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QUALITY OF LIFE ASSESSMENT IN PATIENTS WITH MYOCARDIAL INFARCTION AFTER PERCUTANEOUS CORONARY INTERVENTION

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The purpose of the study was to evaluate differences in quality-of-life scores using the SF-36 questionnaire in patients after myocardial infarction, according to coronary blood flow restoration during the interventional procedure, over the long-term follow-up. This observational comparative study included 152 post-myocardial infarction patients who were followed dynamically for 24 months. Patients were divided into two groups. Quality of life was assessed using the standardized SF-36 questionnaire at 6 months and at the end of the follow-up period, evaluating physical functioning, role limitations, pain intensity, general health, vitality, social functioning, role functioning due to emotional status, and mental health. The data obtained showed that six months after myocardial infarction, patients demonstrated reduced quality of life scores across all scales with partially preserved physical and social functioning. During long-term follow-up, patients with percutaneous coronary intervention showed significant improvements in physical functioning, pain intensity, general health, vitality, and social functioning compared with the same indices in patients without percutaneous coronary intervention. Psycho-emotional components also improved, though changes were less expressed. These findings indicate in favour of percutaneous coronary intervention, which contributes to better long-term quality of life outcomes, primarily by enhancing physical capacity, reducing pain, and improving subjective health perception. The authors are confident that quality-of-life evaluation using the SF-36 complements traditional clinical evaluation and enables targeted rehabilitation strategies. Integration of quality-of-life measures into post-myocardial infarction follow-up is essential to optimize patient care and recovery outcomes.

Key words: myocardial infarction, percutaneous coronary intervention, quality of life, SF-36, physical functioning, psycho-emotional health.

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ОЦІНКА ЯКОСТІ ЖИТТЯ У ПАЦІЄНТІВ З ІНФАРКТОМ МІОКАРДА ПІСЛЯ ЧЕРЕЗШКІРНОГО КОРОНАРНОГО ВТРУЧАННЯ

Метою дослідження було оцінити відмінності в показниках якості життя за допомогою опитувальника SF-36 у пацієнтів після інфаркту міокарда залежно від відновлення коронарного кровотоку під час інтервенційного втручання протягом тривалого періоду спостереження. Обсерваційне порівняльне дослідження охопило 152 пацієнтів після інфаркту міокарда, яким протягом 24 місяців проводили динамічне спостереження. Пацієнтів було розділено на дві групи; якість життя оцінювали за допомогою стандартизованого опитувальника SF-36 через 6 місяців та наприкінці періоду спостереження, оцінюючи фізичне функціонування, обмеження ролей, інтенсивність болю, загальний стан здоров'я, життєву енергію, соціальне функціонування, функціонування ролей через емоційний стан та психічне здоров'я. Отримані дані засвідчили, що за шість місяців після інфаркту міокарда пацієнти демонстрували знижені показники якості життя за всіма шкалами. При цьому частково зберігалися фізичне й соціальне функціонування. Під час довгострокового спостереження пацієнти, яким виконували черезшкірне коронарне втручання, продемонстрували значне покращення фізичного функціонування, інтенсивності болю, загального стану здоров'я, життєвої енергії та соціального функціонування порівняно з пацієнтами групи, яким черезшкірне коронарне втручання не застосовували. При цьому психоемоційні компоненти також покращилися, хоча зміни були менш вираженими. Ці результати вказують на те, що черезшкірне коронарне втручання забезпечує кращі довгострокові результати якості життя, насамперед завдяки підвищенню фізичної працездатності, зменшенню болю та покращенню суб'єктивного сприйняття стану здоров'я. Автори статті впевнені, що оцінка якості життя за допомогою SF-36 доповнює традиційну клінічну оцінку та дає змогу розробляти цілеспрямовані реабілітаційні стратегії. Включення показників якості життя в спостереження після перенесеного інфаркту міокарда є важливим для оптимізації догляду за пацієнтами та оцінювання результатів одужання.

Ключові слова: інфаркт міокарда, черезшкірна коронарна інтервенція, якість життя, SF-36, фізичне функціонування, психоемоційне здоров'я.

