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Factors related to poor asthma control in Latvian asthma patients between 2013 and 2015

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ABSTRACT

Objectives: To investigate whether beliefs about asthma medication, cognitive and emotional factors are related to poor asthma control in a sample of Latvian asthma patients in 2015.

Design: Cross-sectional, self-administered survey.

Subjects: Three hundred and fifty two asthma patients (mean age 57.5 years) attending outpatient pulmonologist consultations in Riga, Latvia during September 2013 to December 2015. The sample size was calculated to detect a prevalence of poor asthma control of 50% with a margin of error of 5% and a power of 95%.

Main outcome measures: The validated Beliefs about Medication Questionnaire (BMQ) and the Brief Illness Perception Questionnaire (brief IPQ) were used. Good asthma control was assessed using the asthma control test (ACT), a validated five-item scale that reliably assesses asthma control over a recall period of four weeks. Logistic regression models were used to predict poor asthma control.

Results: Patients who had a good control of asthma medication (OR 0.70; 95% CI 0.61–0.79) or were confident that their asthma medication improves illness (OR 0.84; 95% CI 0.74–0.95) had a reduced risk of poor asthma control. The more symptoms (OR 1.63; 95% CI 1.44–1.84) the asthma patients perceived or the more their illness affects their life, the higher the probability of poor asthma control (OR 1.47; 95% CI 1.31–1.65). Some beliefs of necessity and concerns of asthma medication were also statistically significantly related to poor asthma control.

Conclusions: Beliefs of necessity of asthma medication, cognitive and emotional illness perception factors correlate well with poor asthma control in Latvian patients.

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Introduction

Globally, about 300 million people are suffering from asthma, and current estimations suggest that an additional 100 million people may be living with asthma by the end of 2025 [1,2].

According to current clinical evidence, compliance to asthma medication is poor, with reported rates of non-compliance ranging from 30 to 70% [3–5]. There is common agreement that low treatment adherence explains in great parts the observed insufficient disease control in asthma patients in both Europe and worldwide as adequate asthma control requires the use of regular asthma medication [1,6–8]. The principal goal of asthma treatment is to achieve adequate asthma control in order to prevent disease progression and functional limitations that a patient experiences due to his disease [1,9]. In addition, good asthma control has been shown to improve quality of life in both children and adult patients [10–12].

One of the key roles of the healthcare professional is to adjust asthma treatment to reach and maintain optimal control. Generally, good control may also depend on several other factors such as individual's understanding of his disease, the necessity or concerns of the current treatment [13–15]. Especially, the necessity-concern framework of the self-regulation theory proposed may affect asthma control as an individual's understanding of his or her disease and its treatment may be an important mediator of key health behaviours, such as medication use [16]. However, there is limited evidence about associations between medication beliefs, illness perception and asthma control. The few studies that have assessed one of the above mentioned indicators were mainly conducted to test

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associations with treatment compliance related to specific medication such as corticosteroids but not with the control of the disease in general [17–18]. Furthermore, there is only limited information available about treatment and control of asthma patients in the Baltic countries such as Latvia.

The aim of this study was to investigate whether beliefs about asthma medication, and cognitive and emotional factors are related to good asthma control in a sample of Latvian asthma patients in 2015.

Materials and methods

Study population

The study population of this cross-sectional patient survey consisted of asthma patients attending outpatient pulmonologist consultations in Riga, Latvia during September 2013 to December 2015. Latvian patients in most cases will receive their initial disease diagnosis and treatment initiation in a pulmonologist practice. They get there in larger part by a referral by a general practitioner (GP) or alternatively by direct patient contact. The majority of GPs refer their asthma and COPD patients to a specialist at least once a year for control. The role of GPs within the Latvian health care system is mainly to ensure that a patient follows the treatment regime set forth by the specialist. Only patients referred by a GP to a NHS registered practice can get their medication reimbursed by NHS. In a first step, a list of all pulmonologists from the database of the National Health Service (NHS) of the medical doctors that have contractual rights to prescribe reimbursed medicines was acquired. Then, pulmonologists in large medical centres and hospitals in Riga and in bigger towns of Latvia were randomly selected and invited to join the study. The total number of participating pulmonologist practices was 15. Each pulmonologist was advised to invite his patients to join the survey. The sample size was calculated to detect a prevalence of poor asthma control of 50% with a margin of error of 5%, and a power of 95%. The total sample size needed and respectively studied was 352 people. Only patients that have been using asthma medication for at least one year were included in this study.

