

## **EPIDEMIOLOGICAL CHARACTERISTICS OF MULTIMORBID SYNDROME IN ADOLESCENTS IN ASSOCIATION WITH ARTERIAL HYPOTENSION**

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### **Introduction**

Improvement of healthcare delivery primarily requires a fundamental reform of preventive theory and practice. To date, such efforts cannot be considered satisfactory. Evidence for this includes the epidemic-like increase in the prevalence of diseases and disease-related disability and mortality within the population, overcrowded hospitals, and the excessive burden placed on emergency medical services. All of these represent the “cost” of insufficient implementation of preventive science and practice at the primary healthcare level [13,14,15,17,18].

Large-scale epidemiological studies conducted in recent years have convincingly demonstrated and translated into practical recommendations that the professional scope of the modern clinician must allocate a substantially broader role to preventive activities. Only under such conditions can effective tools be developed to halt the epidemic of numerous diseases—particularly cardiovascular disorders—through interventions that are efficient, safe, and cost-effective, and capable of producing sustainable outcomes [19,20,21,22,23].

It should also be acknowledged that the earliest “epidemiological campaigns” against chronic non-communicable diseases began in the 1930s. From the 1960s onward, standardized investigation methods became established in epidemiology; by the 1980s, the principal risk factors for

cardiovascular and chronic non-communicable diseases were identified; and in the 1990s preventive programs were implemented across various countries, yielding substantial positive results [8,11,12].

A retrospective review of the evolution of chronic non-communicable disease epidemiology is warranted. Following the notion that “there is benefit in looking back,” we attempted to determine the advantages and limitations of epidemiological investigations specifically in relation to arterial hypotension and only thereafter proceeded with the present work. The rationale was as follows:

1. most epidemiological studies have focused on ischemic heart disease, arterial hypertension, and related coronary conditions;
2. epidemiological investigations have predominantly been conducted in adult populations, whereas adolescents have been underutilized as epidemiological targets;
3. approximately 95% of epidemiological findings relate to the mid- and late twentieth century, limiting their applicability to modern populations and creating an urgent need for contemporary investigations;
4. studies dedicated specifically to the epidemiology of hypotension are scarce, have begun to lose their relevance, and have not been conducted in Uzbekistan or among adolescent populations;
5. no preventive programs for adolescents have been developed or introduced into practice based on the epidemiological findings of arterial hypotension.

These scientific observations and literature data served as the primary basis and impetus for planning the study. Expert reviews and conclusions confirming the scientific relevance, novelty, insufficient prior investigation, and practical applicability of the proposed topic were obtained from specialists and the Coordinating Council under the Ministry of Health of the Republic of Uzbekistan. Subsequently, the dissertation study was carried out in accordance

with the “gold standard” principles of epidemiological research, and the expected outcomes were fully achieved.

The study was designed and conducted with distinctive features, differing from related investigations, the majority of which have been performed abroad [1,2,3]. Specifically, students of the Kosonsoy Industrial–Economic College of Namangan region were selected as the study population. This unorganized adolescent population reflects the characteristics of the entire Fergana Valley and is considered suitable for screening-based epidemiological research, fully meeting World Health Organization requirements (WHO, 2003) for a representative sample (minimal migration impact, uncomplicated linkage with the screening center, sufficient sample size for statistically robust inference, absence of previous epidemiological involvement, and feasible verification procedures).

### **Study Aim**

The aim of the study was to investigate and evaluate the epidemiology, clinical course, and prevention-related characteristics of arterial hypotension among adolescents under the conditions of the Fergana Valley.

### **Materials and Methods**

The study object comprised epidemiological examination results related to arterial hypotension obtained from a representative sample of 1,500 adolescents aged 15–22 years studying at the Kosonsoy Industrial–Pedagogical College of Namangan region.

The study subject included data derived from clinical and biochemical investigations of venous blood and serum of adolescents, as well as epidemiologically collected information on cardiac and other internal organ functions.

