Adherence of Hypertension Patientsto a Healthy Diet and Physical Activity: A Systematic Review

Abstract

Background: One of the main pathological risk factors for the emergence of many cardiovascular illnesses is high blood pressure (BP). Exercise and diet play a significant role in modifying blood pressure, but the underlying mechanisms are not well understood. **Objectives:**To summarize the available data on the extent of compliance of hypertensive patients to diet and exercise. **Methods:** PubMed, SCOPUS, Web of Science, and Science Direct were systematically searched for relevant literature. Rayyan QRCI was employed throughout this comprehensive process. **Results & interpretation:** We included fourteen studies with a total of 752 patients, and 215 (28.6%) were males. One of the key elements in managing hypertension is physical activity. Only research revealed a low rate of compliance with dietary requirements. A decrease in the number of fruits and vegetables ingested and increased consumption of fatty and salty foods are examples of this non-compliance. Family support and self-motivation were found to be strongly correlated with diet compliance. Three studies indicated that patients had high levels of adherence to their diet and medicine, particularly those who had a family history of hypertension.Future research should concentrate on exposures that are probably biologically linked to the risk of hypertension and blood pressure changes, even though the quality of the available data is still poor.

Keywords: *Hypertension; Exercise; Hypertension; Compliance; Systematic review.*

Introduction

“As per the WHO Health Statistics 2012, the prevalence of elevated blood pressure (BP) in males and females aged ≥25 years was found to be 29.2% and 24.8% worldwide, respectively. The BP measurements are measured as the diastolic blood pressure (DBP) at 90 and the systolic blood pressure (SBP) at 140. Prevalence of hypertension among those aged 15 and older was found to be 27.2% overall, with 30.2% of men and 24.9% of females, in the Hong Kong Population Health Survey 2003–2004” [2].

“The leading behavioral and physiological risk factor (13%) for deaths that can be attributed to causes worldwide has been shown to be elevated blood pressure” [1].“Higher blood pressure was estimated to be the cause of 51% of fatalities from stroke and 45% from coronary heart disease” [1].“In addition, high blood pressure raises the risk of renal illness, heart attack, heart failure, and stroke. Evidence for a positive correlation between blood pressure and cardiovascular illnesses has been constant” [3]. “A 5–6 mmHg increase in DBP was found to increase the incidence of stroke and ischemic heart disease by roughly 35–40% and 20–25%, respectively, according to prospective observational studies” [4]. In light of the enormous worldwide disease burden, population-level optimal blood pressure control is crucial.

Societies like the European Society of Cardiology/European Society of Hypertension, the International Society of Hypertension [5], and the American College of Cardiology/American Heart Association [6] have all published guidelines for the management and prevention of hypertension. These guidelines include dietary recommendations, but they mostly concentrate on certain nutrients and dietary patterns, like limiting sodium intake, consuming alcohol in moderation, following the Mediterranean diet, and following the Dietary Approaches to Stop Hypertension (DASH) diet. More lately, new information about additional

nutrients and patterns connected to blood pressure has surfaced, but it hasn't been thoroughly explored yet [7].The primary objective of this review is to study the compliance of hypertensive patients to diet and exercise.

Methodology

This systematic review was conducted in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards [8].

Study Design and Duration

January2024 marked the start of this systematic review.

Search strategy

To discover the pertinent literature, a thorough search was conducted across four main databases: PubMed, SCOPUS, Web of Science, and Science Direct. We limited our search to English and considered each database's specific needs. The following keywords were transformed into PubMed Mesh terms and used to locate the pertinent studies; "Hypertension," "Exercise," "Training," "Diet," "Adherence," and "Compliance." The Boolean operators "OR" and "AND" matched the required keywords. Publications with full English text, available free articles, and human trials were among the search results.

Selection criteria

We considered the following criteria for inclusion in this review:

- Studies that summarized the compliance of hypertensive patients to diet and exercise.
- No age limits were restricted.
- Only human subjects.
- English language.

- Free accessible articles.

