

## PROMOTION OF HEALTHY HEART KNOWLEDGE AND ATTITUDE IN ELEMENTARY SCHOOL STUDENTS IN SHAHREKORD, IRAN

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### Abstract

**BACKGROUND:** Our aim was to test the hypothesis that a one - year, classroom – based education for the third, fourth and fifth elementary school graders could change their knowledge scores about healthy heart.

**METHODS:** It was a randomized and interventional study in elementary schools of Shahr-e-kord, Iran in 2006-2007. A total of 8 elementary schools, categorized by socioeconomic types and male and female setting, were selected and randomized into control or intervention groups. Subjects were 920 third, fourth and fifth graders, aged 9 to 11 years (50% boys and 50% girls). Over a course of 8 weeks, health educators and general practitioner of the elementary schools presented two hours sessions per week on heart function, nutrition, and exercise for healthy heart and living tobacco free for the intervention group. The education program was based on Heart Power! Program, an American Heart Association program. Statistical analysis tests were: Mann – Whitney U test and Wilcoxon matched- pairs signed rank test and Bonferroni correction for the two pair wise comparisons

**RESULTS:** Total heart knowledge at post test was increased 40% in the intervention group ( $P < 0.01$ ). Difference in means of total healthy heart knowledge scores between control and intervention group increased from 12.4 points in baseline to 24.6 points in post test ( total score was 30). Attitude in intervention group changed from 32% to 63.9% after post test ( $P < 0.01$ ). After general and heart examination, we found 69 students with abnormal heart sounds and finally by referred to pediatric cardiologist, for 18 them heart diseases were diagnosed.

**CONCLUSION:** It can be concluded that the classroom – based cardiovascular health promotion had a significant effect on the healthy heart knowledge. Therefore, schools provide an excellent setting for introducing comprehensive healthy heart education and promotion of cardiovascular health to the general population.

**Keywords:** Healthy heart, Elementary school students, Children, School based education, Knowledge, Attitude, Cardiovascular diseases.

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### Introduction

The process of atherosclerosis may begin developing during childhood.<sup>1</sup> It is based partly on evidence of fatty streaks and atherosclerotic lesions that have been found at postmortem in the aorta and coronary arteries of 6 to 30 years old individuals. These were related to ante mortem cardiovascular disease risk factors such as smoking, elevated serum cholesterol, and high body mass index.<sup>2-6</sup>

It thus seems eminently reasonable to initiate healthful lifestyle training in childhood to promote improved cardiovascular health in adult life.<sup>7</sup>

A growing number of children attend elementary through high school. The schools are an especially effective and efficient system for providing health education for children. Both classroom – based and risk – based interventions had positive effects on physical activity and knowledge, with trends towards reduced

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body fat and cholesterol in elementary school children. However, the results from the large group, classroom – based approach showed stronger trends and were much easier to implement in the school system.<sup>8-9</sup>

The few large – scale randomized controlled studies of school – based programs to reduce cardiovascular risk in children, had early results.<sup>9-13</sup> Most school – based interventions, included interactive instruction on selected topics related to heart disease. Interventional time ranged from 1 full school day to 30 – 45 minutes a day once a week over an academic year. Sample sizes in these studies ranged from 90 to 2973 children. Some studies showed improvement in knowledge. In some children, cholesterol levels were decreased.<sup>8,13</sup>

The major purpose of the school – based project of our Healthy Heart Study, a controlled, randomized field trial, was to determine whether a school – based intervention could improve healthy heart knowledge in third, fourth and fifth – grade elementary students in Shahr-e-kord, a city in the center of Iran.

### Materials and Methods

This study tested the hypothesis that a - year, classroom – based education for the third and fourth elementary school graders could change knowledge scores about healthy heart from beginning to the end of the program in two groups. The education program was based on Heart Power! Program<sup>4</sup>. Heart power! is an American Heart Association program designed to encourage children to engage in heart healthy lifestyles. This project was conducted in Shahr-e Kord, The center of Chaharmahal va Bakhtiyari Province with a population of 150.000 and coronary events of 481.05 and 156.61 per 100.000 for men and women respectively.

The organization of elementary schools in Iran was categorized into three types based on financial supports; governmental; semi governmental and private, according to frequency. All financial support of governmental and a part of financial support of semi-governmental schools are provided by ministry of Education but private schools have no financial support from the government.

Educational program follows the rules of Ministry of Education. These school types revealed socioeconomic status of the studied area, therefore the schools were randomly selected from these categories according to their frequency in each cluster. There were no significant difference in type of schools and gender distribution between the selected subjects (14 schools) and the total schools of the city (104 elementary schools).

