

Prevalence of asthma and allergic rhinitis among adult population in Ulaanbaatar, Mongolia

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Background: Mongolia is changing lifestyle, unhealthy habits, increase of air pollution, increasing life expectancy have led to an up rise of chronic respiratory diseases. Over 10 years ago, the prevalence of asthma and allergic rhinoconjunctivitis in Mongolia were in the lower range reported from previous studies.

Objectives: The main aim of the survey is to know the prevalence of asthma and allergic rhinitis among adult population of Ulaanbaatar city, Mongolia and their risk factors.

Methods: Total of approximately 1,200 adults aged 20 years and over were planned to be randomly selected. The questionnaire was developed on the basis of WHO Protocol for Assessment of Prevalence of Major Respiratory Diseases and modified by local risk factors assessment and by other international survey approach including Global Initiative for Asthma and European Community Respiratory Health Survey.

Results: Prevalence of current wheezer in all age group was 15.7% (95% CI: 14.7-16.8). Age and sex segregated distribution of current wheezer were defined among male and female and prevalence was 14.5% (95% CI: 13.3-16.2) in male and female 16.6% (95% CI: 15.2-18.3) respectively. Prevalence of diagnosed asthma among adults was 4.7% (95% CI: 4.3-5.6) in all age group, 3% (95% CI: 2.4-3.7) in male and 6.8% (95% CI: 5.8-7.9) in female. Prevalence of rhinoconjunctivitis was 14.6% in all age group. 28.4% out of subjects with allergic rhinitis has current asthma, while 11.6% of subjects without allergic rhinitis has asthma ($p < 0.01$).

Conclusion: The prevalence of asthma increased for one decade in Ulaanbaatar. Prevalence of diagnosed asthma is approximately 5% and current wheezer is approximately 15% in adults of population, which is close to other Asia and European countries. Allergic rhinitis is a risk factor for asthma.

Key words: Adults; Allergic rhinitis; Asthma; Prevalence; Ulaanbaatar

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INTRODUCTION

In the last couple of decades, the prevalence of atopic diseases is increasing in the different parts of the world. It is estimated that as many as 300 million people of all ages, and all ethnic backgrounds, suffer from asthma and the burden of this disease to governments, health care systems, families and patients is increasing worldwide. In 1989 the Global Initiative for Asthma (GINA) program was initiated in an effort to raise awareness among public health and government officials, health care workers, and the general public that asthma was on the increase [1-3].

There are really big differences of prevalence of allergic diseases in countries in the Asia Pacific. Asthma was dramatically increased in the last decades in Asia such as South Korea, Taiwan, Hong Kong, Singapore and Japan [4]. Mongolia, like other countries in Asia Pacific, is undergoing an epidemiological shift in socio-economic transition. Changing lifestyle, unhealthy habits, increase of air pollution, increasing life expectancy have led to an up rise of non-communicable and degenerative diseases including cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases such as asthma, rhinitis and chronic obstructive pulmonary disease (COPD). Over 10 years ago, the prevalence of atopic diseases in Mongolia was in the lowest range reported from previous studies. Especially, there was a quite well population based epidemiological study result in 1999-2000. On this study, the prevalence of asthma, allergic rhinoconjunctivitis and allergic sensitization with 95% confidence intervals were 1.1%, 9.3% and 13.6% in Mongolian villages and 2.1%, 18.4% and 31.0% in Ulaanbaatar city, respectively [5].

In Japan, a recent survey conducted by international standards showed that a substantial number of individuals with chronic respiratory disease including asthma and COPD were not diagnosed and is thought to be consequently not managed and treated properly [6, 7].

Aim of the survey: The target of the survey is to know the prevalence of asthma and allergic rhinitis among adult population of Ulaanbaatar city, Mongolia and their risk factors.

MATERIALS AND METHODS

Subject recruitments

Ten family clinics out of 52 were selected randomly which were

estimated to cover approximately 15,000-20,000 population at large. 5 family clinics are located in the center of the city and other 5 clinics are selected peripheral area of the city. Total of approximately 1,200 adults aged 20 years and over were planned to be randomly selected. The household registration was continued until the desired sample size of qualified respondents was reached. Desired sample size was that subjects aged 20-39 years: 300 female and 300 male, 40 years and over: 300 female and 300 male.

