

EFFICIENCY OF COMMUNITY BASED INTERVENTION PROGRAMME ON KEEPING LOWERED WEIGHT UČINKOVITOST INTERVENCIJSKEGA PROGRAMA ZA ZNIŽANJE TELESNE TEŽE V SKUPNOSTI

Davorina Petek¹, Nataša Kern², Milena Kovač-Blaž³, Janko Kersnik⁴

Prispelo: 24. 8. 2010 - Sprejeto: 4. 1. 2011

Original scientific article
UDC 613.24:614

Abstract

Objective: To establish the effectiveness of community based intervention on lowering and sustaining weight.

Methods: We performed a longitudinal retrospective study in three primary care centres in Slovenia. 333 men aged 35 to 65 and women aged 45 to 70 with body mass index higher than 25 kg/m² and high risk for cardiovascular diseases or with body mass index higher than 30 kg/m² were included. The data for the analysis were extracted from the forms of National cardio-vascular disease prevention programme. Long-term follow-up of their weight was performed 12 to 24 months after the intervention.

Results: The inclusion criteria fulfilled 250 (75%) participants. During the programme the participants' weight lowered by a mean 6.7 kg from 95.5±15.1 to 88.8±14.7 kg (7.1% of the entry body weight, 95% CI: -7.2 to -6.1 %). One to two years after the intervention 62.8% of the participants could not keep the weight they achieved during the intervention phase. Mean regain of the weight was 1.6 kg, (23% of the lost weight, 95% CI: 0.8 to 2.4 kg). Initial body weight of people, who long-term succeeded to keep achieved weight was higher than initial body weight of those people, who regained weight after the programme ($t=3.490$, $P=0.001$) Gender and age did not show any statistically significant impact on long-term weight gain.

Conclusions: The intervention programme was successful by the criteria that weight reduction should be at least 5-10%. Majority of the participants could not sustain the reduced weight, but the mean weight gain was less than one fourth of the weight, lost in the intervention period. Besides the interventions for weight reduction also the long-term programmes for sustaining the achieved weight loss are very important.

Key words: family practice, community medicine, cardiovascular diseases/prevention and control, body weight changes, follow-up study

Izvorni znanstven članek
UDK 613.24:614

Izveleček

Izhodišča: Z raziskavo smo želeli oceniti, kakšna je dolgoročna učinkovitost v skupnosti izvedenega intervencijskega programa hujšanja.

Metode: Dolgoročne rezultate intervencijskega programa delavnic za zdravo hujšanje v Gorenjski regiji smo ocenili z longitudinalno retrospektivno analizo. V raziskavo smo vključili 333 moških (35–65 let) in žensk (45–70 let) z indeksom telesne mase nad 25 kg/m² in visokim tveganjem za bolezni srca in ožilja ali z indeksom telesne mase nad 30 kg/m². Podatke smo pridobili iz obrazcev intervencijskega programa, dolgoročno uspešnost hujšanja pa smo ocenili po 12 do 24 mesecih.

Rezultati: Vključitvena merila je izpolnjevalo 250 (75 %) udeležencev delavnic. Izmerjena telesna teža udeležencev je bila takoj po opravljenem programu v povprečju za 6,7 kg (95,5±15,1 kg do 88,8±14,7 kg) nižja glede na izhodiščno vrednost. Udeleženci delavnic so torej v povprečju izgubili 7,1 % začetne telesne teže (95-odstotni interval zaupanja (IZ): -7,2–6,1 %) Večina udeležencev (62,8 %) eno leto do dve leti po končanem programu ni uspela obdržati

¹Department of Family Medicine, Medical School University of Ljubljana, Poljanski nasip 58, 1000 Ljubljana, Slovenia

²Primary Health Care Gorenjsko, Health Care Center Kranj, Gosposvetska ulica 12, 4000 Kranj, Slovenia

³Primary Health Care Center Ljubljana, Derčeva 5, 1000 Ljubljana, Slovenia

⁴Department of Family Medicine, Medical School University of Ljubljana, Poljanski nasip 58, 1000 Ljubljana, Slovenia and Department of Family Medicine, Medical School University of Maribor, Slomškov trg 15, 2000 Maribor, Slovenia

Correspondence to: e-mail: davorina.petek@gmail.com

doseženega znižanja telesne teže. Povprečni porast telesne teže je znašal 1,6 kg (23 %) izgubljene teže (95-odstotni IZ: 0,8–2,4 kg). Začetna telesna teža udeležencev delavnic, ki so dolgoročno uspeli obdržati znižano telesno težo, je bila višja kot začetna telesna teža tistih udeležencev, ki so se po programu spet zredili ($t=3,490$; $p=0,001$). Starost in spol nista statistično značilno vplivala na porast telesne teže eno leto do dve leti po zaključku programa.

