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Changes in lifestyle habits after counselling by nurse practitioners: 1-year results of the Groningen Overweight and Lifestyle study

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Abstract

Objectives: The Groningen Overweight and Lifestyle (GOAL) study primarily aims at preventing weight gain by nurse practitioners (NP) guided by a standardized computerized software program. Since favourable changes in physical activity (PA) and diet may improve health independently of weight (loss), insight into effects on lifestyle habits is essential. We examined the 1-year effects of lifestyle counselling by NP on PA and diet, compared with usual care from the general practitioner (GP-UC).

Design: A randomized controlled trial.

Setting: Eleven general practice locations in the Netherlands.

Subjects: A total of 341 GOAL participants with overweight or obesity and either hypertension or dyslipidaemia, or both, who completed an FFQ and Short Questionnaire to Assess Health-Enhancing Physical Activity (SQUASH) at baseline and after 1 year.

Results: After 1 year, the NP group spent 33 min/week more on walking compared with the GP-UC group who spent −5 min/week on walking ($P = 0{\cdot}05$). No significant differences were found between the NP and GP-UC groups on the percentage of persons complying with the PA guidelines. In both groups, nutrient intake changed in a favourable direction and participants complied more often with dietary guidelines, but without overall difference between the NP and GP-UC groups.

Conclusions: With the exception of an increase in walking (based on self-reported data) in the NP group, no intervention effects on PA and diet occurred. Positive changes in nutrient intake were seen in both groups.

Keywords
Overweight
Obesity
Primary health care
Diet
Physical activity

The prevalence of obesity is increasing worldwide and according to WHO the (primary) health-care setting can contribute to curbing this global epidemic[1]. In a general practice setting, compliance with the lifestyle component of guidelines is often limited in daily practice[2,3]. Frequently reported barriers for lifestyle counselling by the general practitioner (GP), such as lack of time and insufficient knowledge, may be overcome when counselling is (partially) delegated to nurse practitioners (NP).

Previous studies have shown that lifestyle interventions in primary care can be effective at least in the short term[4–6] and may already be (cost) effective in persons with moderate overweight (BMI 25–30 kg/m^2)[7]. In persons with at least one additional risk factor such as hypertension and/or dyslipidaemia, larger health gains may be achieved.

In the Groningen Overweight and Lifestyle (GOAL) study, lifestyle counselling is provided by NP, guided by a structured program incorporated into the software. The intervention aims at persistent lifestyle changes and preventing weight gain, or achieving moderate weight loss in case of motivated patients. In the intervention group, more participants achieved weight maintenance after 1 year compared with the group with usual care provided by the GP (GP-UC; control condition; 77 % *v.* 65 %; $P < 0{\cdot}05$)[8]. The current paper presents the 1-year effects on diet and physical activity (PA) of software-assisted lifestyle counselling by NP compared with the control group.

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Methods

Subjects

As described elsewhere in detail[8], 457 participants from eleven general practice locations from the northern part of the Netherlands started with the intervention. Eligible participants had a BMI between 25 and 40 kg/m^2 and either hypertension or dyslipidaemia, or both. Hypertension was defined as mean systolic blood pressure ≥140 mmHg and/or diastolic ≥90 mmHg (based on two measurements on at least two different visits) or current use of blood pressure-lowering medication, and dyslipidaemia was defined as a total serum cholesterol >5·5 mmol/l or low HDL cholesterol (male: <0·9 mmol/l; female: <1·1 mmol/l) or a ratio of total to HDL cholesterol >6 mmol/l and/or current use of cholesterol-lowering medication. Exclusion criteria were diabetes mellitus, hypothyroidism, pregnancy, liver or kidney disease, current treatment for malignancy, severely shortened life expectancy, mental illness and addiction to alcohol or drugs.

The GOAL study was approved by the Medical Ethics Review Committee of the University Medical Center Groningen and registered by the Netherlands Trial Register (TC 1365).

Measurements

A trained research team performed a structured medical examination that included measurements of body weight, height, waist circumference and blood pressure as described elsewhere in detail[8]. Participants were asked to complete questionnaires on general characteristics (e.g. educational level, gender), PA and nutrient intake on both occasions.

Physical activity

PA was assessed using the validated Short Questionnaire to Assess Health-Enhancing Physical Activity (SQUASH), referring to an average week in the past month[9]. Activities were classified as light, moderate or heavy intensity on the basis of the participants' age, the metabolic equivalent value of the activity[10] and the self-reported intensity level (slow/light, moderate, fast/intense). Complying with the National PA Guidelines is defined as performing at least 30 min of moderate-to-heavy intensity activity at least 5 d/week. Complying with the Fit Guideline is defined as performing at least 20 min of heavy intensity activities at least 3 d/week[11].

