

Motivational interviewing for smoking cessation in patients with cardiac diseases

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Background

Motivational therapy for smoking cessation given to patients with cardiac disease has a reinforcing role that decreases smoking related precedent health, social and financial burdens.

Aim

The aim of this study was to assess the therapeutic effect of motivational interviewing sessions on the smoking course and quitting success rates in cardiac patients compared with patients who did not receive the sessions.

Patients and methods

Our study was carried out on 120 smokers with cardiac diseases at the rehabilitation clinic; patients were divided into an experimental group of 60 patients who received motivational interviewing sessions while monitoring their smoking severity in the pre, post and follow-up sessions and another 60 matched controls who received a single advice on cessation treatment; both groups were assessed in the pre, post and follow-up session periods. A sociodemographic sheet, the Decisional Balance Scale, the Fagerström Test for Nicotine Dependence, the Readiness to Change Questionnaire, the Stress Test Questionnaire, and the Stress Management technique Questionnaire were used.

Results

Heart attack episodes were decreased in the experimental group by 50% after intervention with higher 'high motivation' to quit (98.33 and 91.66% in post and follow-up, respectively) compared with the preintervention period (1.67%). In the pre and follow-up periods, very low nicotine dependence was reported in 86.67 and 91.67% of the experimental group, respectively, compared with 8.33% in preintervention period. Also, 91.67% of the experimental group stopped smoking successfully in the follow-up period compared with 45% of the control group.

Conclusion

Using motivational techniques can encourage patients to quit smoking with less stress and can increase self-efficacy of patients.

Keywords:

cardiac, cessation, motivational interviewing, smoking, tobacco dependence

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Introduction

Smoking is considered among the leading causes of death and a major factor for contracting cardiovascular diseases (CVD). Passive smoking also increases the risk for chronic obstructive pulmonary diseases. Regardless of the age of smoking and amount of cigarettes smoked, quitting has different advantages for all smokers as it reverses the risk for CVD and reduces mortality by 36% in postmyocardial infarction cases over 2 years. Despite the importance of smoking cessation as a main element among primary and secondary CVD prevention strategies, it receives much less consideration than do other risk factors [1].

Factors that cause failure to reduce smoking include high dependence on nicotine and absence of will and confidence. Therefore, despite the presence of several effective

treatments for smoking cessation, many barriers exist in the same process for some patients and these can be divided into two groups: intrinsic barriers, like lack of will and confidence, and extrinsic barriers, such as financial burdens or absence of dedicated services within hospital settings where they are needed most to help vulnerable patients [2].

A critical aspect of motivation was identified to be assessing readiness to change; considering motivation as a state not a trait, and not static and thus something that can be changed from one day to another. It is noteworthy that all patients who enter treatment are not ready to change as some are ambivalent about it [3].

Motivational interviewing is a directive, client-centered structured psychotherapeutic service aiming at facilitating and maintaining behavioral change by helping clients

explore and resolve their ambivalence [4]. It uses intrinsic motivation and reflective listening in rolling with resistance, building decisional balance, and managing roadblocks to reach a successful change of negative behaviors [5].

When motivational interviewing (MI) was given to a group of 255 smokers in four sessions of patient-centered communication to explore patients' reasons for change, they showed an expected prominent increase in cessation medication use with strengthened motivation and confidence to quit through a 3–6-month period relative to the ones who were only given brief advice [6].

A comprehensive review of MI for smoking cessation conducted by 31 trial researches showed that MI had a statistically significant effect on abstinence rates compared with controls (odds ratio = 1.45, 95% confidence interval = 1.14–1.83), where participants in MI treatment programs had 45% greater odds of being abstinent at follow-up evaluation than control participants [7].

Activities implemented by nurses often require professional expertise and focused effort to integrate them within the clinical system of care, as nursing interventions are known to positively affect smoking cessation. Interventions had a significant effect on patients' successful quit attempts. Therefore, implementing evidence-based multidisciplinary and multifaceted motivational therapies has been effective in significantly improving cessation services (57–86%). Without a dedicated smoking-cessation program, or an updated training of nurses about this program, nurses will lack the sufficient knowledge on smoking-cessation services [8].

