

Nutritional counselling and its effects on diet, nutritional knowledge and status, physical activity and quality of life in a Southern Europe population: evaluation of a health promotion programme

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Abstract

Background: Health promotion and primary prevention are key points for fighting the increase in non-communicable diseases.

Aim: To test the effectiveness of a nutritional counselling programme in improving nutritional behaviours, knowledge and status, physical activity and health-related quality of life in a general population.

Methods: In the period between January–December 2007, we studied the application of the nutritional counselling programme (NCP) developed by Local Health Agency 10 (Florence-Italy). We compared , diet, nutritional knowledge, physical activity, health related quality of life (measured by SF36 questionnaire), body mass index (BMI) and waist circumference before and after a two months intensive nutritional counselling programme using the paired t test and McNemar test. Diet, nutritional knowledge, physical activity, socio-demographic and morbidity information were collected through questionnaires. BMI and waist circumference were assessed by a medical doctor.

Results: We enrolled 74 persons, 59 of whom completed the educational programme. Of these, 34 had a nutritional status assessment after the programme. Mean age was 49 years, 80% were females. BMI, waist circumference and diet, except for water intake, did not change. The percentage of people who had “never exercised in a week” decreased from 46% to 17% ($p < 0.001$). Mean percentage of right answers to nutritional knowledge indicators increased from 64% to 78% ($p < 0.001$). Health related quality of life (HRQL) improved especially with regard to “Physical” and “Emotional Role”.

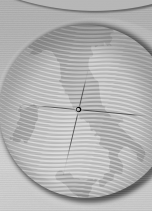
Conclusions: The NCP showed important results in promoting physical activity and improving HRQL and nutritional knowledge, moderate/none results in improving diet and nutritional status.

Key words: nutritional counselling, physical activity, diet, health-related quality of life, southern Europe

Introduction

Unhealthy diet and physical inactivity are widely recognised as key risk factors for non-communicable diseases and are key factors for their prevention and control. In 2004 the WHO delivered a global strategy on diet, physical activity and health which recommended a multi-sector approach to increasing fruit and vegetable consumption, decreasing fat, sugar and salt intake, promoting physical activity and achieving a healthy weight. Recommended intervention strategies were of both behavioural (to change individual lifestyles) and social/environmental (to create positive conditions for change) nature [1]. The counselling approach is an educational/behavioural intervention whose importance in

health promotion and disease prevention has been increasingly recognised, especially in the field of nutrition [2, 3]. It aims to improve knowledge and stimulate a real change in behaviour through a “client-centered approach” [4]. Traditionally, nutritional counselling was given at a primary care level, by family physicians, nurses and dietitians. However, some studies suggest the existence of multiple barriers that may prevent primary care physicians and nurses from providing dietary counselling, such barriers like the lack of time, low patient compliance and poor physician counselling skills [5]. Although there is evidence that brief educational interventions delivered by general practitioners can induce dietary changes [6], better results are achieved by medium- to high-



intensity counselling, usually tailored to individual needs and carried out by highly trained providers, such as registered dietitians. Conversely, low-intensity counselling of primary care patients produces small or medium changes in dietary behaviours. However, intensive counselling is generally conducted among adult patients with recognised risk factors for, or diagnosed with, chronic diseases, or in special clinics with motivated patients [7-16]. Few studies have investigated the effect of medium- to high-intensity counselling intervention in a general population, reporting positive results in terms of dietary changes [17-24]. Moreover, the great majority of these studies have measured the change in fruit, vegetable and fat consumption after nutritional counselling of sample populations in North America or Northern Europe [17-20, 22-24]. In this study, we investigated the effect of an intensive counselling intervention carried out in a general non-hospitalized population of a southern European country, Italy, generally characterized by food habits known as “the Mediterranean diet”, based on olive oil use, high fruit and vegetable consumption and low intake of animal fats, but in which an increasing consumption of animal food and fat and sugar intake has been seen in recent years. This has led to an estimate that the prevalence of overweight adult males lies around 43.8% and around 26.8% for adult females in 2006 and a total prevalence of 10.4% of obese adults [25]. In addition to these questions, this study considers many different outcomes other than dietary patterns and nutritional status, such as nutritional knowledge, physical activity and quality of life. In particular, the latter two have been assessed in relatively few studies and with contrasting results [16, 22, 23, 26-28].