The study employed specialized epidemiological, clinical, instrumental, biochemical, supplementary, and statistical methods. In total,

investigations were carried out across 30 domains, with an overall volume of 31,955 individual assessments.

### **Results**

Multimorbid syndrome was observed in the 15–22-year adolescent population with an overall frequency of 8.7%, including 7.7% among those aged 15–17 years and 12.2% among those aged 18–22 years. With increasing age, the detection rate increased by 4.5% ( $P<0.05$ ).

Analysis of combined versus isolated occurrence of multimorbidity and arterial hypotension yielded the following results: in individuals aged 15–22 years, the combined and isolated occurrence rates were 76.6% and 33.4%, respectively—i.e., the effect of this factor increased by 3.3-fold ( $P<0.001$ ). In the 15–17-year population, the corresponding rates were 74.7% and 25.3% (2.9-fold increase;  $P<0.01$ ). In the 18–22-year group, the rates were 80.4% and 19.4% (4.1-fold increase;  $P<0.001$ ).

Blood groups and their association with arterial hypotension were also analyzed. The findings indicated the following distribution of association for adolescents aged 15–22 years: blood group I—48.7%; 15–17 years—54.9%; 18–22 years—43.8% ( $P>0.05$ ); blood group II—16.5% (15–17 years: 21.3%; 18–22 years: 12.5%); blood group III—15.4% (15–17 years: 7.3%; 18–22 years: 21.8%); blood group IV—6.2% (15–17 years: 7.3%; 18–22 years: 5.2%). These differences were most pronounced in the population with blood group I ( $P<0.001$ ). In blood group II, the association was almost three-fold lower compared to group I ( $P<0.001$ ); in blood group III, 3.2-fold lower ( $P<0.001$ ); and in blood group IV, 7.9-fold lower ( $P<0.001$ ).

Arterial hypotension demonstrated specific differences across adolescents belonging to different blood groups. In particular, arterial hypotension was observed in 71.4% of adolescents aged 15–22 years with blood group I (15–17 years: 73.3%; 18–22 years: 69.7%); in blood group II—26.6% (15–17 years: 26.9%; 18–22 years: 26.3%); in blood group III—28.6%

(15–17 years: 22.2%; 18–22 years: 30.3%); and in blood group IV—17.6% among those aged 15–22 years (15–17 years: 22.5%; 18–22 years: 12.5%).

The obtained results are undoubtedly of preventive, clinical, and prognostic significance and may serve as a basis for improving treatment, rehabilitation, and health-promoting interventions targeting arterial hypotension in adolescents.

### **Conclusion**

Stage IV of the program is implemented continuously throughout the entire adolescent period and is completed by transferring recommendations to institutions and specialists responsible for adult healthcare. At this stage, all fifteen confirmed risk factors for arterial hypotension are subjected to continuous monitoring and are addressed individually within the three defined adolescent risk groups. Preventive (primary prevention), therapeutic (secondary prevention), and complication-reducing (tertiary prevention) measures are ensured on an ongoing basis.

Risk factors requiring constant monitoring in adolescents include: low fruit and vegetable intake (MSMKIQ), irregular dietary pattern (NMOT), psychological stress (RZ), alcohol consumption, socio-economic factors (IIXO), hypertriglyceridemia (GTG), hypercholesterolemia (GXS), physical inactivity, smoking, blood group I, cardiovascular autonomic dysfunction (YuQTKOA), excess body weight (OTV), chronic excessive food intake (SOOI), and inappropriate medication use (DDTQQ). Only when the operational effectiveness of the program is ensured can these risk factors be detected and eliminated early, resulting in the elimination of arterial hypotension morbidity and complete interruption of the disease continuum in adolescents in 93.0% of cases.

The program recommended for practical implementation is grounded precisely on this systematic approach and undoubtedly possesses significant scientific and practical value.

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