Assessment of main variables

A self-administered questionnaire was used to assess socio-demographic and economic factors such as age, education, income and sex. Good asthma control was assessed using the asthma control test (ACT), a validated five-item scale that reliably assesses asthma control over a recall period of four weeks. The ACT consists of the following questions: 'How much of the time did your asthma keep you from getting as much done at work, school or at home?'. 'How often have you had shortness of breath?'. 'How often did your asthma symptoms wake you up at night or earlier than usual in the morning?', 'How often have you used your rescue inhaler or nebulizer medication?' and 'How would you rate your asthma control?'. Each item was scaled from 1 to 5, and by summing the response values a scale score was calculated ranging from poor (5) to total (25) control [19,20]. ACT scores have shown to be well correlated with baseline per cent predicted forced expiratory volume [20].

Medication beliefs were assessed using the five items of greatest relevance to asthma medication adapted from the Beliefs about Medication Questionnaire (BMQ), a validated tool across many disease conditions [21,22]. The specific–necessity scale contains five items that assess patients' beliefs about specific necessity to take prescribed chronic medications. All three questions assessing patients' beliefs about specific necessity to take prescribed chronic medications or concerns were selected from the original BMQ. All belief items had Likert scale responses.

The Brief Illness Perception Questionnaire (brief IPQ) was used to obtain information on illness perception of the study participants. The Brief IPQ consists of eight items and a causal question [17,23,24]. All of the items except the causal question are rated using a 0 to 10 response scale. Five of the items assess cognitive illness representations: consequences (item 1), timeline (item 2), personal control (item 3), treatment control (item 4) and identity (item 5). Two of the items assess emotional representations: concern (item 6) and emotions (item 8). One item assesses illness comprehensibility (item 7). Assessment of the causal representation is by an open-ended response, which asks patients to list the three most important causal factors in their illness (item 9).

Statistical analysis

The Statistical Package for the Social Sciences (SPSS) IBM 21.0 was used to analyse the data. Means, standard deviations, and frequencies are presented to describe the characteristics of the study sample. A cut-off point of $\leq$19 was defined to indicate poorly controlled asthma, and scores of 20 points or more corresponded to well-controlled asthma [19,20]. The answers of the BMQ were dichotomized into (i) 'I agree/I completely agree' and (ii) 'Not sure/I disagree/I

completely disagree' similar to the methods of previous study to ease clinical application [18,25]. The logistic regression analyses were first conducted for each variable alone. In the multivariate logistic analysis the outcome variable was controlled for age, income and educational level. The odds ratio (OR) and respective 95% confidence interval are presented for all models. The OR presented in Tables 3 and 4 are for the 'I agree/I completely agree' categories with the 'Not sure/I disagree/I completely disagree' category as reference group. The validity of each logistic regression model was assessed by the Hosmer/Lemeshow test.

Results

The baseline characteristics of the study population are presented in Table 1. Among the study participants, 75% were women ($n = 264$). The majority of the patients had at least professional education and were earning at least 300 euros per month. Two out of three patients were using corticosteroids and one third a combination therapy consisting of corticosteroids and a beta 2 mimetic drug. The prevalence of poor asthma control was 63% in men and 66% in women.

Whereas age and income were predictors of poor asthma control, educational level, use of corticosteroids or sex were not statistically significantly related to poor asthma control (Table 2). An income level of more than 300 euros/month statistically significantly reduce the probability of having asthma poorly controlled compared to the <300 euro/month patient group. The corresponding OR were 0.39 (300–550 euros/month), 0.28 (550/750 euros/month) and 0.24 (>750 euros/month), respectively.

Table 3 shows the results of the logistic regression analysis of the different beliefs about medicines in regard of poor asthma control. Agreement on necessity of asthma medication was statistically significantly related to an increase in the odds of poor asthma control. The increase in risk of poor asthma control was almost three-fold in patients who were convinced that their life fully depends on their medication (OR 2.89; 95% CI 1.78–4.71). In addition, beliefs such as 'without asthma medication life would be impossible' (OR 2.69; 95% CI 1.56–4.12) or 'without asthma medication the patient would be very ill' (OR 2.69; 95% CI 1.66–4.38) were significantly related to poor asthma control after adjustment for age, education and income. Finally, if the patient was concerned by the need to use his asthma medication constantly, the probability of poor asthma control doubled (OR 1.94; 95% CI 1.19–3.17) compared to those without concerns. Neither were concerns regarding long-term use nor understanding of ones asthma medication statistically significantly related with poor asthma control.

