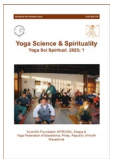
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Yoga as a Complementary Method in Rehabilitation of Patients After Myocardial Infarction

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Abstract

BACKGROUND: Coronary arterial disease (CAD) is a leading cause of morbidity and mortality worldwide. Chronic psycho-emotional stress is recognized as a major risk factor influencing the onset, progression, and prognosis of CAD. Contemporary rehabilitation increasingly emphasizes stress reduction and lifestyle modification as part of secondary prevention.

AIM: To evaluate the effects of a specialized yoga program on stress reduction, modification of risk factors, and functional recovery in patients undergoing rehabilitation for coronary arterial disease.

METHODS: A prospective observational study was conducted in 514 patients with CAD who regularly attended specialized yoga courses during a one-month inpatient rehabilitation program. The intervention included relaxation techniques, vyayama, pranayama, kriyas, theoretical education, and supervised walks. Clinical status, cardiovascular functional parameters (EKG, echocardiography, treadmill stress test), correction of risk factors, and subjective physical and psychological outcomes were assessed using standardized examinations and questionnaires, including perceived stress scales.

RESULTS: After one month, patients showed a 20% improvement in overall functional cardiovascular capacity, with increases in exercise tolerance and oxygen consumption. Echocardiography demonstrated improvement in left ventricular function (EF +6%, FS +4%). Significant correction of risk factors was observed, particularly smoking (89.0%), psycho-emotional stress (73.8%), and arterial hypertension (76.7%). Subjectively, most patients reported improved physical condition, relaxation, reduced anxiety, better sleep quality, and enhanced stress resistance. A high proportion (78.2%) intended to continue yoga practice after discharge.

CONCLUSIONS: Specialized yoga programs appear to be a safe and effective complementary approach in the rehabilitation and secondary prevention of coronary arterial disease, primarily through reduction of chronic psycho-emotional stress and improved self-control, lifestyle awareness, and adherence to preventive measures. Although findings are encouraging, further long-term, controlled, and multicentric studies are required to confirm sustained cardiovascular benefits.

Introduction

Cardiovascular diseases, with ischemic heart disease (coronary arterial disease) as their leading representative, are among the most significant social and medical problems worldwide [1], [2]. Their epidemic spread over recent decades, with a tendency toward global expansion, affects all races, age groups, and professions, resulting in high morbidity, disability, and mortality, and posing serious medical, economic, and social challenges even for developed countries [1], [3].

Coronary arterial disease may manifest as stable angina pectoris, unstable angina pectoris (pre-infarction stage), acute myocardial infarction, sudden cardiac death, or asymptomatic myocardial ischemia [2], [4]. Any of these clinical manifestations may represent the initial presentation of the disease, with an increasing number of cases occurring in younger individuals during their most productive years [3].

Numerous epidemiological studies have demonstrated statistically significant associations between coronary arterial disease and major risk factors, including arterial hypertension, smoking, psycho-emotional stress, obesity, physical inactivity, hyperlipidemia, hyperglycemia, hyperuricemia, thrombotic tendency, and genetic predisposition [2], [4], [5]. Psycho-emotional stress and personality characteristics play a crucial role not only in the direct development of coronary disease but also in promoting other risk behaviors such as smoking, unhealthy diet, physical inactivity, and obesity [6].

Accordingly, developed countries place strong emphasis on primary prevention through national cardiovascular prevention programs focused on

elimination and modification of risk factors [3]. Similar principles are applied in secondary prevention and rehabilitation of patients with established coronary arterial disease [4], [5].

Chronic psycho-emotional stress has been identified as one of the most important predictors of early disease onset and unfavorable prognosis [7], [8], [9]. Numerous cardiological, psychological, and psychosomatic studies confirm the close association between stress and coronary arterial disease [8], [9]. Stress activates the hypothalamic–pituitary–adrenal axis, resulting in increased catecholamine secretion, elevated blood pressure, increased myocardial oxygen consumption, metabolic disturbances, neurovegetative imbalance, electrolyte shifts, ventricular arrhythmias, and an increased risk of sudden cardiac death [4], [7], [8].

Because stress cannot be completely eliminated from modern life, stress-management strategies and anti-stress programs have become an integral part of primary and secondary prevention, treatment, and rehabilitation of coronary arterial disease [7], [8], [9]. Multidisciplinary teams including psychologists, psychiatrists, social workers, and rehabilitation specialists are increasingly involved in comprehensive cardiac rehabilitation programs [3].