The questionnaires for adults

The questionnaire for adults aged 20 years and over was developed on the basis of WHO Protocol for Assessment of Prevalence of Major Respiratory Diseases [8] WHO Chronic Respiratory Diseases and Arthritis Unit, 2004) and modified by local risk factors assessment and by other international survey approach including GINA [9, 10], COPD [11] and European Community Respiratory Health Survey-II (ECRHS II) [12]. The questionnaires included clinical history, respiratory symptoms, prior diagnosis, risk factor exposure including smoking and treatments. Diagnosis of asthma was as follows: Current wheezer (12 month wheeze) was interviewed "yes" to adult questionnaire D1 (Have you had wheezing or whistling in your chest at any time in the past 12 months?) and yes to at least one questionnaires related asthma (Table 1). Ever-wheezer "yes" to adult questionnaire D0 (Have you ever had wheezing in your chest?) and diagnosed asthma "yes" to adult questionnaire D5 (Have you ever been diagnosed to have asthma?). Exclusion criteria were diagnosed tuberculosis, heart problems, chronic obstructive pulmonary diseases, bronchiectasia and diffuse panbronchiolitis. Diagnosis of allergic rhinitis is yes to all of questionnaires of sneezing, rhinorhea and nasal congestion.

The respiratory symptoms were defined as follows:

- *1. Have you had wheezing or whistling in your chest at any time in the past 12 months?
- *2. Have you been at all breathless when the wheezing nose is present?
- *3. Have you had this whistling or wheezing when you did not have a cold?
- *4. Have you been woken up with a feeling of tightness in your chest at any time in the last 12 months?
- *5. Have you been woken up by an attack of shortness of breath at any time in the past 12 months?
- *6. Have you been woken up by attacks of coughing at any time in the last 12 months?

Current asthma is defined as "yes" to question *1 and "yes"

Table 1. Prevalence of allergic rhinitis and rhinoconjunctivitis and their symptoms in all adults (N=1,201)

Rhinitis, rhinoconjunctivitis and their symptoms	Prevalence (%)	Upper 95% prevalence	Lower 95% prevalence
Rhinitis	23.6	24.9	22.4
Any nasal problems except for cold			
Sneezing	39.3	40.8	37.9
Running nose	29.9	31.3	28.6
Nasal congestion	39.9	41.4	38.5
Rhinoconjunctivitis	14.3	15.4	13.3
Eye symptoms	24.8	26.1	23.6

to at least one of questions *2 to *5.

Allergic rhinitis is defined as presence to all of its 3 symptoms including sneezing, running nose and nasal congestion. Allergic rhinoconjunctivitis is defined as allergic rhinitis accompanied with itchy eye and redness.

Questionnaire translation

The questionnaire was translated from English into Mongolian and back-translation into English was conducted.

Data processing and quality control

All questionnaires were checked first by the interviewer before submission to the field supervisor. The field supervisor then checked for completion, range, and consistency of the answers. The questionnaires were then be encoded and entered into the computer using Microsoft Excel. Double data entry was also done to validate the codes that had been entered. Finally, after all questionnaires were entered, marginal for all variables were generated. Data cleaning and editing were be done as follows: data entry errors will be corrected when ascertained. Spurious entries that could not be corrected anymore would be deleted from the file.

Bioethical consensus

We were applied the permission of bioethical consensus to Bioethical Committee, Dokkyo Medical University. The application of bioethical consensus to Bioethical Committee of the Ministry of Health, Mongolia has been approved.

RESULTS

Survey subjects

Total number of the adult survey subjects with 20 years and over was 1,201 (606 male and 595 female). Participants were divided into 7 age groups: 20-29, 30-39, 40-49, 50-59, 60-69, 70 and over, 345, 255, 305, 208, 74, 14 subjects respectively. A half of them are live in central area of the city and another half of them live in sub-urban area of the city.

Prevalence of current wheezer in all age group was 15.7% (95% CI: 14.7-16.8). Age and sex segregated distribution of current wheezer were defined among male and female and prevalence was 14.5% (95% CI: 13.3-16.2) in male and female 16.6% (95% CI: 15.2-18.3) respectively in Fig. 1. Prevalence of current wheezer in subject of 20-39 years was 14.1 % (male 13.2% and female 15.0%).

Prevalence of asthma symptoms by ECRHS questionnaires in all adults >20 years and adults 20-39 years:

Prevalence of 12 months wheeze in all age group and subjects of 20-39 years was 17.1% (95% CI: 16.1-18.2) and 15.6% (95% CI: 14.2-17.1) respectively. Prevalence of other asthma symptoms was shown in Table 2.

