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IMPORTANT FACTORS FOR PHYSICAL ACTIVITY AMONG ELDERLY PATIENTS ONE YEAR AFTER AN ACUTE MYOCARDIAL INFARCTION

A. Ståhle,[1,2] I. Lindquist[1] and E. Mattsson[1]

From the Departments of [1]Physical Therapy and [2]Cardiology, Karolinska Hospital, Karolinska Institutet, Stockholm, Sweden

The aim of this study was to identify and describe the factors of importance for elderly (≥65 years) patients in being physically active one year after acute myocardial infarction. Forty-three consecutive elderly patients with a recent myocardial infarction were randomized either to a supervised outpatient-group training programme, 50 min three times a week for 3 months, or to a control group. An independent observer interviewed the patients 12 months after randomization in order to elucidate the factors that motivated the patients into being physically active. Both groups were identical at the start. The patients in the training group stated that the programme had made them more self-confident regarding physical activities and this seems to be an important factor for continuing to be physically active. Body mass index, age, gender and support from a physically active partner were of minor importance compared to the training programme or earlier experience of regular physical activity.

Key words: elderly, myocardial infarction, cardiac rehabilitation, physical activity, aerobic group training, qualitative research method, randomized controlled study.

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Correspondence address: Agneta Ståhle, PhD, PT, Department of Physical Therapy, Karolinska Hospital, SE-171 76 Stockholm, Sweden. E-mail: Agneta.Stahle@medks.ki.se

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INTRODUCTION

Recommendations for physical activity after a myocardial infarction have changed considerably during recent decades. From previous recommendations to "take it easy" and be careful, today's patient is recommended to feel free to perform symptom-limited activities. Cardiac rehabilitation programmes have paved the way for this evolution by demonstrating the safety of a physically active lifestyle (1–4). These programmes tended to recruit mostly "younger" patients, while those above 65 years of age were excluded. Still, it seems that, when included in cardiac rehabilitation programmes, elderly coronary patients are able to improve their physical capacity just as much as younger patients (5–9). The fact that elderly patients are seldom included in rehabilitation programmes (10) could lead to a limitation in their performance of activities in daily life (11).

Although some elderly patients previously led a physically active life, there is a risk that, after a myocardial infarction, they become afraid of physical activity because of the former recommendation to reduce physical activity after a heart attack (12, 13). Others, with no or limited experience of physical training are not used to, and are perhaps frightened by, physiological reactions such as breathlessness and an increased heart rate, the natural consequence of increased physical activity. Ignorance and insecurity about these factors may prevent some patients from being physically active and from performing household activities such as cleaning or gardening, further contributing to an impaired physical function.

In contrast, those patients with coronary heart disease who participate in rehabilitation programmes often express increased confidence in physical training at home and during other types of physical activity (6, 14). It is not known which elderly patients will benefit from a rehabilitation programme and continue to be physically active after leaving such programmes (15, 16). It is of considerable interest to have access to this kind of information, which would allow the identification of elderly subjects who should be offered a training programme. As encouragement to lead an active lifestyle into old age has been shown to be cost effective for the healthcare system (11, 17), it is important to identify those in need of rehabilitation, and those who can return to an active lifestyle on their own after an acute myocardial infarction.

The aim of this randomized controlled study was to identify and describe factors that are of importance for inducing and/or maintaining physical activity in elderly (≥65 years) patients one year after an acute myocardial infarction.

MATERIAL AND METHODS

Patients

This study was part of a larger randomized study on the overall effects of physical training in a cohort of 109 consecutive elderly patients aged >65 years (mean 71; standard deviation (SD) 4.3) admitted to the Coronary Care Unit at the Karolinska Hospital, Stockholm, because of an acute coronary event between October 1994 and June 1997 (18). The patients were stratified according to diagnosis (acute myocardial infarction or unstable angina pectoris) before randomization performed 1–5 weeks after hospital discharge. The patients were randomized either to supervised outpatient group training or to serve as controls.

The first 44 patients diagnosed with myocardial infarction were recruited to the present study. The main inclusion criterion was the ability to perform a pre-discharge exercise test on a bicycle ergometer at a workload of >70 watts (men) and ≥50 watts (women). Patients with overt heart failure, neurological sequelae, orthopaedic disability, inability to understand Swedish, planned coronary intervention within 3 months or memory dysfunction were not considered eligible.