Based on previously reported beneficial effects of yoga in cardiovascular patients [10], [11], [12], [13], [14], a project introducing yoga as a complementary rehabilitation method was developed. Yoga was assumed to be a valuable adjunct to conventional medical rehabilitation, particularly through reduction of psycho-emotional stress and improvement of lifestyle-related risk factors [10], [11], [12], [13].

The aim of this study was to evaluate the influence of yoga techniques on secondary prevention of coronary arterial disease during cardiovascular rehabilitation, with emphasis on reduction of chronic psycho-emotional stress and other modifiable risk factors such as smoking, diet, and obesity.

Materials and Methods

The specialized yoga courses regarding patients in the Institute were held [1], [2], [3]. The total number of courses held was 82 courses, that is 952 lessons with 976 patients. The classes were held 3 times a week in the period of 60 minutes. A group of 514 patients were regular visitors whose results are presented in this work. During the courses the patients filled in questionnaires by which we are evidencing the changes which appeared in the relation towards diseases and the relation towards yoga in the function of their rehabilitation and recovery [4], [5]. Also, they filled out the perceived stress questionnaires which give evidence of sensitivity of the patients towards stress conditions (6,7).

The selection of the patients was done by doctors-specialists who have chosen patients with easier heart attacks because of the risk of additional physical burdening [8], [9].

In the scope of integral rehabilitation of the patients a special yoga program was included. It was prepared by yoga teacher Pavlos K. Hassanagas [1], [2], [3]. The program has been connected in way to provide reducing of consequences of excessive tension, stress, anxiety and other psycho-physical problems, strengthening of the body, achieving of psycho-physical and mental relaxation and stability, achieving of consciousness about the way of living, working, relaxing, the behavior toward yourself, other people, the environment etc. [1], [2], [3], [6], [7]. At the same time, it was kind of introduction of the patients with yoga in order to continue their practice after returning home [2], [3].

The specialized yoga program includes [1], [2], [3], [6], [7]:

- **RELAXATION TECHNIQUES** which enable the body to be relaxed for relatively short time; balance the activity of nervous system and decrease the mental and physical tension. These techniques and principles of relaxative mood of practicing were the most important part of the program [6], [7];
- **VYAYAMA**: basic psycho-physical exercises for locomotion re-education, improvement of the awareness of the body and its control. The exercises activate the joints and muscles, enhance their elasticity, improve the blood circulation, strengthen the body and reduce or remove various pains, spasms and tensions in the muscles and joints. At the same time, because of their slow, relaxed and aware performance they enable dynamic relaxation i.e. and during the exercises [1], [2];
- **PRANAYAMA**: breathing techniques which enable re-education of the regular way of breathing, enhancement of the breathing capacity, better gas exchange in lungs, physical and mental calmness. The regular way of breathing positively influences all other systems of the body and their functions [6], [7];
- **KRIYAS**: cleansing techniques maintain the internal and external hygiene of the body and reduce unnecessary body consumption [6], [7].

The theoretical education part included lectures about the techniques and principles of yoga, stress, diet and negotiations about the way of living were held, the behavior towards yourself, work, environment, etc. This part of the program was intended to revive the responsibility that the patients have towards their health [1], [2], [3], [6]. Walks in nature under the control and instruction of yoga instructor were organized regularly [8], [9].

Results

The results were analyzed after one month's rehabilitation treatment where the following was taken into consideration: the clinic condition; sex and age structure; type and stage of disease; factors of risk and their correction; lasting of the disease; personnel difficulties; EKG; echocardiography opinion; KST according to standardized Bruce's method; individual evaluation of the improvements they fill after yoga practice and in relation to the disease and health condition in a whole (Table 1-6).

Table 1: Demographic structure of patients

Sex	Patients	%
Male	409	79.6
Female	105	20.4
Total	514	100.0
Age groups	**Number**	**%**
20 - 29	6	1.2
30 - 39	27	5.3
40 - 49	163	31.7
50 - 59	205	49.8
60 - 69	104	20.2
70 - 79	9	1.8
Total	514	100,0
Risk factor	**Number**	**%**
1. Arterial hypertension	146	28.4
2. Smoking	254	49.4
3. Psychic stress	321	62,5
4. Obesity	58	11.3
5. Hypercholesterolemia	51	9.9
6. Hyperglycemia (Diabetes mellitus)	51	9.9

Regarding sex structure, the male sex dominates – 79.6%: 20.4%. The largest percentage of patients are at the age of 50 up to 59 years. Multi factors of risk are obvious for the coronary arterial disease, where on the first place are: arterial hypertension with 28.4%; smoking with 49.4% and psycho stresses with 62.5% (Tab. 1).

