

Patient-reported signs of dampness at home may be a risk factor for chronic rhinosinusitis: A cross-sectional study

Short title: Dampness at home and chronic rhinosinusitis

Caroline Ahlroth Pind¹, María Gunnbjörnsdóttir^{1,2}, Anders Bjerg^{3,4}, Bengt Järvholm⁵, Bo Lundbäck⁴, Andrei Malinowski⁶, Roelinde Middelveld^{3,7}, Johan Nilsson Sommar⁵, Dan Norbäck⁸, Christer Janson¹

1 Department of Medical Sciences, Respiratory, Allergy and Sleep Research, Uppsala University, Uppsala, Sweden.

2. Department of Respiratory Medicine and Sleep, Landspítali - The National University Hospital of Iceland, Reykjavik, Iceland.

3. The Centre for Allergy Research, Karolinska Institutet, Stockholm, Sweden

4. Krefting Research Centre, Department of Internal Medicine and Clinical Nutrition, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden

5. Occupational and Environmental Medicine, Department of Public Health and Clinical Medicine, Umeå University, Umeå, Sweden

6. Department of Medical Sciences, Clinical Physiology, Uppsala University, Uppsala, Sweden.

7. The Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden.

8. Department of Medical Sciences, Environmental and Occupational Medicine, Uppsala University, Uppsala, Sweden.

Corresponding author

Caroline Ahlroth Pind

caroline.ahlroth.pind@medsci.uu.se

+46(0)738059703

+46(0)186110228 (fax)

Department of Medical Sciences, Respiratory, Allergy and Sleep Research

Uppsala University Hospital

751 85 Uppsala, Sweden

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Abstract

Background An association between dampness at home and respiratory conditions has been convincingly demonstrated in children. Fewer studies have been performed in adults and data are lacking for chronic rhinosinusitis (CRS). With a prevalence of 10.9% in Europe, CRS imposes a significant burden on quality of life, as well as economy.

Objective Our aim was to study CRS and other respiratory conditions in relation to dampness at home in a representative sample of adults.

Methods The Swedish GA²LEN questionnaire was answered by 26,577 adults (16-75 y) and included questions on respiratory symptoms, smoking, education and environmental exposure. CRS was defined according to the EP³OS criteria. Dampness was defined as reporting water damage, floor dampness or visible moulds in the home during the last 12 months. The dampness score was ranked from 0-3, counting the number of signs of dampness reported.

Results Dampness at home was reported by 11.3% and was independently related to respiratory conditions after adjustment for demographic and socio-economic factors and smoking: CRS odds ratio (OR) 1.71; allergic rhinitis OR 1.24; current asthma OR 1.21; wheeze OR 1.37; nocturnal dyspnea OR 1.80; nocturnal coughing OR 1.34 and chronic bronchitis OR 1.64. The risk of CRS and most of the other respiratory conditions was further elevated in subjects reporting multiple signs of dampness.

Conclusions & Clinical Relevance This study demonstrated an independent association between dampness at home and CRS in adults. The high burden of this and the other respiratory conditions studied is a strong argument in favour of countering indoor dampness by improving building standards.

Introduction

Dampness at home is a common phenomenon. In the Nordic countries, 15-24% of homes present signs of dampness, such as water leakage or visible moulds (1–4). The prevalence of respiratory symptoms has increased significantly during the last few decades, suggesting a role for environmental factors (4). Several studies have shown a relationship between signs of dampness or moulds and respiratory symptoms, e.g. cough, breathlessness and asthma (3–7). It has also been shown that dampness and moulds are associated with allergic rhinitis (1,3,6,8,9), but this relationship is not as well documented as that for asthma and has mostly been studied in children.

Several studies have elucidated the co-existence of asthma with allergic rhinitis and chronic rhinosinusitis (CRS) (10–13). The term “united airways disease” has been established, suggesting that the inflammation engages the whole respiratory tract rather than a separate target organ (12).

