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Weight loss maintenance in women two to eleven years after participating in a commercial program: a survey

Caroline Gosselin [gosselin.cabanac@synpatico.ca]
Guylaine Cote [acc316@agora.ulaval.ca]

Initial evaluation of weight loss maintenance in women Two-to eleven-years following a commercial program

Caroline Gosselin, PhD
Department of Research and Development
Minçavi,
51, Pinacle Rd, Danville, Qc, J0A 1A0, Canada
gosselin.cabanac@sympatico.ca

&

Guylaine Côté, MSc
Department of Anatomy and Physiology
Faculty of Medicine, Laval University,
Qc, G1K 7P4, Canada
acc316@agora.ulaval.ca

Corresponding author:

Dr Caroline Gosselin
1021 Main, CP 9, Ayer's Cliff
Qc, Canada, J0B 1C0
Tel/fax: (819) 838-5879
gosselin.cabanac@sympatico.ca

Abstract

Background: Most weight loss programs show poor long-term effectiveness. After 5-year follow-ups, reports show that less than 10% of people will maintain a 5% loss from initial body weight. More studies are needed to understand long-term weight maintenance and factors that promote it. The current article presents an initial evaluation of the long-term efficiency of *Minçavi*, a popular commercial weight loss program based on Canada's Food Guide.

Methods: Subjects were randomly picked using the company's list of clients and answered a telephone questionnaire. Participants, 291 adult women from various regions of the province of Quebec, had entered the program 2 to 11 years earlier. Body weight at the beginning and at the end of treatment was recorded as well as actual weight, age and height. Existing records allowed partial verification of the sample. Subjects were placed in 5 categories according to follow-up period; 2 years (n=55), 3 years (n=42), 4 years (n=42), 5-6 years (n=55), 7-8 years (n=51), and 9-11 years (n=46).

Results: After adjusting for possible discrepancy between actual weight and self-reported weight over the telephone, percentage of women who maintained at least 5% of their initial weight loss are as following; 2 years=43,6%, 3 years=33,3%, 4 years=23,8%, 5-6 years=38,2%, 7-8 years=29,4%, and 9-11 years; 19,6%. After 5 years, 14,3% of all women maintained a weight loss of at least 10% of their initial body weight.

Conclusions: Even though success rate is not as high as could be wished for, preliminary results suggest that participation in the *Minçavi* program can lead to effective long-term weight loss maintenance. These promising findings suggest more thorough studies should be conducted on this program.

BACKGROUND

All around the world, and especially in North America, commercial weight loss programs have been established in great numbers to help obese and overweight individuals. Reports show that most of them can produce positive results 1 to 2 years following treatment. However, after 3 to 5 years, most individuals who have lost weight have returned to their initial body weight [1-6]. Follow-up on longer periods are rare, and tend to confirm that maintaining substantial weight loss is something that very few people achieve [7-10] For example, Sarlio-Lahteenkorva and colleagues have recently reported that after 6 and 15-year follow-ups, only 5,1% of all women maintained a loss of at least 5% of their baseline body weight [7].

Obesity experts agree that more long-term studies are needed to understand weight maintenance and help identify factors that enhance it.

The present paper describes an initial evaluation of weight maintenance following a popular commercial program in the province of Quebec, Canada. This program, called *Minçavi* (meaning “thin for life” in French), has been enforcing Canada’s Food Guide recommendations since 1983.

Upon entry in the program, participants, mostly women, receive a recipe book and are told about the importance of eating at least 3 meals a day and choosing from a variety of foods in the four major food groups (grain products, fruits/vegetables, milk/milk products, meat/meat alternate). Recipes are based on un-expensive, readily available whole grains products, vegetables and fruits, lean meats, low-fat dairy products and legumes.

Participants decide themselves how much weight they want to lose.

Based on a variety of nutritious, well balanced, family-friendly meals women and teenagers, in the weight loss phase, are taught to eat around 1400 kcal a day and men, around 1800 kcal. During that phase, on average, 50% of the energy comes from carbohydrates, 25% from protein and 25% from lipids. In the maintenance phase, participants are encouraged to increase their caloric intake by 50 kcal per week, in a minimum of 8 weeks, to eventually reach a daily intake of 1800 kcal for women and 2200 kcal for men. During this second phase, diet composition changes slightly, with a decrease in protein and an increase in lipid content (carbohydrates:50%, protein: 22%, lipids: 27%).

In groups of 50 to 100, participants are taught how to record everything they eat on sheets designed for that purpose and are invited to show them to their group leader every week for feed-back. Group leaders are women who have lost weight and kept if off for at least two years by following the Minçavi program. Weigh-in sessions followed by 30 to 45 minute-conferences on various topics (ex. weight loss, nutrition, motivation) and food sampling take place on a weekly basis. Additional support from a dietician and a psychologist is available through a toll-free phone line and internet.

Participating in the program involves a one-time fee of 25$ (Canadian dollars), and a 7$ fee per week during the weight loss phase. Once a participant has reached her goal weight, she is given free access to weekly sessions for as long as she maintains her goal weight. A fee of 7$ will be charged on weighing sessions if she is found to have gained weight.

Modest losses such as 5% of initial body weight have been shown in the past decade, to induce significant health benefits such as improvements in lipid profile, glycemia, blood pressure, self-esteem and other health related indicators [11-14]. For that matter, maintenance of a 5% decrease from pre-treatment

weight has been recognized in 1995 as the standard for success by the Institute of Medicine [15]. It was used here, as in other studies [7, 16] as the cut-off point to determine successful *vs* unsuccessful weight-maintainers.

Methods

Subjects

Two hundred and ninety one (291) women participated in the present study. They were randomly picked using the company's list of clients. Pregnant women at the time of interview and individuals who had been enrolled for less than a month were excluded from the analysis.