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Despite its high clinical prevalence, myocardial infarction is not just a cause of death and subsequent cardiovascular disease, but also represents a decrease in functional capacity, work capacity, psychological health, and overall quality of life in patients in the long run [11, 15]. Today, patients' outcomes following myocardial infarction are evaluated not only by traditional clinical endpoints (mortality, complications, and/or readmissions) but also by patient-oriented endpoints, including health-related quality of life [1]. European guidelines for acute coronary syndrome management highlight the need for invasive assessment, revascularization, and long-term management following hospital admission, as well as patient-centered management throughout treatment [2].

Percutaneous coronary intervention (PCI) is considered an important tool for restoring coronary blood flow in patients with acute and chronic ischemic heart disease [10]. This manipulation is commonly thought to have clinical significance in myocardial perfusion restoration, reducing signs of ischemia and improving both angina symptoms and prognosis in certain patient populations [3]. On the

other hand, modern research has shown that the quality of life following percutaneous coronary intervention is an independent and important parameter of treatment effectiveness, reflecting the real impact of the disease and the performed procedure on the patient's daily life, physical endurance, social functioning, and psychoemotional condition. Tsoulou et al. (2023) reported statistically significant improvements across all SF-36 subscales by 6 months after PCI, with further gains observed at 12 months. The greatest overall increases were noted in physical functioning, physical role, emotional role, and social functioning. [12].

It is especially important to evaluate Quality of Life (QoL) following myocardial infarction (MI) in patients with comorbidities, as these factors may worsen functional limitations, reduce exercise capacity, decrease treatment adherence, and affect psychological functioning [5]. The standardized SF-36 questionnaire enables a broad assessment of both the physical and mental domains of health in this context, including: Physical functioning, Role limitations, Pain intensity, General health, Vitality, Social functioning, Role functioning due to emotional status, Mental health [6].

Based on the available literature, the topic of improving QOL after PCI appears to be multifaceted. A population-based study conducted by Gąsecka et al., 2021 revealed that the quality of life can improve during the course of a year following a first myocardial infarction, but clinical variables, as well as the post-infarction recovery characteristics, affect the quality of life [4]. The results of a systematic review and meta-analysis by Mansilla-Chacón M et al. (2021) further support the view that in patients with Acute Coronary Syndrome, changes in quality of life following therapy are an important, integral outcome that should be analyzed in conjunction with traditional clinical outcomes [7].

The purpose of the study was to evaluate differences in Quality-of-Life scores using the SF-36 questionnaire in patients after myocardial infarction, according to coronary blood flow restoration during the interventional procedure, over the long-term follow-up.

Materials and methods. The study was conducted as a comparative observational clinical study with dynamic evaluation of quality of life in patients after myocardial infarction, assessing the effectiveness of interventional restoration of coronary blood flow. A total of 152 patients with myocardial infarction were dynamically observed in the study. Quality of life was evaluated during two time periods: 6 months after myocardial infarction and at the end of the observation period, allowing assessment of patients' baseline state in the post-infarction phase and evaluation of subsequent changes in the physical, psychoemotional, and social dimensions of health.

All clinical observations, data collection, and the results analysis were performed on the basis of the Cardiology Department and the intensive care unit of the municipal non-profit enterprise "Ternopil Regional Clinical Hospital" during 2022–2024.

The study was conducted in accordance with the ethical principles of medical research involving human subjects as set out in the World Medical Association's Declaration of Helsinki [13]. Patients were informed about the study objectives, the type of questionnaire, and the potential use of the questionnaire and clinical data for scientific research. Personal data was kept confidential, and informed consent was obtained; participation in the study was voluntary.

There were two treatment groups: PCI and no-PCI. The first group comprised 72 patients who underwent percutaneous coronary intervention (PCI) to restore coronary blood flow (PCI (+) group). The other group consisted of 80 patients who were not treated with PCI (PCI (–) group). No randomization was performed, and patients were divided into groups based on whether they underwent interventional procedures. This classification enabled comparison of changes in quality-of-life indicators across patient groups who used different management options post-myocardial infarction.

The inclusion criteria were: having experienced myocardial infarction, having data available on whether they had undergone PCI, the patient's ability to complete a follow-up, and an available standardized questionnaire for quality-of-life assessment. Exclusion criteria included the absence of clinical and/or questionnaire data, the absence of information on the method used to restore coronary blood flow, the inability to evaluate quality of life within the designated follow-up period, and the presence of factors that would likely make the results of the questionnaire unreliable when the patient was being questioned.