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Table I. *Some clinical characteristics and data from the questionnaires and the interviews in the intervention (Group I) and the control group (Group C) at baseline, 3- and 12 months after randomization. Mean ± standard deviation and/or number (n) are given. The two groups did not differ significantly from each other in any of these parameters (Mann-Whitneys U-test)*

Parameter	Group I ($n = 22$)	Group C ($n = 21$)
Family		
Married/unmarried (n)	17/5	15/6
Habitation		
Apartment/private home (n)	14/8	17/4
Partner initiator of joint activity		
3 months/12 months (n)	6/4	8/10
Working		
3 months/12 months (n)	2/2	4/3
Somatic limitation for physical activities		
3 months/12 months (n)	7/6	10/9
Body Mass Index, BMI (kg/m^2)		
Baseline	26.5 ± 3.5	25.0 ± 2.3
3 months	26.5 ± 3.1	25.0 ± 1.8
12 months	26.2 ± 3.2	25.2 ± 2.1

All 44 patients gave their informed consent to participation. One patient was withdrawn after having moved outside the catchment area, leaving a total of 43 patients in the study.

Twenty-two patients were allocated to the intervention group (Group I) and 21 to the control group (Group C). Group I consisted of 17 men between 67 and 84 (mean 72.7, SD 4.3) years and 5 women between 65 and 71 (mean 67.4, SD 2.3) years. Group C consisted of 16 men between 66 and 83 (mean 72.2, SD 5.3) years and 5 women between 65 and 72 (mean 67.6, SD 3.6) years.

The study was approved by the Ethics Committee at the Karolinska Hospital, Stockholm, Sweden.

Rehabilitation programme

Prior to hospital discharge, all patients received verbal and written information about the importance of physical activity after an acute myocardial infarction, i.e. to take a daily walk, to increase the time and length of the walk gradually and to start with a warm-up period. All patients in both groups were also invited to monthly meetings at the department, held throughout the year, where they could ask about their heart disease, how to cope with it and about the treatment they were receiving. Both groups also had access to a professional team, specialized in cardiac rehabilitation and secondary prevention, and were encouraged to contact this team at any time during the study period to discuss their problems. The medical follow-up at the outpatient clinic was the same for all patients.

In addition to this basic programme, patients in Group I participated in a 50-minute long supervised outpatient group training programme three times a week for 3 months, starting immediately after randomization. The complete programme was supervised by a specialized physiotherapist and supported by music, which guided the intensity of the performance during the session. A detailed description of the programme has been given elsewhere (18). The training aimed at improving the exercise tolerance. It consisted of interval training with three 4-minute long peaks at >85% of the individual maximal heart rate (19) evaluated in a symptom-limited exercise test at baseline. The training was followed by 10 minutes of music-supported relaxation. The patients were free to exercise by themselves between the group training sessions. After the initial 3 months the patients had the possibility to participate in the programme once a week for another 3 months.

On leaving the programme all patients were encouraged to contact training facilities outside the hospital, offered by the National Association for Heart- and Lung Patients.

The patients in Group C did not participate in any training organized by the hospital. They were encouraged to restart their usual/prior physical activity as soon as they felt fit for this. After the 3-month follow-up they were recommended to contact the local National Association for Heart- and Lung Patients concerning taking part in its training programme for heart patients.

Assessments

All patients were assessed at baseline, i.e. just before randomization, and 3 and 12 months after randomization, concerning clinical data and self-motivation, and interviewed at the 3- and 12-month follow-ups. Outcome and efficacy expectations were assessed at 3- and 12-month follow-ups ($n = 26$).

Self-motivation was assessed using the questionnaire Self-motivation Inventory (SMI) developed by Dishman & Ickes 1981 (20). This questionnaire includes 40 items in a 5-point, Likert-scale format, ranging from "Extremely uncharacteristic for me" to "Extremely characteristic for me". A high score on the SMI indicates higher levels of self-motivation. The instrument has been tested for validity and reliability (20).

Outcome expectation was defined as the perceived benefit of a requested behaviour (21, 22). The expectations were collected 3 months after randomization using the questions, "Do you like to exercise regularly?" and "What do you think about your own benefit from exercise?". Each question was followed by a Visual Analogue Scale (VAS) of 10 cm with the extremes "Not at all/Very harmful" to "Very much/Very useful". Only the last 26 included patients out of 44 participated in this part, 15 patients in Group I and 11 patients in Group C.

