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Assessment of Risk Factors of Hypertension among Pakistani People Living in Populated Cities of the Country

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Abstract

The association between diet, age, gender, socioeconomic status, ethnicity and hypertension are well recognized among developing countries. However, the main factors causing hypertension in Pakistan are still not clear. Hypertension is complex and multi factorial. The current article summarizes some of the known factors responsible for hypertension within populated cities of Pakistan. This review was focused on ethnic group of people living within country. Random or multistage screening, socioeconomic status or hypertensive condition was considered during selection of subjects. The dietary patterns in relation with hypertension and other health problems were studied. Studies showed a prominent occurrence among urban adults, particularly women. The Diet transition towards the DASH Diet has been attributed to lower blood pressures. This review highlights the fact that dietary pattern, socioeconomic status, gender, age and obesity is associated with hypertension.

Keywords: Hypertension; Diet; Risk factors; Pakistan.

1. Introduction

Many patients globally have unrecognized or untreated hypertension (El Achhab *et al.*, 2019)**.** The issue of raised arterial pressure was raised for long, and it was considered to be caused by anger, fear, pain, or some environmental factors leading to a decrease in life span (Pickering, 1995). From old times, hypertension is considered a disorder of salt-water balance in our body, as well as the problem in cardiovascular function (Drummond *et al.*, 2019). Generally, it is defined as systolic blood pressure (SBP) more than 140m mmHg or a diastolic blood pressure (DBP) higher than 90 mmHg (World Health Organization, 2013). The diagnosis is based on the average of 2 or more readings taken at each of 2 or more visits after an initial screening (Holm *et al.*, 2006). Furthermore, it is the most important cardiovascular risk factor that leads to serious illness like stroke, heart failure, coronary artery disease, and chronic kidney disease (Afzal *et al.*, 2019; Ehret *et al.*, 2011; Holm *et al.*, 2006; Perol *et al.*, 2019; Vasan *et al.*, 2001; World Health Organization, 2013). It is among the top ten causes of deaths globally (Laar *et al.*, 2019). A recent report showed that the most frequent comorbidities in patients with COVID-19 who developed acute respiratory distress syndrome were hypertension (27%), diabetes (19%), and cardiovascular disease (6%) (Schiffrin *et al.*, 2020). Hypertension affects 30% of adults worldwide; however, its prevalence among children has also been increased in recent years (Sabri *et al.*, 2019).

Of World's Population indo- Asian population consists of one-fifth of a whole (Jafar *et al.*, 2003). Notably, South Asians are at higher risk of Cardiovascular disease, and it is the leading cause of premature adult mortality due to CVD risk factors such as hypertension, and dyslipidemias in the region. The National Health Survey of Pakistan (1990-1994) reported that hypertension is more prevalent among 30% of adults (≥40years), and in addition to that, 30% have high normal blood pressure (Jafar *et al.*, 2003). Moreover, CVD prevalence is 26.9% among the Pakistani population within South Asia (Jafar *et al.*, 2005). The prevalence among the urban population is 22.7%, whereas in the rural area is 18.1%. The overall prevalence of hypertension can vary among ethnic groups in Pakistan such as Baluchis (25.3% in men and 41.4% in women), then Pashtuns (23.7% in men and 28.4% in women), Muhajirs (24.1% in men and 24.6% in women), Punjabis (17.3% in men and 16.4% in women) and Sindhis (19.0% in men and 9.9 % in women) (Jafar *et al.*, 2003).

