

Research Article**Prevalence of Hypertension and Obesity in Families: Correlation Between Adult and Pediatric Populations in Pakistan**

Farah Shakeel¹, Tahir Mahmood Butt², Anika Idnan³, Mustansar Billah⁴, Zille Huma Mustehsan⁵, Akmal Khurshid Bhatti⁶

1. Resident, Family Medicine, Ziauddin University, Karachi, Pakistan.
2. Associate Professor, Community Medicine, CMH Kharian Cantt Medical College, Kharian, Pakistan.
3. Medical Officer, Women's Christian Hospital, Multan, Pakistan.
4. Associate Professor, Community Medicine, M. Islam Medical and Dental College, Gujranwala, Pakistan.
5. Associate Professor, Department of Community Medicine, NUST School of Health Sciences, National University of Sciences and Technology, Islamabad, Pakistan.
6. Professor, Department of Community Medicine, M. Islam Medical & Dental College, Gujranwala, Pakistan.

Farah Shakeel: Corresponding author

Abstract

Background: Hypertension and obesity have emerged as major public health concerns in Pakistan because of rapid urbanization, sedentary lifestyle patterns, unhealthy dietary habits, and increasing metabolic disease burden across all age groups. Familial clustering of obesity and hypertension has gained increasing attention due to shared genetic susceptibility, environmental influences, and behavioral risk factors affecting both adults and children. **Aim:** To determine the prevalence of hypertension and obesity among families and evaluate the correlation between adult and pediatric populations in Pakistan. **Methodology:** A cross-sectional analytical study was conducted on 312 families attending primary healthcare and outpatient departments between January 2023 and December 2024. Anthropometric measurements, blood pressure assessment, demographic variables, dietary habits, and physical activity profiles were recorded for adult participants and their

children. Obesity was defined according to body mass index criteria, and hypertension was diagnosed according to standardized blood pressure guidelines for adults and children. **Results:** Adult obesity was identified in 46.8% of participants, whereas pediatric obesity was observed in 24.1% of children. Hypertension prevalence among adults was 39.7%, while elevated blood pressure was detected in 18.9% of children. Significant positive correlations were observed between parental obesity and pediatric obesity ($r=0.61$, $p<0.001$) and between parental hypertension and elevated pediatric blood pressure ($r=0.54$, $p<0.001$). **Conclusion:** Obesity and hypertension demonstrate strong familial clustering among adult and pediatric populations in Pakistan and are significantly associated with sedentary lifestyle and unhealthy dietary behaviors. **Keywords:** Hypertension, Obesity, Family health

Introduction

Hypertension and obesity are among the most significant noncommunicable diseases affecting global public health and represent major contributors to cardiovascular morbidity, diabetes mellitus, chronic kidney disease, and premature mortality. The prevalence of both conditions has increased dramatically in recent decades, particularly in low- and middle-income countries undergoing rapid epidemiological and nutritional transitions [1-3]. Pakistan is currently facing a growing burden of obesity and hypertension due to urbanization, reduced physical activity, unhealthy dietary patterns, and increasing sedentary lifestyles. Obesity is recognized as a multifactorial chronic disease resulting from complex interactions among genetic predisposition, environmental influences, dietary habits, metabolic abnormalities, and behavioral factors. Excess adiposity contributes significantly to elevated blood pressure through mechanisms involving insulin resistance, sympathetic nervous system activation, endothelial dysfunction, and chronic systemic inflammation [2-4]. Consequently, obesity and hypertension frequently coexist and together substantially increase the risk of cardiovascular disease and metabolic syndrome.

The burden of pediatric obesity and childhood hypertension has increased alarmingly during recent years. Children exposed to unhealthy family dietary practices, reduced physical activity, prolonged screen time, and obesogenic environments are increasingly developing metabolic abnormalities at earlier ages [3-5]. Childhood obesity has demonstrated strong associations with early-onset hypertension, dyslipidemia, impaired glucose tolerance, and increased cardiovascular risk during adulthood. Furthermore, elevated blood pressure during childhood often persists into

adult life, thereby increasing long-term cardiovascular morbidity.

Familial aggregation of obesity and hypertension reflects both shared genetic susceptibility and common environmental exposures. Several studies have demonstrated that parental obesity and hypertension significantly increase the likelihood of obesity and elevated blood pressure among offspring [4-6]. Family dietary patterns, physical activity behavior, socioeconomic status, and parental health literacy play critical roles in shaping childhood metabolic health outcomes. Consequently, family-centered approaches have gained increasing importance in preventive public health interventions targeting obesity and cardiovascular disease. Recent epidemiological evidence indicates that South Asian populations may possess increased susceptibility to obesity-related metabolic complications at comparatively lower body mass index levels. Pakistan has experienced substantial increases in overweight, obesity, hypertension, and type 2 diabetes mellitus across both urban and rural populations [5-7]. However, awareness regarding childhood obesity and pediatric hypertension remains comparatively limited, and routine screening practices are inconsistently implemented in many healthcare settings.