Prevalence of diagnosed asthma among adults was 4.7% (95% CI: 4.3-5.6) in all age group, 3% (95% CI: 2.4-3.7) in male, and 6.8% (95% CI: 5.8-7.9) in female. The prevalence of diagnosed asthma was higher in most of age groups of female than male (Fig. 2).

The prevalence of current allergic rhinitis was 23.6% (95% CI: 22.4-24.9) in all age group, 23% (95% CI: 21.3-24.8) in male and 24.3% (95% CI: 22.6-26.1) in female (Fig. 3). Prevalence of rhinoconjunctivitis was 14.6% in all age group and 13.8% in adults 20-39 years (Table 1).

Relationship between current wheezer and current allergic

rhinitis:

28.4% out of subjects with allergic rhinitis has current wheezer, while 11.6% of subjects without allergic rhinitis has asthma ($p < 0.01$). Allergic rhinitis is a risk factor for asthma.

Influence of smoking to the development of current wheezer. The prevalence of ever and/or current smoking (ever/current smoking) was 49.5% of all adults, 77.1% of male adults and 21.4% of female adults. The prevalence of current wheezer was higher in all and significant in only female ever/current smokers as compared

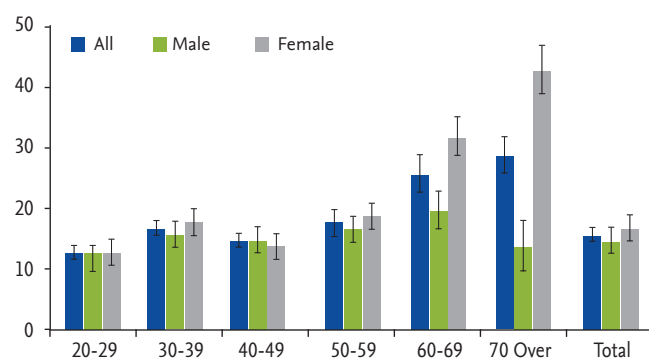


Fig. 1. Prevalence of current wheezer among adults in Ulaanbaatar, Mongolia (%).

to non-smokers (23.6% vs. 14.8%, $p < 0.05$).

DISCUSSION

From epidemiological studies on asthma, allergic rhinitis and atopic diseases in the worldwide, the prevalence is still increasing in developing countries [2, 13-15]. This survey was population based epidemiologic study on asthma and allergic rhinitis and their risk factors. This report covered adults 20 years and over in Ulaanbaatar, Mongolia. In this survey the prevalence of current wheezer was 15.7% in adults 20 years and over, and 14.1% in adults 20-39 years, and that of "12 months wheeze" was 17.1% in adults 20 years and over and 15.6% in adults 20-39 years. The prevalence of allergic rhinitis and allergic rhinoconjunctivitis was 23.6% and 14.2% in adults 20 years and over respectively.

In Mongolia 2 systemic survey of asthma was carried out in 1999-2000 and 2009. Finish and Mongolian researchers performed the first population based epidemiological study of asthma, allergic rhinoconjunctivitis and allergic sensitization in Mongolia, covering Ulaanbaatar, rural towns and villages. The survey subjects were family member of 10-60 years in the random sample taken from family doctors. The subjects were interviewed by trained doctors and nurses by questionnaires prepared from Finish protocol. The

Table 2. Prevalence of current wheezer and respiratory symptoms (%) in the last 12 months in all adults

Variable	20 Years old and over (N=1201)			20-39 Years old (N=595)		
	Mean	Lower 95% confidence limit	Upper 95% confidence limit	Mean	Lower 95% confidence limit	Upper 95% confidence limit
Current wheezer #	15.7	14.7	16.8	13.7	12.5	15.0
Respiratory symptoms						
Wheeze any *1	17.1	18.2	16.1	15.6	13.9	16.6
Wheeze with breathlessness*2	15.2	14.2	16.3	12.6	11.4	13.9
Wheeze without a cold *3	8.9	8.1	9.8	7.3	6.8	9.1
Woken by chest tightness *4	17.2	16.2	18.3	14.2	13.0	15.5
Woken by breathlessness *5	12.5	11.6	13.5	9.7	8.7	10.8
Woken by cough *6	33.6	32.3	35.0	30.7	29.1	32.4

The respiratory symptoms were defined as follows:

*1. Have you had wheezing or whistling in your chest at any time in the past 12 months?

*2. Have you been at all breathless when the wheezing nose is present?

*3. Have you had this whistling or wheezing when you did not have a cold?