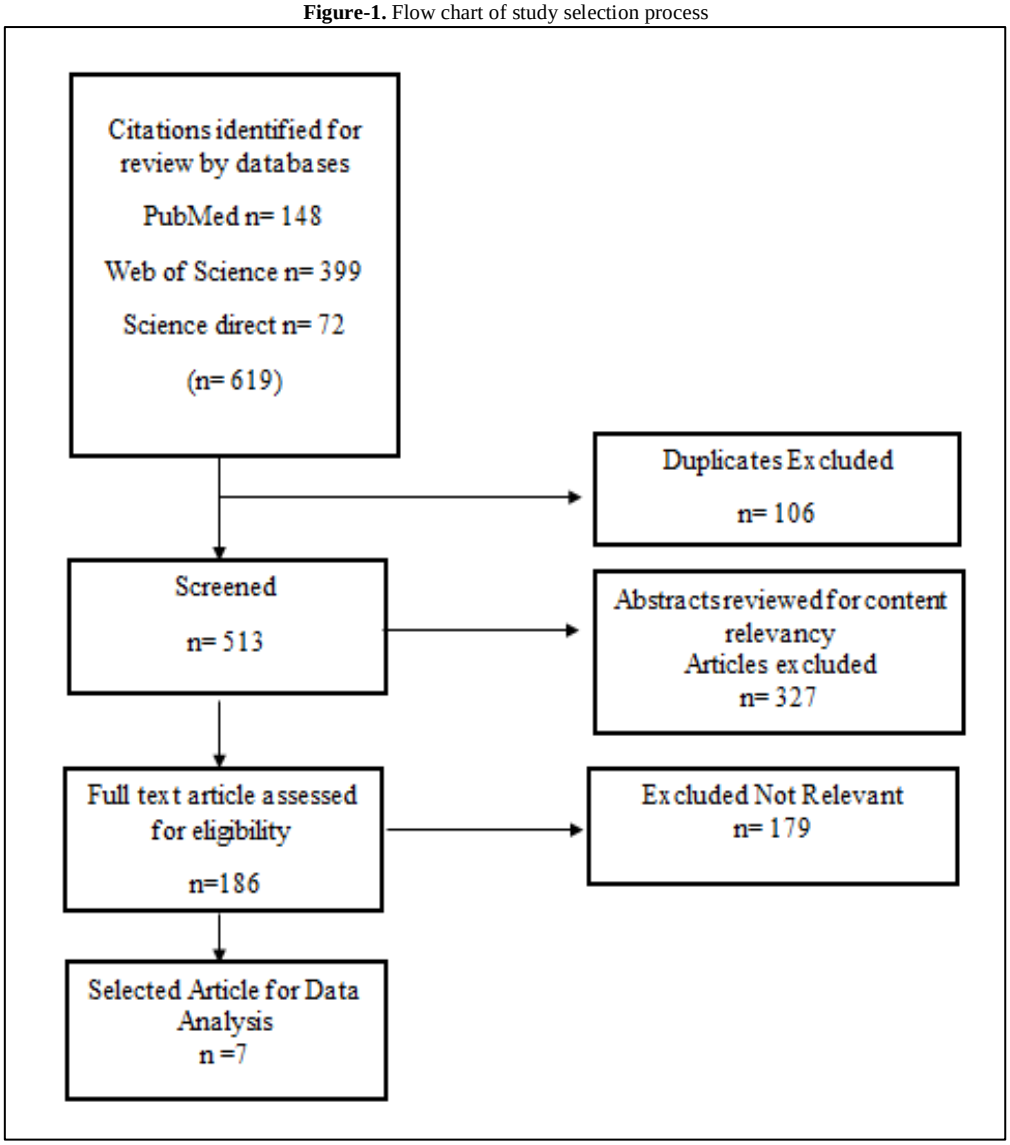
2. Methods

We searched original published articles for epidemiologic studies on the prevalence of hypertension by conducting electronic database searches using PubMed, Web of Science, and Science direct. The search was done on April 14, 2020, and was conducted using three blocks of concepts; the first block with terms of hypertension

("hypertension"[Mesh] or "blood pressure"[-Mesh] or "hypertension" or "blood pressure"), the second block with terms related to Pakistan ("Pakistan" or "Pakistani" or "Pakistani population") and the third block with terms ("prevalence" or "epidemiology study" or "epidemiologic studies" or "epidemiology" or "statistics", or "numerical data" or "prevalence"). MeSH term was only applied to the articles retrieved from PubMed.

A flowchart of information about identification, screening, eligibility, and final studies included was constructed (Figure 1).

Figure-1. Flow chart of study selection process



The search yielded 619 records from all three search databases. The first screening comprised the duplicates exclusion of 106 records, followed by a double-screening of titles and abstracts leading to the exclusion of 327 records. Full-text analysis of the remaining 186 records was done. We excluded letters, abstracts, conference proceedings, published thesis, and reviews. Further screening was done, and articles were considered for inclusion if they were based on quantitative data and clearly explained how diet and the key outcome variables were measured.

Similarly, search limits were applied for diet and hypertension and articles published after 2000, but no limits on study design or sample size. The final articles were selected based on their relevance for understanding how to advance knowledge in the field. The study was focused on dietary measures concerning hypertension in Pakistan. Seven articles that met explicit inclusion criteria were included for the final analysis. For all included studies, the following information was collected: year of investigation, city, study design, sample size, dietary measures in association with hypertension.

3. Results and Discussion

3.1. Study Characteristics

Of the 7 studies, all were about dietary patterns and their effect on health problems associated with hypertension. Three studies used a cross-sectional design, one on randomized controlled clinical, one randomized controlled crossover trial, one surveillance, and pilot study (Table 1).