Several cognitive and emotional illness indicators predicted poor asthma control in the study patients regardless of controlling for other covariates (Table 4). The more the asthma patients perceived that their illness affect their life, the higher the probability of poor asthma control (OR 1.47; 95% CI 1.31–1.65). On one hand, estimated duration, concern and emotional affection of asthma increased the odds of poor asthma control. On the other, a better self-perception of asthma control (OR 0.7; 95% CI 0.61–0.79) or considering that the current treatment is helpful (OR 0.84; 95% CI 0.74–0.95) were related to improved asthma control. Understanding their

Table 1. Baseline characteristics of the study sample.

	Men ($n = 85$)	Women ($n = 264$)	Total ($n = 352$)
Age, mean (SD)	53.7 (17.4)	58.7 (16.6)	57.5 (16.9)
Education, %			
Basic	3.5	7.5	6.5
Secondary	23.3	27.1	26.1
Professional	47.7	28.9	33.5
Higher[a]	25.6	36.5	33.8
Income, %			
<300 €/month	16.7	25.3	23.2
300–550 €/month	36.9	48.2	45.5
550–750 €/month	28.6	18.3	20.8
>750 €/month	17.9	8.2	10.6
Asthma medication, %			
Inhaled corticosteroids	62.8	63.4	63.3
Inhaled corticosteroids + beta 2 mimetic	33.7	33.2	33.3
Poor asthma control[b], %	62.8	66	65.3

[a]Bachelor, masters and PhD levels.
[b]ACT score ≤19.

Table 2. Odds ratio of sociodemographic and socio-economic factors in regard poor asthma control.

	Univariate	
	OR[a]	(95% CI[b])
Age	1.02	(1.00–1.03)
Female sex	1.15	(0.70–1.91)
Education[c]		
Basic or secondary	1	Ref.
Professional	1.08	(0.62–1.89)
Higher	0.61	(0.36–1.04)
Income		
<300 €/month	1	ref.
300–550 €/month	0.39	(0.20–0.76)
550–750 €/month	0.28	(0.13–0.59)
>750 €/month	0.24	(0.10–0.58)
Asthma medication		
Inhaled corticosteroids	0.94	(0.60–1.48)
Inhaled corticosteroids + beta 2 mimetic	1.33	(0.83–2.13)

[a]Odds ratio.
[b]Confidence interval.
[c]Bachelor, masters and PhD levels.

Table 3. Odds ratio of patients' beliefs about specific necessity and concerns about medicines in regard poor asthma control.

	Univariate		Multivariate[c]	
	OR[a]	(95% CI[b])	OR	(95% CI)
Necessity				
My health is fully dependent on the asthma medication	2.85	(1.80–4.50)	2.89	(1.78–4.71)
Without asthma medication my life would be impossible	2.51	(1.60–3.93)	2.53	(1.56–4.12)
Without my asthma medication I would be very ill	2.75	(1.75–4.33)	2.69	(1.66–4.38)
My future health depends on my asthma medication	1.63	(1.02–2.60)	1.54	(0.94–2.54)
Controlling my asthma medication prevents health deterioration	1.00	(0.57–1.76)	0.91	(0.49–1.68)
Concerns				
I am concerned by the need to constantly use my asthma medication	1.90	(1.20–3.01)	1.94	(1.19–3.17)
I am sometimes concerned by long term effects of my asthma medication	1.45	(0.92–2.27)	1.33	(0.82–2.15)
My asthma medication is incomprehensible to me	1.00	(0.58–1.72)	0.82	(0.45–1.47)

[a]Odds ratio.
[b]Confidence interval.
[c]Adjusted for age, education and income.

Table 4. Odds ratio of each of the eight items of the cognitive and emotional illness questionnaire in regard probability of poor asthma control.