*4. Have you been woken up with a feeling of tightness in your chest at any time in the last 12 months?

*5. Have you been woken up by an attack of shortness of breath at any time in the past 12 months?

*6. Have you been woken up by attacks of coughing at any time in the last 12 months?

#Current asthma is defined as "yes" to question *1 and "yes" to at least one of questions *2 to *5.

Prevalence of asthma and allergic rhinitis among adults

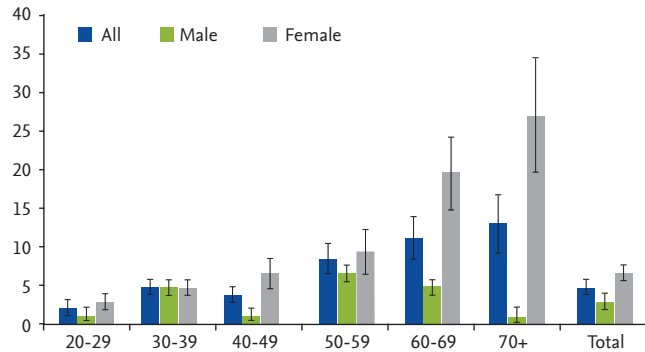


Fig. 2. Prevalence of diagnosed asthma among adults in Ulaanbaatar, Mongolia (%).

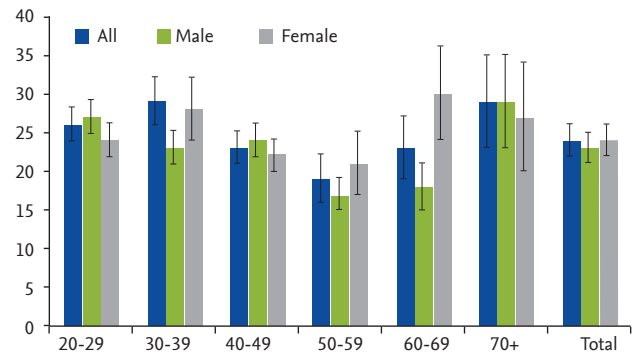


Fig. 3. Prevalence of allergic rhinitis among adults 20 years and over in Ulaanbaatar, Mongolia (%).

prevalence of asthma was 2.1% in Ulaanbaatar, 2.4% in rural towns and 1.1% in villages. Since the definition is different between 1999 study and 2009 study, the rate of “dyspnea with wheeze” in 1999 study and that of “wheeze with breathlessness” was compared. The rate was 2.0% (11 + 7/896) in Ulaanbaatar in 1999 study and 15.2% in 2009 study in Ulaanbaatar [5]. Summing up, the prevalence of asthma in Ulaanbaatar seems to increase for the past one decade. Then, as for rhinoconjunctivitis Arja Viinainen reported its prevalence was 18.4% in Ulaanbaatar, 12.9% in rural towns and 9.3% in villages. In this study its prevalence in UB was 14.6% in all. The definition of rhinoconjunctivitis includes “sneeze, runny or stuffy nose” and “itchy eyes” in both of the survey. Although the definition of rhinoconjunctivitis is similar but not same in both of the survey, the prevalence of rhinoconjunctivitis seems to be close each other in Ulaanbaatar.

For the past one decade, asthma increased and rhinoconjunctivitis did not increased in Ulaanbaatar. The reasons of this discrepancy is not clear.

In this survey the survey protocol adopted ECRHS questionnaires for asthma related symptoms which are utilized to predict asthma prevalence internationally [3].

Among questions “wheezing in the previous 12-months period” (“12 months wheeze”) has been shown to have good specificity and sensitivity in both children and adults. As for the age of study subjects the age group of 20- to 44 year age group was studied in ECRHS [11, 15]. In this study 2 age groups, 20 year and over and 20 to 39 years were studied. The age group 40 years and over were studied for the prevalence of COPD (12i). In this survey the prevalence of “12 months wheeze” in adults 20 years and over and adults 20-39 was 17.1% and 15.6%, respectively. The prevalence