Table-1. Dietary Intake and Prevalence of hypertension among Pakistani population

Sources	Study Design	City Name (sample size)	Dietary Measures	Association with Hypertension [1]
(Ishtiaq *et al.*, 2017)	Cross- sectional (Mach 2014-August 2014)	Rawalpindi-Islamabad (n=219)	Salt restricted diet Yes No	 + -
(Safdar *et al.*, 2015)	Cross-sectional (Secondary Analysis)	Karachi (n= 4304)	Dietary pattern scores Fat and sweet pattern Fruits and Vegetables Seafood and yogurt	 0 0 -
(Raza *et al.*, 2019)	Cross-sectional (January-April 2015)	Karachi (n=600)	Housewives vs working women dietary patterns (3 meals/day, 3-5servings of vegetables/day, 2-4 fruits/day,>6oz fish/poultry/day, and >once fast-food/week) Housewives Working women	 + -
(Naseem *et al.*, 2016)	Randomized controlled clinical (February 2014-March 2015)	Rawalpindi-Islamabad (n=1492)	Salt restriction diet (<1500mg/day) Diet rich in fruits and vegetables low-fat dairy diet Diet low in saturated fat	- - - -
(Jessani *et al.*, 2008)	Randomized controlled crossover trial (3-week trial)	Karachi (n=200)	High sodium diet Low sodium diet	+ -
(Kapoor *et al.*, 2018)	Surveillance	Karachi (n=8361)	Fat and Sweet Pattern Fruit and Vegetable Pattern Seafood and Yogurt Pattern.	0 0 0
(Qidwai *et al.*, 2000)	Pilot (October 1998)	Karachi (n=101)	Increased garlic intake	-

3.2. Characteristics of the Studies' Participants

The ethnic group considered in the studies were the Pakistani population, living in Pakistan. Almost all the studies were focused on adults (18years and above), excluding pregnant women. Random or multistage screening, socioeconomic status or hypertensive condition was considered during selection of subjects. The dietary patterns in relation with hypertension and other health problems were studied.

3.3. Women Diet and Hypertension

With a 30% prevalence of hypertension around the world (Desormais *et al.*, 2019), Pakistani women seem to be the most affected (Shafi and Shafi, 2017). A study done by Ishtiaq *et al.* (2017) in Pakistan showed that, of the 219 individuals, overall prevalence of hypertension was 29.22%. However, women represented over 78%. The same study shows a positive association between salt restricted diet and hypertension. This study shows a higher prevalence among women. This could be associated with different factors such as education, income, employment and dietary habits. Raza et al for example compared the influence of dietary habits practices on blood pressure between housewives and employed women (Raza *et al.*, 2019). The study showed that, of the 600 subjects (300 housewives and 300 working women), more housewives were noted as hypertensive. Furthermore, 18 working women and 58 housewives were hypertensive among those who consumed more than 6 ounces of fish or poultry. Also, 92 housewives and 82 working women had high blood pressure who consumed less than 6 ounces of fish or poultry. This suggests that being a housewife may be associated non-healthy eating habit and contributing factor for hypertension. While this study did not take in consideration multiple check for blood pressure reading, women in Pakistan seem to be the most vulnerable group.

3.4. Dietary Intake

What we eat daily determines our health condition. However, instead of isolated foods the dietary patterns that are adopted over a period of time have synergistic effects on health outcome (Schwingshackl and Hoffmann, 2015). The dietary practices and their health outcomes can vary among ethnic groups (Pérez-Escamilla and Putnik, 2007). In addition, there are inter-individual differences in response to dietary interventions (Kovatcheva-Datchary *et al.*, 2015).

3.4.1. Fruits and Vegetables Intake in Relation to Hypertension

Among Pakistani Population, researchers found a negative correlation between fruits and vegetable based dietary intake and hypertension. But these studies were focused on women. For instance, there were more number of hypertensive house wives who intake less fruits (Raza *et al.*, 2019) and hypertensive people from three different

cities of Pakistan (Naseem *et al.*, 2016). These results were supported by a survey conducted in six countries where hypertension was found to be more common in women and those with lower socioeconomic status, which likely to determines the quality of food (Lloyd-Sherlock *et al.*, 2014). In dietary Approaches to Stop Hypertension (DASH Diet), groups of individuals increasing vegetables and fruits with less intake of fats lowers blood pressure (Bray *et al.*, 2004). Similar results were found in a study done in a small rural Bangladeshi populations of vegetarian and non-vegetarian people showed that consumption of vegetable-based diet for more than five years assists to maintain a healthy serum lipoprotein profile (Das *et al.*, 2012). In Mumbai, the same negative association between a diet rich in fruits and vegetables with HT was studied (Kapoor *et al.*, 2018).