CRS, characterised by nasal polyps and chronic inflammation of the sinuses, is associated with reduced quality of life in affected individuals and with significant direct and indirect costs to society (14–16). Until recently, the prevalence of CRS has not been well studied. Based on the European Position Paper on Rhinosinusitis and Nasal Polyps (EP³OS) criteria (14), defined in 2007, Hastan et al., 2011 (17), estimated the prevalence of CRS in Europe at 10.9% whereas the self-reported prevalence of doctor-diagnosed CRS was 5.0%.

While the influence of dampness and moulds on asthma is well documented, studies of the effects on the upper airways are still limited, especially in adults, and data on CRS are lacking. The Global Allergy and Asthma European Network (GA²LEN) was created in 2005 to bring together leading European research centres in the field of asthma and allergy (18). In 2008, the GA²LEN survey was carried out to assess the prevalence of allergic diseases across Europe (19). The aim of this study is to further assess dampness at home as a risk

factor for CRS, allergic rhinitis and asthma using data from the GA²LEN study. Our hypothesis was that dampness at home is related to a higher prevalence of CRS.

Methods

This study was carried out as part of the GA²LEN survey and was financially supported by the EU Sixth Framework Programme for Research, contract no. FOOD-CT-2004-506378. The study was also supported financially by the Swedish Heart and Lung Foundation, the Swedish Asthma and Allergy Foundation and the Swedish Association against Heart and Lung Diseases. The Gothenburg part of the study was mainly funded by the VBG Group Centre for Asthma and Allergy Research. Ethical approval was granted by the Regional Ethical Review Board in Uppsala, Sweden (Dnr 2008/014). The STROBE checklist was used when writing the manuscript.

In 2008, the GA²LEN questionnaire was sent to 45,000 subjects in four cities: Gothenburg, Stockholm, Uppsala and Umeå in Sweden. Fifteen thousand subjects in Gothenburg and 10,000 subjects in each of the other cities, aged 16-75 years, were randomly selected using civil registries. Up to three reminders were sent to the participant's home address. Participation totalled 26,851 subjects (59.7%). In this study, we have only included subjects who answered at least one of the three questions on dampness at home (n=26,577). The questionnaire included questions on respiratory disorders, smoking, educational level and environmental exposure.

Uppsala is a university city with about 210,000 inhabitants and a humid continental climate. Stockholm is the capital of Sweden, with 910,000 inhabitants in the municipal area and a humid continental climate. Umeå has 120,000 inhabitants and a subarctic climate. Gothenburg is the second largest city in Sweden, with a population of 540,000,

located on the west coast, with a coastal humid continental climate, milder than that in Uppsala or Stockholm.

Definitions

Current asthma was defined as a positive response to the question “Have you ever had asthma?” and at least one of the following symptoms in the last 12 months (i) wheeze or whistling in the chest, (ii) waking with chest tightness, (iii) waking with shortness of breath, (iv) waking with an attack of coughing (11).

Chronic rhinosinusitis (CRS) was defined according to the EP³OS diagnostic criteria (14): presence of at least two of the following symptoms for at least 12 weeks in the past year: (i) nasal blockage, (ii) nasal discharge, (iii) facial pain or pressure or (iv) reduction in sense of smell, with *at least one* of the symptoms being nasal blockage or nasal discharge.

Allergic rhinitis: A positive response to “Do you have any nasal allergies or hay fever?”.

Wheeze: A positive response to “Have you had wheezing in your chest at any time in the last 12 months?”.

Nocturnal dyspnea was defined as being woken up by shortness of breath at any time in the last 12 months.

Nocturnal coughing was defined as waking with an attack of coughing at any time in the last 12 months.

Chronic bronchitis was defined as a positive response to: “In the winter, do you usually produce mucus from your chest almost every day for at least three months each year?”.

Any dampness was defined as a positive response to at least one of the following: “Have any of the following been observed in your home during the last 12 months: (a) Water/moisture damage on indoor walls, floors or roofs? (*Water damage*)

(b) Dented plastic mats, yellowed plastic mats or blackened parquet? (*Floor dampness*)

(c) Visible moulds on walls, floors or roofs?" (*Visible moulds*)

Dampness score was ranked from 0-3, counting the number of signs of dampness (the number of positive answers to the question above) in the subject's home.