The current study aimed at assessing the role of psychiatry field nurses in the motivational interviewing therapy in smoking cessation given in specialized clinics like the cardiology ones. In addition, the study hypothesized the probable successful role of using external and internal motivation on the initiation and maintenance of smoking cessation and on decreasing its cardiac hazards.

Patients and methods

This quasi-experimental study was conducted on smokers with heart diseases at The Rehabilitation Clinic of Heart Disease, Cardiology Department, Ain Shams University Hospitals, located in Eastern Cairo, which serves a catchment area of about one-third of Greater Cairo. It serves both urban and rural areas, including areas around Greater Cairo as well. The rehabilitation clinic serves all cardiac patients who follow-up after being discharged from the hospital to reduce episodes of heart attacks. The clinic works on Sundays, Mondays, and Wednesdays, and is run by doctors and two nurses of the Cardiology Department. The sampling phase (phase of training and pilot study sample) took place from 2007 to 2009 due to the time taken for training nurses in updated motivational interviewing therapy courses and going for a pilot study to test the training courses' implementation success. The researcher visited the clinic twice a week on a weekly basis for 12 months, from March 2011 to the end of March 2012 (field work) from 9.00 a.m. to

10.00 a.m. Research clearance was obtained from the scientific committee of Ain Shams University Hospitals.

Tools

- (1) A predesigned clinical sheet, which involved the sociodemographic characteristics including age, sex, marital status, level of education, occupation, monthly income, smoking among family members, first time of smoking, past trials of smoking cessation, and the use of any stress management methods to face withdrawal symptoms associated with smoking cessation and other life stressors.
- (2) The Fagerström Test for Nicotine Dependence [9] (the Arabic version) [10]: It was used to measure the smokers' nicotine dependence severity during interventions to identify the nicotine addiction level and prescribe the appropriate pharmacotherapy after referring the patient to a psychiatrist. It contains six multiple choice questions with a four-point scale for each. Classification of dependence is as follows: very low (0–2), low (3–4), moderate (5), high (6–7), and very high (8–10).
- (3) The Readiness to Change Questionnaire [11]: It measures readiness to change the pattern of smoking and reasons for initiation, and helps in identifying the characteristics of smokers who currently seek treatment at a smoking cessation clinic and to measure their level of motivation to quit smoking. The tool is also designed to assess an individual's stage of change. It contains 12 items with three subscales: precontemplation; contemplation; and action. The scoring system includes a five-point rating scale for each item.
- (4) The Decisional Balance Scale [12]: It was used to identify pros and cons of tobacco use and cessation by asking participants about the negative and positive feelings that affect their smoking habit, which may serve to increase their reasons and motivation for change. It has five items that cover physical, economic, social, religious, and psychological aspects. Every item is divided into six subitems (three subitems for positive feelings toward smoking and its cessation, and three for negative feelings).
- (5) The Stress Questionnaire [13]: It assesses an individual's level of stress. This is a 10-item questionnaire. Its questions apply to the previous month only. It includes a five-point rating scale that provides a range of five options of responses to measure each of the 10 items for ways that people may feel stress about their life and their smoking.
- (6) The Motivational Interviewing Supervision and Training Scale [14]: This tool was used by the current study's supervisors for the ongoing assessment of the motivational interviewing sessions. This is a 16-item questionnaire; each item is divided into three subitems to evaluate the researcher measuring the phases of change according to the transitional model.

Procedure

A total of 120 smokers with heart diseases were recruited for the present study after explaining the purpose of the

research and obtaining a written consent. The sample included both genders, age group from 30 to 60 years, and all levels of education with no exclusion criteria. Simple randomization was done using coin flipping (heads for the treatment group, and tails for the control group). Participants were divided into two groups of 60 patients each.

- (1) The experimental group (G1): It included patients who received motivational interviewing sessions.
- (2) The control group (G2): It included patients who did not receive motivational interviewing sessions; instead they had a single advice session concerning tobacco dependence treatment.

