IMPACT OF PHYSICAL ACTIVITIES IN REDUCING THE HYPERTENSION RISK AMONG THE OLD ADULTS IN UNITED KINGDOM.

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Chapter # 01 – Introduction

1.1. Background

This chapter significantly introduced hypertension which is a public health concern in many developed and developing countries. However, the current chapter substantially arbitrates on the mechanism, burden, trends and consequences associated with hypertension and effectually analysed the association between hypertension and mortality score. Therefore, considering the increased risk of mortalities from hypertension, the study particularly aims to evaluate the impact of physical activities in reducing the risk of hypertension among old adults in the United Kingdom.

1.1.1. What is hypertension?

Hypertension is significantly known as an asymptomatic condition in which the systematic blood pressure is persistently elevated from the normal range of 120/80 mmHg. Sinnott et al. (2017) revealed that hypertension is considerably diagnosed when the readings of diastolic blood pressure are greater or equal to 90 mmHg and the systolic blood pressure reading is greater or equal to 140 mmHg. The chronic and persistent arterial pressure is elevated and causes drastic pathological changes in the heart and vasculature (Mills et al., 2020; Wang et al., 2018).

Hypertension or high blood pressure is a silent killer which incidentally associated with the lifestyle and environment of patients and dynamically subjected to preoperative or pre-employment medical check-ups. Furthermore, according to Umemura et al. (2019) hypertension is a serious medical condition which increases the risk for kidney, brain, heart and other diseases if not treated with long-term implications. Overall, in the world, hypertension is considered a cause of premature death and can be effectively controlled through regular physical activity and workouts.

1.1.2. The mechanism of hypertension

The chronic elevation of blood pressure affected to proliferate the risk of mortality and morbidity through organ damage. It is acknowledged that blood pressure is the product of systemic vascular resistance and cardiac output. The causes of arterial hypertension significantly follow an increase in systemic vascular resistance or an increase in cardiac output (Arif et al., 2019). However, the mechanism of hypertension through

systematic vascular resistance involves the impairment of renal pressure natriuresis, which through the feedback system increases the blood pressure. The blood pressure increases through excessive activation of the sympathetic nervous system, inappropriate hormonal regulation such as aldosterone system- angiotensin- renin and impaired renal functioning (Saxena et al., 2018). On the other hand, increasing the arterial pressure is also associated with cardiac output, determining the heart rate through hormonal and neuronal control. Additionally, the stroke volume is related to the size of the vascular compartment and myocardial contractility, which play a crucial role to increase blood pressure (Okuyama et al., 2018).

1.1.3. The burden of hypertension worldwide

Hypertension is a leading cause of mortality and is involved in increasing the global burden of disease. The study by Egan et al. (2019) attributed that worldwide, more than 1 billion individuals have hypertension, which significantly contributes to mortality. Uncontrolled hypertension is considered a major reason, which contributed to 9.4 million deaths annually. The previous findings determined that about 26.2 per cent of the adult population of the UK are subjected to hypertension (Fisher & Curfman, 2018). The public health England (PHE) revealed that every year, hypertension or high blood pressure is a disease, which is projected to cost NHS over £2 billion for loss of productivity, medications to treat hypertension and cost of healthcare services.

1.1.4. The consequences of hypertension

The untreated long-term condition of hypertension doubles the risk of chronic diseases such as heart and cardiovascular diseases and imposes additional risk factors, which lead to mortality and morbidity. Although, it is attributed that when high blood pressure is left untreated, it potentially induces life-threatening conditions and health complications (Sinnott et al., 2017; Cham et al., 2018). It is acknowledged that antihypertensive therapy evidently alleviates the risk of renal and heart disease but according to the study of Arif et al. (2019), an enormous segment of the hypertensive population is either inadequately treated or untreated. However, uncontrolled or untreated hypertension increases the risk of cognitive decline, loss of vision, sexual dysfunction, stroke, kidney diseases, heart failure and heart attack (Mills et al., 2020). Generally, excessive or increased pressure can decrease the oxygen and blood flow to the heart and harden arteries. It is also accountable to cause sudden

death by generating an irregular heartbeat. Overall, it is important to overcome the consequences of hypertension by analysing the different trends associated with hypertension.

1.1.5. Definition and trends of marital status

A significant connection is found between health outcomes and marital status, which is particularly varied by gender. The study of Regensteiner and Reusch (2022) evaluated that in men, being never married is considered an important risk factor for high blood pressure and mortality. Bad marriages are significantly associated with some chronic health conditions. The researchers considerably found a link between health status and marriage, which induces emotional stress and leads to heart damage. Enormous literature was found that revealed that the high mortality risk or poor health is particularly associated with marital status (Tuoyire & Ayetey, 2019; Ramezankhani et al., 2019). Generally, marital status is dynamically associated with both positive as well as negative health outcomes, depending upon the condition.

1.1.6. The effects of physical activities on health in general

A large number of studies precisely demonstrated the optimistic and beneficial influence of physical activity on hypertension and its role to reduce both diastolic and systolic blood pressure. The global burden of disease is proliferating because of sedentary lifestyles and physical inactivity. However, the study by Di Raimondo et al. (2021) proved that regular physical activity is a significant act of managing non-communicable chronic diseases such as cancer, diabetes, stroke, hypertension and heart diseases. Moreover, Cham et al. (2018) also acknowledged that being physically active helps to improve brain activities and strengthen muscles and bones. Additionally, physical activities continuously role to maintain healthy body weight and prevent from hypertension. Being physically active help to prevent and manage serious diseases such as osteoporosis, and arthritis with reduced levels of anxiety, stress and depression (Caligiuri et al., 2017). However, the findings of Pescatello et al. (2019) attributed that physical inactivity role to building up fatty material in arteries and making the heart clogged and damaged which leads to a heart attack. Consequently, it is also found that regular physical activity and exercise pump more blood with less effort and makes the heart stronger.

1.1.7. The association between marital status and the development of hypertension

The quantitative study by Regensteiner and Reusch (2022) analyses the findings and revealed that married women are more likely to develop the risk of hypertension as compared to single. In contrast to this, it is also found that a married person has less psychological stress and more access to social support and financial resources and is more likely to incorporate optimistic behaviour for a healthy lifestyle (Cirulis et al., 2019). Only a few studies were conducted previously that effectually examined the association between hypertension and marital transition (Manfredini et al., 2017). Furthermore, bad marriages or being single could negatively reflect on the health of a person and increase the risk of hypertension and its associated complications. Therefore, various studies indicated that the change in marital status is connected with the higher odds of hypertension.

1.2. Why conducting this systematic review is important.

This systematic review is conducted to evaluate, summarise and identify the research findings relevant to hypertension among old adults in the United Kingdom. The grey literature is executed to understand the optimistic and pessimistic results associated with the topic and comprehensively analyse the available evidence (Sfantou et al., 2017). The systematic review study proceed to understand the risk factors and consequences associated with hypertension and reduce the risk of mortality and morbidity among old adults in the UK. Therefore, this systematic study is significantly important to inform the UK population about the risk of hypertension. Furthermore, it is important to provide evidence for a more accurate risk assessment for hypertension risk scores and to help health care providers with the early detection and risk of hypertension for the adult population (Okuyama et al., 2018).

1.2.1. Inform individuals of the risk of hypertension

The lack of health education and information is considered a risk factor for poor control of hypertension or high blood pressure. According to the study of Schwingshackl et al. (2017), the condition of hypertension is known as a silent killer which in later becomes the major risk factor for other serious diseases such as cardiovascular disease, kidney disease or cognitive illness. However, the treatment and awareness regarding hypertension are not properly or accurately delivered and exclusively contribute to proliferating the mortality and morbidity rate (Fisher &

Curfman, 2018). The associated risk factors, which drastically lead to hypertension, need to be publically identified and required some necessary actions to reduce the rate of hypertension among the adult population of the UK (Niiranen et al., 2017). Overall, hypertension determinately impacts global health and to address the condition, some significant actions are required to improve the health status of the adult population in the UK which embraces accurate health assessment, support to healthcare providers, and early detection of hypertension.

