Expectation to Improve Cardiovascular Risk Factors Control in Participants to a Health Promotion Program

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BACKGROUND: We assessed expectations to improve cardiovascular disease risk factors (CVD-RF) in participants to a health promotion program.

PARTICIPANTS AND METHODS: Blood pressure (BP), blood glucose (BG), blood total cholesterol (TC), body mass index (BMI), and self-reported smoking were assessed in 1,598 volunteers from the general public (men: 40%; mean age: 56.7 ± 12.7 years) participating in a mobile health promotion program in the Vaud canton, Switzerland. Participants were asked about their expectation to have their CVD-RF improved at a next visit scheduled 2–3 years later.

RESULTS: Expectation for improved control was found in 90% of participants with elevated BP, 91% with elevated BG, 45% with elevated TC, 44% who were overweight, and 35% who were smoking. Expectation for TC improvement was reported more often by men, persons with high level of TC, and persons who had consulted a doctor in the past 12 months. Expectations to lose weight and to quit smoking were found more often in younger persons than the older ones.

CONCLUSION: Volunteers from the general population participating in a health promotion program expected improved control more often for hypertension and dysglycemia than for dyslipidemia, overweight and smoking.

KEY WORDS: cardiovascular disease; risk factor; expectation; health behavior.

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INTRODUCTION

Elevated blood pressure (BP), elevated blood glucose (BG), elevated total cholesterol (TC), smoking and obesity are major modifiable cardiovascular disease risk factors (CVD-RF)[1] However, awareness related to CVD-RF is often poor in the general public,[2] and a large proportion of the population has poor control of CVD-RF.[3] Improvement in CVD-RF levels in the population can be obtained either by public health measures that target the entire population or by screening and treatment of individuals with high levels of CVD-RF.[4] The latter strategies depend on the cooperation and willingness of the targeted individuals to change their behaviors (i.e., lifestyle, nutrition) and adhere to treatment.[5]

At an individual level, several factors influence health behaviors, including awareness of having CVD-RF and of the associated health risk, perceived benefit that would result from CVD-RF improvement and self-efficacy for such an improvement, and, more generally, various social and other factors that influence empowerment to adopt healthy behaviors.[6–11] Few studies have addressed individuals' expectations for improved level of CVD-RF upon being advised to do so[12] and we are not aware of any such study in nonclinical settings.

As part of a community-based health promotion program including a screening and counseling component on CVD-RF in participants of the general public,[13] we asked participants on their expectations to have CVD-RF improved at a next scheduled visit after being informed on their risk factors and their significance. We also examined whether expectation for improved CVD-RF varied according to age, sex, and risk factor level.

METHODS

The Health Promotion Program has been previously described.[13] Briefly, the "Ligues contre les maladies cardiovasculaires" and the "Ligues de la santé" (http://www.liguesdelasante.ch/) (both are non-profit health organizations) run a Health Promotion Program, which aims at improving knowledge and control of CVD-RF in the population ("Bilan & Conseils Santé", http://www.bilanconseilsante.ch/). This program originated from the former Swiss National Fund Program NRP1A (1985) that started in 1991 with a pilot study and was then expanded to the present broader intervention.[13] The program is given through a mobile unit, i.e., a bus adequately equipped and staffed with 2 trained health educators under medical supervision. Attendance to the program was open to all adults of the general population, at a cost of 30 CHF (~US $25), and was announced through advertisements in various mass media. The program took place throughout the entire Canton of Vaud, which is located in the western, French-speaking part of Switzerland and accounts for 9% of the Swiss population (7.5 million). This study is based on the data of all participants in 2006.