Motivational interviewing sessions carried out by trained psychiatry nurses were used as smoking cessation intervention, given in 12 sessions in a period of 12 weeks each taking 1 h (four theoretical hours and eight practical hours). Participants were seen in the following visits:

Visits	Procedure
Visit zero	Preintervention assessment where the designed sheet was filled in and the questionnaires were answered
Visits 1–12	Motivational interviewing sessions were given (the sessions included coping strategies as relaxation techniques, exercise, behavioral rehearsal, relapse prevention, benefits of quitting, and weight control). Upon the completion of motivational session, the postsession tests and follow-up tests were carried out for both groups and patients were assessed regarding the decrease or ceasing of smoking).
Visit 13	Postintervention assessment where questionnaires were answered
Visit 14	Follow-up assessment where questionnaires were answered. The average time to complete the questionnaires ranged from 30 to 45 min.

Statistical analysis

All data were recorded and entered in a statistical package on a compatible computer. Results were tabulated and statistically analyzed by using the statistical package for the social sciences (SPSS, 17th version) [15]. The Pearson χ -test was used to test for significant association between

different categorical variables, and Pearson correlation was used to measure the degree to which two quantitative variables are related or associated. A P -value of less than 0.05 was considered as statistically significant.

Results

Sociodemographic data

Positive history of family smokers accounted for 91.67% of the total sample, being high among fathers, brothers, and siblings (65.00, 75.00, 48.33%, respectively). Whereas the history of having a smoker wife was small (1.67%). In addition, history of family harm from smoking in both groups accounted for 44.17% (Table 1).

Assessing advantages and disadvantages of smoking in preintervention, postintervention, and follow-up periods

In the preintervention period, the majority of both groups reported more advantages of smoking regarding physical health (weight control), whereas the main disadvantage was disease affecting their children.

In postintervention and follow-up periods, G1 showed a decrease in heart attack episodes by more than 50% as the main advantage for smoking cessation, whereas the main disadvantage was weight gain (Table 2).

Stages of readiness to change in preintervention, postintervention, and follow-up periods

There was a statistically significant difference between all intervention periods in G1 regarding 'low motivation' to change ($P < 0.001$), being absent in postintervention and follow-up periods. Patients in G2 recorded lower 'low motivation' in postintervention and follow-up periods (36.66% for each) compared with 93.66% in the preintervention period.

There was a statistically significant difference between all intervention periods in G1 and G2 regarding 'moderate motivation' to change ($P < 0.001$ for both) where G1 showed higher 'moderate motivation' in postintervention

Table 1 Comparison between groups 1 and 2 as regards family history of smoking (premotivational interviewing sessions)

History of family smokers	Groups [n (%)]			χ^2 group 1	
	Group 1 (n=60)	Group 2 (n=60)	Total (n=120)	χ^2	P-value
Family smokers					
Negative	4 (6.67)	6 (10.00)	10 (8.33)	0.436	0.509
Positive	56 (93.33)	54 (90.00)	110 (91.67)		
Father					
Negative	18 (30.00)	24 (40.00)	42 (35.00)	1.319	0.251
Positive	42 (70.00)	36 (60.00)	78 (65.00)		
Brothers					
Negative	14 (23.33)	16 (26.67)	30 (25.00)	0.178	0.673
Positive	46 (76.67)	44 (73.33)	90 (75.00)		
Wife					
Negative	58 (96.67)	60 (100.00)	118 (98.33)	2.806	0.094
Positive	2 (3.33)	0 (0.00)	2 (1.67)		
Siblings					
Negative	30 (50.00)	32 (53.33)	62 (51.67)	0.133	0.715
Positive	30 (50.00)	28 (46.67)	58 (48.33)		
Family harm from smoking					
Yes	27 (45.00)	26 (43.33)	53 (44.17)	0.034	
No	33 (55.00)	34 (56.67)	67 (55.83)		0.854

Table 2 Comparison between groups 1 and 2 as regards health advantages and disadvantages of smoking and its cessation in preintervention, postintervention, and follow-up periods