Current smoking was defined as positive responses to both "Have you ever smoked for at least one year?" and "Have you smoked at all during the last month?".

Previous smoking was defined as a positive response to "Have you ever smoked for at least one year?" and a negative response to "Have you smoked at all during the last month?".

Never smoking was defined as a negative response to "Have you ever smoked for at least one year?".

Body mass index (BMI) was calculated using self-reported weight and height.

Education was assessed by dividing the participants into five groups according to their highest educational level from the following: *elementary school*, *high school*, *university ≤ 2.5 years*, *university ≥ 3 years*, *ongoing studies* (if highest educational level other than university ≥ 3 years). In the interaction analysis, two groups were formed from the *education* variable, dividing up the population according to whether or not their highest educational level equalled university and excluding all subjects with ongoing studies.

Work situation was used to describe the participants' current occupation: *employee*, *self-employed*, *unemployed*, *on sick leave*, *full-time homemaker*, *full-time student*, *pensioner* or *other*.

Statistical analysis

The statistical analyses were conducted using StatView 5.0.1 (SAS Institute Inc, Cary, NC, USA) and Stata 12 (Stata Corp, College Station, TX, USA). The chi-square test and the unpaired t-test were used when comparing subjects living in damp versus dry homes. Multiple

logistic regression analysis was performed to calculate adjusted odds ratios (OR) and the 95% confidence interval (CI). To analyse the significance of the dose-responder association between dampness and respiratory symptoms, a continuous variable for dampness score was used in the logistic regression analysis. A p-value of < 0.05 was considered statistically significant. Interaction between dampness and sex, age and educational level respectively was analysed for a predetermined subset of outcomes (CRS, asthma, allergic rhinitis and wheeze).

Results

Of the 26,577 study participants, 11.3% (n=2,992) reported having any sign of dampness in their home. Water damage was reported by 7.2% and floor dampness and visible moulds by 4.0% each. Figure 1 shows the numbers of subjects reporting water damage, floor dampness and visible moulds and the overlap between the groups. One sign of dampness was reported by 8.3%, two signs by 2.3% and three signs by 0.7%.

The prevalence of dampness differed between study areas, with the highest prevalence in Gothenburg (12.7%) and the lowest in Umeå (9.5%). The prevalence in Uppsala and Stockholm was 10.2% and 12.1% respectively.

The characteristics of the groups with and without dampness at home are presented in Table 1. Subjects who reported dampness in their home were more often females, were younger and more likely to be current smokers than subjects without dampness. There were also differences in work situation and educational level, where subjects reporting dampness were more likely to be unemployed, on sick leave or full-time students and less likely to be retired or have elementary school as their highest educational level than subjects who did not report any signs of dampness.

Univariate analyses showed that all indicators of dampness (water damage, floor dampness and visible moulds) were associated with a higher prevalence of all the studied

respiratory symptoms (CRS, allergic rhinitis, asthma, wheeze, nocturnal dyspnea, nocturnal coughing and chronic bronchitis). The largest differences in the prevalence of symptoms related to dampness were seen for CRS, nocturnal dyspnea and chronic bronchitis (Table 2).

After adjustment for age, sex, smoking, BMI, educational level, working situation and hometown, water damage or visible moulds were no longer associated with a significantly higher prevalence of asthma. However, the association with floor dampness and any dampness remained. In terms of all the other symptoms, the differences remained significant (Table 3). CRS was clearly associated with all signs of dampness. The effect of dampness was similar in CRS with and without concurrent asthma (OR 1.68 CI 1.31-2.14 and 1.74 CI 1.52-2.00 respectively), whereas the association with asthma without concurrent CRS was much weaker (OR 1.17 CI 1.004-1.35). The association between dampness and CRS remained significant (OR 1.45 CI 1.26-1.66) when adjusting for asthma, allergic rhinitis and chronic bronchitis. No differences were found related to sex or age, in terms of susceptibility to dampness as a risk factor for CRS, asthma, allergic rhinitis or wheeze (data not shown). However, educational level modified the effect of dampness, where not having studied at university was related to a higher impact of dampness on allergic rhinitis (OR 1.58 CI 1.38-1.81 vs. OR 1.05 CI 0.92-1.20, $p = 0.0001$).