Data collection

Subjects were contacted by telephone. Those agreeing to take part in the study, representing 90% of the individuals contacted, were asked a series of questions. Age, height, date of entry in the program, body weight at the beginning of the program, amount of weight loss, length of weight maintenance, and actual body weight, were noted. Body Mass Index (BMI) was calculated for each subject using height and before- and after-treatment weight. Existing records allowed us to verify body weights, weight loss and height on 11% of the sample (n=31). Date of entry was available from records for all women (n=291).

Since it has been demonstrated that people tend to underreport their actual body weight, especially if given by telephone, results were adjusted for the magnitude of the discrepancy. Tell and colleagues [17] have shown that on average, people reported a body weight 2,9% lower than the measured weight (mean= 2 kg). Therefore, a 2,9% increase in body weight was added to all subjects for whom present weight records were not available.

Statistics. Standard methods were used to calculate descriptive statistics and values are presented as means ± SD. Analysis of variance (ANOVA) was used to analyze quantitative variables. Using the ANOVA table, a Bonferroni post hoc test was performed to examine

comparisons between groups. Paired *t*-test was used to evaluate differences between BMIs before the program and at follow-up. For all tests, $p < 0.05$ was accepted as the significant level.

RESULTS

Subjects characteristics. Mean age for the entire group was 43 yrs ±13 upon entry in the program. Mean BMIs before, after the program and at follow-up were respectively; 29,8±4,7, 25,5±4,5 and 29,5±5,4. When BMIs before the program and at follow-up are compared, a significant difference could be found only in the 2-year follow-up group (t=2.919, P=0,0051). On average, subjects lost 11,1 kg±7,1 and at follow-up maintained a mean loss of 4,5%±6,6 of initial body weight.

(Table 1)

Weight maintenance. Two to eleven years (2-11 y) after they had entered the program, 22,7% (n=66) of the women were heavier than when they had started, 29,5% (n=86) had returned to their initial body weight, and 47,8% (n=139) were 1 to 32% lighter than at the beginning of the program

As expected, weight loss maintenance decreased with time. For example subjects maintained on average a weight loss equivalent to 7,0%±8,3 of their initial body weight after 2 years, 4,7%±6,3 after 5-6 years, and 3,4%±6,7 after 9-11 years.

(Table 2).

As seen on Table 2, after 2 years, 43,6% of the subjects were found to maintain a weight loss of at least 5% of their initial body mass, whereas 29,1% maintained a loss of 10% or more. After 5-6 years, these numbers were respectively 38,2% and 16,4%. Thirty eight percent (19,6%) of subjects in the 9-11-year follow-up category maintained a weight loss of at least 5% of their initial mass while 10,9% were found to maintain a loss of 10% or more.

Experts agree that individuals with a BMI between 20 and 25 have a "healthy weight " as they are among those with the least chances of developing health problems. Interestingly, a disproportionate number of women who had started the Minçavi weight loss program with a BMI of 25 or less were found to be heavier at follow-up than at the onset of treatment. Precisely, 39% of these women (20 out of 51) had gained more than they had lost, while only 19% of all women who had entered the program with a BMI of 26 or more did so (46 out of 240).

Age. Some studies have shown a positive correlation between age and weight maintenance [18]. In the present work, no correlation was found between the subjects' age at the beginning of the program and weight loss maintenance (P=0,0651, N.S). However, the relatively narrow age spectrum represented among the Minçavi participants (43±12,8) may limit the interpretation of the current results.

DISCUSSION

The vast majority of weight loss programs have poor long-term efficiency. In the recent years, however, a few studies have reported a relatively high level of weight maintenance. These studies showing better than average long-term weight maintenance are discussed in the following section in the light of our current results.

When comparing efficiency of various weight loss programs, it is important to take into consideration factors such as methodological aspects (e.g. characteristics of sample studied) as well as indirect indications of the programs'

efficiency, such as percentage of people who at follow-up are heavier than they were at the beginning of the program. These factors are taken into consideration in the next paragraphs.

Sample characteristics

Duration of treatment

An intensive weight loss program in Slovenia including behavioral, psychological, cognitive and physical elements has shown promising long-term results on 48 subjects [20]. Median weight loss of completers when they left the program was 11,5 kg. At least 5 years later, 13 of them still maintained the reduced weight.

It is important to note that only participants who had successfully completed at least 4 months of treatment were included in the analysis. This criteria probably allowed selection of individuals already more successful or motivated than the ones who had quit the program after less than 4 months. In comparison, subjects were included in the present study after being enrolled for a minimum of one month in the *Minçavi* program representing the majority of individuals entering this program.

In addition, it has been found that treatment duration is significantly correlated with weight loss after treatment and at follow-up —the longer the treatment, the better the results— [19].

Nevertheless, results provided by this Slovanian general practitioner are valuable as his study implied regular follow-ups and weight measurements of participants for 5 years. His study also confirm the importance of a comprehensive approach in the treatment of obesity.

Complementary treatment

One of the rare studies on weight loss maintenance after 5 years has been conducted by Björvell and Rössner, a Swedish team. A 10-year follow-up has indicated a maintenance of weight losses averaging 10,5 kg after a 4 year continuous treatment [21]. However, in an earlier report, the authors have indicated that 36% of their subjects had their jaws fixed from the start, a factor than could have possibly enhanced the results [22].

On going selection of subjects

The Trevose Behavior Modification Program is a self-help weight loss program offering continuous care. In a recent report [23] it has been shown that members who had completed 5 years of the Trevose program were still 17,3% below their pre-treatment weight, showing considerable weight maintenance.

Again, it is important to note that the Trevose Program participants were selected upon entry and throughout the weight loss process, starting with 329 applicants and ending with 37 participants at the end of the 5-year treatment period. Therefore, only about a tenth of the participants, all highly motivated and successful at weight maintenance, were available for this particular analysis.