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Table 1. Characteristics of the Participants to the Health Promotion Program in 2006 (*N*=1,598)

	Men	Women
N	635	963
Mean age (SD), year	56.1 (13.1)	57.0 (12.3)
Mean body mass index (SD), kg/m^2	26.8 (3.5)	24.9 (4.2)
Body mass index categories (SE), %		
Normal weight (BMI <25.0)	32 (2)	57 (2)
Overweight (BMI 25.0–29.9)	52 (2)	32 (2)
Obese (BMI >=30)	16 (2)	11 (1)
Mean systolic blood pressure (SD), mm Hg	135 (15)	126 (16)
Mean diastolic blood pressure (SD), mm Hg	81 (10)	76 (9)
Blood pressure categories (SE), %		
<140/90 mm Hg	65 (2)	82 (1)
140–159/90–94 mm Hg	25 (2)	13 (1)
≥160/95 mm Hg	10 (1)	5 (1)
Anti-hypertensive treatment (SE), %	15 (1)	15 (1)
Mean total cholesterol (SD), mmol/L	5.6 (1.0)	5.7 (1.0)
Total cholesterol categories (SE), %		
<5.0 mmol/L	27 (2)	27 (1)
5.0–6.4 mmol/L	53 (2)	52 (2)
≥6.5 mmol/L	20 (2)	21 (1)
Lipid lowering treatment (SE), %	11 (1)	7 (1)
Mean blood glucose (SD), mmol/L	6.7 (1.7)	6.4 (1.2)
Blood glucose categories (SE), %		
<6.1 mmol/L (non-fasting: <7.8)	81 (2)	88 (1)
6.1–6.9 mmol/L (7.8–11.0) [impaired glucose tolerance]	16 (1)	10 (1)
≥7.0 mmol/L(≥11.1) [diabetes]	3 (1)	1 (0)
Smoking status (SE), %		
Non-smoker	40 (2)	61 (2)
Past smoker	42 (2)	26 (1)
Smoker	18 (2)	13 (1)
Moderate (<15 cig/d)	9 (1)	7 (1)
Heavy (≥15 cig/d)	8 (1)	6 (1)
Doctor visit in the past 12 months	68 (2)	86 (1)

The program consisted of a 30-minute screening and counseling session. Participants were asked about their expectation to improve their CVD-RF after the counseling part.

Screening

Weight and height were measured and body mass index (BMI) was calculated (kg/m^2). Blood pressure (BP) reading was measured with an automated oscillometric device (Boso Medicus, Bosch) in a sitting position after at least 5 minutes of rest. BP was measured a second time 5–10 min later if the first reading was ≥140/90 mmHg, and the second reading was then considered. Blood glucose (BG) and total cholesterol (TC) were determined on capillary blood and analyses made with a dry chemical analyzer (Ektachem DT60, Eastman Kodak). The health educators administered a structured questionnaire to assess the smoking status, nationality, occupation, and when was the last visit to a doctor.

Assessment of motivation for behavior change (i.e., with respect to smoking, diet, and physical activity) was based on the transtheoretical model of stage of change.[8]

Counseling

Based on results, the officers provided a 15-minute explanation and counseling. Counseling was tailored to the stage of change[14] using brief motivational interviewing.[11,15]

A card summarizing levels of CVD-RF and related risk of CVD (by means of colored bar graphs: low-risk in green, medium-risk in orange, and high-risk in red) was given to all participants. Low risk was defined according to the guidelines of the Swiss Society for Cardiology,[16] i.e., BP <140/90 mmHg, fasting BG <6.1 mmol/L (<7.8 if non-fasting), TC <5.0 mmol/L, BMI <25 kg/m^2, and no smoking. High-risk was defined as BP ≥160/95 mmHg, fasting BG ≥7.0 mmol/L (≥11.1 if non-fasting), TC ≥6.5 mmol/L, BMI ≥30 kg/m^2, and smoking ≥10 cigarettes per day. Medium risk was defined for intermediate values.

Expectation to Improve CVD-RF

After counseling, all participants were systematically invited to be seen again at a next visit 2–3 years later to assess progress in CVD-RF control. Participants were then asked about their expectations on CVD-RF change at this next visit, using the following question "*At which category of risk do you expect to be at the next scheduled visit?*" Answers included *expectation to have CVD-RF in the same current risk category*, or, for those in the medium or high-risk categories, *expectation to have CVD-RF improved to a lower risk category*. Among smokers, being in the pre-contemplation stage of change was considered as an expectation not to quit smoking, whereas being in the contemplation, preparation, or action stages was considered as an expectation to quit smoking.