1.2.2. Provide evidence for a more accurate assessment of hypertension risk score

Blood pressure is considered an emerging baseline and a key predictor of hypertension. However, the risk score substantially incorporates the BMI (body mass index), sex and age to identify the tendency for developing the condition of high blood pressure for short and long-term follow-up (Kjeldsen, 2018; Egan et al., 2019). Moreover, the study by Diaz-Gutierrez et al. (2019) identified that the assessment of hypertension can be effectively done by using the prehypertension category or baseline blood pressure. On the other hand, the study of Sfantou et al. (2017) evaluated that to predict hypertension, the healthcare providers substantially develop the risk score for individuals having the age more than 35 years and involve in smoking, parental history, height, and weight. Additionally, to predict hypertension in adults, the Framingham hypertension risk score is a straightforward and well-known model. It particularly includes the simple factors such as standard clinical examination of blood pressure, rate of smoking, genetics, body weight and height associated with hypertension and estimates the risk of developing hypertension (Di Raimondo et al., 2021).

1.2.3. To help healthcare providers confirm the risk population and promote early detection of hypertension

Hypertensive care required the proper team, which includes community health workers, social workers, dietitians, physician assistants, pharmacists, nurses and other healthcare providers. For the adult population, the lifetime risk of developing hypertension was about 80 to 90 per cent and the probability of receiving antihypertensive drugs is almost 60 per cent (Schwingshackl et al., 2017). Additionally, the study by Whelton et al. (2020) estimated that in the UK, around 14.4 million individuals are suffering from hypertension and around 9 million people have a threat of being diagnosed with hypertension by their general physician. Furthermore, the early detection of hypertension through effective assessment or screening helps to increase awareness for those individuals who are at risk of hypertension. It is attributed that the early detection of hypertension

will significantly limit the damage to arteries and the heart and help to prevent various chronic diseases. The effective intervention of continuous in-service training for hypertension helps to alleviate the risk of hypertension (Diaz-Gutierrez et al., 2019). The primary healthcare providers need to promote health-related programs and screening for hypertension to advance the life quality of adult individuals in the UK.

1.3. Why it should be a systematic review

Hypertension is an urgent and detrimental concern of public health, which required proper healthcare intervention to overcome its prevalence (Whelton et al., 2020). Therefore, the current systematic review study is executed to summarise the existing and available evidence and effectually solve the major health issues. A systematic review is a comprehensive way to address serious health issues and fill the research gap by minimising bias. Moreover, the systematic literature review proceeds to use high-quality research and consistent sources to direct the clinical and healthcare practices (Wang et al., 2018). Therefore, the systematic study widely evaluates available evidence to inform decision-making and formulation of the practice guidelines for hypertension, a global health concern.

1.4. Research Aims, Objectives and Questions

The main aim of this research is based on the evaluation of physical activities to reduce hypertension among older adults. The research is based on individuals aged 65 years and above living in the United Kingdom. Also, the research would purposively evaluate the promotion of physical activities in old adults to reduce hypertension. The research is focused on main objectives that are to know how physical activities impact old adults in the UK to reduce hypertension, to evaluate the impact of hypertension on older adults in the UK and to evaluate the effectiveness of promotions on physical activities for adults adopting it in order to reduce hypertension. In order to answer these objectives the research would answer the following research questions:

- What is the impact of physical activities on adults in the UK for reducing hypertension?
- What promotional programs are effective for adults to reduce hypertension?

How effective are the promotional programs for adults adopting physical activities in reducing hypertension?

Chapter 2 Methods

2.1 Overview

This chapter will explore how physical activity reduces hypertension and how promotional activities to aid individuals (older adults) in the United Kingdom, in lowering their blood pressure. This chapter includes the following descriptions of the study's research design, data sources and search strategy, inclusion and exclusion criteria, methodological strengths and weaknesses, and ethical issues.

Cross-sectional research was performed to meet the time constraints of this study. Cross-sectional research is a method in which numerous information that is important to the topic is addressed at once (Torres-Carrión et al., 2018). This inquiry included a wide variety of subjects. Because it relies on easily accessible data, secondary research is often known as "desk research." This kind of research is often used because of its usefulness and affordability.

This research is based on secondary systematic analysis because of the easy accessibility of the data that is available publically. Methodological summaries of all the primary research that has been conducted in order to answer a certain research issue are known as systematic reviews. A secondary research term for a study that incorporates all previously published research is a systematic review. The secondary systematic analysis is used to analyze the impact of the promotional program already working in the UK among older age adults in reducing hypertension. And to know the impact of physical exercise and intervention working there in the UK systematic secondary analysis are worth identifying because it brings all the prior data in order to answer the effects and impact on the UK population. One of the key reasons for turning to online resources for this inquiry was to ensure that the information obtained was accurate (Strohmaier et al., 2020). This approach may speed up and improve the efficiency of research. This chapter explains all the above-mentioned aspects in detail.

2.3 Research Design

The primary objective of this study is to perform a comprehensive literature review. Using a systematic review technique, all high-quality evidence relevant to the research questions is chosen, appraised, identified, and synthesized (Rodriguez-Lopez et al., 2020). This study strategy was chosen

because of its systematic approach, which produces accurate and dependable data by avoiding bias. Researchers use this study strategy to acquire all relevant literature and then critically examine the data to determine its faults or strengths, which are then presented in a unified form to answer a research question.

To accomplish the study's main goal which is to assess the promotional program's impact on physical exercise among adults for reducing hypertension, the systematic review research design is used. Based on the definition of the systemic review provided by Pranata et al. (2020), this kind of review is one in which all high-quality research evidence that is relevant to the study's questions is analyzed and synthesized. For this research, it is chosen because this research style generates reliable and accurate data while eliminating prejudice because of its rigorous methodology. In this research study, a systematic collection of all relevant literature will be followed by a critical examination and application of the data in presenting collective evidence to create responses to the study issue.

For this research a systematic review method is chosen because it is a clear and transparent approach, accountability, consistency in technique, decreased bias, and evidence-based synthesized outcomes, Rodriguez-Lopez et al. (2020) advocate this design above others. This research has utilised the use of inclusion and exclusion criteria so that a systematic review is able to clearly define the study's research question. After then in this research all of the studies that match the predetermined criteria were given equal importance and data was carefully scrutinized.

The research design for this study is a systematic review research design that is employed for the analysis of this study in which qualitative analysis is been done. The purpose of implementing a qualitative research approach is to help with the investigation, in a subjective (rather than objective) way. Through this research design, the data was gathered in written form rather than in statistical form, or rather than being a scientific field. The reason behind choosing this research method is also that primary data analysis could address research questions that are different from those initially stated (Pescatello et al., 2019). Secondary research relies solely on previously acquired material (i.e. primary research) while undertaking a full review. This research approach acquires, arranges, and assesses numerous data samples to generate an appropriate result. With these research methods, an inductive technique was employed to accomplish the study's aims. The prominent usage of the inductive approach is when data

collection needs to be turned from a generic condition into something special. The reason for using an inductive technique is to explore a wide variety of facts and outcomes. When undertaking inductive research, the investigator searches for patterns in the data gathered and formulates hypotheses to explain those patterns. No theories or assumptions are important at the beginning of an inductive inquiry, and the researcher is free to adjust the path of the study once it has begun. A researcher may utilise an inductive technique for research questions and objectives, but theories are still important to be considered.

2.4 Data sources and Search Strategy

The researcher will conduct extensive literature searches in PubMed, Google Scholar, and Science Direct to find the most relevant papers. The selection of these databases is based on the fact that there are more publications on this subject in those databases. The data needed to progress the outcome may be obtained from this literature search (Forbes et al., 2018). Using these databases is a good choice since their information is accurate and current. Only publications written in English will be included in the study. Additional studies done between 2012 and 2022 will be incorporated to ensure the most up-to-date information is available. Using the PICO framework, the search terms will be discussed using Boolean operators "OR" to combine synonyms, "AND" to combine the search results with other elements, and "NOT" to exclude inapplicable studies.

PICO framework search strategy is given below:

- Population = People who are 65 years and above
- Intervention = Promotional activities
- Comparison = N/A
- Outcome = Physical activity to reduce hypertension.
- Study Design = Qualitative studies

2.5 Inclusion and Exclusion Criteria

A systematic review is a key to finding relevant literature related to the study objectives and developing evidence-based critical findings and conclusions. There are the criteria for inclusion and exclusion that will be used in the proposed study. Due to a high concentration of previous researchers on the chosen study subject, many of them did not meet the inclusion requirements. Many databases, including PubMed, Google Scholar and Science Direct, are used to choose the papers for critical analysis. At a starting point, the most popular articles were new and focused on new interventions or solutions. Articles written in English were chosen since the research is intended for persons who are fluent in English.