Data extraction

The output of the search method was verified twice with Rayyan (QCRI) [9]. The researchers assessed the titles and abstracts' relevance by adding inclusion/exclusion criteria to the combined search results. The reviewers carefully examined each paper that satisfied the inclusion requirements. The writers discussed conflict resolution techniques. The approved study was uploaded using an already-created data extraction form. The authors extracted data about the study titles, authors, study year, country, participants, gender, population type, and main outcomes. A separate sheet was created for the risk of bias assessment.

Strategy for data synthesis

A qualitative evaluation of the research components and conclusions was provided by creating summary tables utilizing data from pertinent studies. The most effective method for using the data from the included study articles was selected once the data for the systematic review had been collected.

Risk of bias assessment

The quality of the included studies was assessed using the ROBINS-I risk of bias assessment technique for non-randomized trials of treatments [10]. The seven evaluated themes were confounding, participant selection for the study, intervention classification, deviance from intended interventions, missing data, outcome assessment, and choice of the reported result.

Results

Search results

A total of 322 study articles resulted from the systematic search, and 87 duplicates were deleted. Title and abstract screening were conducted on 235 studies, and 190 were excluded. 40 reports were sought for retrieval, and 4 articles were retrieved. Finally, 36 studies were screened for full-text assessment; 11 were excluded for wrong study outcomes, 15 for the wrong population type, and 2 articles were letters to the editors. Eight eligible study articles were included in this systematic review. A summary of the study selection process is presented in **Figure 1.**

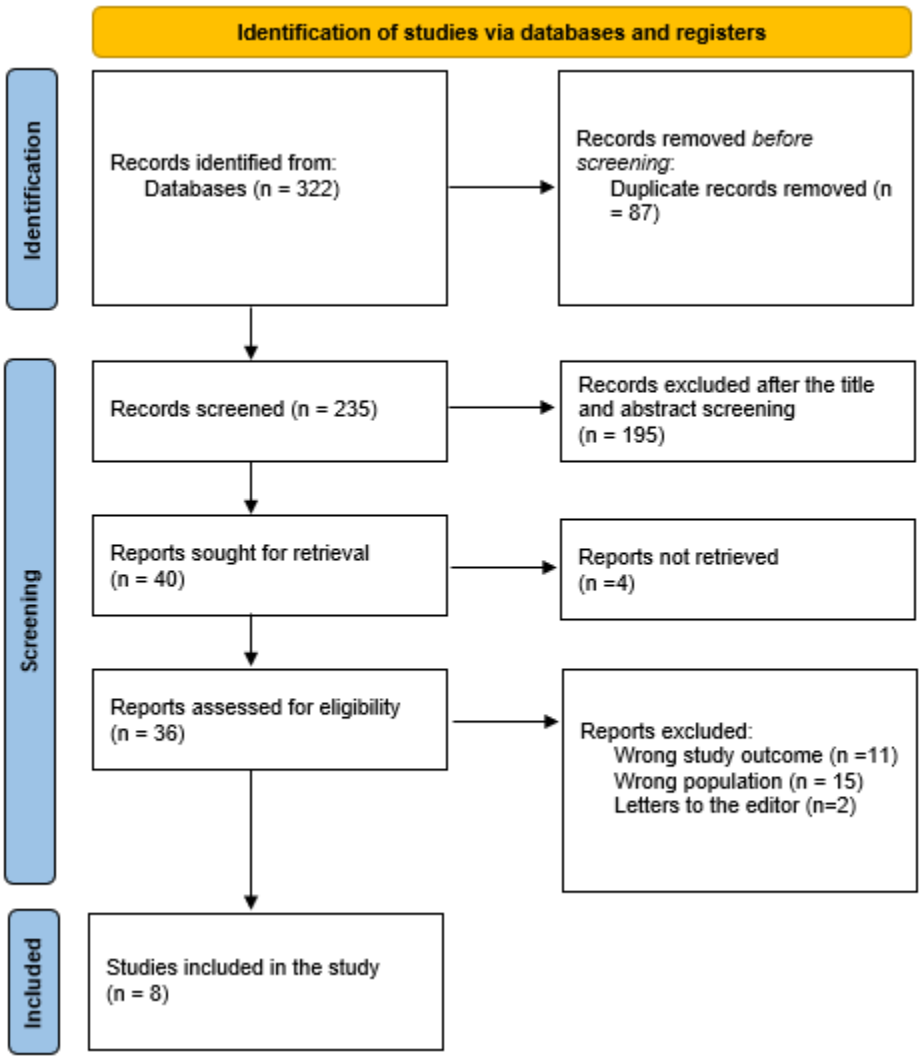

Figure (1): PRISMA flowchart summarizes the study selection process.