Nutrient intake

Nutrient intake and compliance with the national dietary guidelines were assessed by a validated FFQ with the last 4 weeks as reference period[12]. Complying with guidelines on fruit and vegetables is defined as consuming at least 200 g/d each; the guideline for breakfast use is defined as consuming breakfast at least 5 d/week. For fat intake there are two guidelines: consume a maximum of 10 % of energy from saturated fat and use exclusively added fat with a favourable composition (<20 % saturated fat).

Intervention

Patients were allocated to the NP (*n* 225) or to the GP-UC group (*n* 232) by computer-generated random numbers. In the first year, the lifestyle intervention of the NP consisted of four individual visits (1, 2, 3 and 8 months after baseline) and one feedback session by telephone (5 months after baseline). During these contact sessions the NP was guided by the standardized computerized software program, which contains instructions on lifestyle counselling according to (inter)national guidelines[3,13,14] and allows data entry of the measurements. The NP (contracted by the GP) followed a training programme (four sessions of 4 h each) and received an individual instruction about the software program. The primary aim was to prevent weight gain and lose 5–10 % weight if patients were motivated.

The participants in the control group were offered one visit with their GP to discuss results from the screening and thereafter received usual GP care (mean number of visits was 2·0 (SD 1·7)). According to National GP Guidelines[2], this implies low intensive or absent care (regarding focus on lifestyle) for a large majority.

Statistical analyses

Primary outcome measures are changes in dietary intake and PA 1 year after baseline. Differences in baseline characteristics and changes in outcome measures between the two study groups (also within subgroups) were evaluated with the unpaired Student's *t* test for continuous variables and the χ^2 test for categorical variables. A general linear model was performed to adjust for baseline values. Intervention effects for complying with dietary and PA guidelines were calculated as OR by logistic regression (adjusted for baseline values). Changes after 1 year within NP and GP-UC groups were tested with the paired Student's *t* test (continuous variables) and the McNemar test (categorical variables).

All analyses were performed using data of participants who completed the questionnaires. Persons who did not attend the 1-year visit and/or did not complete the SQUASH and FFQ were regarded as dropouts in the analyses. Intention-to-treat analyses were performed with the baseline observation carried forward for persons for whom the 1-year results were lacking.

Tests were also conducted with non-parametric tests and without outliers (defined as cases outside the mean ± 2 SD), but not presented because results were similar. The total duration of PA per week was not calculated for persons with unrealistic results on the duration per day (outside mean ± 2 SD).

The Statistical Package for the Social Sciences statistical software package version 14·0 for Windows (SPSS Inc., Chicago, IL, USA) or the SAS statistical software package version 9·1 (SAS Institute Inc., Cary, NC, USA) was

used for the statistical analyses. $P < 0{\cdot}05$ was considered statistically significant.

Results

Baseline and dropout

Baseline data on SQUASH and FFQ were available for 408 of 457 participants. After 1 year, sixty-seven of them did not complete both questionnaires (or completed only one questionnaire). There were no differences in baseline nutrient intake, PA and other baseline characteristics between dropouts and the final study group (*n* 341), except for energy intake. At baseline, dropouts had a lower intake of energy (7891 *v.* 8576 kJ; $P = 0{\cdot}011$; adjusted for gender and body weight) than persons who had completed 1-year data.

Table 1 shows baseline characteristics for the NP and GP-UC groups. Except for age (participants in the GP-UC group were older; 57 *v.* 55 years; $P = 0{\cdot}026$), there were no differences between these groups.

Changes in physical activity and nutrient intake

At baseline, total and light intensity PA in the NP group was higher compared with the GP-UC group, but moderate-to-vigorous activity and leisure-time activities did not differ between these groups (Table 2). Within the NP group, moderate-to-heavy intensity activity was significantly increased after 1 year (Table 2), mainly because of increases in (leisure time) walking and bicycling. For walking, this increase was significantly larger than in the GP-UC group. The increase in moderate-to-heavy activity in the NP group was accompanied by a decrease in light intensity activities.

There were no significant differences in changes in nutrient intake between the NP and GP-UC groups. Both groups decreased mean daily energy intake, decreased (saturated) fat intake and increased carbohydrate, protein, vegetable and fruit intakes ($P < 0{\cdot}05$ for all; Table 2).