On the contrary**,** the studies revealing no relation of previously mentioned dietary pattern and hypertension involved low-income urban adults, that possibly related to the socioeconomic status of subjects thus showed an inverse association for yogurt and seafood pattern only (Safdar *et al.*, 2015). Previous studies have also shown similar results with diets based on seafood, vegetable, and yogurt in different population groups. For instance, a study conducted in Bangladesh showed a lower risk of hypertension among people consuming more seafood, rice, fruits, and vegetables (Chen *et al.*, 2006). A similar outcome was obtained among Japanese adults who followed dietary patterns including dried fish, soybean products, fruits, seaweeds (Sadakane *et al.*, 2008). However, another population-based study using 26 item food frequency questionnaires from Karachi Pakistan showed no significant association of hypertension with any of the dietary patterns (Kapoor *et al.*, 2018).

3.4.2. Fats and Oils Intake in Relation to Hypertension

Globally famous, fried foods are rarely linked with "healthy" foods as they absorb more oil content (Wainwright and Lampert, 2007). A study done on 428 Filipino women married to Korean men where fried food (deep-fried, shallow fried, pan-fried, and stir-fried) intake was assessed using 24-hour recall, revealed that fried foods could increase the chance of prevalence of prehypertension and hypertension (Provido *et al.*, 2020). In Mumbai, fried snacks and sweets were positively associated with abdominal adiposity. Whereas no association was found in the city of Karachi (Kapoor *et al.*, 2018). Fast food consumers intake more calories, fat, sugar, and sugar, sweetened beverages, and less fiber, milk, fruit, and vegetables (Harris *et al.*, 2010). In Karachi, a study done on women revealed the fact that both housewives and working wives intake fast food occasionally. However, these groups were found to be on the normotensive side and showed normal BP (Raza *et al.*, 2019). Another cross-sectional study conducted among 4304 adults in the populous city of Pakistan has shown no association between Fat and sweet dietary pattern with hypertension. Whereas researchers found a negative association between seafood and yogurt pattern, it might be because of the fact that adults selected for the study were from low income families. Overall there was high poverty, low literacy rate and low health awareness (Safdar *et al.*, 2015).

As a whole a diet plan not only rich in fruits and vegetables but lower in total and saturated fats along with restricted salts can lower the blood pressure (Naseem *et al.*, 2016).

3.4.3. Association of Salt and Garlic Amounts with Hypertension

3.4.3.1. Salt Intake

In history salt is regarded as the essential dietary cause of blood pressure (Kromhout, 2001). The average daily salt intake is 9-12grams daily per person across the world. However, in order to lessen the chance of hypertension among adults, WHO recommends 5grams of salt per day (World Health Organization, 2012). In twin cities of Pakistan, when a diet plan based on a DASH salt-restricted diet (SRD) with a reduced salt concentration of 1500mg for 2000calories was given to the hypertensive group of people for five weeks, it showed a reduction in the blood pressure by 2.19mmHg. Among participants of the study, 63.1% of individuals already had a family history of hypertension, and 67% considered their lifestyle as sedentary one (Naseem *et al.*, 2016). Previous studies also confirmed that the decrease of salt intake in food from 6g is lowering SBP/DBP 7/4 mmHg in hypertensive patients and 4/2 mmHg in individuals without HT (He and MacGregor, 2009). Another study conducted in a normotensive population of Karachi suggested that a decrease in SBP along with a change in sodium concentration from high to low caused 6 (2-9) mmHg in individuals who already had high baseline SBP. Individuals with high baseline BP showed a significant decrease in BP when treated with a low sodium diet. The study overall concludes that the extent to which BP reduces depends on baseline BP (Jessani *et al.*, 2008).

3.4.3.2. Garlic Intake

According to the 2012 National Health Interview Survey, the most common healthcare approaches are natural products. Among the herbal products, garlic is know from ancient times (Matsutomo, 2020). For centuries, it has been an essential part of Diet among the Pakistani population (Ashraf *et al.*, 2011). Worldwide, Asia is contributing to the production of 80% of total garlic (Miraj and Ali, 2014). Recent studies stated that garlic is potentially safer herb because of it cardio protective properties, including blood pressure lowering effects. Therefore, dietary garlic is considered to be effective for HT patients (Matsutomo, 2020). A 24-week study done on newly diagnosed HT patients in Karachi, found that blood pressure reduces significantly with a higher dosage of garlic and with the increase in time of therapy (Ashraf *et al.*, 2013). A previous study in the same city, with 101 subjects' where garlic intake was measured in a crude manner for a month, the results were similar that is, the increase in amounts of garlic in food lowered the BP (Qidwai *et al.*, 2000).