The standardized SF-36 questionnaire (Short Form Health Survey) was used to assess quality of life [8]. The SF-36 questionnaire includes 36 questions and can be scored on 8 scales: physical functioning, role functioning (physical), pain intensity, general health, vitality, social functioning, role functioning (emotional), and mental health. The same scales were used to evaluate physical and mental health. The functional status, impact on daily functioning, and subjective assessment of health were measured for each scale and interpreted on a 0 to 100 scale with higher scores indicating better functional status, less impact on daily functioning, and higher subjective assessment of health.

Both the overall trends in quality-of-life indicators for all patients after myocardial infarction and the differences between PCI (+) and PCI (–) groups were considered. In the first phase, the quality of life was evaluated 6 months after myocardial infarction. A reassessment was conducted at the end of the second-stage follow-up period. The purpose of the comparative analysis was to identify which aspects of quality of life were altered in the long-term post-infarction period as a function of interventional restoration of coronary blood flow.

The statistical analysis of the results was carried out using variational statistics. Mean (M)±standard error of the mean (m) indexes were used for

quantitative indicators. The statistical criteria were applied to compare and evaluate both quality-of-life indicators and the dynamics between the groups, depending on the data distribution. A difference ($p<0.05$) was considered statistically significant. All quality-of-life indicators are reported as scores based on the SF-36 questionnaire scales.

Results of the study. Myocardial infarction patients included in the study showed lower SF-36 questionnaire scores across all scales compared with the highest possible scores, indicating functional, somatic, and psycho-emotional limitations in the post-infarction period. Meanwhile, some parameters remained at a relatively satisfactory level: physical functioning (84.34±1.27 points); role functioning related to emotional state (82.80±2.03 points); and social functioning (79.20±1.66 points). This indicated that patients' physical and social activity was partially preserved six months after myocardial infarction.

The score of pain intensity six months after myocardial infarction was 69.03±1.35 points, which was a clear indication of a pain syndrome possibly linked to the remaining effects of ischemia or exertional angina. The subjective assessment of general health was lower, 57.52±1.35 points. The vitality index score was 69.57±0.88, indicating fatigue, decreased energy, and some restriction in daily activities. The mental health index has been 65.79±1.01 points, which is a moderate decrease in positive emotional tone and presence of elements of anxiety and psychological stress without notable depressive symptoms. Both the physical and mental composite indices of health were also diminished, at 65.71±0.62 points, respectively.

In all investigated patients, no significant changes were observed in most quality-of-life parameters over the 2-year period. Only on the scale of role functioning due to physical condition, there was a statistically significant improvement (from 67.04±1.98 to 72.47±1.66 points, $p=0.009$) and on the pain intensity scale (from 69.03±1.35 to 76.43±1.16 points, $p<0.001$). The data collected show a decrease in pain and an improvement in patients' functional ability to engage in activities of daily living that involve physical activity.

Quality of life was analyzed and compared with that of patients who underwent percutaneous coronary intervention, with better outcomes in those who underwent interventional restoration of coronary blood flow. After 24 months, the majority of SF-36 scale scores were significantly higher in the PCI (+) than in the PCI (–) group. Specifically, patients in the PCI (+) group had a score of 75.43±1.20, whereas those in the PCI (–) group had a score of 63.38±1.22. The physical condition was connected to role functioning, which was 77.68±1.91 and 68.69±1.65 points, respectively. Patients in the PCI (+) group reported higher pain intensity scores (78.72±1.40 points) than those in the PCI (–) group (63.06±1.21 points), suggesting that this type of pain had a lower impact on patients' daily activities post-PCI.

The same trend was observed for the general health status and quality-of-life scales. In the PCI (+) group, the general health status score was 74.47±1.63 points, whereas in the PCI (–) group it was 59.23±1.78 points. Vitality in patients with PCI was 79.39±0.78 points, and in patients without PCI, 66.75±0.81 points. So, patients who underwent interventional restoration of coronary blood flow reported better subjective assessment of general condition, improved energy level, and reduced physical exhaustion.