Efficacy expectation was defined as the perceived ability and likelihood or motivation to perform physical activity (21, 23). The expectations were collected 3 months after randomization using the question "How sure are you that you will exercise regularly, x minutes, y days a week, for the next 9 months?" Each question was followed by a VAS of 10 cm with the extremes "Not at all sure" to "Very sure". Only the last 26 included patients out of 44 participated in this part, 15 patients in Group I and 11 patients in Group C.

All patients were *interviewed* by a physiotherapist (EM) independently from the training programme, 3 and 12 months after randomization. The interview was divided into two parts. The first part contained questions regarding the patient's social and demographic background such as married/unmarried, type of housing (apartment or private home), working/retired and possessing a country house demanding hard physical work. Furthermore, the patients were asked if their wives/husbands were the initiators of joint physical activities.

The second part was a semi-structured interview with questions concerning physical activity before the myocardial infarction and at the present time, apart from the group training in Group I, and including why they had conducted the exercise. This was included to illuminate factors that would induce the patients to practise physical activity.

The interviews were audio-taped and transcribed. The level of physical activity, as stated by the patients, was graded from the interviews by two of the authors (AS, EM) without knowledge of which interview they were dealing with (3 or 12 months) or group (Group I or C). Any differences were discussed until consensus was reached.

The levels of physical activity were set as: 1 = sedentary, 2 = sporadic walks, 3 = regular walks, 4 = regular, not organized, activity, 5 = regular, organized group activity.

Important factors, as expressed by the patients, were analysed from the interviews at the 12-month follow-up according to a qualitative research design (case study, categorization) (24). The transcription was categorized into factors by two of the authors separately (AS, EM). The two analyses were subsequently united, reanalysed and new factors were added until consensus was reached.

Reliability was secured by using a non-participant observer to collect data (EM) and two others (EM and AS) to categorize the transcription separately. The third, not earlier involved author (IL) finally confirmed the categories from quotations marked from the transcript interviews.

Statistical analysis

Data are presented as mean, SD (standard deviation) and range or as median and range, depending on the type of data. As variables were ordinal scale, comparisons between individuals were performed using Wilcoxon's signed-ranks test and between groups the Mann-Whitney U

