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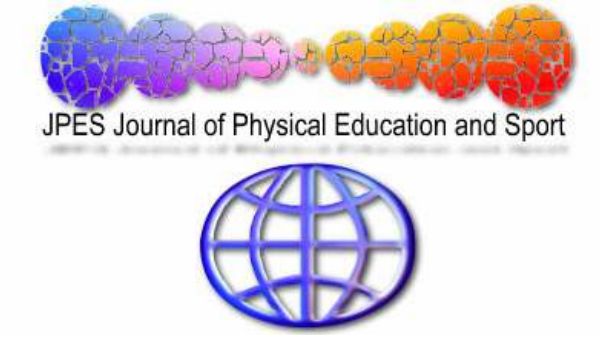

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ORIGINAL RESEARCH

A SCHOOL-BASED INTERVENTION PROGRAM FOR IMPROVING THE RISK FACTORS FOR CARDIOVASCULAR DISEASE AT AGES 12 TO 16.

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ABSTRACT

Background. Cardiovascular disease begins in childhood and this can be correlated with the presence of risk factors in adults. It is reasonable to initiate healthful lifestyle training in childhood to promote improved cardiovascular health in adult life. The purpose of the study was to evaluate the effectiveness of a school-based program designed to reduce specific modifiable risk factors for preventing cardiovascular diseases.

Methods. The sample was 343 students (160 boys, 183 girls) aged 12–16 years from the prefecture of Larissa, Greece. The duration of intervention was 1 school year. The practical part of intervention took place during the class of physical education, while the theoretical part took place in the classroom. Measurements were taken at the beginning, in the middle and at the end of the intervention. The following parameters were measured: weight, height, blood pressure, heart rate, components of the Healthy Eating Index, VO_{2max}, Fitnessgram test battery (1 mile run-walk, trunk lift, push up, curl up, back saver sit and reach).

Results. There were significant differences between the school-groups in the 1 mile run walk ($p<0,001$), 90° push up test ($p<0,001$), Healthy Eating Index ($p<0,001$), fruit component ($p<0,001$), saturated fat intake ($p<0,05$) and variety component ($p<0,001$). In the intervention group there was significant increase in VO_2max ($p<0,05$), in the weight ($p<0,001$), in the Healthy Eating Index ($p<0,05$), in the trunk lift test ($p<0,001$), in the push up test ($p<0,05$), in the sit and reach test ($p<0,001$) and in the component of fruits ($p<0,001$), while there was significant reduction in the 1 mile run walk test ($p<0,001$), in the body mass index ($p<0,05$) and in the component of saturated fat ($p<0,05$).

Conclusion. The intervention program was successfully implemented in schools and there were many significant and positive effects. These results highlight the importance of multicomponent programs for the prevention of CVD in schools. Additional studies are needed to evaluate more precisely the effectiveness of school-based interventions.

Key words: blood pressure, exercise, healthy eating index, school intervention program, VO_2max.

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INTRODUCTION

The major cause of morbidity and premature mortality in most of the industrialized world is cardiovascular disease (CVD) (1). Several sources, including the American Heart Association (AHA) (2), the Centers for Disease Control and Prevention–Youth Risk Behavior Surveillance Surveys (CDC-YRBSS) (3), provide representative data on the distribution and prevalence of major risk factors and CVD-related health behaviors in children and youth. Several evidences underscore the importance of primary prevention of CVD in childhood and the need for population-based approaches to cardiovascular health promotion and risk reduction. Data from the Bogalusa Heart Study (4) and Finland (5) reaffirm the link between risk-factor exposures in childhood and adolescence and atherosclerosis in adulthood. Risk factors for coronary artery disease are present in children and adolescents and tend to track or remain through adulthood. Risk factors that have been shown to track are physical inactivity, obesity and blood pressure (6,7).

The primary prevention of CVD should begin from the early childhood and it is supported by a great number of epidemiological, clinical and laboratory studies (4,5,8). The childhood years provide a unique opportunity for promotion of cardiovascular health. The staff of the schools has access to a large numbers of children in an environment that has the potential to support healthy behavior and is favorable for the delivery of health promotion programs (9). For this reason schools are particularly suitable for cardiovascular health promotion intervention programs, as children in this age group are responsive to health messages and behavioral changes that may be maintained into adolescence and adulthood (10).

