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CARDIOMETABOLIC RISK CLUSTERING AND EARLY BLOOD PRESSURE ELEVATION IN YOUNG ADULTS: IMPLICATIONS FOR PRIMARY PREVENTION

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ABSTRACT

Early cardiovascular risk in young adults is increasingly associated with the simultaneous presence of several modifiable cardiometabolic factors rather than with isolated elevation of blood pressure alone. Excess body weight, abdominal adiposity, insulin resistance, physical inactivity, unhealthy dietary habits, chronic psychoemotional stress, and sleep disturbance may interact and contribute to early hemodynamic dysregulation. The aim of this thesis was to analyze the combined influence of cardiometabolic and behavioral risk factors on early blood pressure elevation in young adults and to identify preventive approaches that may reduce progression toward established arterial hypertension. A narrative analysis of contemporary scientific literature and clinical recommendations on cardiovascular prevention was performed. Particular attention was given to obesity, insulin resistance, abdominal fat accumulation, lifestyle patterns, dietary behavior, sleep quality, chronic stress, and hereditary predisposition as components of an integrated risk profile.

The available evidence suggests that early blood pressure elevation in young adults frequently develops within a broader cardiometabolic context. Excess adiposity may promote sympathetic nervous system activation, stimulation of the renin–angiotensin–aldosterone system, endothelial dysfunction, oxidative stress, and chronic low-grade inflammation. These mechanisms can increase peripheral vascular resistance and create favorable conditions for sustained blood pressure elevation. Insulin resistance may further amplify vascular dysfunction through impaired metabolic signaling, compensatory hyperinsulinemia, and adverse effects on endothelial homeostasis. When insulin resistance coexists with abdominal obesity, sedentary behavior, and unhealthy nutrition, the cumulative cardiovascular burden may be greater than the effect of any single factor considered separately.

Lifestyle characteristics play an important role in this process. Low levels of physical activity reduce metabolic efficiency and may contribute to progressive weight gain and impaired vascular regulation. In contrast, regular aerobic activity supports body-weight control, improves insulin sensitivity, and may contribute to more favorable vascular function. Dietary patterns characterized by excessive salt intake, high consumption of refined carbohydrates, sugar-rich products, and highly processed foods may contribute to both metabolic abnormalities and early blood pressure dysregulation. Young adults with these dietary patterns may therefore require preventive intervention before persistent arterial hypertension develops. Sleep disturbance and chronic psychoemotional stress represent additional non-metabolic contributors. Prolonged activation of the sympathoadrenal and hypothalamic–pituitary–adrenal systems may increase heart rate, vascular tone, and neurohumoral activity. Poor sleep may further aggravate metabolic imbalance and contribute to the persistence of elevated blood pressure.

These observations support a preventive strategy based on integrated cardiovascular risk assessment rather than isolated blood pressure measurement. Screening of young adults should include

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repeated blood pressure evaluation together with body mass index, waist circumference, dietary habits, physical activity, sleep quality, psychoemotional stress, family history, and, where clinically indicated, metabolic markers.

Primary prevention should focus on weight normalization, regular physical activity, reduction of excessive salt and highly processed food intake, improvement of sleep patterns, stress management, and reduction of other adverse lifestyle exposures. Such an approach may allow early identification of young individuals with a clustering of cardiometabolic risks before clinically established hypertension develops.

CONCLUSION

Early blood pressure elevation in young adults should be interpreted as part of a broader cardiometabolic risk profile rather than as an isolated hemodynamic abnormality. The coexistence of abdominal obesity, insulin resistance, physical inactivity, unhealthy dietary habits, chronic stress, and sleep disturbance may contribute to progressive vascular and metabolic dysregulation. Comprehensive risk-factor assessment and early lifestyle-based prevention may therefore represent an effective strategy for reducing the future burden of arterial hypertension and cardiovascular disease in young populations.

Keywords: cardiometabolic risk, young adults, early blood pressure elevation, obesity, insulin resistance, abdominal adiposity, lifestyle, primary prevention.

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