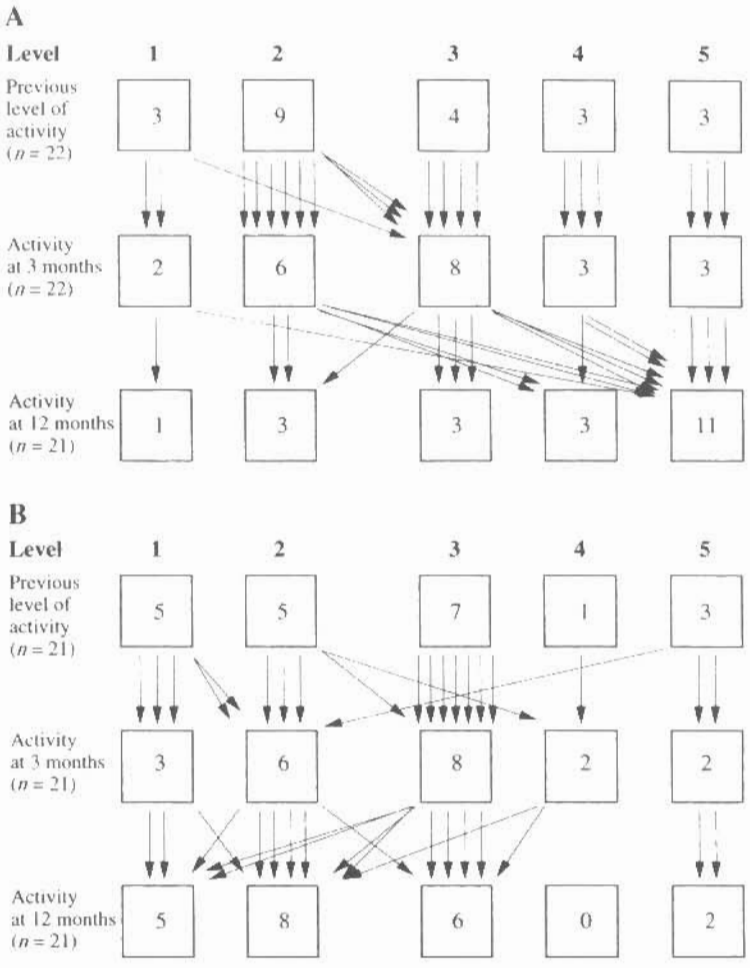

Fig. 1. A: Patients in Group I. Reported activities before admission to hospital, 3 months and 12 months after study start categorized into five levels of activity. 1 = Sedentary. 2 = Sporadic walks. 3 = Regular walks. 4 = Regular, not organized, activity. 5 = Regular organized activity. B: Patients in Group C. Reported activities before admission to hospital, 3 months and 12 months after study start categorized into five levels of activity. 1 = Sedentary. 2 = Sporadic walks. 3 = Regular walks. 4 = Regular, not organised, activity. 5 = Regular organised activity.

test. Inter-rater agreement of level of physical activity was calculated using kappa (25). Simple regression analysis was calculated (Spearman's rank correlation). Thereafter, a stepwise multiple regression analysis was performed in order to find independent predictors for physical activity 12 months after hospital discharge.

RESULTS

The two study groups were well balanced at baseline and 3 months following randomization regarding social and demographic data, partner initiator of joint activity, somatic limitations for physical activity and body mass index (BMI), (Table I). The average compliance (actually performed training sessions divided by possible sessions) in Group I was 86% (range 71–100%). All patients in Group I continued the training for between 3 and 6 months. One patient in Group I was not physically active at the 12-month follow-up because of acute lumbago.

Self-motivation inventory

The self-motivation score, as assessed with the SMI, ranged from 107 to 189 (median 140) scores at baseline in Group I and from 117 to 182 (median 143) at 3 months and from 115 to 183 (median 137) at 12 months. Corresponding values in Group C were 115–183 (median 146), 116–182 (median 146) and 120–192 (median 146), respectively. There were no significant differences between patients in the two groups.

Outcome expectations

The answer to the question "Do you like to exercise regularly?" ranged from 1.3 to 10.0 (median 8.2) in Group I and 0.3 to 10.0 (median 5.0) in Group C. Both groups expressed the same thoughts about the benefit from exercise, median 9.9 (range 5.0–10.0) and 9.8 (range 0.6–10.0), respectively. There were no significant differences between patients in the two groups.

Table II. *Multiple regression analysis in two steps between reported activity 12 months after study start and reported activity before admission to hospital (Active 0), group belonging (Group), Body Mass Index (BMI), gender, Self-Motivation Inventory (SMI), age and support by active partner (Support). n = 42*

Parameter	Step 1 $R^2 = 0.5445$ b	*p*-value	Step 2 $R^2 = 0.4924$ b	*p*-value
Active 0	0.630	0.0004	0.485	0.0009
Group	−1.362	0.0006	−1.421	0.0002
BMI	0.112	0.0879	0.086	0.1696
Gender	0.655	0.1877		
SMI	−0.009	0.3452		
Age	−0.028	0.4999		
Support	0.072	0.8543		

R^2 = amount of explanation; b = beta-coefficient (slope); *p* = probability.

Efficacy expectations

The patients in Group I stated that they planned to exercise four times a week (median) (range 0–7) for 45 minutes (range 0–150) and patients in Group C stated that they planned to exercise three times a week (median) (range 2–7) for 60 minutes (range 15–150). In Group I the answer to the question "How sure are you that you will exercise regularly for the stated minutes and days a week, for the next 9 months?" was expressed as 6.6 (median) (range 0.2–10.0) and in Group C as 7.8 (range 0.1–10.0). There were no significant differences between patients in the two groups.

Interview

Kappa for inter-rater agreement of level of physical activity was calculated as 0.69, 0.64 and 0.68 before admission to hospital and after 3 and 12 months, respectively.

Physical activity before admission to the hospital, as reported in the interview at 3 months, was 2 (median) in Group I and 3 in Group C. Three and 12 months after hospital discharge the corresponding values were 3 and 5 for Group I, and 3 and 2 for Group C. The number of patients in the different levels of activity are presented in Figs. 1A and B.

