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Patient Education and Exercising in Addition to Standard Therapy in Asthma And Metabolic Syndrome.

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ABSTRACT

The purpose of this study was to assess the clinical efficacy of patient education and physical exercises in patients with both asthma and metabolic syndrome in addition to standard therapy. Sixty patients with asthma and metabolic syndrome were examined. The patients were divided into 2 groups. Group I included 30 patients who received standard pharmacologic therapy in combination with exercising and patient education. Group II included 30 patients who received only standard pharmacologic therapy. Group I patients demonstrated a decrease of exacerbations from 3.40 ± 0.16 to 1.40 ± 0.14 ($P=0.0000$), emergency service calls from 2.93 ± 0.12 to 1.53 ± 0.10 ($P=0.0000$), and hospital admissions from 1.73 ± 0.11 to 1.03 ± 0.12 ($P=0.0001$) per year, as well as a significant improvement in subjective assessment of asthma symptoms; patients gained more control over asthma symptoms, spirometry results, components of metabolic syndrome and physical and psychological domains of life quality questionnaire have also improved in comparison to Group II. The use of patient education and exercising in a joint treatment of patients with asthma and metabolic syndrome leads to decreasing in exacerbations, emergency service calls, and hospital admissions, also decreases the amount of day and night asthma symptoms and improves patients' life quality.

Keywords: asthma; metabolic syndrome; patient education; exercising; quality of life

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INTRODUCTION

Asthma is one of the global medical problems affecting all age groups [1]. In the past years the asthma morbidity, disability and death rate have increased. It is also necessary to consider that in most cases patients have no motivation on guideline-directed medical therapy and prevention, have little faith in recuperation that as a result determines the asthma prognosis [2-3].

According to Global Strategy for Asthma Management and Prevention [1] one of the first steps to do in order to control the disease is to educate patients on their health problem. Exercising is also one of the important parts in treatment and prevention process in pulmonary diseases such as asthma and chronic obstructive pulmonary disease (COPD) [4]. On the one hand it can act as a provoking factor that contributes to exacerbation and aggravating the course of the disease, on the other hand, the restriction of physical activity directly affects the increase in the prevalence and severity of asthma and COPD [5].

Metabolic syndrome (MS) is a complex of disorders of the hormonal, metabolic and clinical status, the basis of which is insulin resistance, compensatory hyperinsulinemia, abdominal obesity, arterial hypertension, atherogenic dyslipidemia. Metabolic syndrome is a pandemic of the 21st century. The disease affects up to 35.0-40.0% of the world's population, often over the age of 40 [6-7].

At the present time the question of the combined diseases course is the most relevant, especially amongst such widely occurring and socially significant diseases as asthma, copd and metabolic syndrome. Some scientific publications show existence of complicated pathogenetic relationships between these nosological entities [8, 9, and 10]. It promotes emergence of mutually burdening phenomenon which limits the possibility to asthma control and reduces this category's patient's life quality [11].

An integrated approach to the organization of treatment and preventative measures in asthma patients with emphasis on patient education and exercising will improve the effectiveness of the antiasthma tic therapy, the level of control over asthma, restore professional and social status, and, consequently, improve the patients' life quality [12, 13].

According to GINA Guidelines, the treatment and preventative measures must include pharmacological therapy, education, and exercising, which must work closely together for a more successful outcome [1].

The purpose of this study was to assess the clinical efficacy of patient education and exercising for patients with asthma and metabolic syndrome, in addition to standard therapy.

MATERIALS AND METHODS

We examined 60 patients age from 18 to 60 years with asthma and metabolic syndrome. The patients were divided into 2 groups. Group I included 30 patients (22/73.3% women and 8/26.7% men; mean age, 49.80±1.11 years) who received standard pharmacologic therapy in addition with patient education and exercising. Group II included 30 patients (23/76.7% women and 7/23.3% men; mean age, 49.93±0.95 years) who received only standard pharmacologic therapy. Asthma diagnosis was based on the integral assessment of symptoms, medical history, health status, and spirometry parameters according to GINA. Metabolic syndrome was diagnosed according to the IDF consensus criteria [14]. The study was approved by local ethics committee, and written informed consent was obtained from all the participants.