A number of school-based health promotion interventions have been developed since the late of 1970's. The first-generation studies were didactic and focused on health knowledge, attitudes, and self-reported behaviour. In the decade of 1980 school-based research focused on theoretically behavioural interventions and incorporated the assessment and measurement of physiological risk factors for CVD. The second-generation trials demonstrated the potential of school-based interventions for improving the CVD risk status of children and youth (11) and informed the third generation of research that extended beyond the classroom, with interventions focused on the broader school environment, including food, physical activity programs that affect health-related behaviours. Example of the third generation of school-based research was the Child and Adolescent Trial for Cardiovascular Health (CATCH) (12,13,14). The results of school-based intervention support the recommendations of America Heart Association outlined in the AHA's Guide for Improving Cardiovascular Health at the Community Level (15) that emphasized schools as important components of population-based cardiovascular health promotion and risk-reduction efforts. The majority of the school-based studies (16,17,18,19) reported significant effects on health knowledge, attitudes, and behaviour of the students.

Nevertheless, some apparent controversies with the results of the school-based studies as well as the limited research evidence among school children and adolescents in Greece, was the cause of this study. Therefore, the purpose of the present study was to evaluate the feasibility and efficacy of an intervention designed to reduce specific risk factors for heart disease such as the levels of physical fitness, VO_{2max}, obesity, blood pressure, and dietary intake of children 12 to 16 years old, contrasting changes in the intervention vs control participants.

METHODS

Study Population

A total of 343 students (160 boys, 183 girls), aged 12 to16 years, were invited to participate. Of the 343 students who participated at baseline, 16 students from the intervention and 10 from the control group were not able, for various reasons, to participate at the intermediary or the final measurements.
Table 1.

Intervention school**s** were not randomized selected, but asked to participate in the intervention and research. The inclusion criterion was that schools needed to participate in a health education program with a teacher for two hours per week. Seven public high schools in the prefecture of Larissa, Greece, were recruited into the study. Chosen school**s** were in rural and urban settings and all students in these schools were eligible to participate, except them that were trained systematically in sport clubs or followed any form of training program. The intervention was implemented from September to April. Three measurements were conducted: baseline (September), intermediate (December) and final (May). Parental consent and child assent were obtained before the intervention. The study was approved by the Department of Physical Education and Sport Science, and the Ethics Committee of Democritus University of Thrace, Greece.

Procedure and Measurements

There were three data collection phases over one school year (9 months). Measurements were taken at the beginning of the school year prior to the intervention (initial results), assessed after 15 weeks

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(intermediate results), and repeated at the end of the school year after 35 weeks from the begging (final results). All measurements took place in schools and questionnaires were filled out under the supervision of the teachers.

Intervention procedure

The intervention was taught as a course that integrated exercise, health and nutrition education during school time and consisted of two components:

(i) Classroom theoretical component

Classroom theoretical component was offered only in the schools of intervention for 2 hour per week. Before the beginning of the program, there was a two-day seminar on health and diet issues, for those teachers who agreed to teach these lessons. No theoretical component took place in the control group schools. The educational materials of theoretical component were 3 books and a videotape, published by the Ministry of National Education and Religions Affairs in Greece. The two student manuals titled "Fitness and cardiovascular diseases" and "Diet and Health" provided students with information about cardiovascular diseases and exercise, heart, circulatory system, pulse rate, blood pressure, physical exercise, young's diet, healthy foods, diet and physical exercise, obesity, dietetic habits of family, as well as quizzes, crosswords, various tests and questionnaires. Teacher's manual titled "Fitness and cardiovascular diseases" covered subjects about health, circulatory system, the risk factors for cardiovascular disease and basics of fitness and physical activity. Videotape entitled "Fitness and cardiovascular diseases for students of 12-16 years" included topics among others about the function of the heart and vessels, physical exercise and circulatory system, risk factors for cardiovascular disease, physical activity and cardiovascular diseases, and fitness for young people.

(ii) Physical education component

Physical education component was offered in the intervention group. All physical education teachers, received advices and training before and during the intervention. Among other instructions that were given to them, there were written daily lesson plans for skill-fitness activities (volleyball, basketball, football, track and field) for the daily physical education lessons. The intervention program consisted of 40-55 minute classes conducted for 2 to 3 days per week, for 35 weeks during the course of physical education. For the improving of cardiovascular fitness it was used aerobic exercise. The intensity of aerobic exercises oscillated from 40-60% of their age-predicted maximum heart rate and included a variety of activities such as running, fast waking, jogging, jumping, stair stepping and others. Students were taught how to monitor their heart rate during exercise. Resistance exercise was used to improve muscular strength and endurance. As all secondary schools in Greece the control group schools have PE courses either. There were not standard structures for the PE lessons, but this depends on the facilities of the schools.