In addition, researchers who did their work after 2012 were chosen. A meta-analysis of primary qualitative articles and research papers was chosen. Finally, papers on medical procedures were picked from medical databases and deemed more relevant. Articles that offered opposing viewpoints were omitted. The study did not include any old research publications. Non-medical therapies and interventions that were not employed in the study were also covered in the publications. Only ten research papers were included and rigorously reviewed for the literature after numerous publications and research studies were excluded. Through the primary research, several articles have been chosen for inclusion in the list. Methodological design's strengths and limitations are also listed in this research.

2.5.1 Inclusion Criteria for research

- Research published in 2012-2022.
- Research published in research journals and conferences.
- Research that narrates the impact of promotional activities in reducing hypertension with physical exercise.
- Research papers that are published in the English Language
- Research studies address the intervention as physical exercise only.
- Research was conducted among the UK population only.
- Research studies that measure the effects of physical activities.

2.5.2 Exclusion criteria for research

The studies were excluded on the basis of:

- Irrelevant studies narrating the relation of physical activities with other diseases.
- The conference, news and systematic reviews.
- The published articles before 2012.
- Articles were conducted on other populations like Canada, Africa and so on.
- Research narrates the impact of other programs and not intervening in the reduction of hypertension.
- Articles pertaining to elaborate the promotional activities or programs working in the UK.
- Not peer-reviewed articles.
- Duplicated Publication
- Journal not accessible online
- Not written in the English language.

2.6 Study Screening

This study provides an in-depth analysis of the published work in that field. It is characterized as a systematic literature review or a systematic analysis when done comprehensively (Choi et al., 2020). Stress reduction benefits of physical activity are the subject of a new study based on existing knowledge. In order to properly conduct this study inquiry, various publications were reviewed and selected for screening based on review. In contrast to this, the core search algorithm concentrates on related positive experiences and pulls articles from a number of online databases.

After searching different databases, ENDNOTES would be used as a citation management tool, to recruit all the references in a single folder and cite them easily. In this research, secondary data analysis using the PRISMA tool is selected. Following the screening process, articles were found

on Google Scholar, NCBI, and PubMed, which were then judged suitable for the research. In the beginning, abstracts and study titles of the research were discovered and reviewed. Then the manuscripts were read and checked if they met the inclusion and exclusion criteria, with many researchers being excluded because of inadequate data for an assessment. After checking the reference list of articles with full-text articles, ten studies were selected for critical analysis. The reason behind excluding full-text articles was on the basis that they were not evaluating the physical exercise and promotions especially for reducing hypertension.

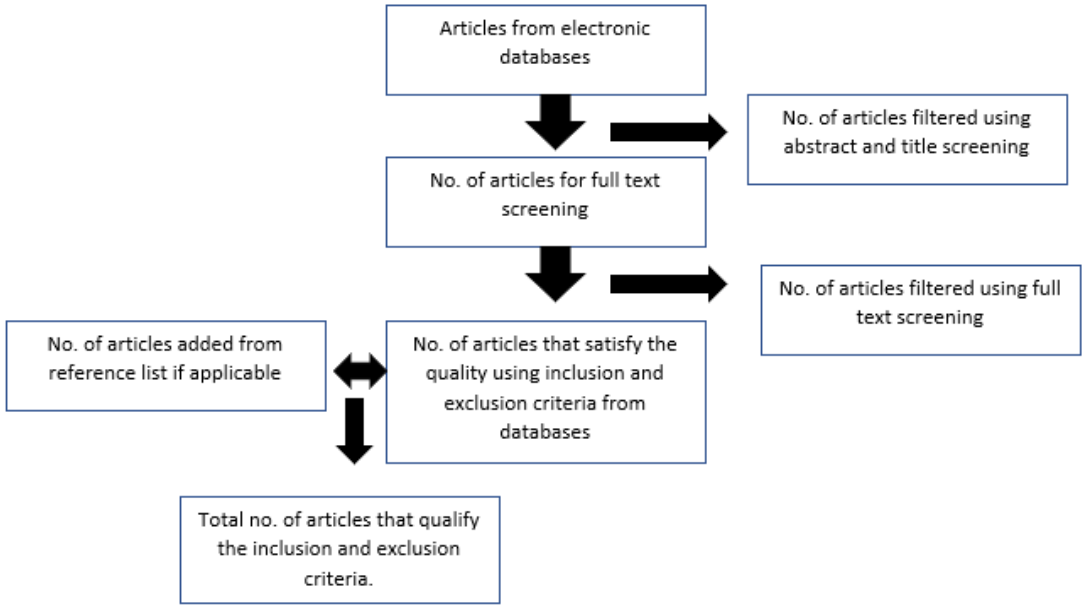

Figure 1: Screening of articles

2.7 Quality Assessment

Qualitative research quality assessment is important. Structured reviews are only as good as the papers they use. The capacity of a study to address questions should supersede the quality of the technique, according to Parveen et al. (2020). This study has selected the critical appraisal skills program (CASP) qualitative research checklist provided in Appendix I. When evaluating the questions and sorts of research that will be included, the chosen tool is best suited for this purpose which is why it is adopted for this research. While using CASP for this study it is important to concentrate on the techniques of data gathering and analysis to uncover the aspects of credibility and transferability (Eigenschenk et al., 2019). Studies will also not be disqualified because of the high standard of the technique used. This is because Dounavi & Tsoumani (2018) found that no approach can be recognised for rejecting qualitative studies based on the quality of their research.

The key strength of employing CASP for this research is that it has been proven to be an excellent measure of the openness of research practice and reporting requirements, but a comparatively less good measure of study design and conduct. When compared with several assessment techniques, the CASP tool for analysis of promotional programs was shown to offer a good indication of the procedural features of research and the details that should be recorded, but to create a lesser agreement between reviewers compared to the other appraisal methods (Choi et al., 2020). The main weakness of using this tool is to perform a sensitivity analysis, weighing, or organizing by quality, the CASP tool may not give findings that may be utilized. For this study 10 questions related to the aims objective, research methods, analysis and etc, are been chosen and attached in Appendix 1 to analyze each research deeply.

2.8 Data synthesis

A rigorous evaluation of the data extraction process is been conducted when the quality assessment has been completed. Using research by Forbes et al. (2018), they demonstrated that data extraction is the process of choosing and processing pre-determined elements. For this research, in order to ensure that the data may be used more easily in the future, the retrieval and entering procedure can be carried out concurrently. Smith et al. (2020) stipulate that data extraction forms must be produced in response to each review question. For this study, it was decided to create a data extraction form, after thoroughly reviewing the already available research. There will be a data extraction table in which the purpose, research

design, population intervention, control, and result will be provided. Excel spreadsheets are used by the researcher for this task. However, it is possible that data extraction might become difficult in qualitative research. Findings might be difficult to recognize, owing to differences in reporting styles. In this research, the tool was intentionally designed to be simple to reduce the risk of errors. To summarize, doing a systematic literature review has aided in the retrieval and synthesis of relevant primary research. The spreadsheet for data extraction is given in Figure 2.

	A	B	C	D	E	F	G	H	I	J	K
1	Author (s)	Year	Journal Name	Purpose of the study	Study research design	Sampling strategy	Sample-size	Data collection method	Key findings	Limitations	Recommendations
2											
3											

Figure 2: Spreadsheet for data extraction

To save time and effort, primary research articles were used. As a result, primary research was utilized in favour of secondary systematic research (Filippou et al., 2020). To provide a testable hypothesis, the research was also designed to be exploratory. Each component was based on how much time, energy, and resources it would take to research. The data collected through the summary table are utilized to analyze the 3 research questions, specifically from results narrated linking them back to the research question. Each article was read thrice in order to answer the 3 research questions and then the results are reported.

2.9 Ethical Issue

An ethically authorized study was employed to perform a review of published research in the form of a literature review. There were no primary or interventional studies using human participants in this research. There was no usage of any patient or other individually identifiable data. This research didn't need to be approved by the ethics committee.

