Introduction

The majority of current national as well as international guidelines emphasize that the primary goals of asthma management are symptom control and future risk reduction (1, 2). Moreover, the preferred stepwise approach for adjusting pharmacological treatment of asthma depends on the current level of asthma control (1, 2). Although such a strategy is effective in the majority of patients (3), experience from everyday practice indicates a discrepancy between the results of randomized controlled trials and clinical practice. In the setting of unselected asthma populations, observational, cross-sectional surveys show, in general, a high frequency of symptoms and activity limitation related to asthma (4, 5, 6). In addition, patients have a tendency to overestimate the level of their asthma control (6).

Along with a proper choice of medication and treatment of comorbidities, an essential role is played by patient education. Our efforts were directed at modification of lifestyle and improvement of adherence to the disease management regimen (7). Inhaled corticosteroids (ICS) are the cornerstone of pharmacological asthma therapy. According to the current Global Initiative for Asthma (GINA) guidelines, ICS represent the first-line medication intended for the regular treatment of all symptomatic asthma patients (GINA 2018). However, there is a large group of patients who require combination therapy to achieve asthma control. The addition of long-acting β2-adrenoreceptor agonists (LABA) to ICS significantly improves symptoms and lung functions in comparison to the same or even higher dose of ICS (8, 9). Within this context, the GINA document recommends taking advantage of this combination in treatment Steps 3-5 (2).

The purpose of our 3-month prospective study was to investigate the treatment of bronchial asthma with a fixed ICS/LABA combination paired with an intervention aimed at a proper inhaler technique. Better adherence to the treatment regimen would lead to a significant improvement in the initial level of asthma control in uncontrolled asthma patients. A secondary objective was to identify risk factors affecting the achievement of asthma control.

Tab. 1. *Criteria for total asthma control according to the study protocol*

Characteristic	Total asthma control
Day-time symptoms	None
Limitation of activities	None
Night-time symptoms/awakenings	None
Use of reliever/rescue medication	None
Lung functions (FEV1 and FEV1/FVC ratio)	Normal
Exacerbations	None
ACT score	25

FEV1 = Forced expiratory volume at first second
FVC = Forced vital capacity
ACT = Asthma Control Test (10)

Materials and Methods

Subjects

Adult asthma patients (≥ 18 years) who had at least a 6-month history of bronchial asthma diagnosed according to the national guidelines were recruited by the investigators (1). All enrolled patients failed to meet the pre-defined criteria for total asthma control despite regular asthma treatment for at least 3 months. The criteria for total asthma control (shown in Table 1) were based on a composite outcome measure resulting from lung function assessment (using spirometry), the frequency of symptom occurrence, use of rescue therapy, history of exacerbations, and Asthma Control Test (ACT) score (10). The exacerbation frequency data referred to the previous 3-month period and the usage of rescue therapy applied in the week before the baseline visit. Exacerbation events were defined according to the GINA 2017 document. The study was approved by the local ethics committees and was conducted in accordance with the Declaration of Helsinki and Good Clinical Practice guidelines. The patients signed an informed consent form before being enrolled in the study.

Study Design and Interventions

Our study was a 3-month, multicenter, open-label, prospective real-life study in adult patients with bronchial asthma who did not meet the criteria for total asthma control (Table 1). A total of 40 selected outpatient offices which specialized either in clinical immunology/allergology or pneumology/phthisiology in the Slovak Republic participated in the study. The goal of our study was to reflect the settings of routine clinical practice.

Within the study period, all enrolled patients underwent a total of five visits according to the protocol. The initial baseline visit was followed by a subsequent „visit 1" and „visit 2" at two-week intervals. „Visit 3" and „visit 4" were carried out at 4-week intervals. At the „baseline visit", the physician recorded the following: complete clinical history, demographic data, disease symptoms, data on comorbidities (according to available medical records), exacerbation history, and current asthma treatment including the frequency of reliever medication use. Every patient underwent spirometry testing with subsequent interpretation of lung function tests (11), and completed an ACT questionnaire. The physician objectively assessed the level of asthma control and decided on the patient's eligibility for enrollment in the study, according to the inclusion criteria. Finally, treatment with a fixed-dose combination ICS/LABA fluticasone propionate/salmeterol xinafoate in dry powder inhaler DiskusTM (FSC) was prescribed with an intention to achieve and maintain asthma control. All patients were instructed by a physician and/or a trained nurse on the principles of proper inhaler handling and the importance of treatment adherence. At all following visits (i.e., „visits 1-4"), data collection according to the protocol was performed in order to recognize possible changes in the level of asthma control (including pulmonary function testing, ACT questionnaire, reliever medication use, and occurrence of symptoms) and medication adherence (an interview aimed at verification of days covered with the recommended use of prescribed asthma medication). The patient's physician ultimately decided on FSC dosage for the period until the next visit.

Statistical methods

Discrete (qualitative) variables were specified utilizing absolute and relative frequency (n, %). The continuous variables were analyzed using arithmetic mean and standard deviation (SD). The significance of the type of variable and the numbers of groups compared was tested through the