This may explain, in part, such outstanding results. It appears nonetheless to be an efficient weight loss strategy, as 77 subjects who had left the Trevose program after only 5 weeks could be contacted for a 5-year follow-up and remained on average 4,7% (4,5 kg) below their pre-treatment weight.

It is possible however, that even though efficient, such continuous and strict treatments may not correspond to the needs and preferences of a majority of people. For example, failure to meet attendance or weight loss requirements results in immediate dismissal from the Trevose program with no possibility of re-entering it. Such programs may suit people who need a strict and highly structured environment to succeed but discourage those who need more flexibility.

Body Mass Index at the onset of treatment

It is known that greater initial body weight favors greater weight loss and in return, better maintenance of a significant amount of lost weight in the long term [23]. For that matter, average BMI of participants should be taken into account when comparing weight loss programs' efficiency. For example, average BMI at the onset of treatment was 41,5 for the Swedish program [22] and 34 for the Trevose program [23]. Participants of the Minçavi weight loss program were relatively light, with a mean BMI of 29,8 at the start of the program.

Amount of weight loss

Anderson and colleagues [18] have recently studied participants who had lost at least 10 kg through an intensive very-low-calorie diet. Forty percent (40%) of their subjects maintained a weight loss of at least 5% of their initial body weight after a 5-year follow-up (n=112). In the present study, participants remained for analyses regardless of how little weight they had lost through the Minçavi program.

Nevertheless, when only those women who had lost at least 10 kg were considered for a 5 to 8-year follow-up (n=43), 55,8% maintained such a weight loss. After 7 years, 25% of Anderson's participants were maintaining a loss of 10% (n=112), while 37,8% of the women in the present study did so after 7 to 11 years (n=44). In addition, mean weight loss of their subjects was 29,7 kg, while among Minçavi's subjects who had lost at least 10 kg, mean weight loss was only 12,0 kg. As mentioned earlier, the greater the weight loss, the more frequent it has been shown to maintain a substantial portion of it over time.

Additional weight gain following treatment

Some people not only return to their initial body weight after a weight-loss program, but gain more than they had lost in the first place. Such a phenomenon can be detrimental to participants' physical and mental health, and for that matter should be prevented. One can probably learn about the level of safety and effectiveness of a weight loss program by inquiring about the risks of regaining more weight than what was lost through the program.

In one study, Grodstein et al [16], have reported that 57% of obese subjects who had participated in a commercial program based on specially designed formulas, could maintain a loss of 5% of their baseline weight after 3 years (in the present work, 33,3% had done so). However, at follow-up, 40% of their participants had gained more weight than they had lost through the diet. In the present study, almost four times less (11,9%) subjects in the 3-year follow-up group were in that unfortunate position.

Other factors

Adjustment for self-reported information

Among the few studies showing relatively high success rates after 3, 5 or 10 years, three relied mostly on self-reported body weight [18, 21, 24]. In these cases, discrepancy between self-reported and measured weight was not adjusted for, suggesting that weight maintenance may have been over-estimated for these programs.

Conclusion

The present work constitutes an initial evaluation of the *Minçavi* program. It is one of the rare existing reports of weight maintenance 10 years following a weight loss program, whether commercial or not.

Limitations of the present study include a small number of subjects in each follow-up category. While the initial number of participants is decent at 291, the subsets that are subsequently used in the analysis become small (n=42 to 55), thus eroding confidence in the results. Another limitation of this study is the use

of self-reported data. Because the present work relied mostly on such data, interpretation called for caution. For that matter, it was necessary to adjust for the discrepancy often seen between self-reported body weight and measured weight.

Once adjusted, results show that after 5 to 11 years, 38% of women maintained a weight loss of at least 5% of their initial weight (n= 157), and 20% maintained such as loss after 9-11 years (n=51). While lower than what could be wished for, these results suggest a higher than average level of weight maintenance.

Interestingly, even though additional weight gain following the *Minçavi* program appears to be less frequent than with other weight loss programs, it was found that a disproportionate number of women who at follow-up had gained back more weight than they had lost, had entered the program with a BMI ranging from 22 to 25 (what is considered a "healthy weight"). Knowing that "yo-yo" dieting has been demonstrated to be as much of a health risk as obesity is [25-27], these results stress the fact that when at a healthy weight (BMI < 25), women should be encouraged to prevent weight gain by eating a healthy diet and enjoying physical activity rather than to try losing weight.

These preliminary results suggest that *Minçavi*, a weight loss program that encourages participants to eat a variety of nutritious, well-balanced, family-friendly meals, is a promising tool for the long-term treatment of overweight and obese individuals. Dietary education, motivation conferences, self-monitoring of food intake, casual atmosphere and social support may all have contributed to

weight maintenance. Prospective studies involving a greater number of subjects and repeated measures of body weight should be conducted in order to better assess long-term effectiveness of the *Minçavi* program and understand factors contributing to weight maintenance.

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Declaration of competing interests

Have you received reimbursements, fees, funding, or salary from an organization that may in anyway gain or lose financially from the publication of this paper in the past 5 years? If so, please specify.

Yes. The present study was conducted by Dr Gosselin in 2000 while she was at the Faculty of Medicine of Sherbrooke University and not employed by Minçavi. However, she is now scientific manager of Minçavi. No such competing interests for Ms. Côté.

Have you held any stocks or shares in an organization that may in any way gain or lose financially from the publication of this paper? If so, please specify.

No, for both authors.

Do you have any other competing interests? If so, please specify.

No, for both authors.

Are there any non-financial competing interests you would like to declare in relation to this paper?. If so, please specify.

No, both authors.

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FIGURE LEGENDS

Table 1. Subjects characteristics.