Methods

The Nutritional Counselling Programme (NCP)

The NCP was developed by the Local Health Unit 10 of Florence, Tuscany, Italy. It began in January 2007 through the collaboration of the Department of Prevention and the Professional Dietetics Unit. The programme was addressed to an adult (18+) general population and consisted of: i) a first individual examination, conducted by a medical doctor and a dietitian, in which the medical history of the patient was recorded, nutritional status was assessed (measuring weight and height to calculate body mass index, and waist circumference) and socio-demographic information collected; ii) four group meetings (maximum 10 persons) of 1 hour scheduled every 15 days. During these meetings, participants were

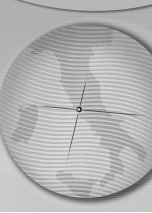
taught, through lectures and practical activities, the healthy-diet guidelines of the Italian Institute for Food and Nutrition Research [29], the basic concepts of metabolism and the benefits of an active life. The activities also included information about proper storage and cooking of food and how to read product ingredient labels. In the first meeting, participants were invited to take note of their food consumption in a diary which was then analysed in subsequent meetings. Two months after the fourth meeting, a second individual examination was scheduled to re-assess body mass index (BMI) and waist circumference. The NCP was managed by a multi-professional team consisting of a medical doctor specialized in public health and nutrition, a general practitioner with experience in psychotherapy, a professional dietitian and a public health assistant. Access to the NCP was obtained through an appointment system of the local health unit and there was a payment fee of € 62.36 for this workshop. The NCP was publicized through general practitioners and metabolic and cardiovascular units, so that patients of these units could urge their family members to attend the NCP.

Study Design and Participants

During the first year of activity of the NCP (January-December 2007), eleven cohorts of participants (74 persons) were recruited, six of which (34 persons) completed the NCP and proceeded to the second individual examination, 59 persons completed at least four group meetings but did not progress to the second individual examination while 15 (20% of the original sample) were fallouts before the fourth meeting. Besides the information collected during the first individual examination (height, weight, waist circumference and patient medical history), in the first and fourth meetings dietary habits, physical activity, nutritional knowledge and health-related quality of life (HRQL) were also recorded through questionnaires. HRQL was assessed using the Short Form 36 (SF36) questionnaire. Information about education, marital status, occupation (to estimate occupational energy expenditure), smoking and family history of hypertension, diabetes, cardiovascular diseases and dyslipidemia were also obtained from each participant. Years of education were classified according to the Italian school system and occupational energy expenditure according to European Commission guidelines [30].

Questionnaires on Diet, Physical Activity and Nutritional Knowledge

The diet questionnaire was developed using the guidelines of the Italian Institute for Food



and Nutrition Research [31]. It enquired about weekly intake of fish, meat (never, 2-3 times, 5-6 times) and fruit and vegetable (never, 2-3 times, everyday) consumption. It also recorded daily water intake (<1 litre, 1-2 litres, >2 litres) and type (structured or not) and weekly frequency (never, once, 2-3 times, everyday) of physical activity. Nutritional knowledge was investigated with a questionnaire listing 20 nutritional statements, related to NCP topics, that participants had to indicate as true or false.

The SF36 Questionnaire

SF36 is a psychometric measure which produces a profile with eight dimensions: "physical functioning", "role limitations due to physical problems", "role limitations due to emotional problems", "pain", "general health", "vitality", "social functioning" and "mental health". The eight dimensions produce values from 0 (worst health) to 100 (best health). In this study, the Italian version of SF36 was used [32, 33].

Data Analysis

The analysis was carried out using Stata 8.0. After a descriptive analysis, differences between baseline and study-end values for continuous and categorical variables were analysed for significance ($p < 0.05$) using the Wilcoxon matched pairs signed rank test. This test, in fact, is appropriate not only for paired continuous data but also for categorical paired variables with three or more ordered categories, which is the case of many of the variables studied. In the case of categorical variables, within category differences were investigated using the McNemar test [34].

Results

Basic Characteristics of the Sample

The mean age of the study sample was 49 years (SD=10.6). There was a higher presence of females and 86% of participants were married. The overall educational level was medium/high. Most subjects were employed in a job involving low-moderate energy expenditure (housewives, clerks, professionals, technical workers, etc). Hypertension (53%) and dyslipidemia (36%) were the most common diseases among the participants. Mean BMI and waist circumference were 29.4 kg/m² (SD=4.7) and 91.5 cm (SD=17.0) respectively. No baseline differences were observed between fallouts and those who made it to the follow-up stage, except for family history of hypertension (Table 1).

