

Comparison Of Four Nutrition Education Methods Aiming At Reduction Of Blood Lipid Levels In Children In Isfahan, Iran*

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Summary:

Hyperlipidemia is quite prevalent among children and adolescents in Isfahan (and other parts of I.R. Iran). Food habits, which begin to be formed from an early age, can be improved through proper nutrition education. This study was conducted to compare the efficiency of different methods of nutrition education of 6-18 year-old school students (n=510) suffering from hyperlipidemia, aiming at controlling blood lipid levels during 1998-1999. Fasting blood samples were taken from 2100 randomly selected school children and analyzed for lipids. The 510 children found to be hyperlipidemic were divided into 4 groups to whom nutrition education (similar contents) was imparted using different methods; a fifth group receiving no education served as controls. The experimental groups received education as follows: Group 1 and 2 received indirect education through their parents and their school health officers respectively; Group 3 received nutrition education directly (face-to-face, 3 monthly sessions); to the fourth Group simple, easy-to-understand modules were given to take home and recommend their families to study them. Fifteen months later a second blood sample was taken from all the children and analyzed. The statistical tests used for analysis and comparison of the results were ANOVA, the Student's t-test and Bon ferroni, using the SPSS software. The magnitude of reduction in total cholesterol (27.59 mg) and in LDL-cholesterol (26.74 mg), and the maximum increase in HDL-cholesterol (5.06 mg) occurred in Group 4 (in all cases $p < 0.05$). The maximum reduction in the TG level (34.96 mg), on the other hand, was observed in Group 1, followed by Group 4 (27.46 mg). The final conclusion is that the best method of community nutrition education aiming at controlling blood lipids of children is using modules (as well as, in general, pamphlets and other written materials).

Key words:

Premature atherosclerosis, hyperlipidemia, children, nutrition education, Iran.

Introduction:

The most common cause of death in the industrial countries is related to the complications resulting from

atherosclerosis. Since it has been shown that the development of fatty streaks in blood vessels and atherosclerosis are a life-long process starting in childhood, primary prevention from childhood has received serious attention over the recent years¹⁻⁴. Our previous studies in this center have revealed that the most important C.A.D. risk factors among children and adolescents is hyperlipidemia⁵. The plasma cholesterol level in 25% of 2-6 year-old girls and 29% of the 6-18 year-old girls in the Isfahan urban population is over the 95th percentile, the corresponding proportions for

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boys are 23% and 29% respectively⁶. Furthermore, the worst type of dyslipidemia (increased levels of total cholesterol, triglycerides, and LDL, with low levels of HDL) is the most common type among children and adolescents in the population in question⁶.

Hyperlipidemia is a risk factor which is preventable, as well as curable. Food habits can be very effective: a diet which brings about up to 25% reduction in total fat intake and increases the ratio of unsaturated to saturated fats to 0.5-1, may result in a decrease of 15-20% in the serum cholesterol level. It has been shown that a 1% reduction in the total cholesterol level can reduce the mortality rate due to CHD by 2%¹⁻².

Considering that food habits of an individual start to be formed from childhood, it is much better to begin nutrition education in that period. A major factor in the success of children's nutrition education is the methodology used. We were interested in a method that can be reasonably effective in the short term, as well as in the long-term, bringing about desirable changes in the food habits of individuals and families. Several factors can influence the nutritional and food habits of children. The role of the parents, school health officers and physicians, as well as of the children themselves, is worth considering. Limited studies have been conducted in other countries to show which one of these groups is, under practical situations, the most effective in transferring nutritional messages to children. For example, a studies in Finland showed that teachers were the best "vehicle" for general health and nutrition education of school children⁷⁻⁹. The present study tested the effectiveness of several nutrition education method in school children, after 3 and 12 months.

Materials and Methods:

Five-hundred-and-ten school children, found to be hyperlipidemic from among a total of 2100 randomly selected students from 5 Isfahan Officer of Education Areas were included in the study. They were divided into 10 groups (5 boy and 5 girl groups), each group containing 17 primary, 17 guidance cycle, and 17 high school students. Four groups in either sex received nutrition education directly or indirectly; the fifth group received no education. The contents of the education

programme were similar in all cases, but the educational methods were different (see below).

Blood samples were taken at the beginning and 3 and 12 months after completion of the educational programme and analyzed, using the ELAN auto-analyzer in the Isfahan Cardiovascular Research Center laboratory, for total cholesterol, triglyceride, LDL-C and HDL-C levels. The blood lipid fraction concentrations at the three time points, as well as among the Groups, were compared using ANOVA and the Student's t-test and Bon ferroni.

The educational methods used were as follows:

- Group 1. The parents of the children received nutrition education.
- Group 2. The Health Officers in the schools received education and were asked to teach the students.
- Group 3. The students received face-to-face nutrition education, using simple, easy-to-understand language and simple practical examples.
- Group 4. For this group written materials were used. Simple, easy-to-understand modules, prepared at our center, were given to the students, so that they would take them home and recommend their family members to study them.
- Group 5. The students were only told that they were hyperlipidemic and had "abnormal blood lipids", but received no nutrition education (directly or indirectly).

The length of each education session (for Groups 1 to 4) was 30-45 minutes, repeated three times with monthly intervals. The contents of the nutrition education were as follows: advantages of liquid oils compared to solid fats in nutrition; the necessity of higher consumption of fruits and vegetables; replacing non-permitted snacks with fruits; importance of preventive measures from early childhood; particular emphasis on regular physical activity from early childhood; limiting egg-yolk intake to 3 per week from childhood.