Physical health aspect	Groups [n (%)]		χ^2	
	Group 1 (n=60)	Group 2 (n=60)	χ^2	P-value
Pre				
Advantages of smoking				
A	48 (67.61)	44 (56.41)	2.310	0.315
B	9 (12.68)	16 (20.51)		
C	14 (19.72)	18 (23.08)		
Disadvantages of smoking				
A	5 (11.36)	10 (17.54)	1.010	0.603
B	28 (63.64)	36 (63.16)		
C	11 (25.00)	11 (19.30)		
Post				
Advantages of smoking cessation				
D	20 (17.70)	14 (27.45)	3.617	0.164
E	54 (90.33)	26 (50.98)		
F	39 (34.51)	11 (21.57)		
Disadvantages of smoking cessation				
D	24 (42.11)	22 (50.00)	0.624	0.732
E	6 (10.53)	4 (9.09)		
F	27 (47.37)	18 (40.91)		
Follow-up				
Advantages of smoking cessation				
D	27 (26.73)	15 (27.27)	0.792	0.673
E	54 (90.33)	26 (47.27)		
F	20 (19.80)	14 (25.45)		
Disadvantages of smoking cessation				
D	12 (28.57)	23 (53.49)	9.002	0.011
E	1 (2.38)	4 (9.30)		
F	29 (69.05)	16 (37.21)		

Advantages: A, weight control; B, alertness; C, avoid sense of side effects of smoking cessation of withdrawal symptoms; D, decreased blood pressure and repaired heart beat and improvement in smell and testing sensation; E, decrease in episodes of heart attack 50%; F, free blood from nicotine dependence and disappearance of chronic cough. Disadvantages: A, disease affects my health in all specially (heart); B, disease affecting children; C, weight gain; D, disease affects my health in all special (heart); E, disease affects children; F, weight gain.

and follow-up periods (39.26% in each) compared with the preintervention period (21.48%). Whereas it was recorded in 38.10 and 40.95% in postintervention and follow-up periods, respectively, compared with 20.95% in the preintervention period in G2.

There was a statistically significant difference between all intervention periods in G1 and G2 regarding 'high motivation' to change ($P < 0.001$ for both) where G1 showed higher 'high motivation' in postintervention and follow-up periods (98.33 and 91.66%, respectively) compared with the preintervention period (1.67%). Whereas it was recorded in 45.28 and 54.72% in postintervention and follow-up periods, respectively, compared with 0.00% in the preintervention period in G2 (Table 3).

Nicotine dependence levels in preintervention, postintervention, and follow-up periods

In G1, there was a statistically significant difference between all intervention stages regarding nicotine dependence levels ($P < 0.001$), where very low dependence was reported in 86.67 and 91.67% in postintervention and follow-up periods compared with 8.33% in the preintervention period.

In G2, there was a statistically significant difference between all intervention stages regarding nicotine dependence levels ($P = 0.0001$), where very low dependence

was reported in 41.67 and 45.00% in postintervention and follow-up periods, respectively, compared with 5% in the preintervention period (Table 4).

Number of cigarettes smoked/day in preintervention, postintervention, and follow-up periods

In G1, 86.67 and 91.67% stopped smoking absolutely in postintervention and follow-up periods, respectively, compared with 8.33% in the preintervention period; furthermore, smoking more than 10 cigarettes/day in 75% of G1 in the preintervention period dropped to 0.00% in postintervention and follow-up periods. There was a statistically significant difference between all stages ($P < 0.001$).

In G2, 41.67 and 45.00% stopped smoking absolutely in postintervention and follow-up periods, respectively, compared with 5.00% in the preintervention period. Furthermore, smoking more than 10 cigarettes/day in 80% of G2 in the preintervention period dropped to 41.67 and 38.33% in postintervention and follow-up periods, respectively. There was a statistically significant difference between all stages ($P < 0.001$) (Table 5).

Assessment of stress experienced in preintervention, postintervention, and follow-up periods

In the preintervention period, 90% of the patients in G1 were mostly stressed by feeling nervous and 'stressed', which dropped to 50.00 and 56.67% in postintervention and follow-up periods, respectively.

As for G2, in the preintervention period, 86.67% of the patients were also concerned by feeling nervous and 'stressed', which slightly dropped to 76.67 and 75.00% in postintervention and follow-up periods, respectively (Table 6).

The use of stress management techniques in postintervention and follow-up periods

In the postintervention period, the main coping strategies usually used by G1 were physical exercise (70%), deep breathing exercises (68.33%), and ablation and prayer (48.33%). G2 usually used deep breathing (40%) and ablation and prayer (23.33%).