Schools which were stratified by types (Governmental, semi – governmental and private) and setting (girl and boy) were randomly divided into intervention or control groups. According to Harrell and colleagues, total estimate sample size was 1200 third and fourth graders, aged 9 to 10 years (600 children in intervention and the other half in control group). There were no significant difference in school type, gender distribution and third and fourth graders at the schools between the intervention and control groups.

All children completed a 30 – question healthy heart knowledge test questionnaire as a baseline examination. It had four subclasses including 7 questions for anatomy of heart (e.g., which vessel carries blood away from the heart?), 6 questions for smoking as a risk factor for cardiovascular diseases (e.g., what is the relationship between smoking and heart diseases?), 8 questions for exercise (e.g., how much physical activity should you perform per day?), and 9 questions for healthy nutrition (e.g., How many servings of fruits and vegetables should you have every day?). The questions were multiple choices, matching and labeling types.

Ordinarily, each elementary school in Iran has a health educator and a sport teacher. Both students in intervention and control groups had their health educators and sport teachers, but over a course of 8 weeks, health educators and sport teachers of the primary schools presented 2 hours sessions per week on heart function, nutrition, physical activity and living tobacco free for the third and fourth graders in intervention group. The education program was based on HeartPower! Program for grades 3 through 5.<sup>14</sup> Health educators and general practitioners of the intervention group received especial training for educating HeartPower! Program in a workshop. Health educators explained heart function, circulation and oxygenation in anatomy session and emphasized the importance of food pyramid and managed group activity focusing on meal planning and encouraged importance of living tobacco – free and read stories about smoking and heart disease for the children. Sport educators discussed importance of exercise and engaged children in physical activities such as jumping jacks or running in place and planned aerobic activities in small – group games. All the students passed the second examination in healthy heart after the intervention, as post test.

Mann-Whitney U test was used to reveal to what extent did knowledge scores about healthy heart lifestyles change from beginning to the end of each program, and between intervention and control groups.

**Table 1.** Healthy heart knowledge scores

	intervention		control	
	pretest	post test	pretest	post test
Knowledge(%correct)	41.4	82.4	38.0	42.4
Knowledge; total	12.44(4.52)	24.72(5.22)	11.42(5.86)	12.72(6.12)
Anatomy of Heart	1.46(1.16)	5.56(1.82)	0.82(1.32)	1.28(1.76)
Smoking	2.04(1.14)	4.55(3.46)	2.32(1.42)	2.45(1.61)
Nutrition	5.28(2.26)	7.98(1.72)	5.24(2.84)	5.76(2.41)
Sport	3.62(1.82)	6.66(1.56)	3.08(3.28)	3.64(2.18)

P<0.001 for all scores, in comparison with control

Subclasses of healthy heart knowledge scores for anatomy of heart, smoking, exercise and healthy nutrition were adjusted and compared for each subject by Fridman matched samples and wilcoxon matched – pairs signed rank test. Bonferroni correction for the two pair wise comparisons was used.

### Results

The sample included 920 children (50% boys and 50% girls) in third and fourth elementary school graders at the studied schools. There were no significant differences in baseline demographic characteristics of the intervention and control groups; including sex, grade (third, fourth or fifth) and socioeconomic status.

Of all children in the interventional group 82.4% attained a passing score of 75% by the end of study, whereas 42.4% of children in the control group passed. In other words, total heart knowledge at post test was 40% correct higher in the intervention than in control subjects ( $P < 0.001$ ). Difference in means of total healthy heart knowledge scores between control and intervention groups increased from 12.4 points in baseline to 24.6 points in post test ( $P < 0.001$ , Table 1). There was no difference in total healthy heart knowledge according to gender or grader.

The mean ranks for healthy heart knowledge subclasses for nutrition, exercise, smoking and anatomy of heart in baseline were 3.36, 2.80, 2.49, and 1.36: respectively ( $P < 0.001$ ). The mean ranks did not change in post test, but knowledge of heart anatomy, increased significantly in post test in intervention group (3.1 points versus 0.46;  $P < 0.001$ ). The same significant changes in the other healthy heart subclasses were observed (Table 1).

### Discussion

This study tested an 8 – week school – based intervention for third and fourth elementary school graders, in order to improve their knowledge about healthy heart. The students who participated in the Heart Power!, a school – based educational program,

showed improvement in their knowledge of healthy lifestyles.