Incremental dampness exposure was estimated using the cumulative number of signs of dampness present in dwelling area, generating a “dampness score”. Subjects reporting more signs of dampness were considered to be more exposed. A higher dampness score was related to a significantly higher prevalence of CRS, wheeze, nocturnal dyspnea, nocturnal coughing and chronic bronchitis (Figure 2) but not asthma or allergic rhinitis. These differences remained significant even when adjusted for age, sex, smoking, BMI, educational level, work situation and hometown. The adjusted odds ratio (95% confidence interval) for having three signs of building dampness compared to those without any sign of dampness

was: 3.38 (2.36-4.82) for CRS, 2.18 (1.55-3.05) for wheeze, 3.46 (2.30-5.21) for nocturnal dyspnea, 1.82 (1.33-2.49) for nocturnal coughing and 2.77 (1.94-3.94) for chronic bronchitis.

To see whether having multiple risk factors was related to an additional risk of respiratory symptoms, adjusted odds ratios were calculated for dampness, together with current smoking (Table 4). The risk of respiratory symptoms was then studied for the group with multiple risk factors compared with subjects who only reported dampness. Dampness, together with current smoking, was related to a significantly higher prevalence of CRS ($p=0.0006$), wheeze ($p<0.0001$), nocturnal coughing ($p=0.002$), chronic bronchitis ($p<0.0001$) and asthma ($p=0.02$) compared with reporting dampness and not reporting current smoking. No additional risk of dampness together with current smoking was seen for nocturnal dyspnea or allergic rhinitis. A significant interaction between smoking and dampness was found in the association to asthma ($p<0.0001$) but not to any of the other outcomes.

Responders and non-responders

Responders had a higher mean age than non-responders (mean $\pm$ SD: 45 $\pm$ 16 vs. 38 $\pm$ 14 years) and the response rate was higher in women than in men (65 vs. 53%).

Discussion

In this large, population-based study, dampness at home was independently associated with an increased risk of both upper and lower respiratory symptoms, after adjustment for smoking, demographic and socio-economic factors. The highest odds ratios were seen for CRS, nocturnal dyspnea and chronic bronchitis.

We have found only one previous study investigating the relationship between exposure to dampness at home and CRS (20). Our results confirm the findings by Gao et al presented in 2016, showing damp environments to increase the risk of CRS. In other studies,

dampness was related to an increased risk of sinusitis and asthma combined with CRS (10,21,22), but the definition of sinusitis was unclear and CRS without concurrent asthma was not studied. The symptom-based EP³OS-criteria used in the present study has been used in previous analyses of GA²LEN data (23). The recent results showing that CRS is one of the conditions most affected by dampness shed new light on the importance of assessing the health effects of dampness.

In the present study there was a significant association between smoking and CRS. This is in accordance to the results from some studies (15), although no such association was found in a recent case control study with objectively verified CRS (16). There are still few studies on the effect of environmental factors on CRS, but there are some results indicating that air pollution, the use of woodstoves as principal source of heat and exposure to gas, fumes and dust at work may be related to an increased risk of CRS (24). Our results contribute another predisposing and preventable risk factor, showing that dampness at home is strongly related to CRS. Dampness was found to have an impact on CRS which was as strong as smoking and the effects were seen to be additive when both risk factors existed. This is an important observation, as subjects living in damp dwellings also had a higher frequency of current smoking.