Measurement procedure

Anthropometric measurements. Height and weight were measured with the students wearing light clothing and no shoes. Height was recorded to the nearest 0.5 cm and weight to the nearest 0,5 kg. Age at baseline was computed from the reported birth date.

Body mass index (BMI). It was calculated as weight (kg) divided by height squared (m^2) per age and sex specific cut off points (20).

VO_{2max} Aerobic capacity was predicted from mile run time, age, gender and BMI, using the equation of Cureton et al. (1995).

Blood pressure. Two measurements of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were taken at 30-60 seconds intervals with an automatic digital oscillometer, after sitting on a chair for at least 10 min, with the left arm at heart level resting on a table. The mean of the two measurements was used.

Physical fitness. The Fitnessgram tests that used were: one-mile run/walk, 90 degree push up, back saver sit and reach, trunk lift and the curl up.

Diet records. The dietary intake was measured by using one 24-h recall questioner. Students were instructed on how to keep the previous one-day food record.

Dietary questionnaire. A 24-h dietary written recall questioner was conducted to each student. Photographs of foods and serving sizes were used to assist students in recalling the exact types and quantities of food and beverages they were consumed during the previous day.

Healthy Eating Index (HEI). For the calculation of the HEI score, all daily food records were analysed. Grain, vegetable, fruit, milk and meat components of the Healthy Eating Index measures the degree to which a person's diet conforms to the Food Guide Pyramid servings recommendations for the grains, vegetables, fruits, milk and meat.

For each of the five food group components of the Index, individuals who consumed the recommended number of servings received a maximum score of 10. A score of zero was assigned to any food group that no items from that category were consumed. Scores between the two levels were scored proportionally.

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Total fat and saturated fat consumption measures total fat and saturated fat as a percentage of total food energy intakes. Total fat less than 30% and saturated fat less than 10% of the total calories were assigned a score of 10 points. A zero score assigned when the proportion of total fat calories was more than 45%, or more than 15% for saturated fat. Intakes between the two levels were scored proportionately. Total cholesterol and sodium consumption measures total cholesterol or sodium intake. A 10 point value was assigned when intake for cholesterol or sodium was less than 300 mg. or 2.400 mg, and zero points when intake was more than 450 mg or 4.800 mg respectively. Variety examines the amount of in a person's diet over a 1 - day period. A maximum score was given if 8 or more different food items were consumed. A score of zero was given if three or less different items were eaten. Scores between the two levels were scored proportionately.

Statistical Analysis

All statistical analyses were carried out using the SPSS software version 9.0 for Windows (SPSS Inc., Chicago, IL) package for personal computers. Data were analysed for the main effects of group and time and the interaction of group by time with a 2 (group) × 3 (test period) repeated-measures analysis of variance (ANOVA). Least Significant Difference (LSD) test used to perform all pairwise comparison between group and time means. For all statistical comparisons, a significance level of $P< 0.05$ was chosen.

RESULTS

The baseline characteristics of the study population are shown in Table 2. Descriptive statistics (mean ± SD) for age, body mass index, height, weight, systolic blood pressure, diastolic blood pressure, pulse rate, 1 mile-run walk, curl up, 90^o push up, back saver sit and reach test, trunk lift test, VO_2max, Healthy Eating Index, grain consumption, fruit consumption, vegetable consumption, milk consumption, meat consumption, total fat consumption, saturated fat consumption, cholesterol consumption, sodium consumption, and variety component were calculated for participants in intervention and control groups.

(table 2).

Multiple comparisons were assessed by Repeated Measures ANOVA. Two-way repeated measures ANOVA (school-group × time), with repeated measures for the time factor, were used to compare variables in intervention and control group at baseline, in the middle after 15 weeks and in the final of the intervention program, after 35 weeks. The independent factors were school group (intervention, control) and time (baseline, middle and final). The dependent variables of interest were body mass index, weight, systolic blood pressure, diastolic blood pressure, pulse rate, 1 mile run-walk, curl up, 90^o push up, back saver sit and reach and trunk lift.VO_{2max}, Healthy Eating Index score and the components of Healthy Eating Index. Pairwise comparisons among school-group means were done using the least significant difference (LSD) procedure**.**

The between school-groups tests indicates that there were significant differences in the following dependent variables: 1 mile run walk ($F_{1,328}$=35,27, p<0,001), 90^o push up test ($F_{1,328}$=18,85, p<0,001), HEI ($F_{1,239}$=20,74, p<0,001), fruit component ($F_{1,239}$=69,07, p<0,001), saturated fat intake ($F_{1,239}$=18,89, p<0,05) and variety component ($F_{1,239}$=15,79, p<0,001).