Chapter 3: Results

3.1 Introduction

Chapter 3 summarises the findings of publications on the effects of promotional activities in the UK to strengthen physical activities among adults to reduce hypertension. This chapter will evaluate the systematic review of literature and PRISMA and CASP table for the recruited studies. Also, the studies selected would be analysed according to the research questions, and a theme would be generated for each research question.

3.2 PRISMA Flow Guidelines

After searching different databases, ENDNOTES would be used as a citation management tool to recruit all the references in a single folder and cite them easily. In this research, secondary data analysis using the PRISMA tool is selected. Following the screening process, 2009 publications were found in Google Scholar, NCBI, and PubMed, which were then analysed for the research. In the beginning, 800 abstracts and study titles of the research were discovered and reviewed. Only 150 of the 2009 manuscripts met the inclusion and exclusion criteria, with 128 research being excluded because of inadequate data for an assessment. After checking the reference list of 20 full-text articles, ten studies were selected for critical analysis.

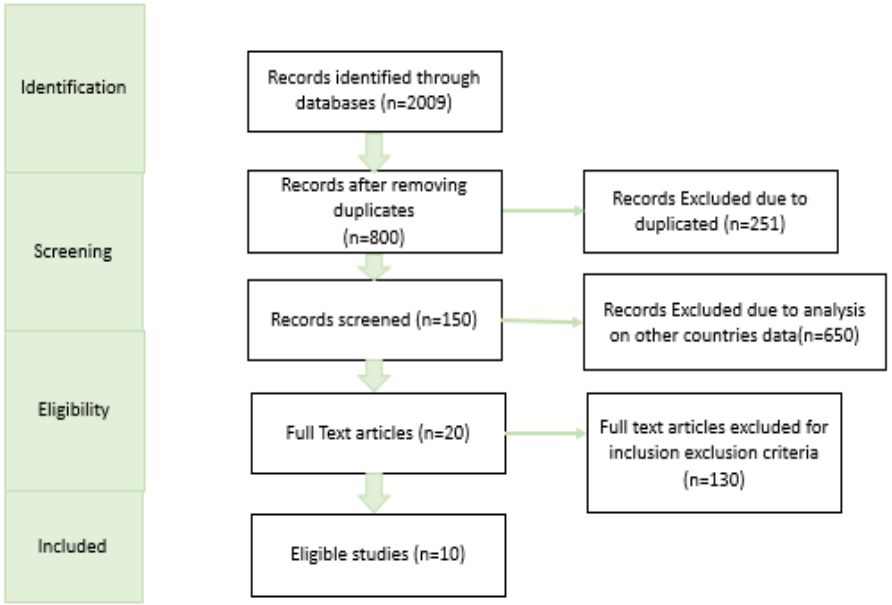

Figure 3: PRISMA Flow chart

3.3 CASP Analysis

The CASP table for the ten studies selected is given in the following table:

Questions	(Metcalf et al., 2012)	(Glynn et al., 2014)	(Lobelo et al., 2018)	(Carey et al., 2018)	(Broekhuizen et al., 2016)	(Rogers et al., 2020)	(Arija et al., 2018)	(Fletcher et al., 2018)	(Yang, 2019)	(Stockwell et al., 2019)	Fernández et al., 2017)	(Kosteli et al., 2017)	(Boutevillain et al., 2017)	(Lee et al., 2017)	(Zubala et al., 2017)	(Musich et al., 2017)	(Muellmann et al., 2018)	(Gheysen et al., 2018)	(Gothals et al., 2020)	(Heath et al., 2012)
The clear aim of the research	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Research design according to the aim	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Appropriate data collection methods	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes

Appropriate data analysis	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Appropriate outcomes used	Yes	Yes	Yes	Yes	Can't say	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Testing methods or analysis clearly described	Yes	No	Can't say	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes
A clear statement of findings	No	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethical considerations are taken into account	No	No	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes

Ability to generalise the results	Yes	Yes	No	Can't say	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Research is valuable	Yes	Can't say	Yes	Yes	Yes	Yes	Yes	Can't say	Yes	Yes	Yes	Yes	Yes	Yes	Ca n't say	Yes	Can 't say	Yes	Yes	Yes

The CASP analysis shown above about the 20 studies selected through PRISMA guidelines narrates that the majority of the studies don't include ethical considerations. However almost all of the studies reported aims and objectives clearly but some of them (Metcalf et al., 2012), (Glynn et al., 2014), (Carey et al., 2018), (Yang, 2019) and (Arija et al., 2018) fails to demonstrate or address those aims in a clear results statement. In many research testing and methods of analysis were complete addressed, except for (Glynn et al., 2014), (Yang, 2019) and (Stockwell et al., 2019). The majority of the red highlights showed that the study lacks the important source of information listed in the table above.

3.4 Summary of research articles

The PRISMA guidelines and CASP analysis formed 20 articles to be critically assessed based on physical activities effects on adults in the UK and promotional programs intervention in it. The table below shows the finding and analysis of those 20 research articles:

Author	Aim	Research Design	Results and Conclusion
Metcalf et al. (2012)	To assess if, and to what degree, physical activity interventions alter the overall activity levels	Systematic review and meta-analysis.	P<0.01 for the standardised mean difference and P<0.001 for the pooled intervention impact on total physical activity and moderate or vigorous physical activity were both minor to non-existent. This research shows that physical activity

			programs have only slightly impacted individuals' total activity. That such therapies have had minimal efficacy in lowering BMI or body fat may be explained in part by this result.
Glynn et al. (2014)	This research aims to evaluate an app that encourages physical exercise in primary care.	In rural primary care, an 8-week, open-label, randomised control experiment.	Participants came to the program independently or were referred by their primary care physician. Twenty-seven per cent of the 90 randomly assigned individuals were filtered out, leaving 12 patients (9 per cent rejected to participate). 78 individuals provided these data, 37 of whom belonged to the treatment group and 41 to the control group. The intervention and control groups started with daily step counts of 4365 and 5138, respectively. The effects of the intervention group's increased physical activity lasted throughout the study. There were substantial increases in physical activity in the general practice population after only a few weeks of using an app on their smartphones.
(Lobelo et al., 2018)	The goal of this research is to offer a complete assessment of the data on the feasibility, validity, and efficacy of PA promotion in	Systematic review	Physical activity assessment and promotion in healthcare settings will be made easier with these findings, which will help the American Heart Association meet its 2020 Impact Goals by providing concrete recommendations for healthcare systems, clinicians, community care providers,

	healthcare settings for adult patients. Another American Health Association (AHA) statement on the evaluation of PA for clinical and research purposes has been added to this one.		fitness professionals, technology companies, and other interested parties.
Carey et al. (2018)	This study's major objective is to present an overview of the pathophysiological reasons for high blood pressure as they are now understood. Afterwards, they discuss techniques for preventing and controlling hypertension and challenges to doing so and propose multi- and population-level health interventions.	The study's research methodology is based on examining hypertension control, and its targeted approach includes activities intended to promote individual awareness, treatment, and management.	On the other hand, population-based initiatives aim to reduce blood pressure (BP) in the whole population by a small amount. Consistent optimising adherence, medication supply, and avoiding therapeutic inertia are associated with greater blood pressure management. The Chronic Care Model, a patient-provider-health-system relationship, integrates a multi-level approach to hypertension treatment. A paradigm change is needed to improve hypertension detection, prevention, and treatment, which necessitates the application of measures that have been shown to reduce BP.

