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Quality of life in non-infectious rhinitis and asthma*

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SUMMARY

In this study we evaluated how the quality of life in subjects with asthma was affected by a history of non-infectious rhinitis.

The study comprised 180 persons with asthma and 156 controls, who answered the Short Form 36 quality of life questionnaire. Both the asthma subjects and the controls were stratified according to a history of non-infectious rhinitis (NIR).

The global physical quality of life score (PCS) was significantly lower for all the asthma subjects regardless of their previous history of NIR compared to controls (NIR positive asthma, -8, p=0,001, NIR negative asthma, -9, p=0,001). The subjects with asthma and a positive history of NIR obtained significantly lower scores for their global mental quality of life (MCS) than the controls (46 vs 51, p=0.004). The subjects with asthma and a negative history of NIR obtained MCS scores that were similar to those of the controls (50 and 51, p=0.9).

In this population based study, the physical Qol of the subjects with asthma was lower regardless of a previous history of NIR compared to controls. A positive history of NIR in asthma was however associated with a poorer mental Qol.

Key words: quality of life, asthma, non-infectious rhinitis, SF 36

INTRODUCTION

The Short-form 36 (SF-36) is one of the world's most recognised quality of life (Qol) questionnaires for assessing the patients' own perception of well-being (Ware et al., 1992; Bousquet et al., 1994). The SF-36 has been used in several studies to assess Qol in asthma and the overall conclusion is that asthma primarily imposes physical limitations on Qol (Bousquet et al., 1994; van der Molen et al., 1997; Ried et al., 1999; Osman et al., 2000). Rhinitis is associated with asthma in 75-78% of patients (Greisner et al., 1998; Leynaert et al., 2000), but only one previous study has evaluated the relative Qol burden of rhinitis in subjects with asthma (Leynaert el al., 2000). The result showed that perennial allergic rhinitis was associated with significantly lower mental Qol scores compared to controls. Additional asthma did not produce a further deterioration in mental Qol, but subjects with asthma, who did not have perennial allergic rhinitis, were not evaluated because of a small number of subjects. The extent to which asthma without rhinitis is associated with a poor mental Qol thus remains unclear.

The aim of the present study was to evaluate how a history of non-infectious rhinitis (NIR) affects Qol in subjects with asthma, especially in the asthma subjects with a negative history of NIR. The subjects with asthma in this study were originally recruited for a longitudinal asthma study in 1986 and represent a population based sample (Balder et al., 1998). In this group, 82% previously reported a positive history of NIR.

PATIENTS AND METHODS

The study was approved by the local ethics committee at Sahlgrenska University Hospital in Göteborg.

The subjects with asthma in this study were originally recruited for a prospective asthma study in 1986, as a population sample of 420 individuals, living in Göteborg, born in 1926-1970 (16-60 years of age) (Balder et al., 1998). Asthma was defined as the recent onset of attacks of dyspnoea, wheezing, dyspnoea or cough induced by asthma triggers, symptom relief by bronchodilators and at least one of the following criteria:

1. Three amplitude differences in PEF variations of at least 20% during two weeks of registration
2. FEV1 increased by ≥ 15% from the initial value after the inhalation of ß2 bronchodilators

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3. FEV1 increased by ≥ 15% after two weeks of treatment with oral steroids
4. PC20 ≤ 4mgml-1 in a methacholine challenge test

Table 1. Description of health concepts in the SF-36 questionnaire.

Measure	Number of items	Definition
Physical function	10	Extent to which health interferes with a variety of activities, such as sports, carrying groceries, climbing stairs, walking
Social function	2	Extent to which health interferes with normal social activities, such as visiting friends during past month
Role physical	4	Extent to which health interferes with usual daily activities, such as work, housework, or school
Role emotional	3	Extent to which health interferes with usual daily social activities; for example, accomplished less than would like
Mental health	5	General mood of affect, including depression, anxiety and psychological well-being during the past month
Vitality	4	Energy or tiredness
Bodily pain	2	Extent of bodily pain in past four weeks
General health	5	Overall rating of current health in general
Health transition	1	Change in health status last year

The prevalence of NIR was assessed in 1996 at 82% in the asthma group. NIR was defined as a positive answer to the question: "Since the age of 15, have you ever had a problem with nasal obstruction, itching and/or attacks of sneezing when you did not have a cold or the flu?" (Charpin et al., 1996). This question has previously been validated against in-depth interviews, and has been used to assess rhinitis in several major respiratory surveys (Sibbald et al., 1991).

The present study was performed during the winter of 1998. A total of 302 of the asthma subjects were invited to the Sahlgrenska University Hospital. After we sent out three invitations and made two phone calls, 60% (n=180) of the invited subjects participated in the study. The most common reasons for not attending the study were failure to respond, refusal to participate and sickness.

