An Overview of a National Surveillance Program in Iran for Prevention of Chronic Non-communicable Diseases from Childhood: CASPIAN Study

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Abstract

Background: The health status of children in the Iran has improved in many areas such as lower rates of infectious diseases and declines in malnutrition. However rapid lifestyle changes might make them prone to chronic diseases in adulthood. Because of the importance of collecting national information about related risk behaviors and risk factors, this national project was conducted for the first time in the Eastern Mediterranean region.
Methods: The baseline survey was conducted among 21111 school students aged 6-18 years, and their parents living in 23 provinces; biochemical tests were obtained from 4811 students.
Results: Underweight and overweight had similar prevalence (13.9% underweight, 13.4% overweight).The most prevalent type of dyslipidemia was low HDL-C and hypertriglyceridemia. In addition to providing national percentiles and reference curves for weight, height and body mass index, this study provided the first reference curves for waist circumference and blood pressure of children, as well as the first national prevalence of pediatric metabolic syndrome in Asia. Unhealthy nutrition and low physical activity were associated with most risk factors.
Conclusion: Close monitoring of children and adolescents for risk factors and risk behaviors should be considered as a public health priority, thus a national school-based surveillance program is being established in this regard in Iran.

Keywords: *Health promotion, prevention, chronic diseases, lifestyle, surveillance, Iran*

Introduction

Actually most national public health programs and policies, as well as national-level research projects on children in low- and middle-income countries are focusing on undernutrition and its effects on survival, mortality and development of mothers and children. However, such countries are experiencing rapid epidemiologic, demographic and nutrition transitions, and are facing a double burden of nutritional disorders and health problems, notably chronic non-communicable diseases (CNCDs) such as cardiovascular disease (CVD), osteoporosis, diabetes mellitus and malignancies.

It is estimated that by the year 2020, CNCDs will account for about three-quarters of mortality rate in low and middle-income countries (1). Meanwhile, interest in early life determinants of adult chronic diseases is increasing because there is a growing body of evidence that their process begins early in life (2), their behavioral and biological risk factors persist from childhood into adulthood, and most modifiable risk factors are tracking from early to later in life (3).

The health status of children and adolescents in the Iran has improved in many areas such as lower rates of infectious diseases and declines in macronutrient deficiency of the past. However rapid westernization and lifestyle changes might make them prone to CNCDs in adulthood (4-5). It is of special concern for policy makers to have accurate information not only about the

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risk behaviors and risk factors in children and adolescents, but also about how these factors varies across different parts of the country, consequently for the first time in Iran, and to the best of our knowledge in the Eastern Mediterranean region, this national project was conducted.

Material and Methods

The baseline survey was conducted among 21111 school students and their parents living in 23 provinces with significant differences in socio-demographic and lifestyle factors. The questionnaires used were based on the WHO STEPwise approach to NCD (Tools ver 9.5) and the WHO Global School Health Survey (GSHS). Weight status was assessed by using the charts of the Centers for Disease Prevention &Control (6).The laboratory examinations were conducted on a subsample of students studied (n= 4811). In addition, smoking behaviors were assessed confidentially among 11,966 adolescents, ages 11-18 yr.

After needs assessment for each province, this project is providing a culturally-appropriate model for action-oriented interventions, and is implementing a national school-based surveillance system for risk behaviors and risk factors of chronic diseases. This undergoing project is a joint collaboration of the World Health Organization (WHO/EMRO) and the National Ministry of Health and Medical Education and Ministry of Education and Training; concerning its goals and objectives, it is entitled:" Childhood & **A**dolescence **S**urveillance and **P**revention of **A**dult **N**on-communicable disease": CASPIAN (Caspian is the name of the world's largest lake, located in Northern, Iran) Study (7).

Results

The mean (±SD) age of students was 12.2± 3.3 years with 8.6±1.5 yr in elementary schools (n= 7620), 12.7±1.1 yr in middle schools (n= 6494), and 15.8±1.2 yr in high schools (n= 6997). Overall, 84.6% of participants lived in urban and 15.4% in rural areas; 90% of subjects studied

were from public and 10% from private schools.