CRS is a disease with a wide spectrum of symptoms. The foundation in the therapy for CRS is intra-nasal corticosteroids, but the addition of periodic per oral corticosteroids or endoscopic sinus surgery may be necessary. In many cases, repeated surgery is needed due to polyps growing back after removal (14,15). The cost of CRS because of treatment, visits to health care and reduced work productivity is high (15). Combined with the fact that it is a lifelong disease with impairment of life quality (15), this makes it important to obtain a better knowledge of risk factors for CRS to prevent the onset of the disease.

Wheeze, nocturnal dyspnea and nocturnal coughing were related to all signs of dampness. A relationship between these symptoms and dampness has also been seen in other studies (5,6,22). Water damage, floor dampness and visible moulds were all separately related to an increased prevalence of chronic bronchitis and allergic rhinitis. Our results indicating that dampness is related to allergic rhinitis are in line with previous findings (1,2,6,8). When it comes to chronic bronchitis, previous studies have yielded more inconsistent results. In 2003, Gunnbjörnsdottir *et al.* (4) did not find any significant association between water damage or visible moulds and “long-term phlegm production”, using a definition similar to our definition of chronic bronchitis. Water damage generated an OR of 1.57, which is close to the results of the present study, but the result was not significant. Similar numbers were seen in another study, where any dampness generated an OR of 1.51 for chronic bronchitis (1). This result did not reach significance either. Both these studies were much smaller than the present study, with a total study population of fewer than 2,000 subjects. A larger study could demonstrate a significant relationship between dampness and “productive cough” (5), a relationship also demonstrated in children (9).

Dampness was related to a significantly increased prevalence of asthma, but, seen separately, the only sign of dampness related to asthma was floor dampness. Similar results were seen in another study based on the same indicators of dampness. Gunnbjörnsdottir *et al.*, 2006 (5), demonstrated a relationship between reporting any dampness and asthma but not with water damage alone. In previous studies of asthma and dampness, the results differ, with some studies showing a relationship (2,3) whereas others do not (1,21). In paediatric material, the impact of dampness at home on asthma appears to decrease with age (25). The ability of our study to identify a modest yet statistically significant association of dampness with asthma in adulthood may be due in part to the large study population. Our results showed that dampness had a stronger influence on asthma with

concurrent CRS compared to only asthma, and a similar impact on only CRS as on asthma with CRS. This may indicate that the upper airways are of greater importance than the lower airways when discussing the health effects of dampness. Eriksson *et al.*, 2011 (10), found that asthma with nasal symptoms but not asthma without nasal symptoms was related to dampness.

The prevalence of dampness was 11.3%, ranging from 9.5% to 12.7% in different areas. This is somewhat lower compared to previous studies from Northern Europe, where the prevalence of dampness has been estimated at 15-24% (1–4). Sweden has been reported to have a lower prevalence of dampness compared with other countries in Northern Europe (26), but part of the differences may also be due to a decrease in prevalence over time. Considering Swedish data, the prevalence in 1993 was 21% (4) compared to 12-15% around 2000 (26) and 11% within current 2008 data, lending some support to this notion. Like previous studies (3,20), we were able to demonstrate a dose-responder relationship between respiratory symptoms and dampness at home. In the case of wheeze, nocturnal dyspnea, nocturnal coughing, chronic bronchitis and CRS, increased exposure to dampness was related to a significantly higher prevalence of the observed symptom.

The exact mechanisms by which dampness and moulds affect the airways are not yet known, but exposure to mould-related microbes, such as fungi, may play a role in some cases. Fungal allergens are known to be related to allergic diseases, but fungi also produce toxins and irritants possibly affecting the airways (27,28). It is suggested that damp-related symptoms do not necessarily arise on an atopic basis (9,29), as both sensitised and non-sensitised individuals are affected. Both allergic and non-allergic responses are believed to be involved in the reaction to dampness at home (6).