Zaključki: Glede na sprejeta merila (znižanje izhodiščne telesne teže za vsaj 5–10 %) zaključujemo, da je bil program zdravega hujšanja kratkoročno uspešen. V naslednjih 2 letih sicer večina udeležencev dosežene znižane telesne teže ni obdržala, vendar pa je njihova telesna teža v povprečju porastla za manj kot četrtino izgubljene telesne teže. Z našo raziskavo smo torej ugotovili, da je po začetni intervenciji smiselno in potrebno nadaljevati s programom za vzdrževanje znižane telesne teže.

Ključne besede: družinska medicina, preventivni program, intervencija, zdravo hujšanje, spremljanje

1 Introduction

Due to increasing incidence, obesity is becoming the major health problem in developed world [1]. In Europe, more than half of adults between age 35 and 65 are overweight or obese, defined by body mass index (BMI) 25 - 29.9 kg/m² as overweight, BMI 30 - 39.9 kg/m² as obese and BMI over 40 kg/m² as extremely obese [2]. In Slovenia, 36.7% of people aged 25-64 are overweight and 15% are obese [3]. Other national studies showed that more than 40% of the Slovenian population had BMI over 25 kg/m² [4,5]. The results of the National cardio-vascular disease prevention programme from 2008 are even worse – 73.2% of adults included in the programme had BMI over 25 kg/m² [6]. Also, more men than women are obese in the early middle age group, but after age 45 there is no difference between the genders [5].

Regarding this huge and increasing prevalence and causal connection with other noncommunicable diseases several guidelines, programmes and methods to tackle obesity and reduce weight have been developed [7-9].

For long-term success in keeping reduced weight lifestyle changes are necessary. Different interventions have been successfully tested [10-12], but if we take into account growth of the problem, the interventions need to be widespread, easily accessible and community based, similar to other life style changes [13]. In Slovenia, a National intervention preventive programme for cardiovascular diseases was launched in 2001. It includes several health intervention programmes for healthy life-style, among them »Workshops for healthy weight reduction«. Every family physician in Slovenia is obliged to perform preventive programme for cardiovascular disease for his patients of specific age group (men between 35 and 65 years, women between 45 and 70 years). At the end cardiovascular risk

assessment, based on Framingham risk assessment score is defined for each patient. After completing preventive health check-up, all people with BMI over 25 kg/m² and high risks for cardiovascular disease or people with BMI over 30 kg/m² are referred to the intervention parts of the programme, which are performed in larger Primary health care centres [14]. Activities of the preventive programme are regularly reported to the Ministry of Health and to National Health Insurance Company. Similar multifaceted three dimensional programmes are proven to be effective in several studies [15, 16].

The programmes are fully financially covered by the National Insurance Company. The main objective of the programme is 5-10% reduction of the starting body weight, which represents realistic goal and contributes to improvement of health indicators, especially if the reduced weight is sustained long-term [17-20]. In a systematic review of interventions of the adults in the practice based settings even smaller weight reduction was accepted as successful [11]. Also maintenance of the lost weight is very important in obesity management [21].

Only few reports on routine community based interventions for obesity are found in the literature. Majority of the interventions are part of clinical trials in hospital or primary care settings but regarding the increasing prevalence of obesity, which represents public health problem they need to be community based and oriented. We could not find any report on a nation-wide systematic intervention programme for body weight reduction.

In this paper we analysed the effectiveness of community based programme in one region of Slovenia by the mean body weight loss during the intensive health style modification programme and by keeping lowered body weight of the participants 12-24 months after completion of such a programme.