Reported physical activity before admission to hospital and at 3 months did not differ between the two groups. However, reported physical activity at 12 months was significantly higher ($p < 0.0001$) in Group I. Eleven patients in Group I reported that they had joined special or senior organizations for physical activity in contrast to only 2 patients in Group C (Figs. 1A and B).

Simple regression analysis ($n = 42$) revealed significant correlation between reported levels of activity at 12 months and activity before admission to the hospital ($r = 0.40$; $p = 0.007$), activity at 3 months ($r = 0.50$; $p < 0.001$), somatic limitations for physical activity at 3 ($r = -0.45$; $p = 0.03$) and 12 months ($r = -0.52$; $p < 0.001$) and to which group the patients belonged ($r = 0.54$; $p < 0.001$). There was no significant correlation between reported levels of activity at 12 months and age, gender, BMI, SMI, or support from a physically active partner.

Simple regression analysis ($n = 25$) between reported level of activity at 12 months and outcome expectation and efficacy expectations revealed a significant, positive correlation to reported total time (minutes by time/week) of planned activity ($r = 0.61$; $p < 0.001$).

A multiple regression analysis ($n = 42$) between level of activity at 12 months and age, gender, BMI, support, SMI, activity level before, and group (Group I or C) showed that group and activity before admission to the hospital were the only variables that predicted high activity at 12 months ($R = 0.74$; $p < 0.001$). A stepwise analysis is presented in Table II.

Six important factors for inducing physical activity were revealed from the analyses of the interviews, from patients who reported that they intended to perform physical activity regularly (levels 3–5): general well-being, social interaction, maintaining the achieved fitness level, good information, earlier experiences of regular physical activity, self-confidence, and ability to control and cope with the situation.

Well-being. To be physically active in order to "feel well", i.e. a physical feeling of lightness, comfort and health, was the most prevalent factor in both groups and some patients actually thought it to be a necessity: "*After the training I feel good in both body and mind*" (58, 2, I, 4-4-5; pat. no., page in the interview, group belonging (I or C), levels of physical activity before admission to the hospital—at 3 months—at 12 months). "*I like to exercise. I feel that it is good for me*" (76, 5, C, 5-5-5). "*Now I feel younger than before the myocardial infarction*" (63, 2, I, 2-3-5).

Social interaction. Being together with other group members when exercising, i.e. a feeling of confidence in meeting other people in the same situation, was one of the frequent factors among patients in Group I: "*... and it is the social part that is important too*" (48, 6, I, 3-3-5). "*We are some old folks who keep together exercising. To be together draws me to them*" (58, 2, I, 4-4-5).

To maintain the achieved fitness level. Several patients in Group I, but none in Group C, stated that they exercised in order to maintain the fitness they had reached during 3 months of organized training, i.e. the training had influenced a need to maintain the actual level of physical activity. "*I wanted to try to keep the fitness level I had reached thanks to the training*" (1, 8, 1, 2-3-3)." "*The training was so good, I could not stop exercising, I had to maintain my fitness and perhaps prevent a new infarction*" (92, 4, I, 1-1-5).

Good information. Patients in both groups felt that they were well informed and that the information, given at the hospital, had changed their attitude toward physical activity, i.e. the information had given the patients a genuine knowledge. "*I have changed my attitude to physical activity thanks to more knowledge than before*" (1, 11, I, 2-3-3). "*The hospital has given it to me* (information). *It has been very good and I have actually followed it*" (10, 7, C, 3-3-3).

Earlier experiences of regular physical activity. Four

patients in Group I and three from Group C reported that they had prior experience of regular physical activity, whether or not they had taken part in the training programme. All of these earlier physically active persons (except one in Group C) went back to their earlier level of activity (Fig. 1A and 1B). "*I have been active my whole life, it is my life to be active*" (46, 3, I, 4-4-5). "*I have trained twice a week for 40 years, so it is nothing new for me*" (47, 1, I, 5-5-5). "*I have always been active*" (76, 5, C, 5-5-5).

Self-confidence and ability to control and cope with the situation. The patients in Group I stated that the training programme had given them self-confidence in being physically active. They were not afraid of the feeling of increased heart rate or perceived exertion. "*The programme* (training) *has meant a lot for me. I now understand that I can force myself much more than I ever would have done by myself. I would have been afraid of exertions without this training*" (58, 5, I, 4-4-5). "*I was afraid at the beginning, but not now*" (63, 5, I, 2-3-5).

