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Original article

Problems of elderly patients on inhalation therapy: Difference in problem recognition between patients and medical professionals

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COPD	chronic obstructive pulmonary disease
NRS	numerical rating scale

ABSTRACT

Background: There is no systematic analysis to identify problems involved with instruction on inhalation therapy for elderly patients. We conducted a nationwide questionnaire survey for patients and medical professionals.

Methods: A questionnaire survey was conducted of adult patients on inhaled drugs (ages 18–92 years, 820 individuals) and medical professionals (pharmacists or nurses) who provided instruction on inhalation therapy to these patients in 23 institutions in Japan to investigate the technique and the level of understanding (knowledge) of the inhalation therapy. Changes in the recognition of performance of inhalation technique and inhalation knowledge with increasing age were analyzed.

Results: According to patients' subjective assessment, there was no deterioration in the performance of the inhalation technique or loss of the knowledge with increasing age. On the other hand, medical professionals' objective assessment revealed a significant loss of both inhalation technique and knowledge with increasing age. Not many elderly patients noticed their own problems themselves, revealing a great perception gap between elderly patients and medical professionals. Thus, there was concern that patients would unconsciously practice the inhalation procedure improperly. On the other hand, in comparison with non-elderly patients, elderly patients were less resistant to continuation of therapy, suggesting that they would be more likely to accept instruction on inhalation therapy.

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ROC receiver operating characteristic

Conclusions: Elderly patients are apt to assume that they "understand well", therefore, in order to recognize and close the perception gap between elderly patients and medical professionals, it is necessary to provide them with more aggressive (frequent) instructions on inhalation therapy.

Introduction

Inhalation therapy plays an important role in the treatment of asthma and chronic obstructive pulmonary disease (COPD).[1,2] Inhaled drugs, unlike oral drugs, should be delivered to the target site by inhalation by the patient; therefore, an appropriate inhalation technique is indispensable to achieve an adequate therapeutic effect.[3,4] However, there have been a number of reports regarding cases of inappropriate inhalation techniques.[5,6] Factors reported as causing inappropriate inhalation techniques include age,[7,8] sex,[9,10] and the types of inhalation devices.[11,12] In particular, age is considered to be an important factor. Age-related problems may include decreased cognitive function and physical function according to increased age that interfere with the proper performance of the inhalation technique. In addition, the mortality from asthma is higher in the elderly than in the young. Therefore, to decrease the overall mortality from asthma, implementation of appropriate inhalation therapy in elderly patients is important.[13–15]

Moreover, if problems specific to elderly patients in relation to inhalation therapy are apparent, it is possible to expect improved quality of inhalation therapy through the provision of proper instruction on inhalation therapy to elderly patients who tend to have poor inhalation technique. In this context, we focused on the divergence of recognition between patients and medical professionals in elderly patient, and conducted a multicenter questionnaire survey aimed at comparing the results of subjective assessment by patients and the objective assessment by medical professionals to identify problems particular to elderly patients.

Methods

This study was conducted between February 2014 and March 2015 and covered 23 institutions nationwide that participated in activities of the Association of Inhalation Therapists which is a nonprofit organization consist of doctors and pharmacists who works in the area of inhalation therapy. Patients meeting the inclusion criteria were surveyed by using a questionnaire about age, sex, the knowledge and technique of inhalation therapy, person who provided instruction, presence/absence of gargling, and specific problems (continuity, technique, manipulation, actual sensation of inhalation, understanding of the necessity of therapy, side effects), and medical professionals who provided instruction on inhalation therapy to these patients (mainly pharmacists and nurses) were also surveyed by questionnaire about the patient's knowledge and technique of inhalation therapy and specific problems (understanding of the technique, physical problems involved in manipulation, living environment including solitary living, and understanding of the necessity of therapy) (Supplementary Table 1). All participants gave oral informed consent.

Inclusion criteria: Patients aged 18 years or older who were on inhaled drugs for the treatment of asthma or COPD and had been using inhaled drugs continuously for at least two weeks were included in this study.

Exclusion criteria: Patients were also not eligible if it was difficult for them to respond to the questionnaire because of decreased cognitive function.

The data obtained were stratified by 5-year age groups to analyze the results of patients' subjective assessment and medical professionals' objective assessment about the knowledge and technique of inhalation therapy rated by the NRS. The difference in recognition between patients and medical professionals was also examined, based on the calculation according to Eq. (1) shown below:

$$\text{Difference in recognition between patients and medical professionals} = \text{medical professionals}' \text{ objective assessment} - \text{patients}' \text{ subjective assessment} \quad (1)$$

Variations in NRS scores with increasing age were analyzed by the Jonckheere–Terpstra test at a significance level of $P < 0.001$.

Concerning inhalation knowledge and technique, when patients' subjective assessment was better than medical professionals' objective assessment (misconception of poor performance as good: difference in recognition between patients and medical professionals < 0), the difference was defined as a negative divergence. In this case, the effects of age as a determinant for causing a negative divergence of recognition between patients and medical professionals were studied by receiver operating characteristic (ROC) analysis, and the cutoff value (age at the maximum value of Youden's index = sensitivity−[1−specificity]) was calculated.

The inhalation technique may vary according to the type of inhalation device. In this regard, multivariate logistic analysis was conducted to evaluate the confounding effect of age and the inhalation device in cases where there was a negative divergence of recognition regarding inhalation technique between the patients and the medical professionals. The presence/absence of a negative divergence was used as the dependent variable, and age and the type of inhalation device (devices used by at least 10% of all patients: Diskus, Turbuhaler, pMDI) and the count of all inhalation device were used as explanatory variables.

Patients were divided into two groups by the cutoff value obtained by ROC analysis, and the frequencies of specific problems found by subjective and objective assessment were compared between the groups. The frequencies of specific problems in these two groups were compared by the chi-squared test or Fisher's exact test at a significance level of $P < 0.01$. SPSS ver. 22 (IBM Corp., Armonk, NY, USA) was used for processing statistical analyses. This study was conducted with the approval of the Ethics Boards of Saint Marianna University School of Medicine as a representative of all participating institution (Approval number: 2562). Some participating institutions, including Shiga University of Medical Science (Approval number: 26-37), independently obtained the approval of each Ethics Boards as needed.

Results

The completed questionnaires of 867 patients from 23 institutions located nationwide were collected. Among these respondents, 36 patients who provided incomplete data that lacked information on age or NRS scores, and 11 patients who were under 18 years of age were excluded, and a total of 820 patients were