The present study benefits from its size, with more than 26,000 subjects from four different study areas. The questionnaire was sent to the participant's home address, so

most of the participants answered the dampness questions at home. One limitation, however, is the use of self-reported dampness at home, but a Swedish study in 1999 by Norbäck *et al.* (30) validated questions similar to those used in our questionnaire against objective observations by trained personnel. The questions were found to be reliable due to a significant agreement between observed and self-reported dampness in non-symptomatic subjects, as well as subjects reporting asthmatic symptoms. The definition of CRS is based on self-reported symptoms, which can lead to an overestimation of the prevalence and include subjects who would not have objective signs of CRS in a physical examination. Therefore further studies are needed to evaluate the effect of dampness on doctor-diagnosed CRS. There is also a risk that symptomatic subjects are more prone to report signs of building dampness than those without symptoms. Due to the cross-sectional nature of the study, causation cannot be directly determined and the associations that were found should be studied in a longitudinal setting.

In conclusion, dampness at home is a common problem associated with several respiratory symptoms. The strongest associations were seen for nocturnal dyspnea, chronic bronchitis and CRS, where the association with CRS has been demonstrated in only one previous study. However, further studies in a group of participants with CRS confirmed by a specialist and dampness in the home confirmed by relevant experts are needed in order to confirm dampness as a risk factor for CRS.

Authors' contributions

CP and CJ analysed the data and wrote the manuscript. AB, BJ, BL and RM collected data. RM, CJ and BL supervised the study and contributed to the design of data analyses. MG, AM, JNS and DN contributed to data analysis. All co-authors contributed to drafting the manuscript or revised it critically.

Conflict of interest

Bo Lundbäck has received fees for speaking and for participation at advisory board meetings from GSK, AstraZeneca and Novartis and to his research units grants from AstraZeneca and GSK outside this work. None of the other authors have anything to declare.

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Legends to figures

Figure 1. Number of subjects reporting water damage, floor dampness and visible molds and the overlap between the groups. Subjects not responding to all three questions on dampness excluded (n=942), why total number differs from other figures.

Figure 2. Prevalence (%) of respiratory symptoms and conditions in relation to the number of indicators of dampness in the home. The indicators were: water damage, floor dampness and visible moulds. Dose-response tested for trend for score 1-3.

Table 1 Characteristics of participants with and without dampness*

	No dampness (n=23,585)	Any dampness (n=2,992)	P-value
Age (years)	44.2 ± 16.2	40.3 ± 15.0	<0.0001
Female	54.1	58.8	<0.0001
Smoking history			<0.0001
Never	61.3	59.5	
Previous	25.1	23.9	
Current	13.7	16.6	
Pack years	4.7 ± 10.7	4.9 ± 11.2	0.53
Body Mass Index	24.8 ± 4.2	24.7 ± 4.5	0.41
Work situation			<0.0001
Employee	58.5	55.4	
Self-employed	6.2	6.2	
Unemployed	2.6	4.3	
On sick-leave	3.1	5.0	
Full-time homemaker	0.4	0.4	
Full-time student	12.8	16.2	
Pensioner	14.1	9.4	
Other	2.3	3.1	
Hometown			<0.0001
Umeå	23.4	19.5	
Uppsala	23.3	20.8	
Gothenburg	31.3	36.0	
Stockholm	21.9	23.7	
Educational level			<0.0001
Elementary school	14.4	11.5	
High school	29.5	30.1	
University ≤ 2.5 years	11.2	11.0	
University ≥ 3 years	35.9	36.6	
Ongoing studies	9.0	10.8	

Results expressed as mean ± SD and %

*Any dampness was defined as a positive response to at least one of the following: water damage, floor dampness or visible moulds

Table 2 Prevalence of respiratory symptoms in the presence and absence of signs of dampness

