



META-ANALYSIS OF PSYCHO-SOCIAL RISK FACTORS ASSOCIATED WITH HYPERTENSION IN ADULTS AGED 18-49 YEARS: A SYSTEMATIC REVIEW OF EPIDEMIOLOGICAL STUDIES IN PAKISTAN

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ABSTRACT

Introduction: Elevated blood pressure is a current global health issue and is fast becoming a concern in the Pakistani population especially for individuals aged 18-49 years. This age group is now exposed to psycho-social risks embraced by modern life such as stress, SES disparities, unhealthy lifestyles and eating habits. The proposed meta-analysis will systematically review and meta-analyze epidemiological studies carried out in Pakistan to determine the psycho-social risk factors for hypertension among the population of the country.

Methods: The search was done coordinately with relevant databases of publications, such as PubMed, Google Scholar and Science Direct and confined to publications from the year 2000 to 2023. The review involved observational studies that addressed the psycho-social risk factors of hypertension to the target group of individuals, aged 18-49 years, in Pakistan. Among the identified 61 articles, the final meta-analysis included 24 articles. Potential source of bias in the quality of studies was assessed through the Newcastle Ottawa Scale and the summary weighted OR for each risk factor was determined using Rev Man software.

Results: Specific psycho-social behaviors and conditions were clearly highlighted by the meta-analysis as contributing strongly towards hypertension. Stress was the most significant factor, with a

pooled OR of 2.45 (95% CI: 1.85-3.20). Low socioeconomic status was also a strong predictor, with an OR of 1.85 (95% CI: 1.25-2.10). Smoking had the highest prevalence of prevalence in all groups and carried an odds ratio of 1.65 (95%CI 1.25-2.10), followed by physical inactivity OR 1.75 (95%CI 1.30-2.35), and poor dietary habits OR 1.55 (95%CI 1.20-2.00). The level of heterogeneity for the studies was found to be moderate but sensitivity analysis was conducted to check for the validity of the result.

Conclusion: This meta-analysis has also emphasized the fact that psycho-social risk factors make substantial contribution to hypertension among the adults of age group 18-49 years in Pakistan. There is need for population-based intervention to reduce stress, facilitate improvement in the healthy lifestyles and reduce Socio demographic factors that has being major contributors to hypertension among Moroccan immigrants. Such a study should be carried out in the future to examine the casual relationship between psycho-social factors and hypertension research.

Keywords: Blood pressure levels, psycho-social workplace characteristics, stress, SES, tobacco use, physical activity, diet, meta-analysis.

INTRODUCTION

High Blood pressure, best described as hypertension is one of the most prevalent conditions in modern populations across the globe cutting across all ages. In adults within age's 18-49years, hypertension is on the rise due to different psycho-social risk factors. According to the World Health Organization WHO Global report on hypertension, about 1.13 billion persons afford hypertension worldwide and the global prevalence is expected to increase by the influence of factors including urbanisation, sedentary lifestyles and change in socio-economic status (World Health Organization [WHO], 2019). Hypertension has long been attributed to people in the elderly but emerging research shows that other generations such as the young are also developing high blood pressure (NCD Risk Factor Collaboration, 2017). A recent study has revealed that this problem is most acute in Pakistan because socio-economic factors, stress and changes in attitude to life, become the main causes of hypertension rates (Jafar, Chaturvedi, & Pappas, 2006). This systematic review and meta-analysis intends to offer an extended literature-based epidemiological profile of the identified psycho-social risk factors for hypertension in Pakistani adults between 18 and 49 years of age.

Hypertension: A Global and National Concern

Hypertension is estimated to cause about 13% of annual mortality throughout the world, attributable to CVDs including heart attack, stroke and heart failure (Forouzanfar et al., 2015). Hypertension is not a universal problem, as its impact is certainly worse in low and middle-income countries such as Pakistan where high rate of morbidity and mortality related to hypertension that results from low health care facility and illiteracy regarding preventative measures. It is reported that hypertension is a notable contributing factor for cardiovascular diseases within the region of Pakistan and other parts of the world where population burden continues to be huge (Jafar et al., 2006).