2 Methods

2.1 Setting and study population

We performed a cross sectional retrospective study in Primary Health Care Centre Gorenjsko, north-western part of the country, which covers population of 200.000 inhabitants. By the design of the National preventive programme for cardiovascular diseases men aged 35-65 and women aged 45-70 with BMI > 25 kg/m² and high cardiovascular risk (20% or more, calculated by Framingham scale) or with BMI > 30 kg/m² were eligible for the intervention programme called the »Workshop for healthy weight reduction«. They were referred to the programme by their family physician after the preventive check up.

In the study we included all the participants of this weight reduction programme from March 2003 to December 2004, who finished the programme at least one year earlier.

2.2 Description of the workshop

The programme is organised as a series of meetings for the group of up to 20 participants and proceeds 16 times one hour per week. It is located in regional primary health care centres. The workshop is standardised by its content and type of providers. It consists of a combination of nutrition and physical activity curricula, including the use of behaviour cognitive techniques: setting of weight loss goal, low calorie diet with negative energy balance, based on self selected diet. It offers nutrition education, counselling and group sessions to help solving problems participants encounter during the programme.

Physical activity is offered as guided aerobic exercise one hour per week. Life style modification is suggested (walking instead of driving, using stairs instead of elevators, increasing regular physical activity).

Behaviour techniques include self monitoring, slow/controlled eating, control of stimulus, behavioural substitution, behaviour change, advice and support for maintaining it with reinforcement of positive self-esteem. A general physician, a nurse educator - nutritionist and a physiotherapist are involved in the programme delivery. At the beginning of the programme each participant is examined for: body weight, body height, waist and wrist circumference, blood pressure. BMI is calculated. Body weight is measured by calibrated scale in people without shoes, lightly dressed. All the measurements are repeated at the end of the programme while body weight is checked every week. For all participants blood sugar and blood cholesterol values from the preventive

check-up performed by the family doctor are recorded. According to the programme there was no organised intervention after the end of the workshop to keep the lowered weight.

2.3 Outcome measures

We defined the effectiveness of the programme at expected 5-10% reduction of the beginning weight (or more) and sustained reduced weight for 12-24 months after finishing the programme. The success of the workshop was defined by the percentage of the weight loss and not by the statistical significance of the weight reduction, the same as in similar studies. We explored the long-term effectiveness set by Douketis, i.e. the programme is effective if the participants do not regain more than 3 kg [22].

2.4 Source of data

Data about participants (age, inclusion and end of programme body weight, body height) were obtained from the database of Health Education Service in the Primary Health Care Centre Gorenjsko, which covers one administrative region in Slovenia. Information about body weight 12-24 months after the programme was not included in the database so we collected them by inviting the participants to their personal doctor, who reported the values to the research fellow.

2.5 Statistical analysis

We performed statistical analysis by SPSS for Windows software version 13.0 (SPSS Inc, Chicago, IL, USA). The data of weight were normally distributed what allowed us using mean values in analysis. The effectiveness of the workshop was measured by the mean body weight reduction/increase during the programme and one to two years after the programme. We report the results of selected statistical tests according to the measurement scales of the variables studied: t test of dependent samples to test the equality of means of inclusion body weight and body weight 1-2 years after the programme; t test of dependent samples of means for the difference of the weight gain according to gender. To test the effect of the age on weight gain Pearson's correlation coefficient and corresponding t-test was used.

Significance of t test and correlation is determined at the 0.05 level for 2-tailed test.

3 Results

The programme started 333 participants. 279 participants finished the workshop and were contacted one to two

years after it. We could reach 250 participants, 19 were not available because they moved away or did not agree to participate. One person died in the time of the study. 25% of participants, who either did not finish the workshop or respond to our invitation for weight control 12-24 months after the intervention, were excluded from the analysis. Among 250 analysed participants 84% were women. Average age of all participants was 55.1 ± 7.3 years, of women 55 ± 7.2 years and of men 55.9 ± 7.9 years.

Mean body weight lowered at the end of the programme and slightly increased 12-24 months after the end of the programme. Details are shown in the Table 1.

During the life style change programme participants on average lost 6.7 ± 4.4 kg which represents 7.0% of the entry values. The 95% confidence interval for the mean decrease of the initial weight is $-7.2 < \mu_i - \mu_f < -6.1$ where μ_i is the mean initial weight and μ_f the final one (table 2). Regarding chosen values for the success of the programme being at least 5-10% reduction of the entry mean weight, the weight of the participants was successfully reduced during the programme.