Characteristics of the included studies

Table (1) presents the sociodemographic characteristics of the included study articles. Our results included eight studies with a total of 752 patients, and 215 (28.6%) were males. All of the included studies were cross-sectional studies [11-18]. Five studies were conducted in Indonesia [11, 13, 14, 17, 18], one in Pakistan [12], one in Turkey [15], and one in Surabaya [16].

Table (2) presents the clinical characteristics.Two studies included elderly populations [11, 17], and six studies included the general population [12-16, 18]. Physical exercise was found to be one of the important factors to control hypertension [11, 12]. Two studies found a low compliance rate with dietary guidelines [13, 14]. This noncompliance includes a decrease in the amount of fruits and vegetables consumed as well as an increase in the consumption of fatty and salty foods [13]. Self-motivation and family support were significantly associated with diet compliance [13, 14]. High adherence levels to diet and medication were

found in three studies [15-17], especially those with a family history of hypertension.

Table (1): Sociodemographic characteristics of the included participants.

Study	Study design	City	Participants	Mean age	Gender (Males)
Putri et al., 2019 [11]	Cross-sectional	Indonesia	108	60 to ≥70	29 (26.6)
Ahmed et al., 2008 [12]	Cross-sectional	Pakistan	89	55.8 ±13.4	22 (24.7)
Purwana et al., 2023 [13]	Cross-sectional	Indonesia	75	26 to ≥ 65	38 (50.7)
Solon et al., 2022 [14]	Cross-sectional	Indonesia	40	40-90	13 (32.5)
Oğuz et al., 2019 [15]	Cross-sectional	Turkey	250	62.9±1.15	45 (18)
Kudsiyah et al., 2021 [16]	Cross-sectional	Surabaya	20	NM	12 (60)
Fata et al., 2023 [17]	Cross-sectional	Indonesia	50	NM	28 (56)
Hanifah et al., 2022 [18]	Cross-sectional	Indonesia	120	30-59	28 (23.3)

Table (2): Clinical characteristics and outcomes of the included studies.

Study	Population type	Main outcomes	ROBIN-I
Putri et al., 2019 [11]	Elderly	The findings demonstrated a strong correlation between the elderly with hypertension's perception of their susceptibility to physical exercise (p-value = 0.018) and their family history (p-value = 0.037).	High
Ahmed et al., 2008 [12]	General population	Patients with hypertension can control their hypertension and protect themselves from consequences that may arise from uncontrolled hypertension if they take their medications on a regular basis, avoid table salt, and engage in some form of physical activity.	
Purwana et al., 2023 [13]	General population	The results showed that a sizable majority of hypertension patients (66.7%) did not follow the suggested dietary recommendations. This noncompliance includes a decrease in the amount of fruits and vegetables consumed as well as an increase in the consumption of fatty and salty foods, such as coconut milk.Self-motivation and dietary compliance are correlated: Self-motivation and diet compliance showed a significant link (p-value = 0.000, $p < 0.05$) according to the statistical analysis performed using the chi-square test.	High
Solon et al., 2022 [14]	General population	Family support is essential, particularly when it comes to monitoring the foods that people with hypertension eat, going to medical appointments with them to control their blood pressure, helping to pay for their treatment, and reminding them to take their medication so that the patients feel taken care of and excited about their food.	Moderate
Oğuz et al., 2019 [15]	General population	The study participants exhibited high levels of adherence to both medication and food therapy. It was found that patients who had a family history of hypertension responded well to both medication and diet therapy; patients who regularly engaged in physical activity responded poorly to medication but well to diet therapy; and patients who experienced daily stress were not responsive to either of these interventions.	Moderate
Kudsiyah et al., 2021	General population	The majority of hypertension patients typically follow and adhere to their diet. They abstain from eating foods high in fat or salt, as well as from engaging in strenuous physical	