Diet, physical activity and nutritional knowledge

Overall, significant differences in percentages

distributions were found with regard to water intake ($p=0.003$) and to frequency ($p < 0.001$) and type ($p < 0.001$) of physical activity. In particular, the percentage of people who consumed <1 litre of water per day decreased from 31% to 17% (differences 95%CI=0.01-0.26, $p=0.038$) and the percentage of people who never exercised during the week decreased from 46% to 17% (differences 95%CI=0.15-0.43, $p < 0.001$). This decrease was especially due to the increment of people who practised non-structured physical activity, which changed from 20% to 47% (differences 95%CI=-0.41 to 0.13, $p < 0.001$). An interesting decrease was also observed in the percentage of people who never ate fish during the week, which changed from 46% to 32%, but this difference was not significant (differences 95%CI= -0.01-0.28, $p=0.076$). Regarding nutritional knowledge, the mean percentage of correct answers to nutritional statements increased from 64% to 78% ($p < 0.001$) (Table 2).

Nutritional status and HRQL

Regarding the nutritional status, BMI and waist circumference did not significantly change. On the contrary, all SF36 scales showed an improvement, even if the only scales with significant gains were "Physical Role" and "Vitality", with a mean score that increased from 63.5 to 82.2 ($p=0.002$), and from 53.9 to 57.6 ($p=0.027$) respectively (Table 3).

Discussion

Age, gender distribution and educational level of the study sample were similar to those of comparable studies [17,19, 22, 24]. Regarding socio-economic status, the mode of access to the service, after payment of a fee, may have excluded participants with low income. Indeed, most of those enrolled reported to be employed as non-manual workers. Regarding nutritional status, mean BMI was higher than that reported in the literature regarding counselling interventions in general populations [22] and was more similar to that recorded in counselling programmes for persons at high cardiovascular risk or with hyperlipidemia [7, 8, 12]. The method of publicizing the programme and the recruitment on a voluntary basis could have biased the sample towards overweight or have attracted those persons with obvious weight-related risk factors who might have felt the need for help in controlling their weight. Actually, more than 50% of the sample reported to suffer from hypertension and about 40% from dyslipidemia. The baseline characteristics of the sample should not, however, have influenced the dropout rates, and consequently the reliability of the results, due to a substantial absence of

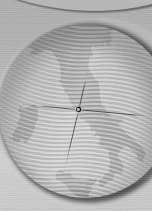


Table 1. Characteristics of the study sample at baseline (N=74).

		Not lost to follow-up (N=59)		Lost to follow-up (N=15)		p*	Overall	
		%	n	%	n		%	n
Males		20	12	20	3	0.977	20	15
Years of education	0-5	3	2	13	2	0.107	5	4
	8	17	10	33	5		20	15
	13	41	24	40	6		41	30
	13+	39	13	14	2		34	25
Marital status	Not married	12	7	7	1	0.635	11	8
	Married	85	50	93	14		86	64
	Divorced	3	2	-	-		3	2
Occupation energy expenditure	Retired	8	5	7	1	0.720	8	6
	Light	63	37	60	9		62	46
	Moderate	24	14	20	3		23	17
	Heavy	5	3	13	2		7	5
Smoking status	Never smoked	58	34	60	9	0.983	58	43
	Current smoker	20	12	20	3		20	15
	Ex-smoker	22	13	20	3		22	16
Family history of obesity		39	23	40	6	0.943	39	29
Family history of diabetes		46	27	47	7	0.950	46	34
Family history of hypertension		59	35	27	4	0.024	53	39
Family history of dyslipidemia		39	23	27	4	0.630	36	27
Family history of cardiovascular diseases		52	31	47	7	0.827	51	38
Diabetes		5	3	13	2	0.256	7	5
Hypertension		15	9	27	4	0.300	53	39
Dyslipidemia		19	11	33	5	0.217	36	27
Cardiovascular diseases		14	8	7	1	0.466	12	9
		Mean	SD	Mean	SD	p**	Mean	SD
Body Mass Index (kg/m ²)		29.1	4.2	30.7	6.3	0.523	29.4	4.7
Waist circumference (cm)		90.0	17.3	96.3	15.1	0.309	91.5	17.0

*Chi square test ;** Mann-Whitney test

differences between those absent from follow up and those who completed the programme.