	Water damage			Wet floor			Visible moulds			Dampness		
	No	Yes	P-value	No	Yes	P-value	No	Yes	P-value	No	Yes	P-value
Wheeze	16.2%	20.4%	<0.0001	16.1%	26.1%	<0.0001	16.3%	22.9%	<0.0001	15.9%	21.6%	<0.0001
Nocturnal dyspnea	5.4%	9.1%	<0.0001	5.4%	11.8%	<0.0001	5.4%	10.7%	<0.0001	5.3%	9.5%	<0.0001
Nocturnal coughing	24.8%	30.7%	<0.0001	24.8%	33.9%	<0.0001	24.9%	33.3%	<0.0001	24.5%	31.3%	<0.0001
Chronic bronchitis	11.5%	16.0%	<0.0001	11.4%	21.2%	<0.0001	11.5%	17.8%	<0.0001	11.3%	16.9%	<0.0001
Current asthma	9.0%	10.5%	0.03	8.9%	13.7%	<0.0001	9.0%	11.6%	0.006	8.8%	11.4%	<0.0001
Allergic rhinitis	26.7%	30.6%	0.0003	26.8%	34.5%	<0.0001	26.8%	34.0%	<0.0001	26.4%	32.0%	<0.0001
Chronic rhinosinusitis	8.1%	13.8%	<0.0001	8.1%	16.4%	<0.0001	8.2%	16.2%	<0.0001	7.8%	13.9%	<0.0001

Results expressed as %

Table 3 Respiratory symptoms and the relationship with indicators of dampness at home

	Water damage	Floor dampness	Visible moulds	Any dampness
	OR (95 % CI)*	OR (95 % CI)*	OR (95 % CI)*	OR (95 % CI)*
Wheeze	1.27 (1.12-1.44)	1.64 (1.41-1.92)	1.46 (1.24-1.71)	1.37 (1.24-1.52)
Nocturnal dyspnea	1.67 (1.40-1.99)	2.06 (1.67-2.53)	2.00 (1.61-2.49)	1.80 (1.56-2.08)
Nocturnal coughing	1.29 (1.16-1.44)	1.40 (1.22-1.61)	1.47 (1.27-1.68)	1.34 (1.23-1.47)
Chronic bronchitis	1.49 (1.30-1.71)	2.03 (1.72-2.39)	1.75 (1.47-2.09)	1.64 (1.47-1.84)
Current asthma	1.11 (0.94-1.30)	1.42 (1.17-1.73)	1.21 (0.98-1.50)	1.21 (1.06-1.37)
Allergic rhinitis	1.16 (1.05-1.30)	1.40 (1.22-1.61)	1.29 (1.12-1.48)	1.24 (1.14-1.35)
Chronic rhinosinusitis	1.65 (1.43-1.91)	1.89 (1.58-2.26)	1.94 (1.62-2.32)	1.71 (1.52-1.93)

The results are presented as adjusted OR (95% CI).

*Adjusted for age, sex, smoking, body mass index, educational level, work situation, hometown

Table 4 Additional risk of respiratory symptoms for dampness together with current smoking.

	Wheeze	Nocturnal dyspnea	Nocturnal coughing	Chronic bronchitis	Current asthma	Allergic rhinitis	Chronic rhinosinusitis
	OR (95% CI)*	OR (95% CI)*	OR (95% CI)*	OR (95% CI)*	OR (95% CI)*	OR (95% CI)*	OR (95% CI)*
No dampness + No smoking	1	1	1	1	1	1	1
Only dampness	1.38 (1.23-1.55)	1.90 (1.62-2.23)	1.41 (1.28-1.55)	1.67 (1.47-1.90)	1.13 (0.98-1.31)	1.23 (1.12-1.35)	1.77 (1.55-2.03)
Only current smoking	2.53 (2.31-2.78)	1.47 (1.26-1.71)	1.78 (1.63-1.93)	2.27 (2.05-2.52)	0.99 (0.86-1.13)	0.91 (0.83-1.00)	1.80 (1.60-2.04)
Dampness + Current smoking	3.50 (2.87-4.27)	2.17 (1.61-2.93)	1.97 (1.63-2.40)	3.61 (2.92-4.46)	1.64 (1.25-2.16)	1.19 (0.97-1.46)	2.80 (2.21-3.54)

Results expressed as adjusted OR (95% CI)

*Adjusted for age, sex, body mass index, educational level, work situation and hometown