Follow-up	Age	Weight loss (kg)	BMI before program	BMI after program	BMI at follow-up	Weight loss maintained (% initial body weight)
Entire group (2-11 yrs) (n=291)	43,0±12,8	11,2±7,0	29,8±4,7	25±4,5	29,5±5,4	4,5±6,6
2 years (n=55)	43,3±12,7	10,4±6,3	30,6±4,5*	26,6±3,9	29,2±5,0*	7,0±8,3
3 years (n=42)	45,8±12,5	12,2±7,6	31,5±5,0	27,0±4,1	30,8±5,4	4,5±6,1
4 years (n=42)	46,1±14,6	10,2±5,8	30,2±6,1	26,3±5,9	30,0±7,0	3,4±5,5
5-6 years (n=55)	43,4±13,4	10,6±7,0	29,6±5,0	25,5±3,5	29,2±5,8	4,7±6,3
7-8 years (n=51)	40,4±13	11,2±6,6	28,0±3,4	23,3±4,1	28,5±4,8	3,5±5,7
9-11 years (n=46)	39,8±9,7	12,8±9,1	29,3±3,8	24,8±4,4	29,7±4,5	3,4±6,7

Table 2. Percentage of subjects according to weight category at follow-up.

Follow-up	Heavier than before program	Back to initial weight	Weight loss 1-4,9%	Weight loss 5-9,9%	Weight loss 10-14,9%	Weight loss 15-19,9%	Weight loss 20-24,9%	Weight loss 25%+	At least a 5% weight loss	At least a 10% weight loss
Entire group (2-11 yrs)	22,7	29,6	15,8	14,4	8,2	5,2	2,1	2,1	32,0	17,6
2 years	12,7	23,6	20	14,5	9,1	10,9	5,5	3,6	43,6	29,1
3 years	11,9	35,7	19,0	14,3	14,3	2,4	0	2,4	33,4	19,1
4 years	14,3	42,9	19,0	11,9	4,8	4,8	2,4	0	23,9	12,0
5-6 years	29,1	23,6	9,1	21,8	7,3	5,5	1,8	1,8	38,2	16,4
7-8 years	31,4	31,4	7,8	13,7	11,8	2,0	2,0	0	29,5	15,8
9-11 years	34,8	23,9	21,7	8,7	2,2	4,4	0	4,4	19,7	11,0

Number of subjects	66	86	46	42	24	15	6	6	93	51

Figure legends

Table 1. Subjects characteristics. Average (±SD) age, weight loss, BMI before, after the program and at follow-up and weight loss maintained in terms of percentage of initial body weight, are given here for the entire group, as well as for each follow-up category. When BMIs before the program and at follow-up are compared, a significant difference could be found only in the 2-year follow-up group (t=2.919, P=0,0051).

Table 2. Percentage of subjects according to weight category at follow-up. Depending on their body weight at follow-up (2 to 11 years after beginning the program), subjects are placed in the present table in categories ranging from "Heavier than before program" to "Weight loss of more than 25% of initial body weight". For each follow-up period, percentage of subjects who maintain a 5% or a 10% loss from initial body weight is indicated.

initial evaluation of weight loss maintenance in women Two-to eleven-years following a commercial program

Caroline Gosselin, PhD
Department of Research and Development
Minçavi,
51, Pinacle Rd, Danville, Qc, J0A 1A0, Canada
gosselin.cabanac@sympatico.ca

&

Guylaine Côté, MSc
Department of Anatomy and Physiology
Faculty of Medicine, Laval University,
Qc, G1K 7P4, Canada
acc316@agora.ulaval.ca

Corresponding author:

Dr Caroline Gosselin
1021 Main, CP 9, Ayer's Cliff
Qc, Canada, J0B 1C0
Tel/fax: (819) 838-5879
gosselin.cabanac@sympatico.ca

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Conclusions: Even though success rate is not as high as could be wished for, preliminary results suggest that participation in the *Minçavi* program can lead to effective long-term weight loss maintenance. These promising findings suggest more thorough studies should be conducted on this program.

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All around the world, and especially in North America, commercial weight loss programs have been established in great numbers to help obese and overweight individuals. Reports show that most of them can produce positive results 1 to 2 years following treatment. However, after 3 to 5 years, most individuals who have lost weight have returned to their initial body weight [1-6]. Follow-up on longer periods are rare, and tend to confirm that maintaining substantial weight loss is something that very few people achieve [7-10] For example, Sarlio-Lahteenkorva and colleagues have recently reported that after 6 and 15-year follow-ups, only 5,1% of all women maintained a loss of at least 5% of their baseline body weight [7].

Obesity experts agree that more long-term studies are needed to understand weight maintenance and help identify factors that enhance it.

The present paper describes an initial evaluation of weight maintenance following a popular commercial program in the province of Quebec, Canada. This program, called *Minçavi* (meaning “thin for life” in French), has been enforcing Canada’s Food Guide recommendations since 1983.

Upon entry in the program, participants, mostly women, receive a recipe book and are told about the importance of eating at least 3 meals a day and choosing from a variety of foods in the four major food groups (grain products, fruits/vegetables, milk/milk products, meat/meat alternate). Recipes are based on un-expensive, readily available whole grains products, vegetables and fruits, lean meats, low-fat dairy products and legumes.

Participants decide themselves how much weight they want to lose.

Based on a variety of nutritious, well balanced, family-friendly meals women and teenagers, in the weight loss phase, are taught to eat around 1400 kcal a day and men, around 1800 kcal. During that phase, on average, 50% of the energy comes from carbohydrates, 25% from protein and 25% from lipids. In the maintenance phase, participants are encouraged to increase their caloric intake by 50 kcal per week, in a minimum of 8 weeks, to eventually reach a daily intake of 1800 kcal for women and 2200 kcal for men. During this second phase, diet composition changes slightly, with a decrease in protein and an increase in lipid content (carbohydrates:50%, protein: 22%, lipids: 27%).