Table 1. Estimated average values of weight and BMI in participants of the weight reduction programme at the beginning, end and 12–24 months after the programme.

Tabela 1. Povprečne vrednosti telesne teže in indeksa telesne mase (ITM) pri udeležencih delavnice zdravega hujšanja ob začetku delavnice, ob koncu delavnice ter 12–24 mesecev po zaključku programa.

Variable Spremenljivka	Weight and BMI ¹ Telesna teža in ITM ¹		
	Mean \pm standard deviation in observed period Povprečje \pm standardni odklon v opazovanem obdobju		
	Beginning ² Začetek ² (n=250)	End ³ Konec ³ (n=250)	Long-term ⁴ Dolgoročno ⁴ (n=250)
Weight (kg) Telesna teža (kg)	95,5 \pm 15,1	88,8 \pm 14,7	90,4 \pm 14,4
BMI ¹ (kg/m ²) ITM ¹ (kg/m ²)	35,3 \pm 4,5	32,9 \pm 4,6	33,5 \pm 4,4

Legend:

¹body mass index

²beginning of the workshop

³end of the workshop

⁴12-24 months after the end of the workshop

Legenda:

¹indeks telesne mase

²začetek delavnice

³konec delavnice

⁴12–24 mesecev po koncu delavnice

Table 2. Estimated mean differences of body weight in participants of the weight reduction programme in short term and long-term follow up.

Tabela 2. Povprečna razlika v telesni teži pri udeležencih delavnice za zdravo hujšanje, ugotovljena s kratkoročnim in dolgoročnim spremljanjem.

Variable Spremenljivka	Difference of body weight and BMI ¹ Razlika v telesni teži in ITM ¹			
	Beginning-end ² Mean ± standard deviation	95% CI 95 % IZ	End-longterm ³ Mean ± standard deviation	95% CI 95 % IZ
	Začetek–konec ² Povprečje ± standardni odklon		Konec–dolgoročno ³ Povprečje ± standardni odklon	
Weight (kg) Telesna teža (kg)	-6,7±4,4	-7,2–6,1	+1,6±6,3	0,8–2,4
BMI ¹ ITM ¹ (kg/m ²)	-2,5±1,6	-2,6–2,3	+0,6±2,3	0,3–0,9

Legend:

¹body mass index

²difference between the beginning and end of the programme

³difference between end of the programme and 12-24 months after the programme

Legenda:

¹indeks telesne mase

²razlika med začetkom in koncem delavnice

³razlika med koncem delavnice in 12–24 mesecev po delavnici

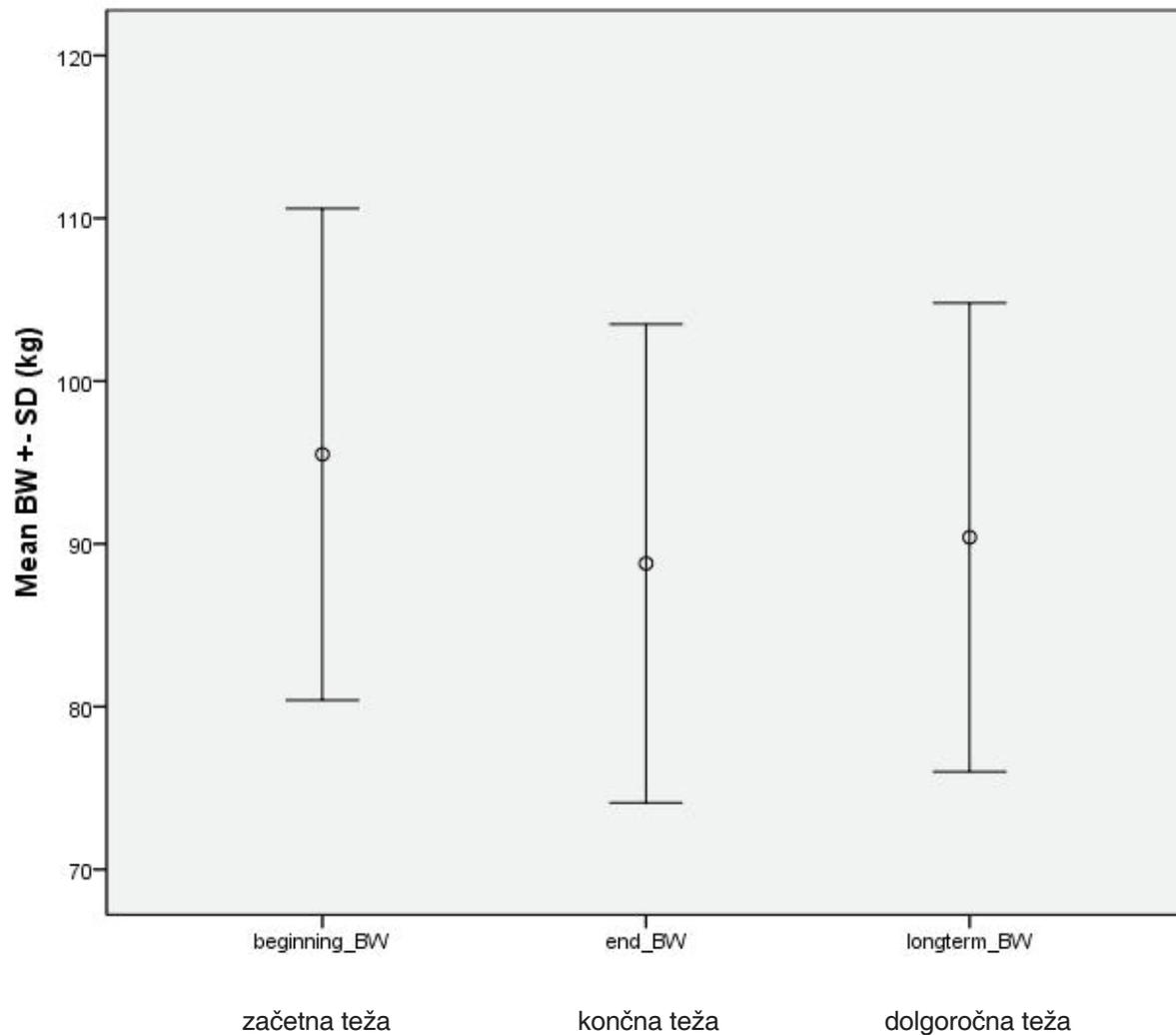
12–24 months after the programme mean body weight of the participants increased by 23% of the weight lost during the intervention. Mean increase in body weight was 1.6 kg, 95% CI: (0.8 to 2.4 kg). 1-2 years after the course 93 (37.2%) participants managed to sustain or even further reduce body weight achieved at the end of the workshop. 157 (62.8%) participants regained some weight 1-2 years after the intervention. 60.4% of our participants were long-term successful in weight control by the Douketis standards regaining less than 3 kg.

Inclusion body weight of the people, who succeeded to keep achieved weight or lowered it 1-2 years after the programme was higher than body weight of those people, who regained weight after the programme:

$\bar{x}_i = 99.6$, $\bar{x}_l = 92.8$, $t=3.490$, $P=0.001$ where \bar{x}_i = mean initial weight of participants who longterm sustained/reduced weight and \bar{x}_l = mean initial weight of participants who longterm increased weight. We did not find statistically significant influence of participants' gender and age on the weight control in the next 1-2 years after the workshop ($\bar{x}_m = 1.48$, $\bar{x}_f = 1.62$, $t=0.129$, $P=0.898$ where \bar{x}_m = difference of weight means for men and \bar{x}_f = difference of weight means for women. The correlation coefficient for age was $r=-0,028$, $P=0,662$).

Figure 1. Mean body weight (kg) \pm standard deviation at the beginning, at the end and 12-24 months after the end of the programme for healthy weight reduction.

Slika 1. Povprečna telesna teža (kg) \pm standardni odklon na začetku delavnice, na koncu delavnice in 12–24 mesecev po koncu delavnice za zdravo hujšanje.



Legend:

beginning_BW → body weight, beginning of the programme

end_BW → body weight, end of the programme

longterm_BW → body weight, 12 to 24 months after the end of the programme

Mean BW \pm SD (kg) → mean body weight \pm standard deviation (in kg)

Legenda:

začetna teža → ob začetku delavnice

končna teža → ob koncu delavnice

dolgoročna teža → 12–24 mesecev po koncu delavnice

teža \pm SD: povprečna telesna teža \pm standardni odklon

4 Discussion

4.1 Summary of the major findings

According to the preset criteria (at least 5-10% reduction of the beginning weight) intervention programme for Healthy weight reduction was short term successful. Long-term results were less favourable. Those participants who entered with higher body weight were more successful in retaining achieved weight.