In this southern European population, the NCP seemed to have some impact, albeit not significant, on the patterns of protein food consumption, increasing the weekly intake of fish, whose protective effect against cardiovascular diseases is well known [35]. On the contrary, it

did not affect fruit and vegetable consumption. This is in contrast with many studies which have found a positive relationship between medium-high intensity nutritional counselling and the increase of fruit and vegetable consumption [10, 11, 19, 20, 22-24]. The lack of change in fruit and vegetable consumption could be due to an already high baseline fruit and vegetable

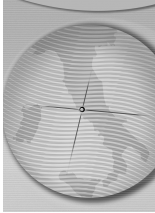


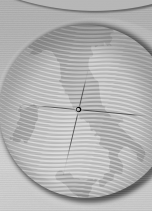
Table 2. Dietary habits, physical activity and nutritional knowledge (N=59) at baseline and at end of study.

		Baseline		End of study		Differences 95%CI	p*
		%	n	%	n		
Fish consumption/ week	Never	46	27	32	19	-0.01-0.28	0.059
	2-3 times	53	31	66	39	-0.29-0.02	
	5-6 times	1	1	2	1	-0.06-0.06	
Meat consumption/ week	Never	13	8	10	6	-0.05-0.12	0.429
	2-3 times	58	34	68	40	-0.23-0.03	
	5-6 times	29	17	22	13	-0.05-0.19	
Fruit consumption/ week	Never	5	3	5	3	-0.06-0.06	0.720
	2-3 times	12	7	8	5	-0.08-0.14	
	Everyday	83	49	86	51	-0.12-0.08	
Vegetable consumption/ week	Never	3	2	-	-	-0.03-0.09	0.096
	2-3 times	14	8	12	7	-0.10-0.13	
	Everyday	83	49	88	52	-0.15-0.05	
Water drunk/day	< 1 liter	31	18	17	10	0.01-0.26	0.003
	1-2 litres	64	38	70	41	-0.21-0.11	
	> 2 litres	5	3	14	8	-0.19-0.02	
Physical activity frequency/ week	Never	46	27	17	10	0.15-0.43	<0.001
	Once	24	14	15	9	-0.05-0.22	
	2-3 times	22	13	51	30	-0.45 to -0.12	
	Everyday	8	5	17	10	-0.21-0.04	
Type of physical activity	None	46	27	17	10	0.15-0.43	<0.001
	Unstructured	20	12	47	28	-0.41 to -0.13	
	Structured	24	14	22	13	-0.10-0.13	
	Both structured/unstructured	10	6	14	8	-0.14-0.08	
Nutritional knowledge indicators correct answers (mean)		64	-	78	-	-	<0.001

* Wilcoxon matched pairs signed rank test

consumption that may indicate a ceiling effect [12]. In fact, in this study 83% of the sample reported eating fruit and vegetables every day before the programme. This observation is coherent with one of the main characteristics of the Mediterranean diet. One important result shown by this study was related to the promotion of physical activity, with a 63% decrease in the number of people who reported never having exercised in the week and a doubling of people now exercising 2-3 times a week. This appears to be an important outcome of the NCP, considering the contrasting results reported in literature [16, 26-28]. However, it is interesting to observe that

this increase was largely due to an increment of people practising non-structured physical activity, such as walking, rather than structured physical activity, such as more vigorous activities carried out in the gym. This finding is consistent with those of other studies which particularly reported an increment in moderate physical activity and walking after a counselling in a primary care setting [16, 26]. Overall, the NCP seemed to be effective in promoting a certain change in attitude in favour of healthier behaviours, as confirmed also by the increase in people who drank more than one litre of water a day, a good habit recommended by the Italian Guidelines for a

**Table 3. Subjective and objective health: SF36 scale values (N=59) and nutritional status indicators (N=34) at baseline and at end of study.**