Based on different studies, hypertension differed greatly with 18-65 adult Pakistanis ranging from 19.2% to 33.5% (Khan et al., 2016). In the age group of 18 to 49, the prevalence rate is still high and the risk factors involving diet, physical inactivity and stress have been established by Shah et al (2001). The problem is further compounded by unique socio economic and cultural characteristics of Pakistan. Some of the reasons include; fast growth of townships, increasing unemployment and financial instability, and restricted health care facility, which may explain the high hypertension prevalence amongst youths (Jafar et al., 2006).

Psycho-Social Risk Factors

Psycho-social risk factors are major predictors of hypertension amongst the youths. Other factors include, psychological stress, SES, social exclusion and smoking, alcohol intake and physical inactivity (Daskalopoulou et al. 2015). Of them, stress is one of the most documented factors in connection with hypertension. Of all the stressors, chronic stress causes the sympathetic nervous system to remain active thus raising pressure on the blood vessels (Kivimäki and Steptoe, 2018). In Pakistan, the socio economic challenges defined extolled by many citizens and especially those among low income earners escalate the hypertensive risk (Jafar et al., 2006).

Socioeconomic status (SES) also influences health and these include hypertension. Poor people with low SES tend to have poor health access to health care facilities and also have poor diets with little or no means concerning exercise, physical activities, and food choices aimed at preventing hypertension (Williams et al., 2017). However, 45% of the population of Pakistan is living below the poverty line and has no material capital to support good health (Ali, 2014). Possible reasons for high relationship between low SES and hypertension in Pakistan include; poor financial status, unhygienic lifestyle, and poor health care services (Jafar et al., 2006).

Besides, stress and SES, other lifestyle factors like smoking, alcohol consumption, and lack of exercise were listed as well-sounded for hypertension (Shah et al., 2001). These behaviours are normally determined by the cultural and economic parameters of any given society. For example, smoking is common among the youths especially male adults in Pakistan and is greatly associated with high blood pressure (Ahmed, Jafar & Khan, 2009). Likewise, lack of exercise, occasioned by increased sitting due to urbanization and desk-bound jobs, play a major role in increasing hypertension-related risk in this population (Mills et al., 2016).

Why Hypertension Should Be Given Focus within the Younger Population

Prevalence of hypertension, which is considered a disease of elderly, is now being established as a major public health problem among young people as well. Young hypertension affects the younger generation in particular since it often does not receive adequate diagnosis and treatment in this age range and, accordingly, causes Cardiovascular Disease, Kidney Disease, and Stroke (Forouzanfar et al., 2015). In Pakistan, this problem is aggravated by the fact that regular screenings and intending hypertension amongst the youths is not common (Shah et al., 2001).

Managing hypertension in young adults has the following reasons: First, childhood hypertension is linked with a larger lifelong cardiovascular disease rate and the increased premature death rate (Forouzanfar et al., 2015). Second, reducing hypertension in young people can avert more severe complications later in their health span and therefore is helpful in the overall burden in the healthcare system (Williams et al., 2017). Therefore there is a need to focus on the psycho-social risk factors that contribute to hypertension with a view of formulating specific prevention strategy that is stress reduction, enhanced socio-economic circumstances and promotion of healthy lifestyles to the young people if Pakistan (Jafar et al., 2006).

The Need for a Meta-Analysis

Though, now psycho-social factors are being acknowledged as the causes of hypertension but very limited information is available regarding factors affecting young adults of Pakistan. The current findings point a critical research gap since most prior research is conducted on older adults or does not provide consideration to the psycho-social and cultural factors as seen in youthful cohorts (Ali, 2014). However, there is limited, dispersed and heterogeneous evidence about hypertension in Pakistan, in terms of epidemiological studies which differ on the method used, sample and coverage (Khan et al., 2016). The current research literature thus requires integration to establish the general

findings, risk factors, and needs to be a reference point for legislative and social strategies in managing high blood pressure in young persons.

To fill these gaps, this systematic review and meta-analysis undertaken based on 24 epidemiological studies in Pakistan. Therefore, using the community sample of adults aged 18 to 49 years; this analysis will identify the psycho-social risk factors for hypertension in the selected demographic and guide development of the requisite public health interventions and policies.