4.2 Limitations and strengths of the study

The study has some weak points, which have to be mentioned. Data were collected as a part of routine data collection for the purpose of the weight loss programme. Due to the characteristics of the database we did not analyse the patients, who did not finish the intervention. Also, we did not systematically analyse the reasons why some participants couldn't be reached after the programme. The study doesn't have a control group, what is a common characteristic of studies on Community oriented medicine [23]. The effects of the various weight reduction programmes are well known, the question remains what is effective and feasible in the light of community needs and resources. Our study represents evaluation of the programme, which derives from community needs, with involvement of local family doctors and other medical staff in local community health centres. It represents analysis and follow-up of the feasible preventive programme, and gives the information what changes the programme needs. These facts are in our opinion representing the strengths of the study. Having in mind increasing prevalence of the obesity and the advantage of community based interventions the everyday environment represents one of the good points of the study. For our knowledge this is the first such study in the country and one of few, which confirmed effectiveness of the intervention outside the prospectively designed studies. Results similar to other studies support the validity of our study [10,11]. Review literature confirms the usefulness of behavioural interventions, combined with diet or exercise, followed by long-term maintenance strategies [15].

4.3 Discussion of the findings

In this study we wanted to analyse the short and long-term effectiveness of the national weight reduction programme in one region of Slovenia. More motivated overweight participants probably attended the programme. Among them women predominated although several studies in Slovenia showed that in the

middle age group more men than women are overweight [4] or that there is no difference among both genders after age 45 [5]. Our findings are in concordance with other studies, which also found higher participation of women in the weight reduction programmes and show that women are more concerned about their weight [8, 24-26].

The measure of the effectiveness of life style modification intervention was determined by at least 5-10% weight reduction deriving from the knowledge that already this level of reduction improves health and lowers risk factors such as blood sugar, blood pressure, cholesterol [19, 27]. Satisfying – 83.8% of the beginning - number of participants finished the programme. We can speculate that the design, the schedule and the community location of the programme is adequately adjusted to the potential participants. These facts are important for possible future modifications of the national programme. Also, we were only able to measure the positive end effect of the programme by the measurement of body weight and BMI, which represent proxy measures of cardiovascular morbidity risk reduction. For precise assessment we should as well consider distribution of fat tissue, which is independent risk factor for development of metabolic complications, but this data was not available from the database although it is collected during the preventive health check up. There are other possible positive changes, like adoption of regular physical activity also not measured in the study. Mean age of the participants was 55.1 years – life period, when the professional and family demands start to decrease but on the other hand concerns for health and motivation for behavioural change increase. This might contribute to better outcomes of the intervention. Despite that speculation we did not find any statistically significant differences in outcomes in correlation to the age of the participants.

The participants in four month - programme lost 7% of their inclusion body weight (6.7 kg), or 0.37 kg per week. We find some variety in the average weight loss in similar studies: results of some are in line with ours [28], some have smaller initial weight reduction [29, 30], some have better short term results [8,31]. Some studies have higher drop-out [10]. According to our preset effectiveness measure the outcomes of the intervention were successful in short-term.

Unfortunately, 1-2 years after the programme only 37.2% of the participants sustained or even lowered the achieved weight and all the others put on some weight. The criteria of the long-term weight control differ in the literature. By Douketis the programme is long-term effective if people don't gain more

than 3 kg – in that case 60.4% of our participants were long-term successful in weight control [22]. Criteria from another randomised control trial is set on sustaining at least on 80% of the lost weight – the percentage of successful participants in our study drops to 31% one year after the programme [32]. Even in the organised two-year programmes, the results show gaining of the weight after first six months [22]. Weight regain is well known from the other studies and achieves 30–35% of the lost weight in the first year after the intervention [18, 28]. Our results can be compared with another Slovenian weight-reduction programme with 6 months of weight reduction part of the programme and additional 18 months with the goal to maintain achieved weight. The results were better than in our study – beginning weight was reduced for 12 % in the first six months but increased in the next months so that at the end of two-year programme participants lost in average 9.4 % of the beginning weight [8]. The opinion about the necessary length of the programme also varies, 16 weeks being too short and long-term programmes are necessary [18]. Presently, Slovenian national life style intervention programme ends for the participant after 16 weeks and future weight control is left to the family physician or to the patient himself. Also the lipid and sugar values are not routinely controlled as a part of the national programme.