(table 3).

Using the least significant difference (LSD) test, we observed that there were statistically significant differences in the intervention school-group between initial and final measurement, or between the intermediate and final measurement in the following variables: HEI, component of fruits, saturated fat intake, body weight, BMI, $VO_{2max,}$ 1 mile run-walk test, push-up test, back saver sit and reach test, trunk lift test (table 4). Also there were statistically significant differences in control school-group, between initial and final or between the intermediate and final measurement in the following variables: component of fruits, body weight, BMI, one mile run-walk test, push-up test, trunk lift test

(table 4).

DISCUSSION

The purpose of the present study was to evaluate the effects of a one year school-based intervention program that includes health and physical education for the primary prevention of the modifiable risk factors for cardiovascular disease. These factors were cardiorespiratory fitness, nutrition, hypertension and obesity.

Aerobic capacity. After 1 school year of intervention positive effects were found in the aerobic capacity between the initial and final measurement in the intervention group. No changes were found between the initial and final measurement in the control group, or between the intervention and the control group.

Similar surveys had conflicting results, due to the different methods that were used in the school-interventions programs, like the improvement of 20% of VO_{2max} during the intervention of 1 year (21), or the decreased of oxygen uptake in another study (22). In our study the increased aerobic capacity may be attributed to the intervention program, that included theoretical lectures of 40 to 55 minutes, twice a week, emphasizing heart health and cardiovascular fitness, combined with physical activity including aerobic exercise and circuit weight and flexibility training.

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Students understood the importance of the aerobic capacity for their cardiovascular health, which can be achieved in the school environment during the physical education lessons. This not only upgrades the physical education in schools, but this approach is absolutely compatible with the modern perceptions for exercise and health (23).

The improvement of aerobic capacity for cardiovascular benefits was feasible in Greek schools and we could apply the theoretical model, and according to it, aerobic exercise should take place for at least 3 times per week, for 40-55 minutes each time (24). Indeed, the frequency of physical education in secondary schools is 3 times per week and the duration ranges from 40 to 55 minutes, enough time according to Pate at al. (25) to have cardiovascular benefits, when the program includes aerobic exercise with medium intensity. For this reason students easily learned to find the intensity from their pulse rate. Knowing the pulse rate that corresponds to the 40-60% of the highest pulse rate, (220 minus age) they knew if they were in the levels of intensity that they should exercise (26). The overall results revealed also that an intervention program in the school environment could provide multiple benefits and other important adaptations, like flexibility and muscular strength and endurance.

We had to use a valid, reliable and objective as well as fast and economic way to calculate the aerobic capacity, because there were many and repeated measurements that should take place in schools. For this reason the equation of Cureton et al. (27) that predicts the VO_{2max}, from the one-mile run-walk Fitnessgram test was chosen to be the most proper. The rationale for using the one-mile run walk test to estimate VO_{2max} is based on the fact that for exhaustive exercise lasting longer than two minutes, energy is provided primarily through aerobic metabolism (28).

Obesity. Over the past 20 years, several school-based studies have implemented and evaluated programs aimed at reducing cardiovascular disease risk and obesity prevalence (29, 30). Our study produced small changes in BMI and no reductions in body weight of the students. This is because not only the short duration of the intervention and it's components but also the lack parent's and family involvement may affected the success for reduction of obesity in children. A meta-analysis of 41 intervention studies aimed to reduce the children's weight, found that interventions that incorporate both a behavioral and knowledge component, particularly those that include exercise in the intervention, are likely to produce weight loss (31). It is known that the reduction of the body fat in children requires a net decrease in positive energy balance. This can be achieved by reducing energy intake, increasing energy output through physical activity, or both. Our intervention provided only theoretical information to the students about the food choices and no any intervention to their family menus.

Dietary intake. The study estimated also the quality of student's nutrition by the Healthy Eating Index score. The effectiveness of the intervention was successful and the students improved considerably the quality of their diet. The theoretical courses for nutrition played a major role for the improvement of the HEI score. The knowledge that students acquired, allowed them to follow a diet, better and healthier concerning their initial diet.