From above its suggested that the control of salt intake and use of garlic is an active natural agent in developing countries for the prevention and treatment of hypertension.

3.5. Obesity, Age and Family History

Around the world, various studies reported that adverse health outcomes are associated with being overweight, the family history and age (Barrett-Connor and Khaw, 1984; Hunt *et al.*, 1986; Jafar *et al.*, 2003; Nanan, 2002; Yoon *et al.*, 2003). In Rawalpindi-Islamabad, a study presented that more of hypertensive individuals were women. Among the total hypertensive individuals' majority 59.4% were obese whereas, 42.2% of them had family history of the disease, and 78.12% had a family life. Overall, increase in the prevalence of hypertension with age, weight, family status, economic status, education, and physical activity was observed in twin cities of Pakistan (Ishtiaq *et al.*, 2017). The fact that family history is a risk factor of hypertension is supported by the work of Jasmine et al who found 41.86% hypertensive adults having hypertensive parents in Chennai (Sundar *et al.*, 2013). Another study on women in Karachi stated that out of 68% hypertensive house wives 44.1 % were overweight and were having a sedentary lifestyle compared to working women (Raza *et al.*, 2019). Similarly, a study on adults from Karachi showed more of older and overweight people in hypertensive category as compared to pre-hypertensive and normotensive groups (Safdar *et al.*, 2015). In addition, Data from multiple health screening camps held at multiple locations in rural area of Punjab showed around 50% patients with hypertension were obese. The median age of all patients were 47 years (Shafi and Shafi, 2017). This is also supported by study done in North India, which validated that increase in age, body mass index, and obesity increases the prevalence of hypertension (Yadav *et al.*, 2008).

3.6. Socioeconomic Status Diet and Hypertension

Recent research shows that hypertension is more prevalent among developing countries with low-income status (Lloyd-Sherlock *et al.*, 2014; Uddin *et al.*, 2020). A study conducted in twin cities of Pakistan found that 70.3% of hypertensive individuals were unemployed, and 60.9% were illiterate, which indicates their socioeconomic status (Ishtiaq *et al.*, 2017). In India, the fourth foremost risk factor of death and disability is hypertension, with a national prevalence rate of 25% (Geldsetzer *et al.*, 2018; Venkateshmurthy *et al.*, 2018). Researchers did research in the United Kingdom, Spain, France, and Netherlands and found that a healthy diet is more expensive (Bernstein *et al.*, 2010). The studies from high income countries showed that good quality of diet is associated with socioeconomic status of individuals (Mullie *et al.*, 2010). Among remote Indigenous Australians, even for short span of low money period has left an impact on reduction of diet quality and increased risk of diseases (Wycherley *et al.*, 2017). A study validated that the diet of whites had good quality than the African Americans (Kant *et al.*, 1991; Raffensperger *et al.*, 2010). In Karachi, study on women showed 68% of hypertensive women who were housewives with diet low in fruits (Raza *et al.*, 2019).

4. Conclusion

In Pakistan, Women seem as main victims of hypertension (Ishtiaq *et al.*, 2017; Raza *et al.*, 2019). As it was seen more prevalent in women among majority of the ethnic groups within country (Ishtiaq *et al.*, 2017; Jafar *et al.*, 2003). However, among factors leading to increase in blood pressure were same as in other countries that is factor of age, obesity, physical activity, diet and socioeconomic status. However, the studies included were conducted in Pakistan were confined to populous city Karachi and the twin cities of Islamabad-Rawalpindi only. The diet in accordance with DASH Diet which is rich in fruits and vegetables and low in fats, salt have good impact on patients. Pakistani cuisine has major use of garlic. Therefore, families with meals having lots of garlic showed low blood pressures. Overall low salt and high garlic was found have positive impact. Furthermore, like other studies education and employment was found to be linked with management of hypertension. And unemployed individuals like housewives had diet low in vegetables and fruits.

5. Limitations of Study

Reviewed articles written and published in English only. Most studies were about association of food and hypertension among Pakistani people residing within country. The studies were only focused on people living in Karachi, Islamabad and Rawalpindi which may not be a very good representative of overall country's situation. This study did not focus on genetic or hereditary pathways for hypertension. Therefore, there is possibility of other disease relations which are not considered in this study.

Conflict of Interest

The authors declare no conflict of interest.

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