Broekhuizen et al. (2016)	We wanted to determine whether an Internet-based exercise program focused on enhancing the quality of life of non-active older individuals worked. The intervention's influence on the participants' quality of life increased physical activity, life satisfaction and the dose-response connection were also explored. The research comprised participants who fulfilled their daily physical activity targets indicated by the intervention program.	A web-based application was used to examine the intervention in a randomised controlled experiment.	Compared to the control group, 50 (42.0%) of 119 individuals in the intervention group fulfilled the physical activity levels (4.31 for emotional and mental health and -0.72; P=.009). Similarly, 11 (11.06) of the intervention group individuals satisfied the health change criteria, compared to 2 (2.03) of the control group participants. The research found a correlation between time spent and quality of life in engaged moderate-to-vigorous physical activity (MVPA). The findings of this study indicate that after three months, an Internet-based physical activity program improved the quality of life of 60- to 70-year-olds, particularly among those who met their daily physical activity targets.
Rogers et al. (2020)	The research aimed to establish if lockdown had a disproportionate influence on physical activity	Self-reported Survey	Younger folks were more likely than older adults to adjust their PA practices. Changes in physical activity were linked to stories about coping techniques, according to structural topic modelling done on narratives about them. Physical

	behaviour among groups at a greater risk of COVID-19 infection or who believed they were at a higher risk.		activity policies should consider vulnerable adult groups, such as those with chronic conditions or who believe they are in danger, as well as the necessity of having access to green or open places for physical activity.
(Arija et al., 2018)	Physical exercise intervention programs (group, supervised, and with socio-cultural activities) have been shown to reduce cardiovascular disease (CVD) risk, as well as improve quality of life (HRQoL) and blood pressure (BP) in hypertensive patients.	Randomised control trail	Some aspects of HRQoL improved as a result of participation in a physical activity program that did not alter the diet, even in multivariate models. Independent of baseline control of BP, both the PA program and changes in CVD risk and HRQoL in physical component summary, role physical, and body pain throughout the intervention showed an increase in the proportion of patients with managed BP. Patients with hypertension in primary care saw improvements in their cardiovascular health and HRQoL, as well as better management of their blood pressure with this PA intervention program.
(Stockwell et al., 2019)	The goal of this research is to examine the impact of DBCI (Digital behaviour change interventions) on sedentary behaviour in	There was a comprehensive analysis of all major databases from their origin until March 2018. In order to	A total of 22 studies involving 1757 older persons were considered, and 68 per cent of them had a moderate-to-high risk of bias. According to meta-analyses, DBCI increased overall physical activity across RCT trials and pre-post studies, increased moderately to vigorous physical activity, and decreased inactive time. Systolic blood pressure was

	older persons (>50 years old).	evaluate the impact of DBCI on physical activity and/or sedentary behaviour in older persons (aged 50 and older), randomized controlled trials or pre-post treatments were included. Meta-analyses using random effects were conducted.	reduced, and physical functioning was improved as a side effect. With further high-quality research, DBCI may help older persons become more active, operate better physically, and lower their blood pressure.
(Yang, 2019)	It is the goal of this article to provide an overview of the most current findings in sports medicine and exercise science.	Systematic review	The results show that for the sake of their well-being and the prevention of vascular dementia, chronic patients should engage in physical exercise on a regular basis as well. A patient's primary care physician should encourage them to engage in physical activity, educate them on how to exercise safely in line with their physical strength, and provide them with exercise precautions.

(Fletcher et al., 2018)	PI (Physical inactivity) is the primary focus of this research, which also examines the pathophysiological effects of SB/PI on the cardiovascular system and the benefits of PA/exercise, as well as the mechanisms and triggers that cause PI, the importance of preventative measures to improve PA/exercise/CRF, and factors that can help health care providers improve PA/exercise/CRF and reduce SB/PI.	Review of physical inactivity and physical activity in providing protective health benefits.	The results indicate that in order to achieve good changes and enhance world health, particularly the lowering of cardiovascular disease, local, regional, national, and international initiatives must be established and executed to boost PA among all persons.
(Fernández et al., 2017)	To assess physical condition and physical activity level related to perceived barriers and	Cross-sectional study design	The results of the study highlighted a correlation between physical condition and obesity. Moreover, the body mass index and gender variability showed a direct correlation which acts as a major barrier to performing physical

	identify major limiting factors of physical activities in adolescents.		activity. It is also found that laziness, fatigue and the physical image is a barrier to physical activity.
(Kosteli et al., 2017)	To examine the factor which limits or encourages participation in physical activity.	Cohort study	Through purposive sampling, 26 individuals (males) were selected in the study having an age between 50 – 89 years to identify the barriers or promoters of PA. The results determined that the main barriers to PA are motivational, attitudinal, older age perception, PA perception, disappointment, frustration, fear, embarrassment, and other health-related factors which include breathing issues, mobility problems, and fatigue. On the other hand, the findings also revealed some PA enablers which include controlled or autonomous motivation, performance accomplishments, self-regulation and attitudes.
(Boutevillain et al., 2017)	To recognise physical activity barriers and facilitators in the population of chronic low back pain.	Qualitative study	The results of the study significantly recognised the facilitators of physical activity which are associated with group practice, supervision by professionals and individuals which improve their adherence. Considering the barriers, it is identified that the socio-environmental factors are dominated by lack of time and physical factors integrated with pain and psychological barriers.

(Lee et al., 2017)	To identify the exercise perception in the older population.	Reviewing the perception of the older population.	It is acknowledged that physical activity produces health outcomes and benefits when perform at a longer duration, greater frequency and higher intensity. However, the study recommended guidelines for a moderate-intensity aerobic activity for 150 – 70 minutes. The study attributed that the major key components of physical activity are to provide potential solutions and identify barriers. Moreover, it is found that older people get distinct benefits which include balance training, stretching exercise, and flexibility. Therefore, various resources are available that significantly assist adults to continue an active and healthy lifestyle.
(Zubala et al., 2017)	The systematic study continues to evaluate the characteristics and effects of physical activity promotion and intervention for people over 50 years old.	Systematic review	The study findings attributed to the promotion of physical activities, and various interventional strategies are present. There are signs that older persons may benefit more from motivators more important to them than merely cognitive techniques and behaviour change techniques, such as environmental and social support and enjoyment from physical activity. It is necessary to use a holistic strategy that considers environmental, social and individual elements and is adapted to the older population's needs.

(Musich et al., 2017)	The study was executed to determine the frequency levels of physical activity from light to moderate among older adults.	Cross-sectional study design	About 78 per cent of participants were significantly engaged with a high or intermediate level of physical activity which role to provide them with numerous health benefits which include improve mental and physical health, improve life quality, reduction in stress and depression, reduce mortality rate, decrease cognitive decline (Alzheimer disease, dementia), reduce the prevalence of chronic diseases such as hypertension, diabetes, and cardiovascular diseases.
(Muellmann et al., 2018)	The study aims to compare the effectiveness of different health interventions which enhance physical activity in older people aged more than 55 years old.	Systematic review	It is attributed that older adults who are more than 55 years old can effectively promote their physical activities through eHealth interventions. Additionally, population-based strategies were required to enhance the ratio of physical activity in old age people and improve their health and life quality. The approaches were promoted to reduce the progression of chronic diseases and frailty.
(Gheysen et al., 2018)	To significantly analyse the potential synergistic effects by comparing the CA interventions with the control group, and PA	Systematic review or meta-analysis	The results of the study showed that to improve cognitive health in an older population, it is important to integrate cognitive exercises. Moreover, to treat cognitive decline, it is important to promote combined CA+PA programs. Thus,

	interventions to CA+PA interventions.		to obtain effective cognitive outcomes it is suggested to promote high doses of intervention sessions.
(Goethals et al., 2020)	The study aims to determine the impact of quarantine on physical and mental health and programs of physical activity. Moreover, the research was executed to determine various physical activity programs important to preventing a sedentary lifestyle.	Qualitative study	The number of individuals who attend the physical activity programs were declining after quarantine and they prioritise performing PA at home. The study reflected that it is significant to support older people, integrate safe and simple ways to maintain their health and stay physically active in their limited space. In this context, a national policy significantly helps to promote the sessions of physical activity at home for older adults.
(Heath et al., 2012)	The aim of the study is to identify evidence-based interventions regarding physical activities.	Systematic review	The study effectually suggested some informational approaches which support physical activity campaigns. It is found that the social, physical and behavioural evidence-based approaches are effective to promote the planning and policies regarding physical activity. Therefore, many evidence-based approaches are effective which increasing physical activity among people of different social groups, ages, communities and countries.

3.5 Analysis of Studies

3.5.1 Impact of physical activities on adults in the UK for reducing hypertension

Although physical activity has been found to reduce blood pressure and postpone the development of hypertension, it remains unclear how it does this. This is partly due to a lack of understanding of how the many components that contribute to hypertension work together (Kiuchi et al., 2017). Resistance training may impact vasoconstriction control, whereas aerobic exercise may change insulin sensitivity and autonomic nervous system function to minimise blood pressure rises (Rogers et al., 2020). Although the connection between physical activity and elevated blood pressure has yet to be completely explained, the existing facts allow for physiologically valid hypotheses to be developed. Racially dependent responses to exercise stimuli have been seen in recent cell research revealing differing effects on the suggested pathways.

