**Trigger factors in asthma and chronic obstructive pulmonary disease: a single-centre cross-sectional survey**

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**INTRODUCTION**

The presence of trigger factors may help to distinguish asthma from chronic obstructive pulmonary disease (COPD). Knowing and avoiding trigger factors for both asthma and COPD can facilitate the design of comprehensive management programmes that can aid disease control. This study aimed to describe the relative frequency and range of various trigger factors in asthma and COPD.

**METHODS**

We conducted a telephone-based survey involving asthma and COPD patients on follow-up at a university hospital in Singapore.

**RESULTS**

A total of 779 asthma patients and 129 COPD patients participated in this study. Among these patients, 93.8% of those with asthma and 42.6% of those with COPD had trigger factors (p < 0.001). The median number of trigger factors was greater among asthma patients than among those with COPD (3 vs. 0, p < 0.001). Trigger factors found to be significantly more prevalent among asthma patients compared to those with COPD include tobacco smoke, alcohol, upper respiratory tract infections, incense smoke, perfume, laughter, a dusty environment, air-conditioning, heavy rain, heavy traffic fumes, citrus fruits, gastro-oesophageal reflux, household pets, flowers/pollen, medications and psychological triggers. Trigger factors that were not previously described, such as bathing, fatigue, insufficient sleep, crowded places and overeating, were also reported.

**CONCLUSION**

Trigger factors, although found in both groups of patients, were more common among asthma patients. Knowledge of these trigger factors may be useful in distinguishing between the two diseases and optimising disease management.

Keywords: asthma, chronic disease, chronic obstructive pulmonary disease, disease management, precipitating factors

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gastro-oesophageal reflux symptoms (e.g. heartburn), household pets, household pests,\(^{21}\) flowers (i.e. pollen),\(^{22}\) medications\(^{23}\) and psychological triggers (e.g. anxiety, depression and anger).\(^{24}\)

The questionnaire included an open-ended question that asked patients about any other trigger factors known to aggravate their condition.

Statistical analysis was performed using SPSS Statistics version 17.0 for Windows (SPSS Inc, Chicago, IL, USA). Results were presented as mean ± standard deviation, or median (interquartile range [IQR]). Fisher’s exact test was used for nominal data, Mann-Whitney \(U\) test was used for ordinal data and Student’s \(t\)-test was used for continuous data (after verifying normality and equality of variances). Baseline characteristics and the frequency of various trigger factors among the patients with asthma and those with COPD were compared. We described summary data for miscellaneous trigger factors that were not specifically addressed in the questionnaire. A \(p\)-value < 0.05 indicated statistical significance and all tests performed were two-tailed.

**RESULTS**

A total of 1,289 asthma patients and 192 COPD patients were eligible for inclusion in the study. Among these patients, 779 (60.4%) asthma patients and 129 (67.2%) COPD patients agreed to participate in the telephone survey. The overall participation rate was 61.3%.

The overall ethnic distribution of the patients was 52.3% Chinese, 34.3% Malay, 11.5% Indian and 2.0% other ethnicities. Among the survey participants, spirometry data was found for 684 (87.8%) asthma and 122 (94.6%) COPD patients. Patients with COPD were more likely to be of older age, male and currently smoking tobacco, as compared to those with asthma (Table I). As expected, COPD patients also had significantly poorer lung function than those with asthma; they also predominantly had moderately severe disease (i.e. Stage III), as defined by the Global Initiative for Chronic Obstructive Lung Disease.\(^{12}\)

We found that more than twice the number of asthma patients had at least one trigger factor as compared to COPD patients (93.8% vs. 42.6%, \(p < 0.001\)). In addition, more asthma patients had multiple trigger factors. The median number of trigger factors was also greater among asthma patients than among those with COPD (3 [IQR 2–4] vs. 0 [IQR 0–1], \(p < 0.001\); Table II). All the trigger factors surveyed were significantly more prevalent among asthma patients than COPD patients, except for chemical exposure at work, hot weather and household pests (these three factors were not significantly different between the two groups). In this survey, we reported several trigger factors that, to the best of our knowledge, were not previously described, including bathing, fatigue, insufficient sleep, crowded places and overeating.

**DISCUSSION**

In this study, we showed that there is a wide range of trigger factors for asthma and COPD, and identified novel trigger factors such as bathing, fatigue, insufficient sleep, crowded places and overeating. A substantial proportion of the participants had trigger factors that exacerbated their symptoms (93.8% of asthma patients...
and 42.6% of COPD patients). Asthma patients were found to have more trigger factors than those with COPD (median 3 vs. 0).

More than 90% of the asthma patients in our study reported at least one trigger factor. Qualitatively, some of the trigger factors examined in the present study, such as laughter and anxiety, have been proposed to be markers of suboptimal asthma control and near-fatal asthma. Quantitatively, an increased number of trigger factors has been linked to poorer asthma control. As such, trigger factors in COPD is under-recognised. We highlight that although non-atopic mechanisms, such as the direct irritation of diseased airways, could occur and may account for the presence of trigger factors in COPD.