The control group in this study is a random sub sample of 400 individuals from the original 1986 source population. The group was stratified for age, sex and a history of NIR (200 with a positive history of NIR (NIR subjects) and 200 with a negative history of NIR (controls). Because some individuals had moved more than 40 km from Göteborg and a few had died, 166 NIR subjects and 155 controls were invited. The response rate was 48% of the NIR subjects (n=80) and 49% of the controls (n=76) (Table 2).

Table 2. Trends for the study population in chronological order. NIR=non-infectious rhinitis.

Year	1986	1996		1998	
Group				Invited	Examined
ASTHMA (n)	420	407		302	180
			Controls	155	76
CONTROLS (n)		1,904	NIR subjects	166	80

Qol was assessed with the Swedish version of the SF-36. The Swedish version of the SF-36 has been translated and validated according to the international quality of life programme (Sullivan et al., 1995). All the subjects answered the SF-36 questionnaire, but four questionnaires were lost (subjects with asthma only).

In addition to the SF-36, the subjects answered a questionnaire on rhinitis and asthma. This questionnaire included questions about hay fever and previous history of allergic disease.

A history of childhood allergies was used as a proxy variable for atopy based on a positive answer to the question: "Did you as a child have any form of allergy, such as eczema, asthma or hay fever?" A positive answer indicates a history of symptomatic disease associated with atopy, but it does not confirm presence of specific Ig E-mediated allergy, nor does it predict a positive skin-prick test reaction for any specific allergen.

Hay fever was defined as a positive answer to the question: 'Have you currently or previously had hay fever, that is nasal blockage, runny nose and/or sneezing attacks, during the autumn and/or summer that was not due to a common cold?'

Nasal steroids were discontinued four weeks before examination and antihistamines five days before examination. Inhaled steroids or oral steroids were not discontinued. Short-acting, ß2 agonists were not taken four hours before examination and long-acting, ß2 agonists were not taken three days before. Ipratropium bromide was not taken 12 hours before examination.

Spirometry was assessed by a trained nurse, using a dry

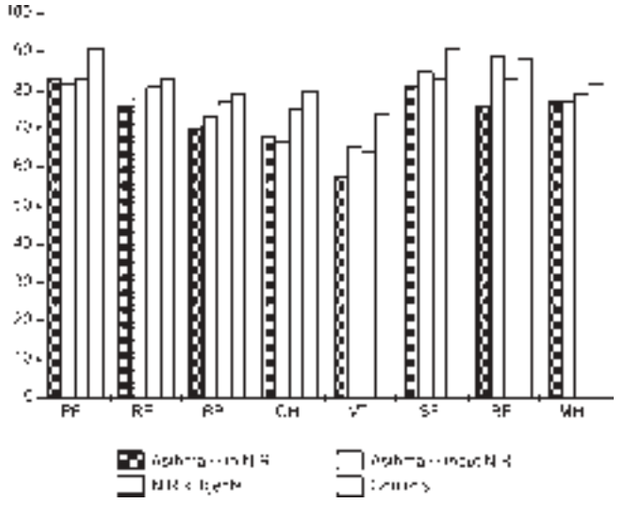

Figure 1. Mean scores for the SF-36. PF=physical function, RP=role physical, BP=bodily pain, GH=general health, VT=vitality, SF=social function, RE=role emotional, MH=mental health.

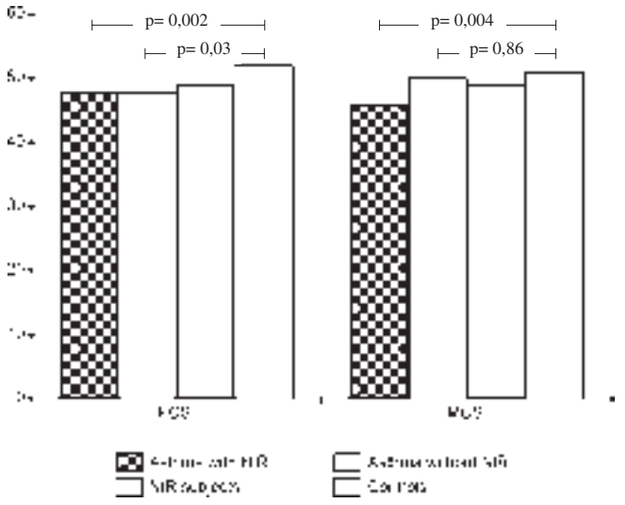

Figure 2. Mean physical and mental component summary.

spirometer (Vitalograph, Buckingham, UK), according to the American Thoracic Society and expressed as the percentage of predicted (Knudson et al., 1976; ATS statement, 1979).

A skin-prick test has previously been performed in 157 subjects in the asthma group within the longitudinal asthma study (Balder et al., 1998).