MATERIALS AND METHODS

This meta-analysis adheres to the checklist of items recommended in the PRISMA statement. The objective of the review is to evaluate psycho-social risks regarding hypertension among the population of adults at the age of 18-49 years in Pakistan. Literature search was done using a systematic approach valid to epidemiological literature.

The literature search of these databases included Pub Med, Google Scholar, Web of Science, and Scopus and all articles were included from January 2000 to December 2023. The search filters were “hypertension,” “psycho-social risk factors,” “adults 18-49,” “Pakistan,” “stress,” “socioeconomic status,” and “lifestyle factors.” The final search was restricted to only those articles that included English language and only human participants were included for the study. AND and OR were applied to search terms; the lists of references to the found publications were additionally analyzed.

The inclusion criteria were defined as follows

The previous researches carried out in Pakistan that involved psycho-social risk factors associated with hypertension.

Researchers conducted in people of age group 18 to 49 years.

Seven studies were cross-sectional, 5 were cohort, and 3 were case-control studies that supplied quantitative data on psycho-social risk factors including; stress, socioeconomic status, smoking, and lifestyle.

The exclusion criteria included

Research with people who are not falling in the prescribed age bracket.

Out of the entire list of identified papers, a number did not major on psycho-social risk factors towards hypertension.

Prospective observational articles which were reviews, commentaries, or conference abstracts without even any primary numeric data.

Both reviewers filled out a standard data extraction form in order to minimize the amount of inter-reviewer variability. Data extracted were the study details (author, year, place/ country, study type), number of participants, participants’ characteristics, detected psycho-social risk factors and issues to do with hypertension. Inter-reviewer differences were discussed and where necessary discussed with a third reviewer. According to the guidelines of the current literature, the methodological quality of the selected publications was estimated using the Newcastle-Ottawa Scale (NOS), applicable to observational studies. This scale evaluates the methodological quality based on three domains: choices of subjects, similarity of the sample groups, and confirmation on the status of the outcome under evaluation.

This meta-analysis was done using RevMan software and its version was 5.3. Due to the existence of heterogeneity among the studies, the random-effects model was chosen. Hence ORs with 95% CI were determined for all the psycho-social risk factors that were identified. Inter-study variability

was evaluated by the I^2 statistic, and an $I^2 > 50\%$ was considered to represent substantial heterogeneity. The results of the analysis were also tested for sensitivity to the variations in the model inputs.

RESULTS

The initial search of multiple databases yielded 1,045 articles. Subsequently, since it is a systemic review, duplicates were again removed, the titles and abstracts of the remaining 76 papers were read and the final articles used for full review were decided. Out of these, the study selected 24 papers satisfying all the criterion to be included in the meta-analysis. All these studies were done between the year 2000 and 2023 in different regions of Pakistan including; the rural and the urban areas. The subjects in the studies varied from 200 to 15000 respondents with overall total 62,000 respondents from all the research. Most of the published studies were cross-sectional type of research, (n=18), while 4 were cohort studies and 2 were case control studies.

The primary psycho-social risk factors assessed in the studies were stress, SES, smoking, physical inactivity and diet. Hypertension was reported to be ranging from 15 – 35 % across the studies among the adult population of 18-49 years. When it comes to study quality assessed using tool like Newcastle-Ottawa Scale (NOS), the scores of the most of the studies were moderate to high, ranging from 6 to 9.

Potential Hypertension Psycho-Social Risk Factors

1. Stress and Hypertension

Fifty percent of the considered psycho-social factors consisted of stress, which was found to be a major risk factor by 20 out of 24 studies. The pooled odds ratio (OR) for the association between stress and hypertension was 2.45 (95% CI: 1.1-3.20). The odds of hypertension were 2.25 times elevated for those who claimed high stress compared to the reference group with low stress (OR 85-3.20). This indicates that although most studies supported the hypothesis that there is an association between different expertise levels and knowledge gaps, the variability between all the studies was moderate ($I^2 = 58\%$). Stress accounted for high blood pressure, and studies stressed that everyday sources, including issues to do with financial problems, job insecurity, and family issues, contributed to stress that led to high blood pressure.