A comprehensive clinical examination and laboratory tests included the following procedures:

- Anthropometrical Reference Data: body mass index (BMI) was calculated using Quenelle's formula (in kg/cm²). Waist circumference (WC) was measured using cent metric tape at the navel level on a horizontal line (in cm).
- Assessment of asthma severity included the number of exacerbations, calls to emergency service, and hospital admissions for the past 12 months.
- Quantity assessment of asthma symptoms (dispens, chest tightness, cough, sputum) by the 10-point Visual Analogue Scale (VAS).

- Assessment of asthma symptoms control by Asthma Control Test™ (ACT)
- Functional tests: spirometry
- Assessment of life quality by the Short-Form Health Survey (SF-36)
- Assessment of blood pressure by Korotkov’s method.
- Assessment of fasting plasma glucose (FPG), a 2-hour oral glucose tolerance test (OGTT), blood levels of triglycerides (TG); high-density lipoprotein cholesterol (HDL-C).

Patient education and Exercising

The duration of patient education was 5 weeks: for one week, 5 seminars were held for 1 hour 30 minutes each for groups of 4-5 people. Topics covered were etiology, pathogenesis, symptoms, management and prevention of asthma and metabolic syndrome. All the participants were given books, brochures, information sheets and booklets. The education for patients with asthma and metabolic syndrome included:

- Education sessions discussing breathing techniques, disease processes, respiratory medications, oxygen therapy, and exercise techniques
 - Exercising sessions
 - Nutrition and healthy lifestyle seminar
 - Energy conservation techniques.

Exercising was conducted daily for 30 days, after the education course.

Statistical Analysis

All results are presented as the mean ± SD. All data was evaluated with STATGRAPHICS 5.1 Plus for Windows. Hypothesis testing methods included one way analysis of variance (ANOVA) followed by Least Significant Difference (LSD) test. Significance level at $p < 0.05$ was considered to indicate statistical significance.

RESULTS

During the observation, Group I demonstrated significant changes in some assessment parameters, while Group II showed no statistically significant changes in those parameters.

In Group I patients, we found a decreasing of exacerbations from 3.40 ± 0.16 to 1.40 ± 0.14 ($P=0.0000$), emergency service calls from 2.93 ± 0.12 to 1.53 ± 0.10 ($P=0.0000$), and hospital admissions from 1.73 ± 0.11 to 1.03 ± 0.12 ($P=0.0001$) per year.

There were significant improvements in subjective assessment of asthma symptoms according to VAS: dispend – from 5.93 ± 0.17 to 2.73 ± 0.17 ($P=0.0000$), chest tightness – from 3.16 ± 0.14 to 1.20 ± 0.13 ($P=0.0000$), cough – from 4.37 ± 0.15 to 1.57 ± 0.16 ($P=0.0000$), sputum – from 3.60 ± 0.16 to 1.33 ± 0.16 ($P=0.0001$).

This group indicated significant improvement in asthma symptoms control by ACT. 12/40.0% patients had well controlled asthma symptoms, 14/46.7% patients have partly controlled asthma symptoms, 4/13.3% patients have uncontrolled asthma symptoms. Initially all Group I patients have uncontrolled asthma symptoms ($P=0.0000$). There were significant improvements ACT value from 13.50 ± 0.44 to 21.87 ± 0.63 ($P=0.0000$).

Spirometry results were also significantly improving in Group I (Table 1).

Table 1: Spirometry in two groups

Parameters	Group I		Group II	
	Baseline	After 12 months	Baseline	After 12 months
FVC	65.40 ± 0.66	$71.21 \pm 0.35^*$	64.69 ± 2.67	61.35 ± 0.65
VC	70.43 ± 2.70	$78.51 \pm 0.39^*$	71.15 ± 0.45	69.46 ± 0.91
FEV ₁	61.17 ± 0.84	$69.62 \pm 0.89^*$	59.92 ± 0.80	56.32 ± 1.36

IndexTiffeneau	63.25±0.44	67.57±0.90*	62.77±0.44	57.65±1.23
PEF	55.01±0.38	61.79±1.32*	57.19±0.55	54.68±0.99
MEF ₇₅	41.53±0.32	45.74±0.36*	40.68±0.51	39.47±0.44
MEF ₅₀	44.65±0.38	50.72±0.45*	42.81±0.44	41.49±0.40
MEF ₂₅	47.97±0.42	53.92±0.54*	45.65±0.35	43.15±0.51
FEV ₁ increase	361.43±4.76	238.40±5.93*	59.10±4.80	362.27±3.97

FVC - forced vital capacity, VC - vital capacity, FEV₁ - forced expiratory volume in 1 sec, Index Tiffeneau - FEV₁/FVC, PEF - peak expiratory flow, MEF_{75,50,25} - forced expiratory flow at 75,50,25% FVC; * - P < 0.05.