Statistical analyses

The questionnaire data were processed according to the SF-36 manual including the re-coding of items, computed scale scores and transforming raw scale scores from the 0–100 scale.

Analyses between the groups with regard to the different domains were performed with the non-parametric Kruskall-Wallis test, using the SAS statistical software package, version 8. Comparisons between groups of FEV 1 were made using a non-parametric Wilcoxon test. A p-value of < 0.05 was considered statistically significant. The outcomes of the different domains including PCS and MCS were analysed as dependent variables in multiple linear regression models with asthma, rhinitis, smoking habits, gender and age as independent variables.

Table 3. Baseline data for responders (R) and non-responders (NR).

	n	Age years	Gender female %	Smokers %	NIR %
Asthma R	180	49	62	54	80
Asthma NR	122	41	63	36	84
NIR subjects R	80	50	63	55	100
NIR subjects NR	86	43	42	31	100
Controls R	76	51	49	65	0
Controls NR	79	45	52	28	0

RESULTS

Baseline data for responders (invited subjects participating in the study) and non-responders (invited subjects who did not participate in the study), are shown in Table 3. The responders were generally older than the non-responders and included a higher percentage of smokers.

Data on atopy, hay fever, smoking and FEV 1 in the examined population are presented in Table 4. Using the proxy variable for atopy (a positive answer to the "atopy" question), most self-reported "atopy" was found in the asthma subjects with NIR and in the NIR subjects. Hay fever (a positive answer to the hay fever question) was more common in the asthma subjects with NIR. According to the result of the skin prick test, previously performed in the asthma group, 88/157 (56%) were skin prick positive for perennial allergens such as house-dust mite or cat (asthma with NIR 61%, asthma without NIR 34%) (Balder et al., 1998). Skin prick tests were not conducted in the control group.

Figures 1 and 2 and Table 5A show the results for asthma with NIR, asthma without NIR and NIR without asthma compared with controls for the different domains. The asthma subjects with NIR had significantly lower scores in all but one domain (role physical) compared with the controls, including the glob-

Table 4. Data for the examined subjects, *=p<0.001, compared to controls.

Group	n	Atopy %	Hay fever %	Smoker %	FEV 1.0 L/min
Asthma with NIR	143	41	71	55	85*
Asthma without NIR	37	19	26	53	77*
NIR subjects	80	22	51	55	90
Controls	76	19	8	65	93

Table 5. Difference in mean-score compared with controls. p-values according to Kruskall-Wallis.

Domain group	Physical function	Role physical	Bodily pain	General health	Vitality	Social function	Role emotional	Mental health
Asthma with NIR	-8	-10	-9	-12	-16	-10	-12	-5
	0.001	0.06	0.03	0.0005	0.0001	0.0003	0.03	0.018
Asthma without NIR	-9	-8	-6	-13	-9	-6	1	-5
	0.001	0.19	0.26	0.002	0.067	0.078	0.36	0.25
NIR subjects	-8	-5	-2	-5	-10	-8	-5	-3
	0.034	0.28	0.52	0.10	0.002	0.018	0.42	0.25

al scores: mental component summary (MCS) and physical component summary (PCS). All the significant differences exceeded five scale points (McHorney et al., 1993). The asthma subjects without NIR obtained significantly lower scores on the PCS compared with the controls. Their MCS scores did, however, not differ significantly from that of the controls.

Although this is not shown in the tables, the asthma subjects with NIR obtained lower but non-significant scores on the MCS compared with the asthma subjects without NIR (50 vs 46, p=0.06) but not on the PCS (48 vs 48, p=1.0).

The asthma group as a whole (asthma with NIR + asthma without NIR) obtained significantly lower scores on the MCS and PCS compared with the control group as a whole (NIR subjects + controls) (MCS: 50 vs 47, p=0.05 and PCS: 50 vs 48, p=0.01).

In the linear regression model, rhinitis and asthma were independently associated with the outcome in the same domains as in the univariate analyses.

DISCUSSION

In this population sample of subjects with asthma, a history of NIR adversely affected mental Qol. In the absence of NIR the mental Qol was similar to that of the healthy controls. The results indicate that asthma without a history of rhinitis is associated with a better mental quality of life outcome.

The largest differences in scores between the asthma subjects with NIR and the asthma subjects without NIR in this study were seen in the domains related to energy, tiredness (Vitality) and interference with daily activities (Role emotional). Previously published data by Juniper, derived from "in-depth interviews" with a large number of patients with allergic rhinitis, reveal that the most common problems associated with allergic rhinitis are sleeping problems, activity limitations and non-nasal symptoms, such as thirst, poor concentration, headache and emotional problems (Juniper, 1997). It has been suggested that the limitations caused by rhinitis, and the limitations imposed by asthma, may have a different impact on the quality of life perceived by the patient. It is, for instance, possible to minimise the adverse effects of physical exercise caused by asthma by avoiding it, so called "cooping", but it is hard to avoid the negative effects of poor sleep or emotional problems commonly seen in rhinitis (Reid et al., 1999).