of “12 months wheeze” in Asia and other areas in the world was as follows; 17.1% (adults 20-79 years) in the nation-wide survey of Japan [7], 16.1% (adults 20-44 years) in 3 areas of Sweden [16], 2.5% (adults 15 years and over) in rural Beijing [17], 24.9% (15 years and over) in 5 urban centers of Turk [18], and 10.1% (university students 16-31 years) in Bangkok, Thailand [3]. Summing up, the prevalence of asthma /asthma related symptoms seems to be close to that of the other area of the world, while the prevalence was lower in rural Beijing. The reason for such observations is not clear. However, rapid urbanization may cause the increase of asthma prevalence in Ulaanbaatar as described previously. Diagnosed asthma can be another definition to compare, although diagnosis of asthma can be variable due to the difference of understanding of doctors in each of regions. The prevalence of diagnosed asthma was 4.7% in Ulaanbaatar 2009 (present survey), 4.2% in Japan [7], 6.6% in Turk [18], 1.5% in Ethiopia [19] and 8.8% in Bangkok [3]. Again, the prevalence of asthma in Ulaanbaatar is thought to be close to the other urban areas in Asia.

In this survey the prevalence of “12 months wheeze” is much higher than diagnosed asthma (17.1 vs. 4.7 in Ulaanbaatar), and similarly (10.1 vs. 4.2 in Japan [7]), (24.9 vs. 6.6 in Turk [18]) and (10.1 vs. 8.8 in Bangkok [3]). In St Petersburg the prevalence of asthma was much higher than official statistics [20]. Summing up, these observations strongly suggest that asthma was under-diagnosed and consequently under-treated not only in Ulaanbaatar but also in many areas in the world. It is needed to find asthma in its early stage, since early intervention to stop exposure to risk factors that sensitize the airway may help improve the control of asthma and reduce medication needs [21].

Mongolia is located between two neighbor countries China

and Russia. The prevalence of asthma and allergic rhinitis was compared between Mongolia and these two countries. The prevalence of asthma among adults was 7.4% (95%CI 6.6-8.3%) and the prevalence of allergic rhinitis was 10% (95%CI 8.0-12.1%). Asthma was diagnosed in 56% patients with allergic rhinitis. Seventy-seven percent of patients with asthma had allergic rhinitis [20]. The prevalence of self-reported asthma was lowest among adults in rural China [17]. The people of Beijing were reported significantly more asthma than those living in Urumqi in three categories: wheezing or whistling in the chest in the past year (6.0%, 95% CI: 5.1-6.9% vs. 2.9%, 2.3-3.5%, $p < 0.001$), sleeping disturbed due to wheezing (1.3%, 0.9-1.7% vs. 0.6%, 0.3-0.9%, $p < 0.03$) and having experienced asthma ever (10.7%, 9.6-11.8% vs. 7.6%, 6.6-8.6%, $p < 0.001$). The prevalence of allergic rhinitis (30.0% vs. 31.1% estimated as 12-month nasal symptoms in Beijing and Urumqi, respectively) and eczema (2.8% vs. 2.0% recorded as 12-month itchy rash) in the two cities were not significantly different [22]. Among the 20-44-yr-olds, the prevalence of reported asthma attacks in the previous 12 months was 0.67% in rural Beijing, very much lower than that reported in ECRHS centres (3.1%), urban Canada (6.9%) and semirural Canada (5.1%), after adjusting for age and sex [23].

In this study the prevalence of current wheeze was 15.7% and that of allergic rhinitis was 23.6%. The prevalence of current wheeze was twice in individuals with allergic rhinitis. Similar relations were reported in the survey in Sweden [16], and St. Petersburg [24]. Observed high percentage of asthma among individuals allergic rhinitis suggests that complication of asthma should be searched in allergic rhinitis patients.

In this study prevalence of current wheezer was higher in female than in male (16.6 vs. 14.5) conforming to other report and statement [16, 21].

In present survey asthma was more frequent in ever/current smokers. The increase was significant among female population. In adults with asthma tobacco smoking is associated with accelerated decline of lung function, increase of asthma severity and reduces the likelihood of asthma being controlled [21]. Observation of present survey suggests that tobacco smoking may accelerate the development of asthma especially in female population. Female population may be more sensitive to tobacco smoke than male population. Similarly, female are reported to be more sensitive to smoking for development of chronic obstructive pulmonary disease than male [25].

In conclusion, the prevalence of current wheezer was around

15%, while the prevalence of physician diagnosed asthma was around 5%. Remaining 10% of the population with potential asthma has not been managed for prevention or treatments of asthma. The prevalence of asthma seems to be almost twice increased for one decade in population of Ulaanbaatar. Tobacco smoking seems to increase the prevalence of asthma especially in elderly female population. Present survey was done in Ulaanbaatar only. Further survey is expected in rural area by using international survey protocol such as ECRHS questionnaires to know the change of the prevalence of asthma and other allergic diseases.

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