In groups of 50 to 100, participants are taught how to record everything they eat on sheets designed for that purpose and are invited to show them to their group leader every week for feed-back. Group leaders are women who have lost weight and kept if off for at least two years by following the Minçavi program. Weigh-in sessions followed by 30 to 45 minute-conferences on various topics (ex. weight loss, nutrition, motivation) and food sampling take place on a weekly basis. Additional support from a dietician and a psychologist is available through a toll-free phone line and internet.

Participating in the program involves a one-time fee of 25$ (Canadian dollars), and a 7$ fee per week during the weight loss phase. Once a participant has reached her goal weight, she is given free access to weekly sessions for as long as she maintains her goal weight. A fee of 7$ will be charged on weighing sessions if she is found to have gained weight.

Modest losses such as 5% of initial body weight have been shown in the past decade, to induce significant health benefits such as improvements in lipid profile, glycemia, blood pressure, self-esteem and other health related indicators [11-14]. For that matter, maintenance of a 5% decrease from pre-treatment

weight has been recognized in 1995 as the standard for success by the Institute of Medicine [15]. It was used here, as in other studies [7, 16] as the cut-off point to determine successful *vs* unsuccessful weight-maintainers.

Methods

Subjects

Two hundred and ninety one (291) women participated in the present study. They were randomly picked using the company's list of clients. Pregnant women at the time of interview and individuals who had been enrolled for less than a month were excluded from the analysis.

Data collection

Subjects were contacted by telephone. Those agreeing to take part in the study, representing 90% of the individuals contacted, were asked a series of questions. Age, height, date of entry in the program, body weight at the beginning of the program, amount of weight loss, length of weight maintenance, and actual body weight, were noted. Body Mass Index (BMI) was calculated for each subject using height and before- and after-treatment weight. Existing records allowed us to verify body weights, weight loss and height on 11% of the sample (n=31). Date of entry was available from records for all women (n=291).

Since it has been demonstrated that people tend to underreport their actual body weight, especially if given by telephone, results were adjusted for the magnitude of the discrepancy. Tell and colleagues [17] have shown that on average, people reported a body weight 2,9% lower than the measured weight (mean= 2 kg). Therefore, a 2,9% increase in body weight was added to all subjects for whom present weight records were not available.

Statistics. Standard methods were used to calculate descriptive statistics and values are presented as means ± SD. Analysis of variance (ANOVA) was used to analyze quantitative variables. Using the ANOVA table, a Bonferroni post hoc test was performed to examine

comparisons between groups. Paired *t*-test was used to evaluate differences between BMIs before the program and at follow-up. For all tests, $p < 0.05$ was accepted as the significant level.

RESULTS

Subjects characteristics. Mean age for the entire group was 43 yrs ±13 upon entry in the program. Mean BMIs before, after the program and at follow-up were respectively; 29,8±4,7, 25,5±4,5 and 29,5±5,4. When BMIs before the program and at follow-up are compared, a significant difference could be found only in the 2-year follow-up group (t=2.919, P=0,0051). On average, subjects lost 11,1 kg±7,1 and at follow-up maintained a mean loss of 4,5%±6,6 of initial body weight.

(Table 1)

Weight maintenance. Two to eleven years (2-11 y) after they had entered the program, 22,7% (n=66) of the women were heavier than when they had started, 29,5% (n=86) had returned to their initial body weight, and 47,8% (n=139) were 1 to 32% lighter than at the beginning of the program

As expected, weight loss maintenance decreased with time. For example subjects maintained on average a weight loss equivalent to 7,0%±8,3 of their initial body weight after 2 years, 4,7%±6,3 after 5-6 years, and 3,4%±6,7 after 9-11 years.

(Table 2).

As seen on Table 2, after 2 years, 43,6% of the subjects were found to maintain a weight loss of at least 5% of their initial body mass, whereas 29,1% maintained a loss of 10% or more. After 5-6 years, these numbers were respectively 38,2% and 16,4%. Thirty eight percent (19,6%) of subjects in the 9-11-year follow-up category maintained a weight loss of at least 5% of their initial mass while 10,9% were found to maintain a loss of 10% or more.

Experts agree that individuals with a BMI between 20 and 25 have a "healthy weight " as they are among those with the least chances of developing health problems. Interestingly, a disproportionate number of women who had started the Minçavi weight loss program with a BMI of 25 or less were found to be heavier at follow-up than at the onset of treatment. Precisely, 39% of these women (20 out of 51) had gained more than they had lost, while only 19% of all women who had entered the program with a BMI of 26 or more did so (46 out of 240).

Age. Some studies have shown a positive correlation between age and weight maintenance [18]. In the present work, no correlation was found between the subjects' age at the beginning of the program and weight loss maintenance (P=0,0651, N.S). However, the relatively narrow age spectrum represented among the Minçavi participants (43±12,8) may limit the interpretation of the current results.

DISCUSSION

The vast majority of weight loss programs have poor long-term efficiency. In the recent years, however, a few studies have reported a relatively high level of weight maintenance. These studies showing better than average long-term weight maintenance are discussed in the following section in the light of our current results.

When comparing efficiency of various weight loss programs, it is important to take into consideration factors such as methodological aspects (e.g. characteristics of sample studied) as well as indirect indications of the programs'

efficiency, such as percentage of people who at follow-up are heavier than they were at the beginning of the program. These factors are taken into consideration in the next paragraphs.

Sample characteristics

Duration of treatment

An intensive weight loss program in Slovenia including behavioral, psychological, cognitive and physical elements has shown promising long-term results on 48 subjects [20]. Median weight loss of completers when they left the program was 11,5 kg. At least 5 years later, 13 of them still maintained the reduced weight.