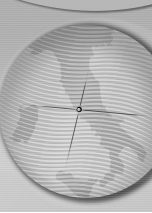
	Baseline		End of study		p*
	Mean	SD	Mean	SD	
Physical functioning	81.2	19.2	83.6	19.8	0.156
Physical Role	63.5	38.1	82.2	30.5	0.002
Pain	66.1	29.4	72.6	26.1	0.115
General Health	62.6	20.1	66.5	18.8	0.137
Vitality	53.9	19.1	57.6	18.9	0.027
Social Activities	67.2	25.7	73.7	20.8	0.097
Emotional Role	61.6	39.1	72.3	35.1	0.077
Mental Health	62.8	19.8	66.8	16.7	0.107
Body Mass Index (kg/m²)	29.1	4.1	29.1	4.2	0.983
Waist circumference (cm)	90.0	20.3	90.7	12.9	0.852

*Wilcoxon matched pairs signed rank test

Healthy Diet [29]. This positive effect in changing behaviours was accompanied by an improvement in nutritional knowledge. This is in line with previous studies which found that increased knowledge was associated with greater changes in dietary behaviour [7, 8]. However, the overall mean percentage of right answers to nutritional knowledge indicators after the programme was 78%, leaving room for improvement and suggesting that the programme failed to properly address certain arguments, such as the concepts of metabolism and nutrient intake. Observing the effect of the NCP on perceived and objective health, it seemed to achieve some results for HRQL too, determining an improvement in all eight SF36 scales, although it did not seem to have any effect on objective health indicators such as BMI and waist circumference. The SF36 scales that showed significant improvement were the "Physical Role" and "Vitality". The improvement in these scales related to the physical dimension of health could be associated to the increased physical activity behaviour. The improvement in scales related to the social/emotional area of health, which in previous studies had not been associated with dietary changes such as increase in consumption of fruit and vegetable, could also be due to the increase in physical activity, which in previous studies was associated with an improvement in mental health. The improvement in these scales could also be due to the positive effect that participation in the NCP may have had, which involved periodic support and encouragement

that may have promoted improvements in social/mental well-being [22-24, 26]. However, one reason for the effect found in this study could be that participants had relatively poor health status at baseline [22]. The mean scores of SF36 scales at baseline were lower than mean values for Italian population in the same age group of the study sample [33]. This seems to confirm the hypothesis, mentioned above, that the sample was recruited among people who perceived themselves as having health problems or to be at risk for health problems, and this, probably, also influenced the perception of HRQL. The NCP did not seem to have any effect on objective health. In fact, BMI and waist circumference did not change after the programme. This is in contrast with other studies of samples with similar baseline nutritional status, even if their findings are not completely consistent. The poor results reported by this study could be due to the short duration of the follow-up period (2 months from the end of the counselling programme) which could be insufficient for achieving significant weight changes, or to the limited effectiveness of the educational intervention aimed at weight reduction where a more intensive approach is needed [7, 8, 12]. However, these results should be interpreted cautiously because only 34 persons had a nutritional status assessment after the programme.

The study had some limitations: i) the relatively small sample size and follow-up rate, especially with regard to the group which completed the



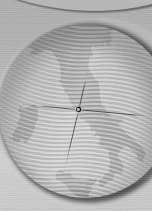
final BMI and waist circumference assessment, even if it is larger than the sample size of previous studies [16]; ii) it reports observational data from a single counselling programme which may not be generalized to other programmes or other populations; iii) recruitment was voluntary so there could have been selection bias; iv) assessment of outcome indicators was mainly based on self-reported data that may be inaccurate and could cause misclassification of dietary and physical activity habits after the NCP, because people could be induced to report changes that are expected. However, in a study of free-living outpatients, it can be assumed that subjects honestly report their true behaviours [8, 23].

The results of this observational study showed that a NCP conducted in a southern European population traditionally characterized by a

“Mediterranean diet” did not have much effect on diet, in large part already characterized by healthy elements. On the contrary, it showed good results in promoting physical activity and improving HRQL. This study also highlighted the possibility of recruitment problems, such as selection of high-income or overweight persons, and of gaps in educational aspects of the counselling programme. These results suggest that the NCP should be better tailored to population habits and characteristics, perhaps emphasizing lifestyle aspects more than dietary ones and adapting educational methods to the cultural level of the participants. Though cost aspects were not considered, previous research has shown that nutritional counselling may be a highly cost-effective approach to reducing risk factors linked to over-eating [36].

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