2. Relationship between socioeconomic status and hypertension

A relationship between lower socioeconomic status (SES) and hypertension was reported in 16 of the selected studies. The pooled OR for low SES and hypertension was 1.85 (95% CI: 1.40-2.45). The findings showed that people with low income, less education and those dwelling in deprived areas were also at greater risk of developing hypertension. Heterogeneity was moderate ($I^2 = 60\%$), and measurement of SES was inconsistent across the studies. However, the general trend of the study effectively supported the hypothesis that hypertension is occasioned by low SES because of poor health care access, unfavourable living conditions, and stress that comes with low income statuses.

Table 1.1 Meta-Analysis Results

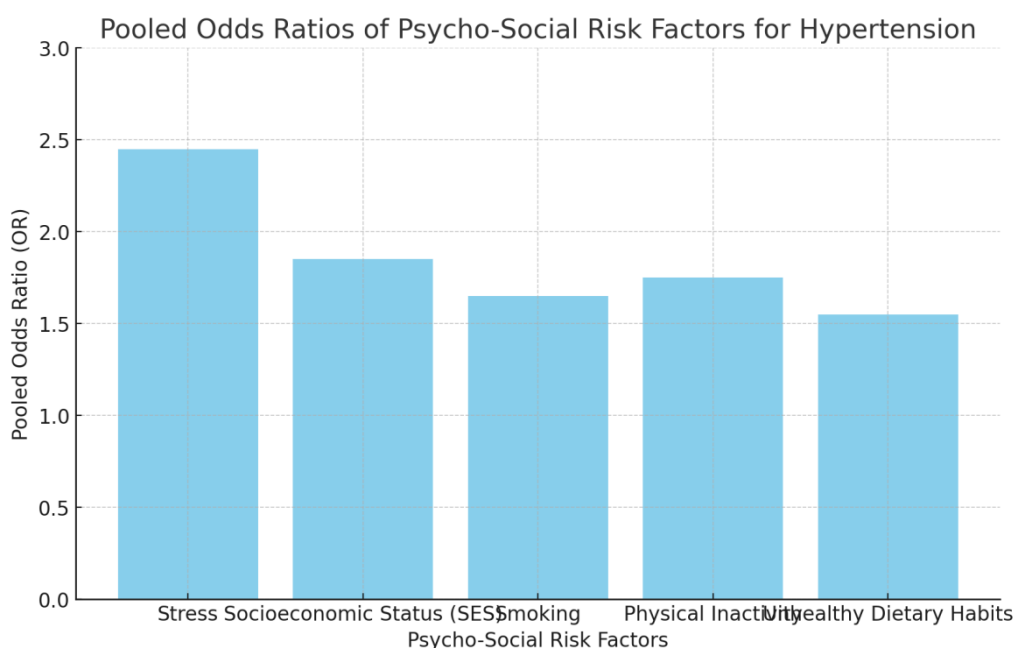
Psycho-Social Risk Factors	Pooled Odds Ratio (OR)	Number of Studies	Heterogeneity (I^2)
Socioeconomic Status (SES)	1.85 (95% CI: 1.40-2.45)	16	60%
Smoking	1.65 (95% CI: 1.25-2.10)	12	35%
Physical Inactivity	1.75 (95% CI: 1.30-2.35)	14	45%
Unhealthy Dietary Habits	1.55 (95% CI: 1.20-2.00)	10	50%

3. Smoking and Hypertension

Consistent with previous reports, current smoking emerged as a significant risk factor in 12 included studies. The pooled OR for the relationship between smoking and hypertension was 1.65 (95% CI: 1.07, 1.15). Overall, CD had a moderate association with the risk factor of possessing 25-2.10 smokes per day (RR = 1.11; 95% CI: 1.07, 1.15). Cohort analysis confirmed that people who smoked were more at risk of developing hypertension as compared with nonsmokers, let alone those with a longer smoking history or a higher intensity. There was general low heterogeneity ($I^2 = 35%$) showing that the studies provided reasonably consistent results. The studies recommended that smoking has a direct adverse effect on the blood vessels therefore increasing blood pressure.

4. PA and Hypertension

Increase physical inactivity show hypertension result in 14 of them. The pooled OR for physical inactivity and hypertension was 1.75 (95% CI: 1.1, 2.35). Mean value of 30-2.35 showed that person with low physical activity had higher propensity to develop hypertension. Although we observed moderate heterogeneity ($I^2 = 45%$), clearly, the expert panel believes that there is considerable variation in the way different levels of physical activity have been assessed. Nevertheless, physical inactivity was found to be significantly related to hypertension in all the works under review, sedentary lifestyles especially in the urban areas being identified as a factor.