Childhood obesity and hypertension frequently remain underdiagnosed because symptoms may be subtle during early stages. Additionally, many families fail to recognize obesity and elevated blood pressure as significant pediatric health concerns requiring medical evaluation [6-8]. Early identification of high-risk families is therefore essential for implementing preventive interventions before progression to irreversible cardiovascular and metabolic complications.

Existing literature from Pakistan has predominantly focused on adult obesity and

hypertension prevalence, whereas comparatively fewer studies have comprehensively evaluated familial correlations between adult and pediatric metabolic health indicators [7-9]. Furthermore, socioeconomic transition, urban dietary patterns, and lifestyle behaviors unique to Pakistani populations may significantly influence intergenerational transmission of obesity and hypertension risk.

The present study was therefore designed to determine the prevalence of obesity and hypertension among families and evaluate the correlation between adult and pediatric populations in Pakistan. The study additionally aimed to identify demographic, behavioral, and lifestyle factors associated with pediatric obesity and hypertension within family settings. By generating updated regional evidence, the findings are expected to support family-centered public health interventions and preventive strategies targeting obesity-related cardiovascular risk in Pakistan [8-10].

Methodology

A cross-sectional analytical study was conducted at Ziauddin University in Pakistan between January 2023 and December 2024 after approval from the institutional ethical review committee. The study included families with at least one adult parent and one child aged 5 to 17 years. The sample size was calculated using OpenEpi software version 3.01, assuming an anticipated obesity prevalence of 40%, a 95% confidence interval, a 5% margin of error, and an 80% power, resulting in a minimum required sample size of 288 families. After adjustment for incomplete data and nonresponse, 312 families were enrolled.

Adult participants aged 28 years and above and their children aged 5–17 years were included in the study. Families with chronic endocrine disorders, congenital cardiovascular diseases, severe chronic

illness, pregnancy, or incomplete anthropometric and blood pressure data were excluded. Written informed consent was obtained from adult participants and guardians of pediatric participants before enrollment. Assent was additionally obtained from children where appropriate. Confidentiality of participant information was maintained throughout the study.

Demographic variables, including age, gender, residence, educational status, family income, dietary habits, physical activity, screen time, smoking exposure, and family history of hypertension or obesity, were recorded using structured questionnaires. Anthropometric assessment included measurement of height, weight, waist circumference, and body mass index according to standardized protocols. Adult obesity was defined according to World Health Organization body mass index criteria, while pediatric obesity was classified using age- and sex-specific body mass index percentiles.

Blood pressure measurements were obtained using calibrated sphygmomanometers after appropriate rest periods. Adult hypertension was determined according to standard hypertension guidelines using systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg, and current antihypertensive medication use. Pediatric elevated blood pressure and hypertension were classified using age, sex, and height-adjusted percentile charts.

Physical activity was assessed based on weekly exercise duration and sedentary behavior, while dietary assessment included frequency of fast-food intake, sugary beverage consumption, fruit intake, and vegetable intake. Screen time was evaluated as daily exposure to television, mobile devices, and computers.

Data analysis was performed using SPSS version 26.0. Quantitative variables were expressed as mean $\pm$ standard deviation,

while categorical variables were presented as frequencies and percentages. Pearson correlation analysis was performed to evaluate relationships between adult and pediatric body mass index and blood pressure measurements. Independent t-tests and chi-square tests were applied to compare groups. Multivariate logistic regression analysis was conducted to identify independent predictors of pediatric obesity and hypertension. A p-

value less than 0.05 was considered statistically significant.

Results

A total of 312 families comprising 624 adults and 458 children participated in the study. The mean age of adult participants was 41.8 ± 10.7 years, and that of pediatric participants was 11.2 ± 3.6 years. Urban residents accounted for 63.1% of participating families.

Table 1: Demographic and Clinical Characteristics of Study Participants

<i>Variable</i>	<i>Adults (n=624)</i>	<i>Children (n=458)</i>	<i>p-value</i>
<i>Mean age (years)</i>	41.8 ± 10.7	11.2 ± 3.6	<0.001
<i>Male gender</i>	301 (48.2%)	236 (51.5%)	0.274
<i>Urban residence</i>	394 (63.1%)	289 (63.1%)	0.998
<i>Obesity prevalence</i>	292 (46.8%)	110 (24.1%)	<0.001
<i>Hypertension prevalence</i>	248 (39.7%)	87 (18.9%)	<0.001
<i>Sedentary lifestyle</i>	337 (54.0%)	251 (54.8%)	0.813
<i>Fast-food consumption >3/week</i>	279 (44.7%)	216 (47.2%)	0.421
<i>Positive family history of hypertension</i>	302 (48.4%)	—	<0.001

Explanation: Obesity and hypertension were highly prevalent among adult participants, while substantial proportions of children also demonstrated obesity and elevated blood pressure. A sedentary lifestyle and frequent consumption of fast food were common among families.