Underweight and overweight had similar prevalence, i.e.13.9% of students had a BMI level of $<5^{th}$ percentile, and 13.3% had a BMI$\geq 85^{th}$ percentile (8.82% had a BMI between 85th to 94th percentile, and 4.5%had a BMI of $\geq 95^{th}$ percentile).

The laboratory examinations revealed that the mean serum triglycerides and its percentiles were significantly higher, and the mean and percentiles of total, low-density, and high-density-cholesterol were significantly lower than the reference values from Western population. In total, 45.7% of participants had dyslipidemia; the most frequent ones were low HDL-C (24.8%) and hypertriglyceridemia (24.5%), followed by hypercholesterolemia (6.4%) and high LDL-C (6.3%), respectively.

The prevalence of self-reported cigarette smoking was 14.3%, with a higher prevalence in boys than in girls (18.5% vs. 10.1%, respectively, *P*< 0.001). Overall, 57.8% of smokers were occasional smoker. Smoking waterpipe, as a traditional fun, was an important determinant of tendency to cigarette smoking.

Most students had a positive family history (including parents, grand parents, uncles, aunts) for chronic diseases e.g. such history for hypertension, diabetes, obesity symptomatic osteoporosis, and malignancies was respectively present in 49.3%,26.7%,48.5%,11.8% and 12.1% of students. By considering myocardial infarction, stroke and sudden death before the age of 55 as "premature" CVD, it was observed that 28.1% of students had such positive family history in their first and or second relatives, with a prevalence of 3.5% in their fathers, and 1% in their mothers.

Discussion

In addition to providing national percentiles and reference curves for weight, height and body mass index (8), this study provided the first reference curves for waist circumference (9) and blood pressure (10) of children and adolescents, as well as the first national prevalence of pediatric metabolic syndrome (11) in Asia.

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Although significant differences existed between the status of children and adolescents living in districts with different socio-demographic factors, but in general the intake of sweet/fat/salty snacks and deep fried foods was high, and most families consumed hydrogenated solid fat and breads prepared from white wheat flour (7).

The mean and percentile values of serum lipids (12) were significantly different from Western values (13).Western scientific guidelines emphasize on the high prevalence of high levels of total and LDL-cholesterol among youths, whereas in our study low HDL-C and hypertriglyceridemia were much more prevalent .The unhealthy lifestyle behaviors in terms of dietary and physical activity habits was associated with overweight (7), hypertriglyceridemic-waist phenotype (15), metabolic syndrome (16), and high blood pressure (10). Furthermore, we found that a group of normal-weight children and adolescents had cardiometabolic disorders as usually found in obese individuals, and this was another emphasis on the role of ethnicity and lifestyle behaviors on CNCDs' risk factors (17). Early life influence on later risk factors was also documented by finding the protective role of breast feeding on some risk factors (10, 16).

Although the prevalence of smoking was much lower than many other countries, and in most cases of smoking was occasional and not regular, but preventive measures should be considered from early childhood in order to prevent its escalating trend documented in many developing countries. In this regard, public health measures should be taken into account not only for cigarette smoking, but also for the socially accepted habit of water pipe use that is revived in traditional teahouses.

The high prevalence of children with positive family history of CNCDs is another emphasis on the considerably high prevalence of CNCDs in our community, and shows that in addition to population-approach, it is necessary to consider the high-risk approach for primordial/primary prevention of adult chronic diseases from early life.

Based on the finding on the low physical activity level among students, notably among girls, and the negative attitude of near one-third of parents toward the regular extracurricular physical activity of their children, mostly because of limited access to safe environment for physical activity out of school, one of the interventions of the study aimed to provide a low-cost and simple model of culturally-appropriate and low cost facilities for improvement of physical activity with targeted interventions for girls and their mothers through an after-school program and to determine the changes in anthropometric indexes after this program. This trial was conducted in 7 cities and had good results.

In view of the tracking of risk behaviors and risk factors from childhood to adult life, surveillance of such factors can provide useful information for long-term national planning against chronic diseases; as a result a school- based surveillance system is designed and is being implemented at national level. The findings of this system would clarify the time-trends of changes in risk behaviors and risk factors, and would be beneficial for policy makers to provide action-oriented and evidence-based interventions.

Close monitoring of children and adolescents for CNCD-related risk factors and risk behaviors should be considered as a public health priority in developing countries so that preventive measures can be taken in a timely manner.

Acknowledgements

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