The social functioning scores were high for both groups, 88.46±1.28 points for PCI (+) and 87.71±1.50 points for PCI (–). The PCI (+) group also had higher scores for role functioning, based on emotional state (95.77±1.61 points versus 89.41±1.90 points in the PCI (–) group). The mental health score was 74.50±0.84 and 68.10±1.02 points, respectively. Therefore, patients after PCI improved their scores not only in physical aspects of quality of life but also in some psycho-emotional aspects.

A statistically significant difference from the baseline measures was observed for the physical functioning, role functioning, physical condition, pain intensity, general health, vitality, and social functioning subscales in the PCI (+) group ($p<0.05$). No statistically significant differences were observed on the role functioning scales for emotional state and mental health compared with baseline. Thus, the most pronounced positive changes following the interventional restoration of coronary blood flow mainly concerned the physical component of quality of life, pain syndrome, subjective assessment of general health status, and daily activities.

Discussion. Thus, the data obtained and the analysis clarifying the dynamics of quality-of-life indices in patients after myocardial infarction allowed us to indicate the following. The first one: the overall results of the study suggest that quality of life in patients who experience a myocardial infarction is not at the highest levels, even at the end of the long-term follow-up period, across all SF-36 scales. Meanwhile, patients undergoing PCI had higher physical functioning scores, lower pain intensity, better general health, and greater daily activity 24 months after myocardial infarction.

The second, the data obtained proved that quality of life after a myocardial infarction is an important integrated indicator not only of the patient's clinical situation but also of the degree of physical, psycho-emotional, and social functioning. In the long term, even after myocardial infarction, SF-36 scores remain below the maximum possible, reflecting its after-effects on everyday activities and subjective health perception. Here, our data align with the results of a survey of patients after myocardial infarction, in which clinical status was assessed during rehabilitation using meta-analyses of the short-form health survey SF-36 [7]. The authors emphasize the importance of adequately assessing the efficacy of the provided controlled minimally invasive interventions during rehabilitation using a number of survey programs to analyze positive changes in mental and physical health outcomes.

The third one: PCI patients had higher quality-of-life scores, especially in the physical component of

health, pain intensity, general health, and vitality. This may be due to the reopening of the coronary arteries, decreased ischaemic symptoms, improved exercise capacity, and improved pain interference in daily life. The same findings are reported in recent studies, in which patients with coronary artery disease undergoing percutaneous coronary intervention showed improvements in quality-of-life measures [9, 14].

Finally, the quality of life after myocardial infarction is also influenced by whether revascularisation is performed. May be affected by the patient's clinical status, comorbidities, compliance, cardiac rehab programs, and psycho-emotional state. Thus, the increases observed in the PCI (+) group should be considered the cumulative effect of interventional treatment, subsequent drug therapy, and ongoing medical surveillance.

We believe that Quality of life evaluation must be integrated with the traditional clinical and haemodynamic parameters, and it should provide an accurate evaluation of the patient's condition after an MI. Over time, the use of the SF-36 questionnaire allows identification of which areas of functioning remain impaired and the adaptation of treatment and rehabilitation.

To resume, we want to stress that the present study has demonstrated the validity of using a quality-of-life assessment in the follow-up of patients with myocardial infarction. PCI might be an important factor in improving recovery of physical functioning, decreasing pain, and subjective assessment of health status in the long-term post-infarction period.

Limitations. We applied the following limitations in this clinical study: we did not account for plasma insulin levels in patients with myocardial infarction, i.e., latent or existing diabetes mellitus, as concomitant disease was not considered. We also excluded from the study the type or form of myocardial infarction and its clinical characteristics in treated patients.

Conclusion

After a myocardial infarction, quality of life is still poor 24 months later, highlighting the long-term effects of the disease on physical, psychological, and social functioning.

Percutaneous coronary intervention was associated with improved physical functioning, decreased pain intensity, increased daily activity, and better subjective assessment of general health.

The SF-36 questionnaire is an important part of the assessment of treatment efficacy, along with the traditional clinical and haemodynamic criteria, and helps to optimize post-infarction monitoring and rehabilitation of patients.

Prospects for further research include further improvement of minimally invasive percutaneous interventions in patients with myocardial infarction, the use of more variable controlled cardiac rehabilitation programs, as well as their quality of life evaluation with randomized clinical trials within the entire Ternopil region, or expanding this study to the western region of Ukraine with an attempt to cover the entire country to obtain an adequate picture of the quality of life of patients with myocardial infarction after treatment and rehabilitation programs improvement.