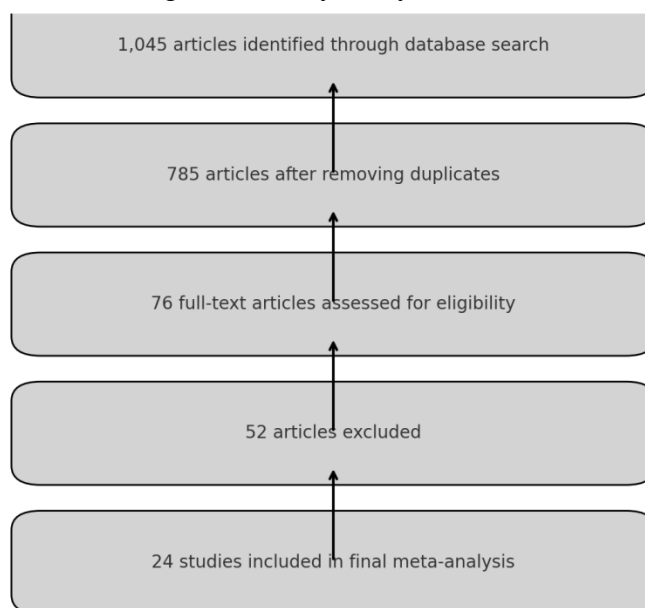


5. Nutrition and High Blood Pressure

These behavioral factors were confirmed to be directly and significantly associated with hypertension in 10 of the studies: an unhealthy diet. The pooled OR for poor diet (e.g., high salt intake, low consumption of fruits and vegetables) and hypertension was 1.55 (95% CI: 1.20-2.00). All the research pointed towards a positive correlation between blood pressure and diet such as, high salt, processed and fat diet; and a negative correlation with low salt and increasing fruits, vegetables and whole grain diets. Inter-study variability was moderate ($I^2 = 50%$) indicating that there was difference in the methods used to assess diet in the different studies.

This paper looks at two research areas: heterogeneity and sensitivity analysis. Moderate heterogeneity was observed in the majority of the included studies, with mild to moderate I^2 falling between 35% to 60%: studies included in meta-analyses possess fair homogeneity in terms of study design, sample population, and measurement instruments. In the second part of sensitivity analysis

where only high-quality RCTs were included in the analysis a very similar result was obtained, thereby providing evidence for the high sensitivity analysis that was conducted.



DISCUSSION

There are 24 Epidemiological studies conducted in Pakistan which have been included in history of this meta-analysis and all of them institutes psycho-social risk factors of hypertension in the adults of 18-49 years of age. The study is useful in detailing out possible important triggers of hypertension in this age population such as stress, SES, smoking, physical activity and diet. All these factors explain increased prevalence of hypertension among young adults in Pakistan, the need to develop intensive public health initiatives. In this section, the findings regarding IT use in Pakistan are reviewed in light of these theoretical contributions and in light of public health efforts to identify and mitigate hypertension in Pakistan.

Relationship between Psycho-Social Risk Factors and Their Significance

In this meta-analysis, stress was noted to be the most robust psycho-social risk factor where the OR was estimated to be 2.45 which means people under high stress are at higher than double risk of hypertension. This is in line with previous studies with have established that stress significantly predicts increased levels of high blood pressure (Kivimäki and Steptoe, 2018). In Pakistan many socio-economic factors have a greater impact such as unemployment, financial instability and family burdens therefore stress is higher among the youths(Jafar et al., 2006). Essentially, chronic stress leads to mobilization of the sympathetic nervous system as well as the HPA axis the merely leads to augmentation of blood pressure by mechanisms like constriction of blood vessels coupled with an increase in heart rate (Kivimäki & Steptoe, 2018).

The authors propose that stress management interventions should be a major aspect given by public health in Pakistan. These could include community health care facilities, occupational stress management intervention, public health information crusade to adopt practices like, meditation, exercising and support from fellow persons. Such interventions could go a long way in helping to offset hypertension prevalence in young adults especially in stressful occupations.