According to Arija et al. (2018), during the physical activity intervention, the risk of cardiovascular disease was reduced. Taking into consideration the fact that negative values in this variable are beneficial since they lower the risk of cardiovascular disease, would boost the influence of the dependent variable which is the chance of having regulated blood pressure. Administering healthy lifestyles and quality of life as an adjunct to BP therapy is supported by these significant correlations between program completion, CVD risk reduction, and improved quality of life. However, according to Stockwell et al. (2019), a lack of physical exercise is a risk factor for non-communicable illness and healthy ageing, although the majority of older persons stay inactive. By using digital behaviour change interventions (DBCIs), we can reach a large number of seniors to increase physical activity and decrease inactivity.

According to the research findings above, aerobic exercise is defined as a kind of physical activity that involves a high degree of repetition and rhythmic movement. They heavily use our legs, shoulders, and arms, among other significant muscle groups (Broekhuizen et al., 2016). All aerobic activities, such as walking, running, swimming, dancing, and heavy gardening, such as digging, are included. Adults with hypertension may benefit greatly from regular physical exercise to lower their blood pressure. In the United States, approximately half of the individuals have hypertension, according to recent research, and although physical exercise during free time may help this illness, little is known about its benefits (Carey et al., 2018).

The majority (>60 per cent) of the study population maintained their usual PA intensity level throughout the COVID-19 lockdown as determined by a large-scale survey of adults aged 20 and older conducted across the United Kingdom (Glynn et al., 2014). More than twice as many participants decreased than raised their PA intensity in the adjusted group. There were lower levels of physical activity (PA) among those who were overweight or obese and those with high blood pressure or lung illness (including asthma). Since the lockdown began, younger individuals (those under 70) have adapted and altered their PA habits more significantly than older persons (those 70 and older). A lower intensity of vigorous physical activity was also related to being female, living alone, or without a garden, while a greater intensity of vigorous physical activity was associated with having school-aged children (Glynn et al., 2014). Adults with lung disease, depression, obesity, disability, and hypertension were more likely than others to participate in low-intensity physical exercise. Participants who had shifted to less severe PA (physical activity) were more likely to disclose their feelings and thoughts about risk (Carey et al., 2018).

According to Fletcher et al. (2018), both biological and disease-specific studies have shown the positive effects of exercise on health. A reduction in serum triglycerides, an increase in high-density lipoprotein and a decrease in low-density lipoprotein have all been proven to be favourable effects of aerobic exercise at the cellular level. According to this research, physical activity may help prevent cardiovascular disease (CVD) regardless of age, gender, or ethnicity. Studies reveal that both intensity and duration of exercise or PA have a direct impact on health outcomes and mortality rates. However, compared to inactivity, any sort of physical activity may reduce the risk of cardiovascular disease.

3.5.2 Promotional activities are effective for adults in reducing hypertension

According to the analysis of a study in the UK, it is seen that the general population's prevalence of hypertension may be higher than previously thought (Song et al., 2020). A high degree of hypertension awareness is also difficult to achieve and maintain. By using social media and shifting healthcare practices, awareness campaigns may help patients better understand their lifestyle risk factors and help them improve their health outcomes. Hypertension care must be rethought to better address the underlying causes and consequences of patients' dietary and exercise decisions on their blood pressure (Metcalf et al., 2012). Although patients acknowledge that they are the ones who are ultimately responsible for preventing

and controlling high blood pressure, they do not consider this to be a major health issue. In the future, clinicians must be equipped with the right instructional resources and tools to help persons at risk of hypertension adjust their behaviour.

The adoption of physical exercise is a complicated habit, therefore different levels of engagement were noted in the community: 54.6% of the participants agreed to walk more than four days a week, while 32.2% walked briskly one to four days a week; the dropout rate was 13.2% (Lobelo et al., 2018). There has been a wide range of dropout rates and compliance rates in previous research on the promotion of physical exercise, according to Glynn et al. (2014). At the conclusion of the study's 24-week period, 33% of participants in the intervention group dropped out. The results of this research show that a behavior-related non-pharmacological intervention may be successfully implemented in a community with limited resources.

According to Glynn et al. (2014), Walking at a moderate pace reduced blood pressure (BP) in hypertensives compared to those who were not hypertensive. According to various meta-analyses and the World Hypertension League, physical exercise lowered BP by 11/ 6mm Hg in hypertensives and 4/ 4mm Hg in normotensives. Systolic BP decrease of 5 mm Hg in hypertensives has the potential to lower mortality from coronary heart disease, strokes, and all causes by 9%, 14%, and 7%. Other cardiovascular risk variables, such as dyslipidemia, insulin resistance, body weight, arterial compliance, left ventricular hypertrophy, or inadequate cardiovascular reflex control, have been shown to be positively impacted by regular physical activity as well.

Prevention and management of hypertension may be addressed by employing both targeted and a population-based methods. Traditional clinical practice employs a method known as the "targeted approach" to lower excessive blood pressure in individuals. From public health mass environmental control experiences that don't directly target a specific demographic, the population-based strategy is formed (Reckelhoff et al., 2018). With this technique, the objective is to keep the general population's blood pressure from dropping too much, since it might lower the general population's risk and prevalence of hypertension. Population-based interventions are typically seen to have a larger potential for reducing cardiovascular disease than focused treatments. This is based on the idea that exposing a large number of individuals to low-level cardiovascular

disease risk increases the number of instances. The incidence of hypertension, stroke and coronary artery disease might be reduced by 17 per cent, 14 per cent, and 6 per cent if diastolic blood pressure is reduced by 2mmHg in the general population (Badr et al., 2021). However, both methods may employ the same treatments, since they are complementary and mutually reinforcing highlighting the importance to introduce health promotion programs that are crucial in the management of hypertension in the at-risk population and among patients.

According to Yang (2019), before and after a workout promotional program is important to warm up and cool down. Intensity is reduced to roughly half of what was initially anticipated and may involve stretching. Before and after running, you may stroll and stretch, for example. Warming up is suggested to avoid musculoskeletal injuries and heart attacks, despite the lack of evidence that it helps prevent injuries. After a workout, it's a good idea to cool down to help speed healing from minor injuries and avoid disorientation. Previously, it was suggested to engage in physical activity for at least 10 minutes, but new research shows that shorter activities may be just as beneficial. To counteract a decline in Koreans' level of aerobic physical activity, a variety of strategies are required.

3.5.3 Effective promotion of physical activities in reducing hypertension

Randomised controlled studies support a causal link between physical exercise and lower blood pressure. Dozens of studies have shown exercise's beneficial benefits in lowering blood pressure. A 2-mmHg decline in the population's average diastolic BP leads to a 17% reduced incidence of hypertension which is more pronounced for hypertensives and pre-hypertensives (Broekhuizen et al., 2016). As a result, even small decreases in blood pressure (BP) among normal and pre-hypertensive individuals might have significant public health consequences. In recent years, exercise modalities have been the subject of multiple systematic reviews and meta-analyses.

Aerobic training

According to Carey et al. (2018), aerobic, resistance, and combination aerobic and resistance exercise all positively impact blood pressure, according to a newly updated meta-analysis. Aerobics training lowered blood pressure in prehypertensives' systolic and diastolic measurements by 4.3% and 1.7%, respectively. This amounted to an overall reduction of 4.3%. Participants with normal blood pressure saw a 1.1 mmHg reduction

in diastolic blood pressure after completing an aerobic exercise program. Ambulatory blood pressure monitoring throughout the day and night was studied by (Lobelo et al., 2018). Normal blood pressure (ambulatory pressure less than or equal to 135/85 mm of mercury) was shown to significantly decrease daytime blood pressure when data from 11 randomised controlled trials were pooled. Blood pressure measurements at night did not differ from those at other times of the day. Aerobic exercise training's impact on the elderly was examined by Glynn et al. (2014). The net systolic and diastolic BP changes of 5.3 mmHg and 3.7 mmHg were statistically significant when 23 trials were pooled. Hypertension was a factor in four of six investigations. However, researchers found that the findings were identical when data were stratified by hypertension status (Glynn et al., 2014).