Previous studies of the quality of life in asthma, using the SF-36, have shown a reduction in the physical domains but only to a lesser extent in the mental domains, such as vitality and mental health (Bousquet et al., 1994; van der Molen et al., 1997; Ried et al., 1999; Osman et al., 2000). The impact of asthma on the physical domains was confirmed in our study with a lower PCS in the asthma group as a whole (asthma with NIR + asthma without NIR) compared with the controls (48 vs 50, p=0.01).

Even though experimental studies have indicated that rhinitis in asthma is an expression for a generalised air way inflammation (Braunstahl et al., 2000; Gaga et al., 2000; Hellgren et al., 2002), 15-20% of subjects with asthma have a negative history of rhinitis symptoms. Data indicate that rhinitis may play an important role in asthma. We have previously shown that self reported non-infectious rhinitis is a risk factor for development of asthma (Torén et al., 2002). It has also been shown that the rhinitis precedes the asthma onset in 2/3 of the patients (Greisner et al., 1998). The phenotype expression of asthma and rhinitis is, however, inconsistent with overlapping symptomatic disease and changes in activity over time as depicted by the current rhinitis and asthma guidelines (ARIA and GINA). We have thus chosen to use a wide definition of non-infectious rhinitis, based on a single validated sensitive question. Previous validation of rhinitis questionnaires have shown that questions that address specific rhinitis symptoms, such as nasal blockage or sneezing, have a sensitivity estimated at 96% and a specificity at 91% when identifying rhinitis compared with in-depth interviews in the same patients (Sibbald et al., 1991). The wide definition of NIR used in this study was not intended for the diagnosis of specific subgroups of non-infectious rhinitis, classification in persistent or intermittent rhinitis, or for the assessment of symptom intensity, but simply for the identification of the phenotypic expression of non-common cold rhinitis in asthma. To decrease the obvious risk for misclassification, however, all the subjects were examined by anterior rhinoscopy, excluding larger septal deviations, turbinate hypertrophy and large nasal polyps (data presented elsewhere) (Hellgren et al., 2002).

The predominance of smokers and higher age among the responders in the study compared to the non-responders could

have contributed to lower scores in both the mental and physical domains. The selection was, however, similar in all four groups (asthma with NIR, asthma without NIR, NIR subjects and controls) and the differences between them should therefore still be relevant.

As the study focused on rhinitis, a selection towards subjects with nasal problems in the asthma group could be suspected (in the control group, the subjects were selected on the basis of their NIR status). The distribution of NIR was, however, even between the responders and the non-responders in the asthma group, indicating no selection.

Finally, the distribution according to age, gender and smoking habits differed between the four groups in the study population. These factors have been found to affect Qol in previous studies using the SF-36 (Ware et al., 1994; Woolf et al., 1999). We therefore controlled for age, gender and smoking habits in the multiple regression models and the results remained unchanged.

In this study we used a generic Qol instrument. Compared with disease-specific Qol instruments, generic instruments are, less specific. Generic questionnaires lack specific questions aimed at areas of function that are important for a specific disease, and thus there is a risk for underestimating the true problem. In the present study we wanted to compare the different burdens of two diseases (asthma and rhinitis) in the same patient, and thus a specific Qol instrument was not applicable.

Previous Qol studies of allergic rhinitis have revealed a primary impact on the mental rather than the physical Qol (Bousquet et al., 1994; Leynaertet al., 2000). Since the NIR question is not specifically responsive to present nasal symptoms, the effect on the mental Qol could be expected to increase if only subjects with present nasal symptoms had been included.

Qol is a well-recognised outcome measure for assessments of the impact of disease on patients, but the results must still be interpreted with care. A problem with Qol studies is the clinical relevance of the differences in Qol scores. The fact that the difference is statistically significant may not be enough. According to Ware, a difference of five scale points on the SF-36 indicates clinical relevance and in our study all the significant differences exceeded five scale points (McHorney et al., 1993).

Because asthma in adults is most often considered to be a chronic disease, it was interesting to see that asthmatic patients with a phenotype to develop non-infectious nasal symptoms at any point before or after their on-set of asthma had a poorer mental quality of life still after 20 years. This was not seen in asthma subjects without a history of NIR, even though the FEV % -predicted was significantly lower in this group, indicating a worse asthma. It is not clear, however, if asthma without rhinitis actually represents a different sub group of subjects with asthma, or if the subjects in this group simply neglected their rhinitis symptoms. It also remains to be evaluated if treatment of the rhinitis in asthma improve the mental Qol in the long term.

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