	Univariate		Multivariate[a]	
	OR[b]	(95% CI[c])	OR	(95% CI)
How much does your illness affect your life?	1.46	(1.32–1.62)	1.47	(1.31–1.65)
How long do you think your illness will continue?	1.14	(1.05–1.25)	1.16	(1.05–1.27)
How much control do you feel you have over your illness?	0.69	(0.62–0.78)	0.70	(0.61–0.79)
How much do you think your treatment can help your illness?	0.84	(0.75–0.95)	0.84	(0.74–0.95)
How much do you experience symptoms from your illness?	1.65	(1.47–1.85)	1.63	(1.44–1.84)
How concerned are you about your illness?	1.24	(1.15–1.34)	1.23	(1.14–1.34)
How well do you feel you understand your illness?	1.00	(0.92–1.08)	1.00	(0.92–1.09)
How much does your illness affect you emotionally? (e.g. does it make you angry, scared, upset or depressed?)	1.34	(1.24–1.45)	1.36	(1.25–1.48)

[a]Adjusted for age, education and income.
[b]Odds ratio.
[c]Confidence interval.

illness did not affect asthma control in the study population.

Discussion

Our study showed that some beliefs of necessity of asthma medication as well as cognitive and emotional illness perception factors correlate well with poor asthma control in Latvian patients. Naturally, our study had some limitations. Asthma control was measured by a self-report questionnaire not previously validated in the Latvian population. Clinical measurements of asthma control may be more precise and objective. However, the ACT has been successfully validated in other studies consisting of a similar population to ours and has shown to be well correlated with baseline per cent predicted forced expiratory volume [20]. Thus, the ACT may correlate well with forced expiratory volume in the Latvian population as well. In addition, as this study is cross-sectional in design, no conclusions on causality can be drawn. Finally, even though the patients of this study were recruited from the main towns and the capital city where the majority of the Latvian population live, the results cannot be generalized to the overall population of Latvian asthma patients.

Guideline-defined asthma control can be attained and maintained for the majority of patients in controlled research settings, but current evidence indicates that many asthmatic patients do not achieve an acceptable asthma control in real-life clinical practice [9,26,27]. In our study, two out of three patients had poor asthma control measured by the ACT. Even though assessing asthma control with only symptoms and not clinical measurements usually overestimates the result, our estimates of poor asthma control is in line with previous findings from European studies revealing a prevalence of 49–76% of poor asthma control in various European populations [7,8,28–30]. The AIRE study conducted in seven European countries (France, Germany, Italy, The Netherlands, Spain, Sweden and UK) showed that just 5.3% of all patients in European countries met all the GINA criteria for asthma control. 46% of patients reported daytime symptoms and 30% asthma-related sleep disturbances at least once a week [7]. A Spanish study on the other

hand found a high number of patients with inadequate asthma control, with slightly higher figures in winter than in spring (74.4 versus 71%) [30]. Furthermore, a cross-sectional study performed in 29 countries of America, Europe and Asia on 7786 adults' asthma reported that in Central and Eastern European close to 70% of asthma patients experienced that their disease limited their normal daily activities [8]. Finally, the European Community Respiratory Health Survey II reported that 85% of the asthmatic adults who had used corticosteroids (ICS) in the last 12 months were not able to achieve total control of the disease. Among those who had not used ICSs in the past year, the prevalence of uncontrolled asthma was 54% [29].

As shown in this and other studies, there is a strong influence of beliefs about illness and treatment on self-management of asthma [31]. Previous studies have shown that individuals with asthma who believe that their medication is necessary for their present and future health or that it prevents exacerbation of their disease are more likely to have their asthma well controlled [32]. In contrast, individuals who are concerned about their asthma medication are more inclined to deviate from the prescribed treatment [14,15,25]. Patients often make treatment choices according to their own understanding and beliefs about the illness and treatment [33]. Patients' adherence to medication is particularly influenced by the way in which they evaluate their personal need for medication relative to their concerns about potential negative effects of taking it [21,33]. This is in line with the results of our study indicating that asthma patients concerned about their medications had a 2–3 fold higher probability to have poor asthma control. Furthermore, a recent Australian study indicated that personal health beliefs about control can undermine adherence to medical and environmental remediation advice and likely contributes to high rates of uncontrolled asthma [34].

In conclusion, our findings may have several practical applications in the care of asthma patients. Existing questionnaires assessing beliefs of medication necessity, cognitive or emotional illness perception may be used to identify patients with poor asthma control, in order to help them to identify problems of poor control and offering better treatment solutions. If these tools were integrated within the pulmonologist practices where the vast majority of asthma patients receive their initial disease diagnosis and treatment initiation, they could help in designing individualized asthma treatment plans, and thus reduce the short and long-term complications of asthma improving the quality of life of asthma patients.

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