Regarding the correction of the factors of risk, the greatest success is achieved with smoking - 89.0%, then with psycho stress - 73.8% and with arterial hypertension - 76.7% (Tab. 2).

Table 2: Correction of the risk factors

CORRECTION OF RISK FACTOR	NUMBER	%
1. Arterial hypertension	112	76.7
2. Smoking	226	89.0
3. Psychic stress	237	73.8
4. Obesity	42	72.4
5. Hypercholesterolemia	35	68.6
6. Hyperglycemia (Diabetes mellitus)	22	43.1

According to the localization of the heart attack on the myocardia, it is shown that the most common are anteroseptal and inferior infarction of myocardia (Tab. 3).

Table 3: Location of myocardial infarction

LOCATION OF MYOCARDIAL INFARCTION	NUMBER	%
1. Anterior extensive	27	5.3
2. Septal	11	2.1
3. Anteroseptal	144	28.0
4. Anterolateral	52	10.1
5. Lateral	27	5.3
6. Posterior	17	3.3
7. Inferoposterior	48	9.3
8. Inferolateral	11	2.1
9. Inferior	133	25.9
10. Subendocardial	28	5.5
11. Reinfarction	16	3.1
TOTAL	514	100.0

Table 4 shows the indexes of the pulse, pressure, and the results of Tread mill according to Bruce at the beginning and after finishing the one-month rehabilitation treatment. The doctor's opinions show improvement of integral functional cardiovascular capacities by 20%. The Tab. 4 shows evaluation of contractility shortening of the myofibrils at the beginning and after finishing the one-month rehabilitation treatment. There is an improvement of 6% for EF and 4% for FS.

Table 4: Functional evaluation of cardiovascular capacities according to the values of Treadmill coronary stress-test following the method of Bruce, and functional evaluation of contractility of the left ventricle estimated by echocardiographic measurement at the beginning and after a month of treatment

	Median score	
Treadmill coronary stress-test	**At the beginning**	**After a month**
Pulse at rest	77.1 / min	74.3 / min
Blood pressure at rest	19.2 / 11.5 kpa	15.9 / 10.8 kpa
Pulse during effort	132.5 / min	110.4 / min
Blood pressure during effort	21.8 / 12.1 kpa	21.2 / 11.0 kpa
Max. effort endured	103 Watts / min	144 Watts / min
Consumption of oxygen	1.58 L / min	2.1 L / min
Percentage of theoretically expected endurance	55%	75%
Echocardiographic measurement	**At the beginning**	**After a month**
Ejection fraction (E.F.)	53 %	59 %
Fractional shortening of the myofibrils (F.S.)	0.22	0.26

The data achieved by questioning and subjective evaluation of his/her current health condition are in correlation with the objective indexes achieved regarding the health condition of the patient after the one-month rehabilitation period.

Table 5 shows that 68.3% of the patients, because of the disease, feel reduced physical condition. 59.1% feel nervous, depressed and reduced working capability, and 25.9% besides getting tired quickly they are afraid of the disease. Cardiovascular disease in the period of rehabilitation acquires gradual and controlled introduction of the patient in the physical activity or some other engagement which acquires greater psycho-physical tension. The yoga techniques and suggested yoga methods during the courses which are a great personal engagement of each patient to resolve a part of problems that such disease bears were shown as very effective in the experience of these patients.

Table 5: Difficulties which patients have because of the disease

DIFFICULTIES	NUMBER	%
1. Reduced physical condition	351	68.31
2. Getting tired quickly and having fear of the disease	133	25.9
3. Feeling nervous, depressed with reduced working capability	304	59.1

As an improvement regarding physical plan 62.8% state improvement of their physical condition and control of getting tired. 33.5% have learned how to rest physically more effectively, and 37.5% feel bigger elasticity, which means bigger consciousness and a control of the own body. Regarding the psycho-relaxation 69.8% feel better relaxation and 19.8% feel calm and reducing of fear of the disease, which shows

acquiring of bigger safety and a capability of controlling the inner psycho conditions which these patients can be emotionally colored (Tab. 6).