DISCUSSION

The important message from this study is that elderly patients recovering from an acute myocardial infarction seem to be able to change their exercise habits in a favourable way after participating in a 3 months' aerobic group training programme. Patients with previous experience of regular physical activity seem to be able to restart their earlier activity on their own. This knowledge is of importance when screening patients for cardiac rehabilitation focusing on exercise.

One limitation of the study may be that only fairly "healthy" elderly individuals were included. A certain patient selection is, however, a prerequisite for the accomplishment of a training programme in elderly patients. The results of this study should thus not be generalized to all patients above the age of 65, but to those who are able to perform an exercise test (at a reasonably low intensity corresponding to a brisk walk on flat ground). Except for this prerequisite, the patients in this study were consecutively recruited from a standard population of patients with a myocardial infarction as generally seen in coronary care units.

Views and opinions are often studied through questionnaires. This tool is, however, insufficient when collecting information of such a specific nature as in the present study. An appropriate method for analysing qualitative questions is needed, such as the case-study design and categorization used in this study. With these methods, data are collected from interviews and/or observations.

The choice of using the case study as a research method depends on the type of research problem and questions being asked. The case study represents a way to conduct research on complex social units consisting of multiple variables that can be of importance for the understanding of the phenomenon in question (24). The disadvantages may be that the study is limited by biases intrinsic to the researchers performing and interpreting the interviews.

Our study focused on the form of activity and not the intensity during the performance of the activity. Therefore, the patients were asked about time spent on the activity, and if they exercised by themselves or in a group and about the regularity of the exercise. As we could not find a scale corresponding to our research questions, we constructed and used a new scale, despite the fact that the scale has not been validated. However, two researchers independently of each other classified the patients according to the present scale and, thereafter, compared the results of the classification. The results of the separate classifications showed a good inter-rater agreement (kappa 0.64–0.69) (25). The classifications were also compared with the results from another 6-graded scale, design to assess the intensity of physical activity in the elderly (26), and used in an earlier study with the same patient material (18). When comparing the results from these two scales, a poor positive correlation was found (activity before admission: $r = 0.40$; at 3 months: $r = 0.51$, and at 12 months: $r = 0.46$), although the scales relate to different questions.

Proportionately, many subjects were interviewed in the present study. In studies using the case-study design, the collection of data is generally stopped when saturation of the factors studied is obtained, i.e. when no new data appear. We chose to continue the collection of data in order to use the information together with outcome measurements.

One purpose of this study was to identify factors that, at discharge, could predict adherence to exercise. Dishman & Ickes (20) found that subjects with a high self-motivation score were more likely to continue to exercise than those with a lower score. We did not find any differences in the two groups concerning this variable and consequently no possibility to predict who would follow the advice of exercising regularly when using this instrument.

There was, however, a correlation between reported activity at 12 months and outcome expectations and efficacy expectations at 3 months. This correlation was measured on a small group of patients ($n = 26$) and the result should therefore be interpreted with caution. Activity before admission to hospital and group belonging were found to be the strongest predictors for physical activity. The reason that only the last 26 included patients answered these questions was that we, after the start of the study, thought these questions important for understanding and explaining the results. They were therefore added during the last year of the study.

Initially, we thought that BMI, age, gender and/or support from a physically active partner could influence the activity level at 12 months. However, this could not be confirmed. There was a tendency, but not a significant one, for patients to be more physically active if they were living in a house rather than in an apartment.

The patients' own opinions about why it is important to exercise were that it is good for the health, that it helps to maintain fitness level after a training period, and that it gives the opportunity to meet other people in the same situation. Other important factors for engaging in physical activity were the

ability to cope with the situation, self-confidence and earlier experience of physical activity. All these factors were revealed through the interviews and, presumably, not readily found with a questionnaire with predetermined questions. The interview, as a method for collecting information, is chosen when the purpose is to determine whether there is a general opinion rather than an individual opinion. Who has what opinion is of no importance, but that the factor exists.

Participating in a 3 months' aerobic group training programme seems to promote changes in the exercise habits of elderly patients recovering from an acute myocardial infarction, and as an active lifestyle may retard disability and dependency (17, 27). It is therefore very important that elderly patients are given the opportunity to participate in cardiac rehabilitation programmes.

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