It is important to note that only participants who had successfully completed at least 4 months of treatment were included in the analysis. This criteria probably allowed selection of individuals already more successful or motivated than the ones who had quit the program after less than 4 months. In comparison, subjects were included in the present study after being enrolled for a minimum of one month in the *Minçavi* program representing the majority of individuals entering this program.

In addition, it has been found that treatment duration is significantly correlated with weight loss after treatment and at follow-up —the longer the treatment, the better the results— [19].

Nevertheless, results provided by this Slovanian general practitioner are valuable as his study implied regular follow-ups and weight measurements of participants for 5 years. His study also confirm the importance of a comprehensive approach in the treatment of obesity.

Complementary treatment

One of the rare studies on weight loss maintenance after 5 years has been conducted by Björvell and Rössner, a Swedish team. A 10-year follow-up has indicated a maintenance of weight losses averaging 10,5 kg after a 4 year continuous treatment [21]. However, in an earlier report, the authors have indicated that 36% of their subjects had their jaws fixed from the start, a factor than could have possibly enhanced the results [22].

On going selection of subjects

The Trevose Behavior Modification Program is a self-help weight loss program offering continuous care. In a recent report [23] it has been shown that members who had completed 5 years of the Trevose program were still 17,3% below their pre-treatment weight, showing considerable weight maintenance.

Again, it is important to note that the Trevose Program participants were selected upon entry and throughout the weight loss process, starting with 329 applicants and ending with 37 participants at the end of the 5-year treatment period. Therefore, only about a tenth of the participants, all highly motivated and successful at weight maintenance, were available for this particular analysis.

This may explain, in part, such outstanding results. It appears nonetheless to be an efficient weight loss strategy, as 77 subjects who had left the Trevose program after only 5 weeks could be contacted for a 5-year follow-up and remained on average 4,7% (4,5 kg) below their pre-treatment weight.

It is possible however, that even though efficient, such continuous and strict treatments may not correspond to the needs and preferences of a majority of people. For example, failure to meet attendance or weight loss requirements results in immediate dismissal from the Trevose program with no possibility of re-entering it. Such programs may suit people who need a strict and highly structured environment to succeed but discourage those who need more flexibility.

Body Mass Index at the onset of treatment

It is known that greater initial body weight favors greater weight loss and in return, better maintenance of a significant amount of lost weight in the long term [23]. For that matter, average BMI of participants should be taken into account when comparing weight loss programs' efficiency. For example, average BMI at the onset of treatment was 41,5 for the Swedish program [22] and 34 for the Trevose program [23]. Participants of the Minçavi weight loss program were relatively light, with a mean BMI of 29,8 at the start of the program.

Amount of weight loss

Anderson and colleagues [18] have recently studied participants who had lost at least 10 kg through an intensive very-low-calorie diet. Forty percent (40%) of their subjects maintained a weight loss of at least 5% of their initial body weight after a 5-year follow-up (n=112). In the present study, participants remained for analyses regardless of how little weight they had lost through the Minçavi program.

Nevertheless, when only those women who had lost at least 10 kg were considered for a 5 to 8-year follow-up (n=43), 55,8% maintained such a weight loss. After 7 years, 25% of Anderson's participants were maintaining a loss of 10% (n=112), while 37,8% of the women in the present study did so after 7 to 11 years (n=44). In addition, mean weight loss of their subjects was 29,7 kg, while among Minçavi's subjects who had lost at least 10 kg, mean weight loss was only 12,0 kg. As mentioned earlier, the greater the weight loss, the more frequent it has been shown to maintain a substantial portion of it over time.

Additional weight gain following treatment

Some people not only return to their initial body weight after a weight-loss program, but gain more than they had lost in the first place. Such a phenomenon can be detrimental to participants' physical and mental health, and for that matter should be prevented. One can probably learn about the level of safety and effectiveness of a weight loss program by inquiring about the risks of regaining more weight than what was lost through the program.

In one study, Grodstein et al [16], have reported that 57% of obese subjects who had participated in a commercial program based on specially designed formulas, could maintain a loss of 5% of their baseline weight after 3 years (in the present work, 33,3% had done so). However, at follow-up, 40% of their participants had gained more weight than they had lost through the diet. In the present study, almost four times less (11,9%) subjects in the 3-year follow-up group were in that unfortunate position.

Other factors

Adjustment for self-reported information

Among the few studies showing relatively high success rates after 3, 5 or 10 years, three relied mostly on self-reported body weight [18, 21, 24]. In these cases, discrepancy between self-reported and measured weight was not adjusted for, suggesting that weight maintenance may have been over-estimated for these programs.

Conclusion

The present work constitutes an initial evaluation of the *Minçavi* program. It is one of the rare existing reports of weight maintenance 10 years following a weight loss program, whether commercial or not.

Limitations of the present study include a small number of subjects in each follow-up category. While the initial number of participants is decent at 291, the subsets that are subsequently used in the analysis become small (n=42 to 55), thus eroding confidence in the results. Another limitation of this study is the use

of self-reported data. Because the present work relied mostly on such data, interpretation called for caution. For that matter, it was necessary to adjust for the discrepancy often seen between self-reported body weight and measured weight.

Once adjusted, results show that after 5 to 11 years, 38% of women maintained a weight loss of at least 5% of their initial weight (n= 157), and 20% maintained such as loss after 9-11 years (n=51). While lower than what could be wished for, these results suggest a higher than average level of weight maintenance.

Interestingly, even though additional weight gain following the *Minçavi* program appears to be less frequent than with other weight loss programs, it was found that a disproportionate number of women who at follow-up had gained back more weight than they had lost, had entered the program with a BMI ranging from 22 to 25 (what is considered a "healthy weight"). Knowing that "yo-yo" dieting has been demonstrated to be as much of a health risk as obesity is [25-27], these results stress the fact that when at a healthy weight (BMI < 25), women should be encouraged to prevent weight gain by eating a healthy diet and enjoying physical activity rather than to try losing weight.