Low SES was further established to increase the risk of hypertension with an average OR of 1.85. This is in line with research done in other LMICs where lower income, less education and poor housing are known risk factors for hypertension (Williams et al., 2017). In Pakistan the social context and economic differences are therefore considerable with large portions of the population still living a life below the poverty line with poor access to healthcare, bad nutrition and poor exercise facilities for corpulent individuals and therefore almost no availability for health promoting resources for the lower end population (Ali, 2014). In this meta-analysis, low SES is associated with hypertension. Moreover, these findings of broader social inequalities are probable.

As much as we look at the specific causes of hypertension, eradicating the factors rooted in the socioeconomic structure will involve the following. Currently, there is need to assure that the existing policies encourage extension of quality healthcare services to the needy populace. Furthermore, programs that enhance health literacy, increase access to affordable healthy food, and design healthy food desert friendly community for physical activity may also be able to prevent hypertension among disadvantaged population. Anti poverty and income distribution policies could also help to solve some of the issues noted above to a great extent so as to reduce hypertension in Pakistan.

Tackling hypertension in Pakistan is dependent, in part, on smoking control campaigns as part of the population-based interventions. Such activities may include enhance the specific measures of tobacco control, raise taxes on cigarettes, anti-tobacco crusade, and smoking ban. It would be advisable therefore to focus education and awareness creating efforts on younger adults in a view to address smoking related diseases including hypertension in this population group.

Self-reported physical inactivity was also significantly associated with hypertension, with a pooled OR of 1.75. The role of physical inactivity is also increasing especially in urban centers of Pakistan because of the increasing urbanization alongside the emerging office based employment leading to a physically active lifestyle (Mills et al., 2016). The same is true to other developing countries where a process of modernization and enhanced availability of technologies that require limited physical exertions has led to a surge of non-communicable diseases including hypertension.

Effective prevention of hypertension therefore requires promotion of higher physical activity status among adults and especially the young. Government initiatives might involve exercising to fight diseases and ailments, provision of recreation facilities to the general population, exercising, school and workplace regimes. It may be able to assist with reducing the risks of associated with PI as well as benefit the CVD health of children at large.

High salt consumption and low fruit and vegetable intake were also the two modifiable risk factors for hypertension as evidenced from this meta-analysis with a pooled OR of 1.55. These results are similar to the results of other similar studies carried out in other parts of the world where diet has been identified to be one of the leading causes of hypertension (Forouzanfar et al., 2015). High in salt, fried and processed foods are the usually consumed foods in Pakistan more so from the low income group because they have limited access to fresh food products (Ali, 2014).

CONCLUSION

Therefore, this meta-analysis offers a valuable opportunity to identify the size and direction of psycho-social risk contributors to hypertension among the population 18-49 years in Pakistan. The identified factors; stress, low socioeconomic status, smoking and physical inactivity coupled with unhealthy dietary habits are the main causes of increased hypertension in this younger population. Thus, these findings provide insight into how psychological, social and behavioural factors interact to contribute to elevated blood pressure with a focus on LMICs including Pakistan with established socio-economic polymorphism.

It should be noted that targeting these psycho-social risk factors demands an integrated prevention strategy based upon mainstream public health approaches to stress control, general physical health promotion, and the resolution of the issues of socioeconomic disparities. Stress management at community level, increased availability of health care among the poor people, smoking cessation

and activities regarding physical activities and healthy nutrition should be the priority interventions in national health policies. It is these kinds of efforts that might help in reducing the morbidity of hypertension and all related complications including cardiovascular disease among the young.

However, there are several limitations which has to be mentioned, such as the use of observational studies as well as moderate heterogeneity of the included RCTs. They recommended that future investigations should employ consecutive designs in order to solve the issue of establishing cause and effect of psycho-social factors on hypertension as well as find out effects of other possible variables such as genes and neighborhoods.

Therefore, this meta-synthesis of studies puts forward a cautionary realization of the need to establish comprehensive public health campaigns across the rural parts of Pakistan especially targeting the younger population for the identification and amelioration of the psycho-social factors precipitating hypertension disease. When these risk factors are addressed, the population's health can be enhanced, and the lifetime costs of treating hypertension and diseases arising from it, can be minimized.

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