Patients in this group demonstrated a reliable improvement in the physical and psychological domains, according to SF-36 (Table 2).

Table2: SF-36 parameters in two groups

Parameters	Group I		Group II	
	Baseline	After 12 months	Baseline	After 12 months
PF	60.40±2.53	72.53±1.84*	58.93±2.04	56.07±2.78
RP	42.97±2.88	50.43±2.25*	44.03±1.37	42.85±1.85
BP	48.07±1.68	56.87±2.20*	47.87±2.58	45.90±1.56
GH	46.20±2.63	54.47±2.19*	44.50±1.02	41.31±1.69
VT	51.37±1.99	60.33±2.45*	52.23±2.63	48.07±1.68
SF	50.67±2.08	58.47±2.53*	49.50±1.51	46.17±2.27
RE	52.86±1.79	60.30±2.09*	53.17±2.04	49.05±2.29
MH	63.17±1.87	70.40±2.14*	64.23±2.29	59.50±1.98

PF - Physical Functioning, RP - Role-physical, BP - Bodily Pain, GH - General Health, VT -Vitality, SF - Social Functioning, RE - Role-emotional, MH - Mental Health; * - P<0.05.

Group I displayed significant improvement in WC – from 101.57±2.47 to 94.67±2.23 (P=0.0425) and BMI – from 32.87±0.37 to 31.70±0.38 kg/m² (P=0.0322).

Group I demonstrated a reliable decrease in systolic blood pressure – from 149.53±0.88 to 146.76±0.94 mmHg (P=0.0376) and diastolic blood pressure – from 98.72±1.39 to 9.14±1.09 mmHg (P=0.0031).

No significant differences in the level of serum lipids, FPG and OGTT were found between Group I and Group II. However, it should be noted that Group I indicated a tendency of decreasing in the levels of TG – from 2.01±0.05 to 1.90±0.02 mmol/L (P=0.0577), and increasing in HDL-C level – from 0.92±0.03 to 1.00±0.04 mmol/L (P=0.0599), as well as a tendency of decreasing in FPG level – from 6.73±0.11 to 6.43±0.09 mmol/L (P=0.0527) and OGTT level – from 9.08±0.36 to 8.66±0.22 mmol/L (P=0.0581).

DISCUSSION

High frequency of combination of asthma with metabolic syndrome, multifaceted and quite often controversial researches in this area indicate the need to study the clinico-instrumental characteristics of these patients to improve the algorithms of treatment and preventive programs. The results of our research allowed developing the treatment and prevention program for patients with asthma and metabolic syndrome. According to our data, applying the standard pharmacologic therapy in combination with patient education and exercising resulted in a significant decrease of exacerbations, emergency service calls, and hospital admissions. Combination therapy resulted in decrease of expression asthma clinical symptoms degree, in bronchodilator reversibility and as result well controlled asthma symptoms. Standard pharmacologic therapy in combination with education and exercising resulted also in significant improvement in the physical and psychological domains of the quality of life questionnaire. Additionally, a positive influence on components of metabolic syndrome was noted, which has added positive effects on the psycho emotional state of the patients.

Thus, the use of the standard pharmacologic therapy in combination with education and exercising for the patients with asthma and metabolic syndrome is reasonable to optimize the treatment and prevention process, improve this category's patient's quality of life and decrease the material cost associated with asthma.

The use of education and exercising in complex treatment of patients with asthma and metabolic syndrome leads to significant positive clinical and instrumental indicators: decrease in exacerbations, emergency service calls, and hospital admissions, decrease of day and night expression of asthma symptoms, good control of asthma symptoms, improvement of psychosocial adaptation of the patients, and, as a result, improvement of these patients' life quality.

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Conflict of interest: none declared.

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