These preliminary results suggest that *Minçavi*, a weight loss program that encourages participants to eat a variety of nutritious, well-balanced, family-friendly meals, is a promising tool for the long-term treatment of overweight and obese individuals. Dietary education, motivation conferences, self-monitoring of food intake, casual atmosphere and social support may all have contributed to

weight maintenance. Prospective studies involving a greater number of subjects and repeated measures of body weight should be conducted in order to better assess long-term effectiveness of the *Minçavi* program and understand factors contributing to weight maintenance.

Acknowledgements

The authors would like to thank Lyne Martineau and Caroline M. Gauthier, president and vice-president of *Minçavi inc.*, as well as Véronique Gilbert, BSc, Danielle Dubois, Dtp and the *Minçavi* group leaders for their valuable assistance.

Declaration of competing interests

Have you received reimbursements, fees, funding, or salary from an organization that may in anyway gain or lose financially from the publication of this paper in the past 5 years? If so, please specify.

Yes. The present study was conducted by Dr Gosselin in 2000 while she was at the Faculty of Medicine of Sherbrooke University and not employed by Minçavi. However, she is now scientific manager of Minçavi. No such competing interests for Ms. Côté.

Have you held any stocks or shares in an organization that may in any way gain or lose financially from the publication of this paper? If so, please specify.

No, for both authors.

Do you have any other competing interests? If so, please specify.

No, for both authors.

Are there any non-financial competing interests you would like to declare in relation to this paper?. If so, please specify.

No, both authors.

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FIGURE LEGENDS

Table 1. Subjects characteristics.

Follow-up	Age	Weight loss (kg)	BMI before program	BMI after program	BMI at follow-up	Weight loss maintained (% initial body weight)
Entire group (2-11 yrs) (n=291)	43,0±12,8	11,2±7,0	29,8±4,7	25±4,5	29,5±5,4	4,5±6,6
2 years (n=55)	43,3±12,7	10,4±6,3	30,6±4,5*	26,6±3,9	29,2±5,0*	7,0±8,3
3 years (n=42)	45,8±12,5	12,2±7,6	31,5±5,0	27,0±4,1	30,8±5,4	4,5±6,1
4 years (n=42)	46,1±14,6	10,2±5,8	30,2±6,1	26,3±5,9	30,0±7,0	3,4±5,5
5-6 years (n=55)	43,4±13,4	10,6±7,0	29,6±5,0	25,5±3,5	29,2±5,8	4,7±6,3
7-8 years (n=51)	40,4±13	11,2±6,6	28,0±3,4	23,3±4,1	28,5±4,8	3,5±5,7
9-11 years (n=46)	39,8±9,7	12,8±9,1	29,3±3,8	24,8±4,4	29,7±4,5	3,4±6,7

Table 2. Percentage of subjects according to weight category at follow-up.

Follow-up	Heavier than before program	Back to initial weight	Weight loss 1-4,9%	Weight loss 5-9,9%	Weight loss 10-14,9%	Weight loss 15-19,9%	Weight loss 20-24,9%	Weight loss 25%+	At least a 5% weight loss	At least a 10% weight loss
Entire group (2-11 yrs)	22,7	29,6	15,8	14,4	8,2	5,2	2,1	2,1	32,0	17,6
2 years	12,7	23,6	20	14,5	9,1	10,9	5,5	3,6	43,6	29,1
3 years	11,9	35,7	19,0	14,3	14,3	2,4	0	2,4	33,4	19,1
4 years	14,3	42,9	19,0	11,9	4,8	4,8	2,4	0	23,9	12,0
5-6 years	29,1	23,6	9,1	21,8	7,3	5,5	1,8	1,8	38,2	16,4
7-8 years	31,4	31,4	7,8	13,7	11,8	2,0	2,0	0	29,5	15,8
9-11 years	34,8	23,9	21,7	8,7	2,2	4,4	0	4,4	19,7	11,0

Number of subjects	66	86	46	42	24	15	6	6	93	51

Figure legends

Table 1. Subjects characteristics. Average (±SD) age, weight loss, BMI before, after the program and at follow-up and weight loss maintained in terms of percentage of initial body weight, are given here for the entire group, as well as for each follow-up category. When BMIs before the program and at follow-up are compared, a significant difference could be found only in the 2-year follow-up group (t=2.919, P=0,0051).

Table 2. Percentage of subjects according to weight category at follow-up. Depending on their body weight at follow-up (2 to 11 years after beginning the program), subjects are placed in the present table in categories ranging from “Heavier than before program” to “Weight loss of more than 25% of initial body weight”. For each follow-up period, percentage of subjects who maintain a 5% or a 10% loss from initial body weight is indicated.

18 July 2001

Reviewers' reports

Weight loss maintenance in women two to eleven years after participating in a commercial program: a survey

Caroline Gosselin [gosselin.cabanac@synpatico.ca]
Guylaine Cote [acc316@agora.ulaval.ca]

Michael Lowe

This paper reports on long-term maintenance of weight loss among participants in a commercial weight loss program. Such evaluations are rare and therefore welcome. Furthermore, it is even rarer for such long-term follow-ups to be conducted. The study is well described but I believe over-interprets the findings given some of the inherent methodological limitations.

My major criticism is that all of the data were based on self-report. Furthermore, weight at the beginning of the program was recalled from many years before. Therefore there is no way of verifying the accuracy of past or current weights and therefore of actual weight loss achieved or maintained. Subjects may have overestimated their starting weight and underestimated their current weight, making it look like they did better than they did. The authors note that body weight and weight loss could be verified in 11% of the sample, but no further information is provided and 11% of the sample is obviously inadequate to know how accurate the sample was overall. Adjusting all body weights for self-reported error is desirable but is immaterial to this problem. Therefore the authors need to be much more tentative in drawing conclusions about the likely effectiveness of their intervention.