Results and Discussion:

The mean total cholesterol, LDL-C, triglyceride, and HDL-C levels for the 5 groups are shown in Tables 1 to 5. It is seen from Table 1 that a significant increase (3.26 mg/100 ml) in HDL-C and a significant decrease (34.96 mg/100 ml) in TG concentrations occurred in Group 1 after 3 months (in both cases $P < 0.050$; no further change was observed after the following 9 months, that is, one year after education was imparted to parents.

According to Table 2, education of school officials also brought about statistically significant changes.

($P < 0.05$) in 2 of the 4 lipid fractions of the children after 3 months: a decrease of 25 mg/100 ml and 18mg/100 in total cholesterol and LDL-C, respectively. Like in Group 1, no further change occurred after the first 3 months.

TABLE 1

Comparison of the concentration (mg/100 ml) of blood lipids of the children before and after nutrition education of parents (Group 1) ($\bar{x} \pm SD$)

Lipid Fraction	Initial concentration	Concentration after	
		3 mo.	12 mo.
Total chol	175.3±30.9	172.2±25.7	171.3±24.4
LDL-C	108.0±31.7	107.1±24.7	106.2±24.0
TG	153.6±114.5	119.2±38.5	118.6±37.8
HDL-C	36.5±8.9	39.0±7.1	39.8±7.7

TABLE 2

Comparison of the concentration (mg/100ml) of blood lipids of the children before and after nutrition education of officials (Group 2) ($\bar{x} \pm SD$)

Lipid Fraction	Initial concentration	Concentration after	
		3 mo.	12 mo.
Total chol	182.1±33.9	157.1±28.4	159.4±26.8
LDL-C	117.4±31.8	99.0±23.3	97.9±21.5
TG	126.6±41.7	138.8±44.5	136.3±42.5
HDL-C	39.5±8.7	39.2±8.1	39.1±7.5

Face-to-face nutrition education of the children caused not only statistically significant decreases ($P < 0.05$) in total cholesterol and LDL-C, but also a significant reduction in the TG level (Table 3).

The findings of this study showed that nutrition education of the families of the children using pamphlets and modules could also

TABLE 3

Comparison of the concentrations (mg/100ml) of blood lipids of the children before and after face-to-face nutrition education (Group 3) ($\bar{x} \pm SD$)

Lipid Fraction	Initial concentration	Concentration after	
		3 mo.	12 mo.
Total chol	174.7±31.7	165.0±31.6	164.9±31.8
LDL-C	106.1±31.7	100.0±25.4	101.2±22.1
TG	144.4±56.8	127.2±45.1	128.6±44.2
HDL-C	40.25±13.5	40.2±9.8	40.1±8.7

The findings of this study showed that nutrition education of the families of the children using pamphlets and modules could also bring about desirable changes in blood lipid levels. As seen in Table 4, such education resulted in reductions in the total cholesterol (27.6 mg) and LDL-C (26.7 mg) concentrations, as well as an increase in the HDL-C level (5 mg), the difference being statistically significant in all cases ($P < 0.05$).

TABLE 4

Comparison of the concentrations (mg/100ml) of blood lipids of the children before and after nutrition education of their family members using modules (Group 4) ($\bar{x} \pm SD$)

Lipid Fraction	Initial concentration	Concentration after	
		3 mo.	12 mo.
Total chol	205.6±26.0	180.0±35.6	178.1±34.0
LDL-C	135.6±27.8	110.0±27.1	108.9±27.0
TG	151.0±47.6	125.1±42.1	123.5±42.4
HDL-C	40.0±6.13	44.2±9.7	45.5±10.0

In Group 5 (the no-nutrition education group) a statistically significant reduction ($P < 0.05$) was observed in the total cholesterol level (17.3 mg) after 3 months; no change occurred in the concentrations of the other lipid fractions.

TABLE 5

Comparison of the concentrations (mg/100ml) of blood lipids of the children with concentration after 3 and 12 month in the no-education group (Group 5) ($\bar{x} \pm SD$)

Lipid Fraction	Initial concentration	Concentration after	
		3 mo.	12 mo.
Total chol	180.8 \pm 37.6	165.1 \pm 31.2	163.4 \pm 30.5
LDL-C	117.4 \pm 30.0	116.1 \pm 28.8	115.6 \pm 29.5
TG	124.6 \pm 41.3	120.1 \pm 36.4	118.2 \pm 34.1
HDL-C	43.0 \pm 11.9	42.1 \pm 10.7	41.4 \pm 9.7

Comparisons of the blood lipid fraction levels in Groups 1 to 4 revealed, briefly, the following:

- The largest reductions in the total cholesterol, and LDL-C levels were observed in Group 4 (nutrition education of the children's families using pamphlets and modules).
- Similarly, the largest increase in the children's blood lipid concentrations occurred in Group 4.
- The largest reduction in TG level occurred in Group 1 (nutrition education of the parents), followed by that in Group 4.

In no case was there a significant difference between boys and girls.

It is concluded, then, that the most effective method of nutrition education was pamphlets and teaching modules i.e., written materials, put at the disposal of the children and their families.

It is to be noted that the contents of nutrition education were exactly the same in all the methods used. Consequently, the fact that written materials

proved to be most effective would mean that the main reason for the effectiveness of the method was that the materials were accessible at all times, and also that a larger number of individuals living close to the children could have access to the materials. The children, their parents and the other individuals had constant access to the pamphlets and modules at home.

Another reason for the success of the method in question could be that people attach more attention to written materials in general (for social and cultural reasons) and consider them more valid and reliable—as compared to oral messages.

It is recommended, then, that action be taken to prepare simple books, modules, pamphlets, posters etc., containing easy, simple-to-understand nutrition and food messages, to be used for individual and community nutrition education. The main responsible authorities can be the ministries of health and education, that should publish such teaching materials and distribute them, free of charge or at low prices, among families.

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