Present study gives us insight into the results of the weight reduction programme. The community bases of this intervention programme is very important in the light of high and further increasing prevalence of obesity and the results showed to be an effective way of lowering and less to sustaining weight loss. So it gives valuable descriptive information for further changes and adjustments of this part of the preventive programme. Specifically, it shows, and this doesn't differ from other studies, that long-term follow up support and surveillance needs to be planned and this can be the message to preventive health professionals [33,34]. Regular contact with the family physician after the end of the programme is one of the options which showed moderate effect in other studies [35]. There is clearly the need for cooperation of providers in primary care and multidisciplinary preventive units, which construct the programme.

Acknowledgements

We would like to thank all the participants, participating general practitioners, nurses and others involved in the programme.

Sponsorship: The work was partly supported by the research grant from ARRS – State Research Agency for Research Funding No L3-6395-1027.

Conflict of interest: None

References

1. Overweight and obesity. Atlanta, Centre for Disease Control, National Center for Chronic Disease Prevention and Health Promotion, 2003. Available Jan 15, 2010 from: www.cdc.gov/nccdphp/dnpa/obesity.
2. Seidell JC, Flegal KM. Assessing obesity: classification and epidemiology. *Br Med Bull* 1997; 53: 238-52.
3. Zaletel-Kragelj L, Eržen I, Fras Z. Interregional differences in health in Slovenia: Estimated prevalence of selected cardiovascular and related diseases. *Croat Med J* 2004; 45: 644-50.
4. Koch V. Nutrition habits of adult habitants of Slovenia from the aspect of health protection [in Slovenian]: doctoral thesis. Ljubljana: University of Ljubljana, 1997.
5. Gradišek A, Soln D, Trsan V *et al*. A study of risk factors for development of chronic noncommunicable diseases in Ljubljana [in Slovenian]. *Zdrav Var* 1992; 31: 71-7.
6. Bulc M. Dosedanji rezultati preventivnih pregledov v družinski medicini. *Družinska medicina* 2009; 7 (Suppl. 6): 73-6.
7. NICE clinical guideline. Obesity: guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children. Available Dec 13, 2010 from: <http://guidance.nice.org.uk/CG43/NICEGuidance/doc/English>.
8. Kovač-Blaž M. Hujšanje po programu "Zdravljenje debelosti": magistrsko delo. Ljubljana: Univerza v Ljubljani, 2004.
9. Accetto R, Bulc M, Čakš T, Čebašek-Travnik Z, Čelan-Lucu B, Jež M *et al*. Preventiva v osnovnem zdravstvu: priporočila za prakso. Ljubljana: Zdravstveni dom, CINDI Slovenija, 1998.
10. Graffagnino CL, Falko JM, La Londe M, Schaumburg J, Hyeck MF, Shaffer LE, *et al*. Effect of a community-based weight management program on weight loss and cardiovascular disease risk factors. *Obes Res* 2006; 14: 280-8.
11. Katz DL, O'Connell M, Yeh MC, Nawaz H, Njike V, Anderson LM, Cory S, *et al*. Task Force on Community Preventive Services. Public health strategies for preventing and controlling overweight and obesity in school and worksite settings: a report on recommendations of the Task Force on Community Preventive Services. *MMWR Recomm Rep* 2005; 54 (RR-10): 1-12.
12. Hardcastle S, Taylor A, Bailey M, Castle R. A randomised controlled trial on the effectiveness of a primary health care based counselling intervention on physical activity, diet and CHD risk factors. *Patient Educ Couns* 2008; 70: 31-9.
13. Kolsek M, Struzzo P, Svab I. Qualitative study on community and primary health care involvement on alcohol and tobacco actions in seven European countries. *Subst Use Misuse* 2008; 43: 303-16.
14. Navodilo o spremembah in dopolnitvah navodila za izvajanje preventivnega zdravstvenega varstva na primarni ravni. *Uradni list RS* 2001; 67 z dne 10. 8. 2001. Available Dec 13, 2010 from: <http://www.uradni-list.si/1/content?id=32476>.
15. Södlerlund A, Fischer A, Johansson T. Physical activity, diet and behaviour modification in the treatment of overweight and obese adults: a systematic review. *Perspect Public Health*. 2009; 129: 132-42.
16. NHS Centre for Reviews and Dissemination University of York. The prevention and treatment of obesity. *Eff Health Care* 1997; 3: 1-12.