In the follow-up stage, G1 usually used deep breathing exercise (33.33%) and ablation and prayer (23.33%), whereas G2 usually used deep breathing exercise (35%) and physical exercise (33.33%) (Table 7).

Discussion

The current study demonstrated an evident positive family history of smoking: the highest percentage was seen among brothers and fathers, and their siblings (65.00, 75.00, and 48.33%, respectively). This was in agreement with the studies reporting that smoking in first-degree relatives is a strong predictor of being a current smoker [16,17] with exposure to smoking cues and stressors [18]. This can be explained by the notion that Egyptians who have greater positive beliefs about

Table 3 Comparison between group 1 and 2 as regards stages of readiness to change in preintervention, postintervention, and follow-up periods

Subscales	Readiness to change	Periods [n (%)]				Total (n=120)	χ^2	
		Pre	Post	Follow-up	χ^2		P-value	
P=low motivation	Group 1 (n=60)	50 (83.33)	0 (0.00)	0 (0.00)	50 (100.00)	15.955	<0.001	
	Group 2 (n=60)	56 (93.66)	22 (36.66)	22 (36.66)	100 (100.00)	1.970	0.373	
C=moderate motivation	Group 1 (n=60)	29 (21.48)	53 (39.26)	53 (39.26)	135 (100.00)	34.133	<0.001	
	Group 2 (n=60)	22 (20.95)	40 (38.10)	43 (40.95)	105 (100.00)	17.691	<0.001	
A=high motivation	Group 1 (n=60)	2 (1.67)	59 (98.33)	55 (91.66)	116 (100.00)	162.450	<0.001	
	Group 2 (n=60)	0 (0.00)	24 (45.28)	29 (54.72)	53 (100.00)	38.562	<0.001	

A, action; C, contemplation; P, precontemplation.

Table 4 Comparison between groups 1 and 2 as regards nicotine dependence levels in preintervention, postintervention, and follow-up periods

Nicotine dependence levels	Group 1 (n=60) [n (%)]					Group 2 (n=60) [n (%)]				
	Dependency levels					Dependency levels				
	Very low	Low	Moderate	High	Very high	Very low	Low	Moderate	High	Very high
Pre	5 (8.33)	6 (10.00)	4 (6.67)	20 (33.33)	25 (41.67)	3 (5.00)	3 (5.00)	6 (10.00)	22 (36.67)	26 (43.33)
Post	52 (86.67)	8 (13.33)	0 (0.00)	0 (0.00)	0 (0.00)	25 (41.67)	6 (10.00)	4 (6.67)	11 (18.33)	14 (23.33)
Follow-up	55 (91.67)	5 (8.33)	0 (0.00)	0 (0.00)	0 (0.00)	27 (45.00)	6 (10.00)	4 (6.67)	10 (16.67)	13 (21.67)
χ^2				140.862					33.227	
P				<0.001					0.0001	

Table 5 Comparison between groups 1 and 2 as regards number of cigarette smoking/day in preintervention, postintervention, and follow-up periods

Number of cigarettes/day	Group 1 (n=60) [n (%)]				Group 2 (n=60) [n (%)]			
	No cigarette smoking	From 1-3/day	From 3-10/day	More than 10	No cigarette smoking	From 1-3/day	From 3-10/day	More than 10
Pre	5 (8.33)	6 (10.00)	4 (6.67)	45 (75.00)	3 (5.00)	3 (5.00)	6 (10.00)	48 (80.00)
Post	52 (86.67)	8 (13.33)	0 (0.00)	0 (0.00)	25 (41.67)	6 (10.00)	4 (6.67)	25 (41.67)
Follow-up	55 (91.67)	5 (8.33)	0 (0.00)	0 (0.00)	27 (45.00)	6 (10.00)	4 (6.67)	23 (38.33)
χ^2				140.862				33.179
P				<0.001				<0.001

Table 6 Comparison between group 1 and 2 as regards stress related to 'self out of control' in preintervention, postintervention, and follow-up periods