For 145 of 169 persons, the weight goal of the participant was recorded by the NP. A total of 113 persons had the intention to reduce their weight, and thirty-two persons to maintain their current weight. In the first group, 26 % had ≥5 % weight loss, and in the second group 9 % ($P = 0{\cdot}05$ for difference between groups). The mean decrease in daily energy intake in these groups was 949 and 699 kJ/d, respectively ($P = 0{\cdot}50$).

Guidelines on physical activity and nutrient intake

Overall, no significant intervention effects were found for the percentage of persons complying with the PA and dietary guidelines. The percentage complying with the National PA Guideline in the NP group changed from 67 % to 75 % compared with 73 % to 70 % in the GP-UC group ($P = 0{\cdot}11$). In both groups, significantly more participants complied with the guidelines on fruit and fat after 1 year (data not shown).

Intention-to-treat analyses

Intention-to-treat analyses did not alter the results substantially.

Discussion

In our study, lifestyle counselling that focused on weight maintenance by NP led to an increase in walking compared with GP-UC. There were no other significant differences between groups with regard to changes in PA and food intake, but both groups favourably changed nutrition behaviour.

We found a mean reduction in energy intake of 732 kJ (175 kcal)/d in both groups, which is comparable to the results of Jeffery and French[15] who described reductions of 368 kJ and 828 kJ (88 kcal and 198 kcal, respectively) in two intervention groups, although the counselling was not carried out individually. In the Finnish Diabetes Prevention Study and PREMIER trial, higher reductions were seen in the intervention groups (1033–1343 kJ (247–321 kcal)), but these studies aimed at weight loss instead of weight maintenance and the results of the latter study were after 6 months[16,17]. Light intensity activity decreased in the NP group, whereas moderate-to-heavy intensity increased, which was also found in other studies in which total time spent on PA hardly changed but activities were performed more intensively[17].

Table 1 Baseline characteristics for NP and GP-UC groups

	NP group (*n* 169)		GP-UC group (*n* 172)	
	Mean or %	SD	Mean or %	SD
Age (years)	55·2	7·7	57·1*	7·7
Men (%)	48·5	–	45·3	–
BMI (kg/m^2)	29·4	3·1	29·5	3·7
BMI ≥ 30 kg/m^2 (%)	34·9	–	36·0	–
Waist circumference for men (cm)	103·4	7·6	103·3	8·5
Waist circumference for women (cm)	97·2	9·6	97·0	12·0
Current smokers (%)	21·3	–	14·5	–
At least one attempt to lose weight during the last 5 years (%)	55·6	–	61·1	–

NP, nurse practitioner; GP-UC, general practitioner usual care.
*$P < 0{\cdot}05$ for difference between NP and GP-UC groups.

Table 2 Changes in physical activity and food intake among intervention (NP) and control groups (GP-UC)

	NP (*n* 169)				GP-UC (*n* 172)					
	Baseline		Delta†		Baseline		Delta†		*P* value (delta between NP and GP-UC groups)§
	n‡	Mean	95 % CI	Mean	95 % CI	*n*‡	Mean	95 % CI	Mean	95 % CI	
Weight (kg)	169	88		−1·9**		172	87		−0·9**		0·07
Total PA (min/week)	120	2304*	2095, 2513	−126	−304, 53	129	2026	1867, 2185	−68	−225, 89	0·52
Light intensity (min/week)	147	1666**	1496, 1836	−180*	−344, −16	157	1368	1221, 1516	−80	−223, 63	0·47
Moderate-to-heavy intensity (min/week)	135	596	496, 695	97*	1, 194	140	720	616, 823	−22	−112, 68	0·24
Leisure-time PA (min/week)	142	625	509, 741	61	−56, 179	146	656	573, 740	−14	−85, 57	0·31
Walking (min/week)	161	174	141, 207	33*	3, 63	162	183	154, 213	−5	−28, 18	0·05
Bicycling (min/week)	159	132	104, 160	34*	5, 64	160	135	107, 164	5	−22, 33	0·15
Sports (min/week)	169	160	85, 234	−27	−101, 47	172	161	114, 207	−42	−88, 5	0·52
Gardening (min/week)	164	72	50, 93	9	−12, 29	162	99	77, 120	3	−19, 25	0·78
Odd jobs (min/week)	156	93	60, 126	17	−22, 56	160	96	58, 133	1	−22, 23	0·48
Energy (kJ)	169	8587	8182, 8993	−748**	−1038, −458	172	8566	8182, 8949	−733**	−1029, −437	0·97
Energy (kcal)	169	2052	1955, 2149	−179**	−248, −109	172	2047	1956, 2139	−175**	−246, 105	0·97
%E from fat	169	35·3	34·4, 36·2	−2·6**	−3·5, −1·7	172	34·6	33·6, 35·5	−1·9**	−2·8, −1·0	0·56
%E from saturated fat	169	12·9	12·5, 13·4	−1·6**	−2·0, −1·2	172	12·5	12·1, 13·0	−1·0**	−1·4, −0·6	0·16
%E from protein	169	15·4	15·1, 15·8	0·6**	0·3, 1·0	172	15·5	15·1, 15·8	0·5**	0·2, 0·9	0·68
%E from carbohydrates	169	44·6	43·6, 45·5	2·0**	1·2, 2·9	172	45·3	44·3, 46·3	1·3**	0·3, 2·2	0·43
Cholesterol (mg)	169	188·6	177·3, 200·0	−27·4**	−37·0, −17·8	172	185·8	174·3, 197·3	−21·9**	−31·3, −12·4	0·49
Alcohol (g)	169	12·4	10·2, 14·6	−1·2	−2·4, 0·1	172	12·7	10·7, 14·6	−0·6	−2·0, 0·8	0·44
Vegetables (g)	169	145·2	120·3, 140·7	16·1**	6·3, 25·9	172	158·6	125·4, 148·5	13·6*	1·9, 25·2	0·87
Fruit (g)	169	130·5	103·8, 136·4	85·1**	65·5, 104·7	172	137·0	109·1, 144·6	64·1**	43·2, 84·9	0·27