The positive changes which they feel in relation to the disease are: 57.0% have an equal rhythm of the heart, 18.3% feel reduced of the pain in the chests and 14.8% have reduction of the high blood pressure. Other improvements they mention as a result of yoga techniques and which are very important for the patients are: improving of the quality of sleeping - 38.9%, reduction of the mental tension - 44.6%, better stress resistance 28.6% and improving the contact with the others - 11.3% which means increasing of self-confidence and readiness for effective joining in the normal life (Tab. 6).

Having in mind that yoga is a new activity in the scope of the rehabilitation of the patients in the Institute which is the only one in our county, we wanted to see the behavior of the patients towards yoga and how much support of the other patients, the family and the health stuff means to them in yoga practice in the Institute and after their returning home. The results achieved show that by improving contact with others there is a need for exchanging yoga experiences. 38.6% have exchanged their experience with the other patients and they have received support regarding their activity, 64.2% have exchanged their experiences with their families and they have also received support from their side and 55.4% have received full support from the health staff in the Institute. This shows that the support the patients get from the other patients, families and the health staff are very important for their engagement and successful fulfilness of yoga courses. But the fact which shows that yoga increases self-confidence at these patients and the responsibility for their own health condition and brings them to an activity and motivation in that direction, so 78.2% will go on practicing yoga after returning home, 21.0% remain undetermined, and 0.8% will not continue practicing (Tab. 6).

Table 6: Improvements which are the result of yoga exercise

Physical improvements	**Number**	**%**
1. Better physical condition	359	69.8
2. Knowing how to rest physically more effectively	172	33.5
3. Bigger elasticity	193	37.5
Subjective psychic improvements	**Number**	**%**
1. Achieving bigger calm and relaxation	359	69.8
2. Achieving bigger calm and reduction of the fear of the disease	102	19.8
Subjective improvements regarding disease	**Number**	**%**
1. Equal rhythm of the heart	293	57.04
2. Equal rhythm of the heart and reduction of the pain in the chests	94	18.3
3. Reduction of the high blood pressure	76	14.8
Other subjective improvements	**Number**	**%**
1. Better quality of sleeping	200	38.9
2. Reduction of the mental tension	229	44.7
3. Stress resistance	147	28.6
4. Improvement in contact with others	58	11.3
The importance of the support	**Number**	**%**
1. Given by other patients	200	38.9
2. Given by the family	330	64.2
3. Given by the health staff	285	55.4
Disposition for going on practicing yoga	**Number**	**%**
1. Yes	402	78.2
2. Undetermined	108	21.0
3. No	4	0.8
Total	514	100.0

Discussion

In this research all patients filled out the Perceived Stress Questionnaire which proves the increasing sensitivity of these patients towards stress and stress situations. The affirmations in questionnaire are concerning events in last two years of the patients' life, for instance what is the feeling of the patient during tension, fatigue, worry, frustration; if he/she has enough energy and enthusiasm for working; if he/she is capable to bring decisions by himself, to solve conflict situations, what is his/her attitude towards future etc.

Most of the answers give evidence that patients sometimes or very often feel fatigue, indecision, frustrations, lack of time, fear of future etc. The sense of stress and stress situations is present in the mind of patients. These stressful situations have great influence to their life and that is one of the main factors of risk for incidence and actualization of cardiovascular diseases.

It is very important that yoga not only helps the efficiency of the entire program of rehabilitation of patients but also increases the instructions and advice which doctors recommend in the function of prevention and further rehabilitation.

The rehabilitation of cardiovascular disease, especially coronary disease (already had heart attack on myocardia) is a process which provides achieving of optimal physiological, social, professional and economic capabilities of these patients. From the modern cardiovascular view, rehabilitation is a part of the integral treatment of cardiovascular patients with the aim of improving the whole quality of their health, prolonging life and improving the quality of life [4], [5]. Introducing of the specialized yoga program in rehabilitation is something new in our operation and the elaborated results, especially on psycho plan justify our expectations. We would like to point out that it is prospective study based on the previous experiences of some centres where similar research has been done, and our previous experiences in application of yoga in this field. The official doctrinal attitudes for rehabilitation of heart diseases still do not recommend yoga in the rehabilitation routine protocol [3], [4].

