiology. Nevertheless, challenges in diagnosis frequently arise due to reduced levels of natriuretic peptides and difficulties obtaining clear echocardiographic images in obese individuals.
Ebong A. I, Goff Jr C. D, Rodriguez J. C, Chen H, Bertoni G. A. 2014.	Obesity-related heart failure with preserved ejection fraction: diagnostic and therapeutic challenges	The pathogenesis, treatment alternatives, and diagnostic difficulties for obesity-related HFpEF are compiled in this study.	Literature review	This review addresses the increasing prevalence of heart failure with preserved ejection fraction (HFpEF), focusing on the challenges in diagnosing obesity related HFpEF and the lack of established treatments despite

				the introduction of potential drugs.
Ahmad T, Testani M. J. 2014	Physical Activity Prevents Obesity and Heart Failure: Now What Are We Going to Do About It?	Researchers from the fields of physiology and genetics have endeavored to dissect the components of exercise's health-promoting benefits.	Editorial	This article discusses the widely accepted belief that physical activity is essential for overall health and well-being. It explores the relationship between physical activity, obesity, and cardiac health and emphasizes the need for cardiologists and the healthcare community to promote healthy behaviors to prevent cardiovascular disease.
Lavie J C, Carbone S, Neeland J. I. 2020	Prevention and Treatment of Heart Failure: We Want to Pump You Up	Suggests a significant role for body composition, particularly body fat, in the development of heart failure (HF).	Editorial	This text explores the impact of body composition, including body fat and skeletal muscle mass, on heart failure

				(HF) development and prognosis.
Monica A, Bozkurt B, Panjath G, Aggarwal B, Ostfeld J.R, Barnard D. N, Gaggin H, Freeman M. A, Allen K, Madan S, Massera D, Litwin E. S. 2018.	Lifestyle Modifications for Preventing and Treating Heart Failure	Provides a general overview of lifestyle measurements, particularly as they apply to heart failure (HF), to medical professionals so they can participate in more informed and collaborative decision-making with their patients.	Literature review	It addresses the rising prevalence of heart failure (HF) due to longer survival and unhealthy lifestyles, emphasizing the potential of lifestyle changes to prevent and manage early-stage HF (stage A HF). It reviews evidence on weight management, exercise, nutrition, dietary composition, supplements, and mindfulness as interventions.
Csige I, Ujvárosy D, Szabó Z, Lőrinczl, Paragh G, Harangi M, Somodi S. 2018.	The Impact of Obesity on the Cardiovascular System	The study illustrated how improved methods for cardiac diagnostic procedures enable the early identification and management of	Literature review	This article talks about how obesity impacts the cardiovascular system. While obesity causes heart structure and function

		medical disorders that are not yet clinical, hence preventing cardiovascular events.		changes, it also oddly has a protective effect in some cases, known as the "obesity paradox." Advanced cardiac imaging helps detect issues early, allowing for prevention and treatment.
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