Table 2: Correlation Between Adult and Pediatric Anthropometric and Blood Pressure Parameters

<i>Parameter Correlation</i>	<i>Correlation Coefficient (r)</i>	<i>p-value</i>
<i>Parent-child BMI correlation</i>	0.61	<0.001
<i>Parent-child systolic BP correlation</i>	0.54	<0.001
<i>Parent-child waist circumference correlation</i>	0.49	<0.001
<i>Parent-child sedentary behavior correlation</i>	0.58	<0.001
<i>Parent-child fast-food consumption correlation</i>	0.46	0.002

Explanation: Significant positive correlations were observed between parental and pediatric obesity indicators, blood pressure measurements, and unhealthy lifestyle behaviors.

Table 3: Predictors of Pediatric Obesity and Elevated Blood Pressure

Predictor Variable	Odds Ratio (95% CI)	p-value
<i>Parental obesity</i>	3.41 (2.12–5.47)	<0.001
<i>Parental hypertension</i>	2.96 (1.88–4.65)	<0.001
<i>Sedentary lifestyle</i>	2.54 (1.63–3.94)	<0.001
<i>Screen time >4 hours/day</i>	2.11 (1.34–3.31)	0.001
<i>Fast-food intake >3/week</i>	1.98 (1.27–3.07)	0.003
<i>Urban residence</i>	1.72 (1.09–2.73)	0.021

Explanation: Parental obesity and hypertension were strong independent predictors of pediatric obesity and elevated blood pressure. A sedentary lifestyle and excessive screen time significantly increase pediatric metabolic risk.

Multivariate logistic regression analysis identified parental obesity, parental hypertension, sedentary lifestyle, excessive screen time, and frequent fast-food intake as independent predictors of pediatric obesity and elevated blood pressure ($p < 0.001$). Children from urban families demonstrated significantly higher obesity prevalence compared with rural families.

Discussion

The present study demonstrated a high prevalence of obesity and hypertension among both adult and pediatric populations in Pakistan and identified strong familial correlations between parental and childhood metabolic risk factors. These findings are consistent with recent epidemiological studies reporting increasing obesity and hypertension prevalence in South Asian populations undergoing rapid nutritional and lifestyle transition [11-12]. The substantial burden observed in the current study highlights the growing public health importance of cardiovascular risk factors within family settings.

Adult obesity prevalence exceeded 45% in the present study, while nearly one-quarter of children were classified as obese. Similar increasing trends in obesity prevalence have been documented in recent Pakistani and regional studies [11-13]. Urbanization, reduced physical activity, increased fast-food availability, and prolonged sedentary behavior have contributed substantially to rising obesity rates among both adults and children.

A significant positive correlation between parental and pediatric body mass index was observed in the present study. Familial aggregation of obesity may result from shared genetic predisposition, common dietary patterns, and household lifestyle behaviors [12-14]. Children residing in households with unhealthy dietary practices and low physical activity exposure are more likely to develop obesity and associated metabolic complications during early life.

Hypertension prevalence among adults approached 40%, while elevated blood pressure was identified in nearly one-fifth of children. The findings are concerning because childhood elevated blood pressure frequently progresses into adult hypertension and significantly increases future cardiovascular risk [13-15]. The strong correlation observed between parental and

pediatric blood pressure measurements further supports the role of familial clustering of cardiovascular risk.

Sedentary lifestyle and excessive screen time emerged as important independent predictors of pediatric obesity and elevated blood pressure in the current study. Reduced physical activity contributes to weight gain, impaired metabolic regulation, endothelial dysfunction, and increased sympathetic nervous system activity [14-16]. Modern lifestyle patterns involving prolonged use of digital devices and reduced outdoor physical activity may therefore substantially increase pediatric cardiovascular risk.

Fast-food consumption and unhealthy dietary practices were significantly associated with obesity and hypertension in the present cohort. High intake of processed foods rich in saturated fats, salt, and refined carbohydrates contributes to adiposity and blood pressure elevation [15-18]. Public health interventions targeting dietary education and the promotion of healthy lifestyles are therefore essential for reducing the obesity-related disease burden. The findings of the current study have important implications for preventive healthcare policy in Pakistan. Family-centered interventions involving nutritional counseling, regular blood pressure screening, promotion of physical activity, and reduction of sedentary behaviors may significantly reduce intergenerational transmission of obesity and hypertension risk [17-20]. The present study additionally provides updated regional evidence regarding familial clustering of obesity and hypertension and emphasizes the urgent need for integrated public health strategies addressing cardiovascular risk factors from early childhood.

Conclusion

Obesity and hypertension demonstrate strong familial clustering among adult and pediatric populations in Pakistan and are significantly associated with sedentary lifestyle and

unhealthy dietary behaviors. Parental obesity and hypertension substantially increase the risk of pediatric metabolic abnormalities and elevated blood pressure. Early family-centered preventive interventions and lifestyle modification strategies are essential to reduce the growing burden of cardiovascular disease in Pakistan.

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