[16]		activity. Nonetheless, a sizable portion of clients continue to violate their diets. It indicates that there is a clear risk of prolonged hypertension in the general population.	Moderate
Fata et al., 2023 [17]	Elderly	The findings showed that just a small percentage of respondents—14% or 7 respondents—were in the category of high adherence to the low-salt diet, while almost half of respondents—46% or 23 respondents—were in the group of lack adherence.	High
Hanifah et al., 2022 [18]	General population	The findings of the analysis indicated that among hypertensive patients, social support and dietary adherence had a significant positive link with a moderate power of correlation ($r = 0.49$, $p < 0.05$). Individuals with hypertension who felt more social support were more likely to follow the hypertension diet.	Moderate

Discussion

“The degree to which a person complies with agreed-upon suggestions from a healthcare practitioner in terms of taking medication, adhering to a diet, or other lifestyle changes is known as adherence” [19].“This review found that physical exercise was one of the important factors in controlling hypertension, especially in the elderly population”[11, 12]. “Regular aerobic and resistance training may be helpful in treating and preventing hypertension, according to studies. For five to seven days a week, engage in 30 minutes of moderate-intensity aerobic exercise (walking, running, cycling, yoga, or swimming) or high-intensity interval training (HIIT), which alternates brief bursts of intensive activity with recovery periods of less strenuous activity. Additionally, strength exercise helps lower blood pressure” [6].

The current study reported that two studies found a low compliance rate with dietary guidelines [13, 14]. This noncompliance includes a decrease in the amount of fruits and vegetables consumed as well as an increase in the consumption of fatty and salty foods [13]. Self-motivation and family support were significantly associated with diet compliance [13, 14]. High adherence levels to diet and medication were found in three studies [15-17], especially those with a family history of hypertension.Methods that were both objective and subjective were identified. Every approach could have benefits and drawbacks. The most reliable biochemical measure of dietary nutrient consumption is urinary excretion. It is a method of assessment that is simple to use and does not rely on the respondent's recollection [20]. Nonetheless, a number of variables, such as the patient's level of hydration and the thoroughness of the sample, influence the degree of concordance between urine excretion and food consumption [21].Positive BP changes occurred in tandem with dietary modifications [22-25]. A diet more in line with DASH was linked to a lower incidence of diabetes [26], a lower risk of coronary heart disease

and stroke [27], and a lower rate of heart failure [27]. These findings were supported by other prospective cohort studies in the literature. Each of these offers proof to encourage the adoption and follow-through of this diet plan.

In their meta-analyses of RCTs, **Dinu *et al.*** [28] found that higher adherence to the Mediterranean diet decreased blood pressure; however, no evidence was provided for observational studies. We discovered no indication of an association in observational studies and moderate-quality evidence for lower blood pressure with the Mediterranean diet. Many of the study's findings can be explained by biological mechanisms. There is moderately strong evidence that diets low in sodium can lower blood pressure by raising plasma renin activity, serum aldosterone, adrenaline, and noradrenaline plasma levels, total cholesterol, and triglycerides [29]. Improvements in insulin resistance are thought to be the cause of the BP effects of low-calorie or low-fat diets [30]. The BP-lowering effect of a high-protein and very low-carb ketogenic diet may be attributed to the amino acid content, particularly arginine, a substrate for nitric oxide, which enhances vasodilation, endothelial function, and insulin resistance and lowers blood pressure [31, 32], or to partially replacing carbohydrate intake with protein [33].

Conclusion

It has been established that one of the key elements in managing hypertension is physical activity. Only research revealed a low rate of compliance with dietary requirements. A decrease in the quantity of fruits and vegetables ingested, as well as an increase in the consumption of fatty and salty foods, are examples of this noncompliance. Family support and self-motivation were found to be strongly correlated with diet compliance. Three studies indicated that patients had high levels of adherence to their diet and medicine, particularly those who had a family history of hypertension.Future research should concentrate on exposures that are probably biologically linked to the risk of hypertension and blood pressure

changes, even though the quality of the available data is still poor at this point. New dietary elements that have not yet been studied (or published) should also be the subject of future research. It should be noted that the main focus of this research is not the actual differences in BP levels based on baseline variability but rather dietary variables and comparisons between studies.

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