The same improvement was not observed in all components of the Healthy Eating Index, because it is difficult to change all dietary habits that concern the entire family. Also this is related to economic and social conditions, as well as habits that had been solidified over the time. The most important improvement was in the component of fruits consumption of the HEI. This can be interpreted as the easier and with small cost dietary modification, which can be achieved only with the increase of consumption of seasonal fruits.

It is difficult to compare directly the findings of our intervention, aimed to improve the diet quality, with other similar interventions, as Simons-Morton et al. (32), aimed also to improve students' diet, or that of Sahota et al. (33) intervention, that included modification of school meals. The reason is the implementation of different programs and intervention methods, the different time duration, and the different methods of measurement and evaluation of diet quality.

The quality of student's diet can further improve, because the mean score of HEI in the intervention group was 68 that represent a diet that "needs improvement". Despite the improvement of 4% of the HEI in the intervention group, the indicator abstains enough from the "excellent" levels ranges from 80-100. In our study the majority of students (83%) belonged in the HEI category "needs improvement", and this was observed by other studies too (34).

According to the results of the study, Greek student's diet approaches the models and the dietary habits of "western" type diets. Similar results were found in America, where the HEI score was 63,8 and the lowest score was in the consumption of fruits as in our study (35). It is likely the shift of dietary habits of Greek population in "western type" diets abandoning the traditional Mediterranean diet that has been recorded before (35), it is also presented in the results of our study. Consequently, it is necessary to have interventions aiming to modify dietary habits in Greek young as the one we applied in our study.

Blood pressure. The program appeared to have no effects on blood pressure or heart rate. There are several randomized and controlled studies with interventions that examined the effects on blood pressure in children. Interventions were generally conducted over several months, with sample sizes as well as interventions varied widely, from regular aerobic activity programs to participation in activity-related games or other activities. In

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these studies we observe controversial results. Same findings like ours were observed in a study (16), that included theoretical knowledge and aerobic exercise, in another study (14) where the CATCH program was implemented or finally in the Ewart et al. study (36) that a program with 30 minutes of aerobic exercise, had no any positive results concerning blood pressure. In contrary, important differences were observed in blood pressure, when the program "Know your Body" was applied (37). Finally, decrease in systolic and diastolic blood pressure was found in another study, compared to the control group in children 9-11 years of age (38). Probably the variety of intervention programs, in combination with the duration of the intervention, shows the controversial results regarding the possibility to have changes in blood pressure in children's age.

CONCLUSION

Health is strongly linked with education. The majority of the children attend high schools, which are especially effective and efficient to provide health education. Lifetime patterns of physical activity and diet as well as many of the risk factors for cardiovascular diseases often have their roots in childhood. Comprehensive intervention programs including health education, nutrition education and physical activity during the school time could help students to develop positive health attitudes.

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Appendix

Table 1. Number of students at the beginning of intervention (initial measurement) per age and sex.

	Boys					
	Girls			Total		
Intervention group	86 (6*)		80 (2*)	166 (8*)		
Control group	86 (5*)		78	164 (5*)		
	12 years	**13 years**	**14 years**	**15 years**	**16 years**	**Total**
Intervention group	46 (7*)	32	45	35 (1*)	8	166 (8*)
Control group	43 (1*)	50 (1*)	50 (1*)	8	13 (2*)	164 (5*)

*** They did not participate in the intermediary or in the final measurement.**

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Table 2. Baseline physical characteristics, physiological measures, Fitnessgram tests and Healthy Eating Index components for intervention and control participants (mean ± SD).

	Intervention group (n=174)	Control group (n=169)		Intervention group (n=174)	Control Group (n=169)
Age (years)	13,56±1,23	13,38±1,16	**$V0_{2max}$ (ml/kg/min)**	43,62±6,44	43,18±5,49
BMI (kg/m^2)	22,40 ±4,32	21,65±3,77	**Healthy Eating Index**	5,50±12,0	64,44±10,0
Height (m)	1,61±0,09	1,64±0,08	*Grain consumption*	6,14±3,30	4,96±3,50
Weight (kg)	59,02±14,96	59,35±13,35	**Fruit consumption**	2,22±2,70	1,75±2,60
SBP (mm Hg)	107,80±12,7	106,40±10,0	**Vegetable consumption**	3,72±3,20	3,71±3,30
DBP (mm Hg)	74,10±10,40	78,30±9,00	**Milk consumption**	5,52±3,40	6,06±3,00
Pulse rate (bpm)	87,58±11,32	85,14±12,05	**Meat consumption**	7,89±3,80	6,88±4,30
1 mile run walk (min)	9,52±2,03	10,67±2,50	**Total fat consumption**	9,89±1,00	9,76±1,20
Curl up (rep.)	49,52±20,56	45,81±14,2	**Saturated fat consumption**	3,70±4,20	3,05±3,80
90^o Push up (rep.)	14,71±9,18	11,62±5,40	**Cholesterol consumption**	8,14±3,90	9,30±2,70
BSSR (cm)	24,35±6,77	23,96±7,94	**Sodium consumption**	10,00±0,00	10,00±0,00
Trunk lift (cm)	32,51±5,58	30,50±7,47	**Variety component**	9,27±1,50	8,96±1,50