NP, nurse practitioner; GP-UC, general practitioner usual care; PA, physical activity; %E, percentage of energy.
Mean values were significantly different at baseline between NP and GP-UC groups, or at change from baseline to 1 year within group: *$P < 0·05$, **$P < 0·01$.
†Deltas are calculated as value at 1-year measurement minus baseline value.
‡Numbers may differ because of missing items in the Short Questionnaire to Assess Health-Enhancing Physical Activity.
§Corrected for baseline values.

A limitation of our study may be that changes in PA and dietary behaviour were measured using questionnaires based on self-report. The use of self-reported data may have led to overestimation of PA. At baseline, a large percentage of the study population already complied with the guidelines, which may be partly explained by over-reporting because these percentages are higher than in the Dutch population[18]. Another limitation is that inviting persons to participate may have caused a selection bias resulting in a more healthy study group. However, even with these high percentages at baseline, we found a significant difference between the NP and GP-UC groups on change in walking. PA may be more accurately assessed using, for example, activity monitors, which was not feasible in our study. It is known that overestimates will occur when using FFQ instead of other methods such as dietary history[12,19]. However, under-reporting is also a problem in dietary analysis and especially in overweight persons. Black and colleagues[20] found that persons are consistent over time with regard to personal reporting bias[21] and it is not likely that these issues on reporting will differ between the two study groups and thereby influence our results.

Both SQUASH and FFQ were developed to rank people according to actual nutrient intake or PA for use in epidemiological studies, and not to investigate changes over time[9,12]. Although sensitivity of these questionnaires to measure individual changes may be limited, persons with the most positive changes in the questionnaires also had the most positive effects on blood pressure, lipids and glucose.

The strengths of the GOAL study are the randomized controlled design and the large study population with an equal division in gender. It is worthwhile to achieve lifestyle changes in this middle-aged, relatively low cardiovascular risk population with a moderate mean BMI to prevent weight gain and thereby prevent future accelerated increase of cardiovascular risk factors.

Despite the more intensive lifestyle counselling by NP, similar positive changes in nutrient intake were found in the GP-UC group. The countrywide campaigns held during the course of the study for a healthy lifestyle in combination with the attention on health (and body weight) during the baseline measurements may also be responsible for changes in nutrition behaviour.

For PA, positive changes were only found in the NP group, particularly for walking and bicycling. This result is in line with one of the major aims of the intervention, which is to increase PA incorporated in daily life, rather than focus on high intensity activities such as sports, because it is expected that these changes are more sustainable in the long run. These increases in activity are valuable, because, even without changes in diet and body weight, PA can have positive health effects[22].

In conclusion, the present study shows that positive changes on nutrition behaviour can be achieved by lifestyle counselling by NP, as well as by GP-UC. Although an intervention effect was found on weight maintenance, there were no differences in PA and nutrition behaviour between the study groups, except for a larger increase in time spent on walking in the NP group than in the GP-UC group.

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