Other points requiring attention:

At the beginning of the paper the authors refer to "commercial programs" but most of the research they then mention was not based on commercial programs.

A recent study by Lowe et al. (Int. Journal of Obesity, 2001) is directly relevant to the present study and should be mentioned.

At the end of the first paragraph the authors refer to 2 follow-up periods but report only one result.

In several places the authors have 1-2 sentence paragraphs. This should be avoided.

At the bottom of p. 6 the authors refer to "length of weight maintenance" - how is this defined?

On p. 12, the subjects who dropped our of the Trevose program probably did fairly well not because of the Trevose program but because this program only admits highly motivated individuals.

The second paragraph on p. 13 should be rewritten to indicate that the only reason that larger weight losses are associated with greater weight maintenance is that more weight was lost to begin with.

On bottom of p. 15, most research indicates that weight cycling does not have ill health effects; for the few that do suggest this, it is unclear if volitional weight loss is to blame.

Level of interest: A paper whose findings are important to those with closely related research interests

Advice: Accept after revision, which I do not need to see

Quality of written English: Acceptable

Competing interests

I am a paid consultant to Weight Watchers.
I have received a research grant from Novartis Nutrition Co. and may soon be funded by Slim-Fast.

JD Latner

This study examined the weight losses of individuals enrolled for 2 to 11 years in a Canadian commercial weight loss program. This initial report showed maintenance of weight losses over 5% in a subset of participants who remained in the program over the long-term, and provides preliminary support for the use of commercial weight loss programs. A particular strength of the study was the range of treatment lengths of participants, and the size of the sample that allowed this range. Detailed below are several recommendations to further strengthen the manuscript.

1) Page 5, Line 18: please define "food sampling."

2) Page 6, 1st paragraph of Methods section: Even though only those who had been enrolled for less than one month were excluded from analyses, the study seems to include only participant who were in Mincavi for at least 2 years. Were those who were in the program for less than 2 years excluded as well? If so, specify.

3) Page 7, lines 7-10: Adjusting individuals' self-reported weights is a useful strategy. The authors have used a figure of 2.9% to correct for misreporting, based on Tell et al. Is this figure consistent with the discrepancies in the present sample, based on those participants whose weights were verified? It would be helpful to report the discrepancy found for these 31 persons to provide further rationale for adjusting self-reported weights and for using 2.9% as the correction figure. If the discrepancy found here is very different from 2.9%, you could consider using it rather than Tell et al.'s figure.

4) Page 9, 1st paragraph: This different may or may not be disproportionate. A chi-square test is recommended to examine whether the difference (again discussed in the Discussion section) is significant.

5) Page 10, final sentence: The authors state that subjects represented the majority of individuals entering the program. This appears to be untrue based on the data reported. Subjects in the present study represented the majority of individuals currently in the program; however, like the Slovenian study critiqued for its selective analysis in this section, the present study involved a highly selective sample of individuals who remained in the program as currently active members and did not drop out of treatment. No attempt was made to follow-up individuals who did drop out, and no information is given about what proportion of the total participants (drop-outs plus those remaining) the present sample constitutes. This flaw must be acknowledged in the discussion section. If information on attrition rates is available, this should also be provided.

6) Page 13, 2nd paragraph: The authors compare their data with the Anderson et al. study, which reported that 25% of all participants at 7 years maintaining a loss of 10%; however, the two analyses appear not to be parallel. The present study boasts that 37.8% of women maintained a 10% loss at 7 to 11 years. However, this 37.8% is a percent of the total number of participants interviewed - only those still in treatment. This is not an intent-to-treat analysis, but merely a "completer" analysis of those who remained in treatment, and it is not comparable to a reference that includes all participants, completers and drop-outs (assuming that the Anderson reference is an intent-to-treat analysis).

7) Page 14, line 5: Clarify "formulas." Nutritional formulas?

8) Page 14, 1st full paragraph: The authors report that a proportion of individuals gained weight since starting the program. It would be interesting if the authors would speculate as to why this might have occurred. Could it be merely the effect of time? (Were these gains greater in the longer-term groups?) Or regression toward the mean, at least in those individuals who started at low weights?

9) Page 15, lines 11-13: Although there is no established "average" (as the authors imply here) for weight losses of individuals enrolled in commercial programs between 2 and 11 years, there is a recent study on Weight Watchers of a very similar design, with which it would be informative to compare the current results: Lowe et al., (2001) Int. J. Obesity, 25, 325-331.

10) Page 15, 4th line from bottom: "Knowing that "yo-yo" dieting has been demonstrated to be as much of a health risk as obesity is" - this is a strongly phrased statement considering the mixed evidence on this issue. I would

recommend greater circumspection, perhaps something like "Considering the possible adverse effects of "yo-yo" dieting,..."

11) Table 2: Columns 7-9, weight loss 15-19.9% through 25%+ could be consolidated into a single column of 15%+. The three separate columns seem unnecessary in light of the low numbers in each column. This would also help to de-clutter the table. In addition, the bottom row, number of subjects, is confusing because this only refers (I gather) to the number of subjects in the entire group. I recommend deleting this row and placing the numbers in each cell in the first row, "entire group," such that each cell would contain the percentage followed by the number: i.e., 22.7 (n = 66), 29.6 (n = 86), etc.

12) Several minor corrections of syntax: page 5, line 1: change to "inexpensive"; line 3: join sentence with preceding or following paragraph; lines 5 & 6: change "around" to "approximately"; page 6, line 6: change "For that matter" to "For that reason". Page 2, line 5 and page 12, line 8: I believe you mean to say "effectiveness" and "effective" rather than "efficiency" and "efficient."

Level of interest: A paper whose findings are important to those with closely related research interests

Advice: Accept after revision, which I do not need to see

Quality of written English: Acceptable

Competing interests: none declared.