Resistance Training

In a meta-analysis by Metcalf et al. (2012), resistance exercise has been shown to lower blood pressure. Resistant training decreased normotensive/prehypertensive subjects' blood pressure by an average of 3.9 millimetres of mercury (mmHg) and 3.9 millimetres of mercury (mmHg). A recent meta-analysis by Broekhuizen et al. (2016) found that resistance training can lower blood pressure in those at risk of developing hypertension. Only the diastolic pressure was lowered when resistance training was used in individuals with normal blood pressure. There may have been an overestimation of resistance training's advantages on blood pressure, according to Broekhuizen et al. (2016), owing to the inclusion of studies in which blood pressure was not a primary target. A total of 11 studies were found in which blood pressure was the main endpoint, according to Carey et al. (2018). Resistance training had a substantial impact on diastolic blood pressure (net effect: 2.4 mmHg) among normal and prehypertensive individuals (net effect: 0.8 mmHg) but not on systolic (net effect: 1.5 mmHg).

Contrary to what Glynn et al. (2014) found, our findings show that resistance training has no negative impact on blood pressure (BP) and may even be beneficial in reducing diastolic BP in healthy and prehypertensive people. The results of randomised controlled trials suggest that resistance training may help prevent hypertension despite the lack of evidence from prospective studies. Prospective studies and randomised controlled trials provide inconsistent findings, which may be due partly to self-report data and multicollinearity of exposure factors.

3.5.4 Barriers Preventing Adult to Participate in Physical Activity

Randomised control trial have resulted that there exists certain barriers which prevents adults to participate in physical activities. These barriers can range from external to internal barriers which prevents adult to participate in physical activity. According to the study by Manaf et al., (2013), the external barriers preventing adults for participation in physical activities including limiting culture, social and family relationships, having no one to support (no partner), lack of facilities, cost, and interferences of exercise with the work. The internal barriers preventing adult to participate in physical activity includes lack of interest in exercise, lack of motivation, poor physical and health conditions, injury, and laziness for participation in physical activity.

Promotional Activities to Overcome Barriers of Physical Activity in Adults

In line with the barriers preventing adult to participate in physical activity, Saunders et al., (2018), critically evaluates the promotional activities to overcome barriers of physical activity in adults. One of the activity is the social interaction which improves the physical activity in adults as adults needs to develop a socio-emotional connection with other adults (individuals). Community-level entities should create adult integration plans for ensuring participation in physical activities and exercise. Furthermore, local governments are required to create recreational commissions and programs to promote physical activities in adults.

3.6 Strengths and limitations

3.6.1 Strength

- The systematic review usually addresses a particular question or hypothesis. There is a reliable and accurate result from the systematic review.
- Also, secondary research is an excellent choice for researchers to save money and time (Chen et al., 2020). This research technique saves both time and money since it relies on data easily available from various sources.
- Also, a key advantage of this research strategy is that it makes the study's stated goal easier to grasp.

3.6.2 Weaknesses

- Some information was found to be unimportant, even after a comprehensive examination and out-of-date or irrelevant information was responsible for many research biases.

Chapter 4: Discussion, Conclusion and Recommendation

4.1 Discussion

One of the leading causes of atherosclerosis, hypertension is common in industrialized countries and may lead to a variety of health issues. A heart attack or stroke kills 33% of those with hypertension, whereas kidney failure kills 10–15% of those with hypertension who don't take their medicine as prescribed. Also at risk are the eyes and larger arteries, among other organs (Moore et al., 2017). As a result, researchers are conducting a meta-analysis to determine how exercise affects the blood pressure of older adults with hypertension in the UK. The standardized mean difference in assessing systolic and diastolic changes before and after therapy was 137.8 and 132.08, respectively, based on the meta-analysis results (Carey et al., 2018). Exercise seems to have a significant impact on age-related hypertension, according to all of the studies.

Chronic high blood pressure damages the heart's structure and function, resulting in concentric cardiac hypertrophy (CHD). It seems that the hypertrophic cardiac response to the overpressure is an attempt to regulate the ventricular walls, thereby allowing the heart to operate while coping with an increased hemodynamic load. – (Abramowitz et al., 2018). A medical name for this sort of expansion is compensatory hypertrophy. The cardiovascular system benefits from physical exercise by reducing heart rate and resting heart rate, as well as increasing, left ventricular filling, venous return, and stroke volume. Physical activity is an important part of this process. An aerobic exercise program for six months significantly reduced left ventricular hypertrophy in hypertensive subjects, according to Micha et al. (2017). Individuals who had a reduction in hypertrophy had decreased blood pressure and lost weight as a result. These researchers also found that reducing one's weight is an important factor in lowering the size of the left ventricle. Metcalf et al. (2012) also found that aerobic exercise may help hypertensive individuals minimize their muscle hypertrophy (swelling). As a result of the increased volume of the ventricle due to eccentric contractions during aerobic exercise, there is also likely to be a small degree of hypertrophy in the heart. The process is different in hypertension patients because of the pathologic enlargement of

the ventricular wall. Thus, as a consequence of aerobic exercise and the Frank-Starling rule (increase in ventricle dimensions), stroke volume rises and pathological hypertrophy of the ventricular wall decreases (Lobelo et al., 2018). Physical exertion causes post-exercise hypertension, and daily fluctuations in blood pressure have little effect on its lowering. To regulate blood flow and temperature, as well as the body's neurological responses during physical activity, it is vital to exercise at a high intensity and volume. The duration of hypotension is directly related to the degree of physical exercise, according to Glynn et al. (2014). Due to elevated body temperature, hypotension may be induced by factors such as reduced plasma volume or enhanced vascular dilation chemicals and changes in hormones controlling blood pressure such as angiotensin, renin, and peripheral vasodilation.

In the long term, physical exercise is a non-pharmacological technique for lowering blood pressure at rest or while engaging in regular activities. Exercise may be a better option for regulating blood pressure in the elderly due to its cheap cost and the fact that it does not interfere with other medications (Abramowitz et al., 2018). The debilitating effects of ageing on the body and mind may be lessened and even reversed via regular physical activity and exercise. Hypertensive persons can have post-exercise hypotension, a drop in blood pressure after a light to moderate workout.

According to a recent study, those who follow a self-monitored online workout program are less likely to have high blood pressure than those who follow a supervised program. To put it another way, the unsupervised program lowers blood pressure mostly in those with elevated blood pressure (Keadle et al., 2016). Compared to a 3-month aerobic physical training program, to get the best outcomes, a 6-month aerobic exercise program should be followed for a total of six months. BMI, waist measurement, and weight loss all have an effect on blood pressure. According to prior research on supervised exercise regimens, blood pressure decrease may occur independently of weight loss (Lobelo et al., 2018). For overweight patients with mild to severe hypertension, nonpharmacological therapy should be the first line of treatment. Hypertensive people may lower their blood pressure with only one exercise session (Lanier et al., 2016). Repetition of workouts over time might prolong this hypotensive impact. Cardiovascular rehabilitation or supervised physical training programs are the only places where these positive benefits of exercise may be seen. There is no evidence that an unsupervised exercise regimen affects blood pressure.

Even non-aerobic kinds of exercise have been demonstrated to reduce blood pressure when at rest. According to O'hearn et al. (2021) studied, circuit weight training seems to have the same effect on blood pressure as endurance exercise. As a result of the significant increases in arterial pressure that are caused by isometric and resistive exercise, it was previously thought that long-term participation in these types of exercises would elevate resting arterial pressure. That's not the case at all, though, according to recent studies Exercises like isometric handgrips and weightlifting lower arterial pressure since they are isometric or resistive in nature (Jiménez-Pavón et al., 2020).

The long-term use of physical exercise as a non-pharmacological technique for lowering blood pressure while at rest or while engaging in everyday physical activity is effective (Zhang et al., 2017). To regulate blood pressure in the elderly, exercise may be a more cost-effective and non-disruptive option. Improving one's health and well-being as one gets older is possible thanks to regular physical activity and exercise (Rogers et al., 2020). Post-exercise hypotension may occur in hypertensive persons after a single moderate or low-intensity exercise session. Post-exercise hypotension is noticed in humans after jogging, cycling, running, and swimming, all of which use major muscles.

Muscles' oxidation capacity rises as a result of exercise, which in turn stimulates the aerobic biochemical system to adapt. All of these contribute to an increase in the body's ability to absorb oxygen. Some disorders induce oxygen inhibition in any of the steps mentioned above, resulting in a reduction in functional capability (Oliveros et al., 2020). The effectiveness of the aerobic energy system may be improved through aerobic activities, though. People's functional capability is enhanced as a result, and this holds even as the illness progresses (Broekhuizen et al., 2016). Higher power, better body posture, less tiredness, improved mood and increased self-confidence are just a few of the other benefits of regular exercise for this particular patient group.