Statistical Analyses

Prevalence and standard error were estimated for all CVD-RF. For all participants with non-optimal level of CVD-RF, we assessed the proportions who expected to have CVD-RF improved. For each CVD-RF, we examined the associations between expectation to reduce CVD-RF and age, sex, level of CVD-RF, last visit to a doctor, nationality, and occupation with multivariate logistic regression.

RESULTS

Table 1 shows the characteristics of the 1,598 subjects who participated in the Health Promotion Program in 2006. Participants were more often female and middle-aged (75% were 45–74 years old). Of the participants, 83% were of Swiss nationality; 10% were highly skilled employee or manager, 31% skilled employee, 17% skilled or unskilled worker, and 42% other (mostly retired).

Figure 1 shows the proportion of participants with each CVD-RF who expected to improve their CVD-RF. Most participants with elevated BP or elevated BG expected improvement in their risk factor, whereas less than half of the participants with elevated TC or elevated BMI expected improvement in their risk factor. The majority of smokers did not expect to quit smoking.

Table 2 shows the association between expectation to improve CVD-RF and selected characteristics (all analyses are adjusted for occupation and nationality). Expectation to reduce BP or to reduce BG at the next visit was not associated with sex, age, and CVD-RF. Expectation to reduce TC was associated with high level of TC and male sex, but not with age. Expectation to reduce BMI was associated with young age, but not with sex and BMI level. Finally, expectation to quit smoking was associated with young age, but not with sex and number

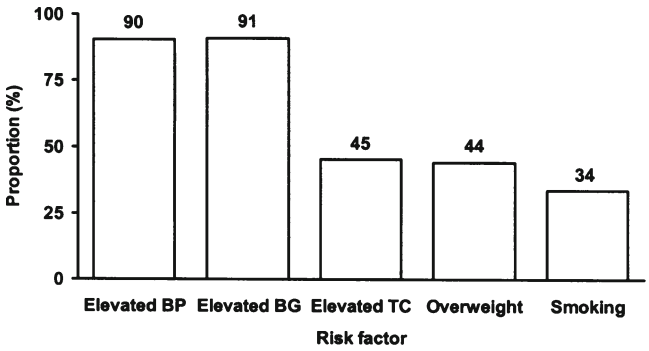

Figure 1. Proportion of participants with elevated blood pressure (BP), elevated blood glucose (BG), elevated total cholesterol (TC), overweight and smoking who expected improved control at a next visit.

of cigarettes smoked. Having visited a doctor in the previous year was associated with expectation to improve TC, but not with expectation to improve the other risk factors. Being treated for any CVD-RF was not associated with expectations for improvement (data not shown).

DISCUSSION

Our study shows that among participants of a mobile Health Promotion Program open to the general public, expectation to improve modifiable cardiovascular risk factors (CVD-RF) differed largely between the considered risk factors. Whereas almost all participants with elevated BP or with elevated BG expected improved levels at the next scheduled visit, more than half of those with elevated TC or with elevated BMI did not expect improvement, and only one third of smokers expected to quit smoking. Younger participants were more confident that they would reduce BMI or quit smoking than older ones, while men expected more often to be able to reduce TC than women. Having visited a doctor in the preceding year was not associated with the expectation to improve CVD-RF, excepted for elevated TC.

Strengths of our study are the large sample size and a population-based design, which increased the external validity of our findings. The distribution of CVD-RF was roughly similar in our study as in a recent survey in the main city of the Canton of Vaud,[17] which suggests that the participants of our study are roughly representative of the general population. However, as participation in our program was voluntary and submitted to a fee, participants may tend to be healthier and wealthier than the actual population (healthy volunteer effect).[18] Hence, our results may underestimate the prevalence of CVD-RF and overestimate favorable attitudes for behavior change.

Another limitation is that expectation to reduce CVD-RF was evaluated through an administered questionnaire that has not been formally validated. Administration of the questionnaire by health educators may also lead the participants to inflate their expectation to improve CVD-RF (social desirability bias).[19] Furthermore, asking participants about their expectation after providing them with explanations about the need for CVD-RF control may alter their true beliefs and expectation for CVD-RF improvement (perhaps in direction of overexpectation).