Stress test	Group 1 (n=60) [n (%)]				Group 2 (n=60) [n (%)]			
	Never	Almost	sometimes	often	never	almost	sometimes	Often
Q2: How often have you felt that you were unable to control the important things in your life?								
Pre	2 (3.33)	27 (45.00)	11 (18.33)	20 (33.34)	0.00 (0.00)	28 (46.67)	11 (18.33)	21 (35.00)
Post	36 (60.00)	21 (35.00)	3 (5.00)	0 (0.00)	11 (18.33)	26 (43.33)	13 (21.67)	10 (16.67)
Follow-up	20 (33.33)	26 (43.33)	13 (21.67)	1 (1.67)	13 (21.67)	28 (46.67)	9 (15.00)	10 (16.6)
Q3: How often have you felt nervous and 'stressed'?								
Pre	0.00 (0.00)	54 (90.00)	3 (5.00)	3 (5.00)	0.00 (0.00)	52 (86.67)	2 (3.33)	6 (10.0)
Post	23 (38.33)	30 (50.00)	7 (11.67)	0 (0.00)	4 (6.67)	46 (76.67)	8 (13.33)	2 (3.33)
Follow-up	8 (13.33)	34 (56.67)	15 (25.00)	3 (5.00)	6 (10.00)	45 (75.00)	8 (13.33)	1 (1.67)
Q4: How often have you felt confident about your ability to handle your personal problems?								
Pre	13 (21.67)	5 (8.33)	25 (41.67)	17 (28.33)	12 (20.00)	2 (3.33)	22 (36.67)	28 (40.00)
Post	4 (6.67)	4 (6.67)	25 (41.67)	27 (45.00)	9 (15.00)	11 (18.33)	30 (50.00)	10 (16.67)
Follow-up	1 (1.67)	19 (31.67)	31 (51.67)	9 (15.00)	10 (16.67)	7 (11.67)	29 (48.33)	14 (23.33)
Q6: How often have you been able to control irritations in your life?								
Pre	26 (43.33)	0.00 (0.00)	22 (36.67)	12 (20.00)	24 (40.00)	0.00 (0.00)	23 (38.33)	13 (21.66)
Post	0.00 (0.00)	11 (18.33)	21 (35.00)	28 (46.67)	16 (26.67)	15 (25.00)	21 (35.00)	8 (13.33)
Follow-up	4 (6.67)	28 (46.67)	22 (36.67)	6 (10.00)	14 (23.33)	10 (16.67)	24 (40.00)	12 (20.00)
Q8: How often have you felt that you were on top of things?								
Pre	19 (31.67)	4 (6.67)	23 (38.33)	14 (23.33)	16 (26.67)	0.00 (0.00)	28 (46.67)	16 (26.67)
Post	1 (1.67)	10 (16.67)	19 (31.67)	30 (50.00)	18 (30.00)	13 (21.67)	22 (36.67)	7 (11.66)
Follow-up	8 (13.33)	20 (33.33)	26 (43.33)	6 (10.00)	15 (25.00)	7 (11.67)	26 (43.33)	12 (20.00)

Table 7 Comparison between groups 1 and 2 as regards use of stress management techniques in postintervention and follow-up periods

Stress managements techniques	Group 1 (n=60) [n (%)]			Group 2 (n=60) [n (%)]		
	Undo	Sometime	Usually	Undo	Sometime	Usually
St 1: Deep breathing exercise						
Post	2 (3.33)	17 (28.33)	41 (68.33)	16 (26.67)	20 (33.33)	24 (40.00)
Follow-up	16 (26.67)	24 (40.00)	20 (33.33)	15 (25.00)	24 (40.00)	21 (35.00)
St 2: Ablution and prayer, in some cases, they really help						
Post	21 (35.00)	10 (16.67)	29 (48.33)	22 (36.67)	24 (40.00)	14 (23.33)
Follow-up	22 (36.67)	24 (40.00)	14 (23.33)	22 (36.67)	20 (33.33)	18 (30.00)
St 3: Imagination help you in all your relationships in a variety of cases						
Post	35 (58.33)	15 (25.00)	10 (16.67)	44 (73.33)	16 (26.67)	0 (0.00)
Follow-up	44 (73.33)	16 (26.67)	0 (0.00)	40 (66.67)	18 (30.00)	2 (3.33)
St 4: Relaxation specifically aimed at reducing anxiety in a moment of calm the mind and body						
Post	16 (26.67)	32 (53.33)	12 (20.00)	33 (55.00)	24 (40.00)	3 (5.00)
Follow-up	33 (55.00)	24 (40.00)	3 (5.00)	31 (51.67)	25 (41.67)	4 (6.67)
St 5: Exercise. Physical activity (walking) this helps to get rid of the actual capacity that is built by anger						
Post	11 (18.33)	7 (11.67)	42 (70.00)	23 (38.33)	24 (40.00)	13 (21.67)
Follow-up	23 (38.33)	24 (40.00)	13 (21.67)	20 (33.33)	20 (33.33)	20 (33.33)
St 6: Don't argue a positive reaction of						
Post	26 (43.33)	18 (30.00)	16 (26.67)	40 (66.67)	14 (23.33)	8 (13.33)
Follow-up	40 (66.67)	14 (23.33)	6 (10.00)	38 (63.33)	14 (23.33)	6 (10.00)
St 7: Distract yourself doing something you enjoy doing						
Post	20 (33.33)	24 (40.00)	16 (26.67)	30 (50.00)	27 (45.00)	3 (5.00)
Follow-up	30 (50.00)	27 (45.00)	3 (5.00)	31 (51.67)	26 (43.33)	3 (5.00)