Promotion of knowledge in young populations, enable us to fulfill prevention programs. In fact, most population- based education studies that have reported on intervention effects on physiological variables have shown modest change or no change 15-17. It could be due to short term studies because, observation of the changes, needs more time. However, children in the Cardiovascular Health in Children Study, a randomized, controlled field trial in 12 schools across North Carolina, had significantly greater knowledge (7.9% more scores) and a significant increase in self reported physical activity than children in the control group. Trends for the intervention group were a reduction in total cholesterol level (-5.27 mg/dl), an increase in aerobic power , a reduction in body fat, and smaller rise in diastolic blood pressure than control children 18. The Cardiovascular Health in Children intervention was more intense than the other studies, involving regular physical activity as well as health knowledge, which may explain these differences.

As part of the other study, Child and Adolescent Trial Cardiovascular Health, 4019 children from four states and representing multiple ethnic groups, were measured selected risk factors both at baseline and after 2 and 12 years of intervention. Although the school – based program effected significant institutional changes in food service and physical activity behaviors, these changes, did not mean, significant changes in risk factors at these ages. These behavioral changes, however, if sustained into adulthood, have the potential to influence cardiovascular risk reduction.

Overall, cardiovascular health promotion linked to healthy heart education for children, has the potential to reduce the risk of atherosclerotic disease in both the child and the community.<sup>7</sup>

Generally, two school – based interventions could be implemented in order to improve heart health in children; classroom – based intervention and risk – based approach on a subset of children with positive risk factors for cardiovascular diseases. Harrell and

colleagues in the first large randomized, controlled study compared these approaches. The study demonstrated that both the classroom – based approach and the risk – based approach, can somewhat improve cardiovascular risk profiles in elementary school children. However, the results from the large – group, classroom- based approach showed, stronger trends and were much easier to implement in the school system. Our study was a classroom – based approach and it was practical because it based on programs readily available to schools and did not require additional teachers or expensive materials. Any qualified school health nurse and sport educator can teach its components for the healthy heart. However, the effective implementation of healthy heart education depends to a large extent on the training and motivation of teachers, administrators, and food service staff at the schools.<sup>20-23</sup>

The process of cardiovascular disease that begins early in life is possibly related to obesity, high serum cholesterol levels, and a diet high in total and saturated fat. Therefore, reducing the intake of high fat foods and cholesterol early in childhood may delay or reduce the risk of cardiovascular disease later in life. Because evidences on relation between higher blood cholesterol levels in children and adolescents with atherosclerotic lesions in coronary and other arteries are accumulating,<sup>24,25</sup> The elementary schools are a suitable media to transfer knowledge of healthy nutrition for heart. In our intervention group, the mean rank was significantly higher for healthy heart nutrition than the other subclasses of healthy heart knowledge in the post test. It is important to note that childhood nutritional behaviors have a profound impact on future adult lifestyle choices. The original CATCH results demonstrated that school – level intervention could modify school lunch and school physical education programs as well as influence on students' behaviors. A 3 – year follow – up of students who participated in CATCH study without further intervention, suggested that the behavioral changes initiated during the elementary school years, persisted to early adolescence for self – reported dietary and physical activity behaviors.<sup>25</sup>

One of the subclasses of healthy heart knowledge for our intervention group, was anatomy of the heart and circulation. The objective of the lesson was based on American Heart Association Heart Power! Program.<sup>14</sup> The students in post – intervention period were able to recite the anatomy of the heart, state that a healthy heart is a pump with valves allowing blood to flow in only one direction and distinguish between arteries and veins and describe the function of coronary arteries. The student painted heart in very primi-

tive from before intervention; but during the intervention phase, the paints of heart changed to a more logic and anatomic ones. The most improvement in healthy heart knowledge score, was for the anatomy of heart in intervention group (3.1 points, versus 2, 1.7, 1.9 for sport, nutrition and smoking scores respectively).

However there was significant difference between healthy lifestyle knowledge of intervention group and control subjects ( $P < 0.001$ ), but the knowledge scores of students in control group also increased in post test, because the children were such young readers at baseline, we elected to overburden them with questionnaires at pretest.

The children participating in this study looked forward to the healthy heart lessons and participated in them with enthusiasm. Therefore, programs specific for cardiovascular health are valuable supplements for schools and provide more in – depth education and skill building in areas targeting reduction of cardiovascular risk. However, a short 8 - week program will not be sufficient to reach to all the goals for prevention of cardiovascular disease. Further research and interventions are necessary to include the family and the media including food service industry, government and the community. However, we would suggest that these programs produce long – term population effects. School – based interventions should be conducted at least annually throughout the elementary, middle, and even high schools.

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