In this study, we did not ask the participants about specific steps they should take to improve CVD-RF. The questionnaire used to assess expectations was simple. More sophisticated questionnaires should address underlying reasons and beliefs for the answers provided and how improvement will be achieved.

We have previously shown that our screening and counseling program did improve CVD-RF in high-risk participants, but not in low-risk participants.[13] This study suggests that the assessment of expectation for improved CVD-RF may be a valuable tool for tailoring counseling and treatment. Further studies will need to examine, using a prospective design, whether expectation to improve CVD-RF predicts behavior change, medication compliance, and actual CVD-RF improvement.

Much remains to be done to improve the effectiveness of delivering individual-based interventions for CVD preven-

Table 2. Factors Associated with Expectation to Reduce Blood Pressure (BP), Blood Glucose (BG), Total Cholesterol (TC) or Body Mass Index (BMI), or to Quit Smoking in Participants with Elevated BP, Elevated BG, Elevated TC, Overweight and Smokers

		OR*	95% CI		p value
Participants with elevated BP	<60 yr vs ≥60 yr	2.0	0.8	4.9	0.12
	Men vs women	0.8	0.4	1.6	0.54
	High vs medium BP†	0.9	0.4	2.0	0.88
	Doctor visit in the past 12 months vs not	0.9	0.4	2.0	0.73
Participants with elevated BG	<60 yr vs ≥60 yr	1.5	0.5	4.8	0.50
	Men vs women	0.5	0.2	1.5	0.24
	High vs medium glucose‡	0.5	0.1	1.5	0.20
	Doctor visit in the past 12 months vs not	0.8	0.2	3.0	0.72
Participants with elevated TC	<60 yr vs ≥60 yr	1.3	1.0	1.7	0.063
	Men vs women	1.5	1.2	2.0	0.001
	High vs medium TC§	2.3	1.7	3.0	<0.001
	Doctor visit in the past 12 months vs not	1.4	1.0	1.9	0.028
Participants with overweight	<60 yr vs ≥60 yr	3.0	2.1	4.2	<0.001
	Men vs women	0.8	0.6	1.1	0.19
	High vs medium BMI‖	1.3	0.9	1.8	0.18
	Doctor visit in the past 12 months vs not	0.9	0.6	1.2	0.40
Participants reporting smoking	<60 yr vs ≥60 yr	3.0	2.1	4.2	<0.001
	Men vs women	0.8	0.6	1.1	0.19
	Heavy vs moderate smoker¶	1.3	0.9	1.8	0.18
	Doctor visit in the past 12 months vs not	0.9	0.6	1.2	0.40

**For each risk factor, the OR is adjusted for age, sex, level of the risk factor, having visited a doctor in the past 12 months, nationality and occupation but not to the other risk factors.*

† Medium BP: 140–159/90–94 mm Hg; high BP: ≥160/95 mmHg

‡.Medium fasting BG: 6.0–6.9 mmol/L (non-fasting: 7.8–11.0) [impaired glucose tolerance]; high fasting BG: ≥7.0 mmol/L (non-fasting: ≥11.1) [diabetes]

§Medium TC: 5.0–6.4 mmol/L; high TC: ≥6.5 mmol/L

‖ Medium BMI: 25.0–29.9 kg/m^2 (overweight); high BMI: ≥30.0 kg/m^2 (obesity)

¶Moderate smoker: <15 cigarettes/day; heavy smoker: ≥15 cigarettes/day

OR odds ratio; CI: confidence interval.

tion.[20] Our study shows that expectation to improve modifiable CVD-RF largely depends on which specific CVD-RF is considered. The significance of these differences and the usefulness of expectation-based approaches to actually improve behaviors and treatment will need to be addressed in prospective studies. Pending more definite answers to these questions, the assessment by health professionals of a person's expectation to improve CVD-RF is simple and may be a useful tool for improving counseling, and eventually behavior change and CVD-RF control.

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