One strength of the present study is its relatively large sample size, making it one of the largest studies to examine trigger factors of asthma. We were therefore able to explore a larger range of potential contributors. This is also one of the few studies that investigated the trigger factors of COPD. Furthermore, while several trigger factors found in our tropical context are also found in temperate conditions, the local climate and culture allowed us to explore the effects of triggers such as heavy rain and exposure to incense smoke.

The present study also had several limitations. Firstly, the use of a questionnaire for data collection subjected the data to recall bias. Nevertheless, this is similar to actual clinical practice where history-taking is the primary method for identifying trigger factors. Secondly, the response rate was moderate at 61.3%. However, as the resulting sample size was still fairly large, the findings were likely to be representative of our patient cohort. Thirdly, we used the cohort of asthma and COPD patients from our hospital’s follow-up database, which could impact the applicability of the results to patients on follow-up with primary care physicians. Nonetheless, the patients who would benefit the most from additional information on disease management are most likely to be those who require tertiary care. Fourthly, we did not collect detailed clinical and laboratory data on the baseline severity and control of asthma, and skin prick testing was not routinely performed for our patients. These factors, however, would not have affected the results or conclusions of the present study. Finally, previously validated questionnaires (e.g. for trigger factors, anxiety and depression) were not used in this study, as we wanted to minimise the survey burden and maximise participation.

The clinical implications of the present study are threefold. Firstly, we empirically validated the recommendation by GINA to use trigger factors for distinguishing asthma from COPD. Based on the findings of the present study, it is also possible that COPD patients with multiple trigger factors may have asthma-COPD overlap syndrome, which has been associated with increased illness severity and healthcare utilisation. In other words, knowledge of trigger factors may help to identify this important clinical phenotype.

Secondly, our findings suggest that the importance of trigger factors in COPD is under-recognised. We highlight that although trigger factors are more common in asthma patients, they also occur frequently in COPD patients. In the present study, nearly half of the COPD patients had at least one trigger factor. Among COPD patients (as well as asthma patients), non-infectious triggers such as dust, hot weather and heavy rain were more frequently reported than infectious trigger factors such as upper respiratory...
tract infections; this is a fact that may not be widely appreciated. Specifically, the proportions of asthma patients with infectious triggers, pollutant-related triggers (e.g. tobacco smoke, heavy traffic fumes and incense smoke) and other non-infectious triggers (e.g. stress) were 29.5%, 33.5% and 90.6%, respectively. The corresponding proportions for COPD patients were 9.3%, 4.7% and 38.8%, respectively. Hence, trigger factor control can be valuable in the management of both COPD and asthma.

Thirdly, this study provided information on a wide range of trigger factors. This information can be used to facilitate comprehensive trigger factor management, either by avoidance or desensitisation. Prior research has shown that avoidance measures directed narrowly toward single allergens were not effective. On the other hand, a structured system of avoidance against multiple allergens has been shown to result in improved symptoms and spirometry-derived indices of lung function among patients with atopic asthma. It is our hope that the findings of the present study will help enhance management plans for asthma and COPD, as well as improve the advice given to asthma and COPD patients. For example, patients could be presented with the whole range of trigger factors explored in this study so that they can quickly identify the problematic ones. While we recognise that some environmental and climatic trigger factors are difficult to avoid (e.g. those that impair the patient’s quality of life), we believe that most of the factors (e.g. tobacco smoke, perfume, certain types of foods and gastro-oesophageal reflux) can be readily mitigated. Furthermore, we noted that a substantial percentage of the patients in the present study were adversely affected by emotional changes (e.g. anxiety, anger or depression). This group of patients could potentially benefit from adjunctive psychological treatment strategies.

The present study helps to provide a fair idea of the range and proportions of trigger factors in asthma and COPD patients. The next step could be correlating these trigger factors to disease control, symptoms, exacerbation and healthcare utilisation. Although this was done for asthma patients in prior studies, there is a need for validation in the Asian setting. Clinically important trigger factors could be used to design management programmes that incorporate mitigation of exposure to aggravating substances. Similar questionnaire surveys could also be conducted in other settings to search for more unusual trigger factors. Although we were not able to offer a definite biological explanation for these novel trigger factors, the identification of such factors could still be useful in improving the management of asthma and COPD. For instance, if fatigue is found to trigger asthma or COPD, the relevant patients could be advised to ensure that they get sufficient rest or sleep.

In conclusion, a broad range of trigger factors exists for both asthma and COPD, although asthma patients tend to have a greater number of trigger factors. Knowledge of these trigger factors may help in the differential diagnosis of asthma and COPD, and mitigation of these trigger factors may improve disease management.

ACKNOWLEDGEMENTS

The authors sincerely thank the following collaborators for contributing to the data collection: the research nurses from the School of Health Sciences, Ngée Ann Polytechnic, Singapore; Ms Dong-Xia Shi, Pulmonary Function Laboratory, National University Hospital, Singapore; and Ms Wang-Jee Ngerng, Division of Respiratory and Critical Care Medicine, National University Hospital, Singapore.

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