4.1.1 Physical activity and Hypertension

The main prevention and treatment of hypertension include regular physical activity as an important part of a healthy lifestyle. Exercising regularly may lower blood pressure by as much as 5–7 mmHg in those who are already suffering from hypertension, according to Khan et al. (2016). Acutely, exercise has been shown to reduce systolic blood pressure by a substantial amount. Post-exercise hypotension refers to the initial drop in blood pressure after exercise, which may last for up to 24 hours and is more evident in people with higher baseline blood pressure. The exercise training response refers to the long-term drop in blood pressure that occurs when people engage in regular physical activity over an extended period of time. There seems to be no difference in the blood pressure response of middle-aged males of European origin regardless of their gender or ethnicity, although it is important to remember that most researchers has focused on exclusively middle-aged European men (Diaz et al., 2017).

Attenuation of the peripheral vascular resistance caused by a reduction in sympathetic nerve activity and an increase in artery lumen diameter is assumed to be the cause of the decrease in blood pressure that occurs with physical exercise. It has also been suggested that lowering blood pressure may be accomplished by reducing oxidative stress and inflammation as well as improving endothelial function, arterial compliance, body mass and the activity of the renin-angiotensin system, parasympathetic activity, renal function and insulin sensitivity (Kiuchi et al., 2017). Many studies have been hampered by their small size and significant variation in terms of the processes behind the drop in blood pressure that occurs as a result of exercise. There is a great deal of inter- and intra-study variability in the blood pressure response to exercise due to variances in exercise regimens, environmental conditions, and genetic factors. Some 20–25 per cent of those with hypertension were found to be non-responders to exercise, which resulted in no drop in blood pressure (Santosa et al., 2020). There are continuing investigations into the genetic and clinical variables that differentiate those who react and those who do not.

4.1.2 Gender differences impact physical activities

Both among the elderly and among young individuals, the prevalence of hypertension has steadily risen or stagnated in the United States during the previous few decades. Males under the age of 65 consistently have greater levels of hypertension than females of the same age range, according

to several research. As an example, research indicated that barely 1.5 per cent of women between the ages of 18 and 29 had hypertension, compared to 5 per cent of males in the same age group. For black women and men, the percentages were 4 and 10 per cent, respectively (Reckelhoff et al., 2018).

A combination of biological and behavioural variables accounts for observed gender variations in hypertension in both humans and animals. Female hypertension is protected by sex hormones and other genetic and biological distinctions between men and women. As adolescence progress and women approach menopause, these biological variables become more apparent, and gender differences in hypertension become less or nonexistent (Badr et al., 2021).

High BMI is a behavioural risk factor for hypertension, as is smoking and a lack of physical exercise. These important behavioural risk factors vary between men and women in a variety of ways. The average BMI for both sexes was 28.7, according to recent research. In general, women are more likely to be obese than males, particularly when it comes to higher grades of obesity (Song et al., 2020). On the other side, males are more likely than women to be obese. Female smokers are less common than male smokers, however, this gender disparity has lessened over the last decades. In contrast, males are more likely to engage in physical exercise than women. As a whole, these disparities in behaviour show that competing behavioural variables (e.g., obesity, physical activity) may narrow the gender gap in hypertension, while others (e.g., smoking) may worsen the discrepancy.

Exercise-induced differences in heart rate and blood pressure between men and women have been documented. Khan et al. (2016) found that men and women work out in distinct ways to sustain cardiac output. With exercise radio-nucleotide angiography, ejection fraction and end-diastolic volume were found to rise in males, while end-diastolic volume was shown to increase for women. Stroke volume at the same percentage of maximum oxygen consumption and maximal, while not quantified in terms of lean body mass, has similarly been shown to vary between men and women (LBM). Dynamic exercise typically raises systolic blood pressure (SBP), however, Diaz et al. (2017) discovered that men and women had

the same SBP while exercising on the treadmill at equivalent labour loads. There has been no evaluation of any gender differences at the same level of intensity.

4.2 Conclusion

Exercising dramatically lowers blood pressure in older persons throughout the United Kingdom, according to this study's findings. Exercise programs are also used to promote stress reduction and blood pressure control among the elderly in the United Kingdom. The treatment of hypertension in older persons may include frequent physical activity. In addition to the fitness benefits acquired by persistent intense exercise, major health benefits may also be accrued. Thus, it is recommended that older persons participate in activities of moderate intensity that raise cumulative daily energy expenditure and preserve muscle strength, even if they are not high enough intensity to improve their fitness. Blood pressure is reduced as a result of regular physical activity, which includes both aerobic and strength training. Recent research has shown a great deal about the flexibility of many biological systems and how they may be influenced by frequent exercise. As we become older, many of our bodily functions begin to deteriorate, and regular exercise is an excellent way to combat this. Furthermore, older people's adaptability and responsiveness to both endurance and strength training are proof of their trainability. In addition to improving cardiovascular function, endurance training also helps athletes operate at or near their submaximal potential. A better health condition and longer life expectancy may be achieved by reducing the risk factors linked with disease states, heart disease, hypertension, diabetes, etc. However, physical exercise does enhance health and functional ability in older persons, even if standard metrics of physiological performance and fitness aren't always elicited. This population's functional ability and quality of life are considerably enhanced as a result of the advantages associated with regular physical activity and exercise.

It indicates that isometric and resistance exercise may successfully reduce diastolic arterial pressure among many people. As a result, both aerobic and isometric exercise help to reduce blood pressure in older, normotensive individuals. To prevent and cure hypertension, nonpharmacological interventions such as isometric exercise may be useful. As well as peripheral vascular adaptations, changes in sympathetic nerve activity are to

blame for the decline in arterial pressure. Forearm exercise may be done quickly, simply, and in any place with the use of aerobic and isometric forearm training. These characteristics may promote the elderly's compliance with recommended training treatments, which may lead to better therapeutic results.

4.3 Recommendation

Most patients can do these operations on their own at home without the need for specialist equipment or extra expenses, and they may even be performed while lying on the floor, making them perfect for patients to learn and practice at home. Because of the good benefits of exercise on blood flow to the muscles and stress reduction, these athletes' hypertension will be alleviated and their performance will increase as a consequence. You may help people with this disease feel better by teaching them about and supervising them while they use these methods. As a consequence, this sickness may be alleviated by training healthcare workers and patients about this method. Individuals with hypertension should consider regular aerobic exercise as an adjunct therapy to medication. Adults over the age of 65 should do half an hour of strenuous physical exercise every day for added health advantages. When a senior person is unable to engage in any strenuous physical exercise, this guideline may not apply. Physical exercise improves a person's quality of life by increasing their freedom. As a result of the positive effects of exercise on blood flow to muscles and stress reduction, these athletes' hypertension will be reduced, and as a result, their performance will improve. The symptoms of this condition may also be alleviated by instructing patients on these approaches and providing supervision on how they should be done. As a result, it is possible to relieve this illness by teaching the healthcare staff and patients about this strategy. As a supplemental treatment for hypertension, it is advised that hypertensive specialists engage in regular aerobic activity. As we become older, our arteries get more inflexible, leading to higher pulse pressure, lower diastolic pressure, and greater systolic pressure. It is vital to observe this. In comparison to younger individuals, this would likely need a different approach to decreasing blood pressure. We advise doctors to evaluate the data closely since there are both advantages and disadvantages to discussing BP objectives in older patients. Several aspects must be taken into account when deciding on an appropriate target blood pressure for older persons with hypertension, including the patient's life expectancy and burden of comorbidity.

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Appendix I

CASP Table

Number	Questions
1	Was there a clear statement of the aims of the research?
2	Is the qualitative methodology appropriate?
3	Was the research design appropriate to address the aims of the research?
4	Was the recruitment strategy appropriate to the aims of the research?
5	Were the data collected in a way that addressed the research issue?
6	Has the relationship between researcher and participants been adequately considered?
7	Have ethical issues been taken into consideration?
8	Was the data analysis sufficiently rigorous?
9	Is there a clear statement of findings?
10	How valuable is the research?