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CYTOKINE PROFILE IN INTESTINAL PARASITIC INFECTIONS AND THE EFFECTIVENESS OF PROBIOTICS IN COMPLEX TREATMENT

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Intestinal parasitic infections caused by *Giardia duodenalis, Ascaris lumbricoides*, and *Enterobius vermicularis* remain clinically relevant due to their association with gastrointestinal symptoms, intestinal dysbiosis, and immune dysregulation. This study analyzed the cytokine and T-cell immune profiles in students aged 17–24 years with giardiasis, ascariasis, enterobiasis, and mixed parasitic infections, and evaluated the effectiveness of probiotic supplementation in complex therapy. Giardiasis was associated with reduced CD3+, and increased serum levels of interleukin-4, interleukin-6, and interleukin-10. Ascariasis was characterized by a pronounced increase in interleukin-6, whereas enterobiasis showed elevated interleukin-4 and signs of inflammatory activation. The addition of probiotics improved treatment effectiveness in giardiasis and ascariasis and may contribute to restoration of intestinal microbiocenosis and modulation of cytokine responses. A comprehensive approach combining antiparasitic therapy, dysbiosis correction, and immunological monitoring may improve treatment outcomes.

Key words: intestinal parasitosis, giardiasis, ascariasis, cytokines, probiotics.

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ЦИТОКІНОВИЙ ПРОФІЛЬ ПРИ КИШКОВІЙ ПАРАЗИТАРНІЙ ІНФЕКЦІЇ ТА ЕФЕКТИВНІСТЬ ЗАСТОСУВАННЯ ПРОБІОТИКІВ У КОМПЛЕКСНОМУ ЛІКУВАННІ

Кишкові паразитарні інфекції, спричинені Giardia duodenalis, Ascaris lumbricoides та Enterobius vermicularis, залишаються клінічно значущими через їхній взаємозв'язок із гастроентестинальними симптомами, дисбіозом кишечника та порушеннями імунної реактивності. У роботі проаналізовано цитокіновий профіль та показники Т-клітинного імунітету у студентів віком 17–24 років із лямбліозом, аскаридозом, ентеробіозом та змішаними паразитарними інвазіями, а також оцінено ефективність включення пробіотиків до комплексної терапії. Лямбліоз асоціювався зі зниженням CD3+ та підвищенням рівнів інтерлейкіну-4, інтерлейкіну-6 та інтерлейкіну-10. Для аскаридозу було характерне виражене підвищення інтерлейкіну-6, тоді як ентеробіоз супроводжувався високим рівнем інтерлейкіну-4 та ознаками запальної активації. Додавання пробіотиків підвищувало ефективність лікування лямбліозу та аскаридозу, сприяючи відновленню кишкового мікробіоценозу та модуляції цитокінової відповіді. Комплексний підхід може поліпшити результати терапії кишкових паразитозів.

Ключові слова: кишкові паразитози, лямбліоз, аскаридоз, цитокіни, пробіотики.

Intestinal parasitic infections remain a major medical and public health challenge despite the availability of contemporary diagnostic and therapeutic approaches. Particular importance is attributed to infections caused by *Giardia duodenalis, Ascaris lumbricoides*, and *Enterobius vermicularis*, as these conditions frequently present with non-specific gastrointestinal symptoms, intestinal dysbiosis, and altered host immunoreactivity. In young individuals without clinically significant comorbidities, such infections may remain undiagnosed for prolonged periods, contributing to low-grade chronic inflammation and functional gastrointestinal disturbances [3, 12, 14].

Conventional diagnosis of intestinal parasitoses is primarily based on the detection of cysts, eggs, or parasite antigens in biological specimens. However, the sensitivity of classical microscopy depends on the frequency of sampling, infection intensity, and the life-cycle stage of the parasite. Therefore, in contemporary clinical practice, increasing emphasis is placed on an integrated diagnostic approach that combines coproscopy, polymerase chain reaction testing, serological assays, assessment of intestinal microbiocenosis, and evaluation of immunological parameters [4, 7, 13].

The immune response to intestinal parasitic infections is complex and heterogeneous. Helminth infections are generally associated with a T helper 2 (Th2)-polarized response, eosinophilia, increased IgE