Our experience shows that yoga contributes for:

- reducing of the consequences of the excessive psycho-tension
- alleviating stress and increasing the resistance of the stress
- psycho-calm and relaxation of the whole body which increases the self-control
- reducing anxiety and the fear which causes activity and work
- psycho-physical and mental strengthening of the organism

- increasing of the consciousness of the way of living and working which increases the responsibility for improving the own health and life
- yoga helps in eliminating the other mentioned factors of risk which means conscious and responsible accepting of the already existing methods of rehabilitation and prevention as a part of one's living.

Specialized yoga courses meet one of the basic medical postulates: Primum non-nocere (without any consequences regarding the patient). Help in reducing and alleviating of one of the most important risk factors - psycho stresses. As a result of strengthening self-control, self-consciousness, self-confidence and self-discipline help in eliminating other risk factors (smoking, inadequate diet. obesity etc.). Yoga gives an opportunity for further independent activity after appropriate education in the Institute, because rehabilitation is lifelong process [4[, [10], [11].

Reality expected favorable effects for longer periods in the sense of secondary prevention of coronary arterial diseases. Possibility of popularization in the general population because of primary prevention and carrying out of healthy habits for life. Yoga has a favorable influence on the entire health condition of the patients of different manifestation of psycho-somatic diseases [6], [8], [9].

Possibility for initiation of multicentric studies for wider and deeper evaluation of this problem from the science view. Proper presentation of yoga science and yoga philosophy because of popularization of its application. Evaluation of our results where we can see an improvement of cardiovascular system is based on usual standardized methods of rehabilitation. This research was basically thought of as a pilot study and absence of control group, "double blind method" and other scientific epidemiologist and statistic methods showed that for a short period of time we cannot prove real organic improvements of cardiovascular system [10], [11], [12], [13], [14].

Conclusions

The effects of specialized yoga courses at 514 patients have been described in this work. The great number of these patients suffer from coronary arterial disease, that is, acute heart attack on myocardia. The yoga courses were attended in the period of one month by the patients who were staying because of rehabilitation in the Institute.

Our results show the greatest influence of yoga on eliminating and alleviating of chronic psycho stresses, increasing of self-control, self-confidence and self-discipline which provide eliminating of other risk factors, undertaking of responsibility for improving of the own health and the quality of living which provides favorable effects for a longer period in the sense of secondary prevention of the coronary arterial disease.

The results correlate with the studies published in different countries in the world (India, USA, West European countries and others).

These encouraged results must initiate further prospective controlled long lasting and multicentric studies for evaluation of favorable effects of yoga on cardiovascular system and entire health of the modern human person.

References

1. Hassanagas K. Pavlos: Hatha Yoga - a Guide of Techniques of Body and Mind Culture, Yoga Society - Skopje, Skopje, 1985.

2. Hassanagas K. Pavlos: The Basis of Teaching Methodology of Hatha Yoga, Yoga Society - Skopje, Skopje,1982.

3. Hassanagas K. Pavlos: Yoga Therapy, Magazine "Yoga" No. 72, Yoga Society - Skopje, 1992.

4. Haskell W.: Cardiovascular complications during exercise training of cardiac patients, Circulation, 920-924, 1978. https://doi.org/10.1161/01.CIR.57.5.920 PMid:639213

5. Dr. Dean Ornish's Guide to a Healthy Heart, Yoga Journal, March/April, 1991.

6. Mayerson A.: The Role of the Discharge Exercise for Risk Stratification Post Myocardial Infarction, Cardiopulmonary exercise testing, Saunders, Philadelphia,1986.

7. Shepard R.: Exercise Regimens After Myocardial Infarction: Rationale and Results, in Wngwr (ed): Exercise and the Heart, (2nd ed), F.A. Davis, Philadelphia,145-159, 1985.

8. Swami Satyananda Saraswati: The Effects of Yoga in Hypertension, Bihar School of Yoga, Monghyr, 1980.

9. Swami Satyananda Saraswati: Yoga and Cardiovascular Management, Bihar School of Yoga, Monghyr, 1982.

10. Vithal C. Nadkarni: The Hostile Heart, Yoga and Total Health, July, 1990.

11. Wison P., Edgett J., Porter G.: Rehabilitation of the Cardiac Patient Program Organization (2nd), 477-516, 1986.

12. Yoga - The Natural Way of a Healthy Heart, The Yoga Federation of Macedonia, Skopje, 1993.

13. Yoga Research and Therapy: Yoga Averts Heart Attack, 11-17,1991.

14. Yoga - The Natural Way of a Healthy Heart, The Yoga Institute, Bombay, 1990.