Note. BMI = Body Mass Index, SBP = systolic blood pressure, DBP = diastolic blood pressure, BSSR = back saver sit and reach test.

Table 3. Mean and significant differences for intervention and control group from baseline to final assessment.

	Initial measurement		Intermediate measurement		Final measurement	
	Intervention group	Control group	Intervention group	Control group	Intervention group	Control group
BMI (kg/m^2)	22,40	21,65	22,05	21,37	22,21	21,65
Weight (kg)	59,02	59,35	58,70	59,29	59,63	60,45
SBP (mm Hg)	107,80	106,40	108,00	108,50	106,70	106,70
DBP (mm Hg)	74,10	78,30	74,90	78,20	74,60	78,60
Pulse rate (bpm)	87,58	85,14	87,98	85,04	85,80	84,96
Mile run walk (min)	9,53	10,68 *	9,38	10,73 *	9,16	10,96 *
Curl up (rep.)	49,53	45,81	50,54	46,53	51,60	45,83 *
Push up (rep.)	14,70	11,62 *	16,01	13,85 *	15,90	11,13 *
BSSR (cm)	24,35	23,96	24,06	23,71	25,25	23,78
VO_{2max} (ml/kg/min)	43,63	43,18	44,10	43,26	44,08	43,46
Trunk lift (cm)	32,51	30,50 *	33,93	32,52 *	33,93	30,46 *
Healthy Eating Index	66,50	64,44 *	69,51	64,09 *	69,11	62,79 *
Grain consumption	6,14	4,96 *	6,26	5,43	5,45	5,22
Fruit consumption	2,22	1,75	2,78	1,07 *	6,21	1,92 *
Vegetable consumption	3,72	3,71	4,48	3,65	3,52	3,43
Milk consumption	5,52	6,06	5,40	5,67	5,16	5,40
Meat consumption	7,89	6,88	7,22	7,95	7,73	7,44
Total fat consumption	9,89	9,76	9,91	7,95 *	9,81	9,57
Saturated fat consumption	3,70	3,05	4,85	2,64 *	3,60	2,15 *
Cholesterol consumption	8,14	9,30 *	9,12	8,99	8,24	8,96
Sodium consumption	10,00	10,00	9,92	9,98	9,97	10,00
Variety component	9,27	8,96	9,59	8,91 *	9,40	8,69 *

Note. BMI = body mass index, SBP = systolic blood pressure, DBP = diastolic blood pressure, BSSR = back saver sit and reach test.

* . Significant differences between the intervention and control group in all three measurements.

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Table 4. Mean and significant differences from baseline to final assessment in intervention and control group.

	Intervention group			Control group		
	Initial	Inter mediate	Final	Initial	Inter mediate	Final
Weight	59,02	58,70	59,63 #ƒ	59,35	59,29	60,45 #ƒ
BMI	22,40	22,05	22,21 #ƒ	21,65	21,37	21,65 ƒ
VO_{2max}	43,63	44,10	44,08 #	43,18	43,26	43,46
Mile run walk	9,53	9,38	9,16 #ƒ	10,68	10,73	10,96 #ƒ
Push up	14,70	16,01	15,90 #	11,62	13,85	11,13 ƒ
BSSR	24,35	24,06	25,25 #ƒ	23,96	23,71	23,78
Trunk lift	32,51	33,93	33,93 #	30,50	32,52	30,46 ƒ
HEI	66,50	69,51	69,11 #	64,44	64,09	62,79
Fruit	2,22	2,78	6,21 #ƒ	1,75	1,07	1,92 ƒ
Saturated fat	3,70	4,85	3,60 ƒ	3,05	2,64	2,15

#. Significant differences between initial and final measurement
ƒ. Significant differences between intermediate and final measurement