St, strategy.

smoking are at a higher risk for engaging in any smoking behavior, and families who smoke make it easier to be modeled, and also the cultural acceptance being a coping strategy where Egyptian adolescents look up to family members and adults in their community and try to emulate their behavior [19].

Predictably, in the preintervention phase, more than half of the whole sample reported the same advantages for smoking regarding physical health aspects like weight control, and disadvantages like disease affecting their children. However, in postintervention and follow-up periods, more than three-fourth of both groups mentioned that the main advantage of smoking cessation was decreasing heart attack episodes; this indicates that health concerns act as external and internal motives for quitting. 'Health reasons' is a broad term that includes many concepts such as experience of main symptoms, a desire to feel better, concern about one's present and future health, experience of illness or death in the family as a result of smoking, and perception of risk factors of smoking on one's own health. In addition, Surgeon General clarified that cigarette smoking causes a temporary increase in blood pressure and that smoking and high blood pressure together triple smokers' risk for heart attack [20].

The current study showed a statistically significant difference between all intervention periods in G1 regarding (low, moderate, high) motivation to change ($P < 0.001$ for all). The experimental group showed absent 'low motivation' and higher 'high motivation' to quit in postintervention and follow-up periods compared with G2. These results were consistent with other studies that have reported that intention to quit smoking increased with motivational interviewing sessions [6,21] as many consider motivation a crucial factor for behavioral change [22].

In G1, there was a statistically significant difference between all intervention stages regarding nicotine dependence levels in G1 and G2 ($P < 0.001$ and $P = 0.0001$, respectively) where very low dependence was reported in 86.67 and 91.67% in postintervention and follow-up periods; there was also a statistically significant difference between all stages regarding reducing smoking in both groups ($P < 0.001$ for both) as 86.67 and 91.67% in G1 stopped smoking absolutely in postintervention and follow-up periods, respectively. This can be attributed to the fact that G1 gained the benefits of quitting and their external motivation as a source of reinforcement (heart disease) increased the strength of motivation that was empowered by using MI sessions, which served effectively in quitting by identifying how to deal with craving and others obstacles with increasing self-efficacy of patients. Similarly, other studies found a significant effect of motivational interviewing on the ability to reduce or completely quit smoking [23–26].

Our data highlighted that more than half of both groups experienced difficulty dealing with stressful situations, which is why smokers in the preintervention phase were dealing with these challenges by smoking to reduce tension, but in the postintervention and follow-up periods, the feeling of being nervous or stressed dropped down in reaction to the same situations experienced, which supports the effectiveness of motivational interviewing in learning how to deal with negative emotional states and how to find alternatives for problem solving.

Finally, the current study reflected the main use of physical and breathing exercising in coping with stress in both groups in postintervention and follow-up periods; this is in agreement with studies that highlight the various health benefits of exercising in decreasing the risk for heart attacks, stroke, and coronary artery disease; improving the

mood [27]; and decreasing the psychological withdrawal symptoms and craving during smoking cessation [28].

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Conflicts of interest

There are no conflicts of interest.

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