17. Hainer V, Toplak H, Mitrakou A. Treatment modalities of obesity: what fits whom? *Diabetes Care* 2008; 31 (Suppl 2): S269-77.
18. Wadden TA, Butryn^{ML}, Byrne KJ. Efficacy of lifestyle modification for long-term weight control. *Obes Res* 2004; (Suppl 12): S151-162.
19. Seagle HM, Strain GW, Makris A, Reeves RS, American Dietetic Association. Position of the American Dietetic Association: weight management. *J Am Diet Assoc* 2009; 109: 330-46.
20. Horvath K, Jeitler K, Siering U, Stich AK, Skipka G, Gratzner TW, Siebenhofer A. Long-term effects of weight-reducing interventions in hypertensive patients: systematic review and meta-analysis. *Arch Intern Med* 2008; 168: 571-80.
21. Counterweight Project Team. Evaluation of the Counterweight Programme for obesity management in primary care: a starting point for continuous improvement. *Br J Gen Pract* 2008; 58: 548-54.
22. Douketis JD, Feigther JW, Attia J, Feldman WF. Periodic health examination, 1999 update: detection, prevention and treatment of obesity. *CMAJ* 1999; 160: 513-25.
23. Longlett SK, Kruse JE, Wesley RM Community-oriented primary care: historical perspective. *J Am Board Fam Pract* 2001; 14: 54-63.
24. Obesity in primary health care: a literature review. London: Health Education Authority, 1995.
25. Balle J, Aldman TP. Treatment of obesity in patient groups. *Ugeskr Laeger* 1996; 158: 4509-12.
26. Padwal RS. Trends in obesity and overweight-related office visits and drug prescriptions in Canada, 1998 to 2004. *Obes Res* 2005; 13: 1905-8.
27. Dickey AR. AACE/ACE position statement on the prevention, diagnosis and treatment of obesity (1998 revision): developed by the American Association of Clinical Endocrinologists and The American College of Endocrinology. Washington: AACE, AACE/ACE Obesity Task Force, 1998.
28. Truby H, Baic S, deLooy A, Fox KR, Livingstone EB, Logan CM, et al. Randomised controlled trial of four commercial weight loss programmes in the UK: initial findings from the BBC „diet trials“. *BMJ* 2006; 332: 1309-14.
29. Hollis JF, Gullion CM, Stevens VJ, Brantley PJ, Appel LJ, Ard JD, et al. Weight loss during the intensive intervention phase of the weight-loss maintenance trial. *Am J Prev Med* 2008; 35: 118-26.
30. Lutes LD, Winett RA, Barger SD, Wojcik JR, Herbert WG, Nickols-Richardson SM. Small changes in nutrition and physical activity promote weight loss and maintenance: 3-month evidence from the ASPIRE randomized trial. *Ann Behav Med* 2008; 35: 351-7.
31. Furlow EA, Anderson JW. A systematic review of targeted outcomes associated with a medically supervised commercial weight-loss program. *J Am Diet Assoc* 2009; 109: 1417-21.
32. Mathus-Vliegen EM, Balance Study Group. Long-term maintenance of weight loss with sibutramine in a GP setting following a specialist guided very-low-calorie diet: a double-blind, placebo-controlled, parallel group study. *Eur J Clin Nutr* 2005; 59 (Suppl 1): S31-S8.
33. Riebe D, Blissmer B, Greene G, Caldwell M, Ruggiero L, Stillwell KM, Nigg CR Long-term maintenance of exercise and healthy eating behaviours in overweight adults. *Prev Med* 2005; 40: 769-78.
34. Marrero DG. Changing patient behaviour. *Endocr Pract* 2006; 12 (Suppl 1): S118-S120.
35. Svetkey LP, Stevens VJ, Brantley PJ, Appel LJ, Hollis JF, Loria CM et al. Comparison of strategies for sustaining weight loss: the weight loss maintenance randomized controlled trial. *JAMA* 2008; 299: 1139-48.