A cross-sectional assessment of the burden of mild asthma in urban China using the 2010, 2012, and 2013 China National Health and Wellness Surveys

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Introduction

- Studies have estimated the prevalence of asthma in China to be between 0.73% and 1.80% [To 2012; Wang 2013; Zhang 2014; Zhang 2015]
  - Prevalence varies significantly by region (e.g. urban vs. rural) [Zhang 2014]

- However, limited data exist on the prevalence of different asthma severity levels in China and the effect of asthma on patient outcomes
Objectives

- To estimate prevalence of asthma (with an emphasis on mild asthma) in urban China using a general population health survey.

- To examine the association between asthma severity (with an emphasis on mild asthma) and quality of life (QOL), work impairment, and healthcare resource use (HCRU).
Data source

• Data from the 2010 (N=19,954), 2012 (N=19,994), and 2013 (N=19,987) China National Health and Wellness Survey (NHWS)
  – NHWS is a general health survey administered primarily online with some offline recruiting
  – Sampling mimics the demographic composition of urban China
  – 3 years of NHWS were combined to maximize sample size for those with asthma

• Total sample size was **N=59,935**
Key measures

• Asthma severity
  – Definition 1: Self-reported (“How severe is your asthma?” - “mild” vs. “moderate”/“severe”)
  – Definition 2: GINA2014 guidelines based on current self-reported medication use (Step 1/2 = “mild” vs. Step 3/4/5 = “moderate”/“severe”)

• Demographics
  – Age, sex, income, education

• Health history
  – Smoking, alcohol intake, exercise, body mass index

• Comorbidities
  – Charlson comorbidity index

• Health outcomes
  – QOL (Short Form 12/36-v2)
  – Work impairment (WPAI-GH)
  – Self-reported HCRU
Total NHWS sample (N=59,935)

Self-reported a diagnosis of asthma (N=825 or 402*)

Mild asthma (N=636 or 310*)

Moderate/severe asthma (N=189 or 92*)

Matched control (N=824 or 400*)

Did not report a diagnosis of asthma (N=57,142)

Exclusion criterion: Self-reported a COPD diagnosis (N=1,968)

*Sample size for analysis using GINA2014 severity definition

Lower sample sizes as only those treated (N=402) could be classified into a severity group

Statistically compared on health outcomes (QOL, work impairment, HCRU), controlling for differences in demographics and health history

Formed through 1-to-1 propensity score matching
## Sample characteristics

<table>
<thead>
<tr>
<th></th>
<th>Self-report definition</th>
<th>GINA2014 guidelines definition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild (N=636)</td>
<td>Moderate/Severe (N=189)</td>
</tr>
<tr>
<td>Age</td>
<td>43.16 ± 14.71</td>
<td>44.43 ± 14.35</td>
</tr>
<tr>
<td></td>
<td>44.04 ± 14.46</td>
<td>42.96 ± 13.50</td>
</tr>
<tr>
<td>Male (N, %)</td>
<td>366 (57.55%)</td>
<td>109 (57.67%)</td>
</tr>
<tr>
<td></td>
<td>175 (56.45%)</td>
<td>52 (56.52%)</td>
</tr>
<tr>
<td>University educated (N, %)</td>
<td>382 (60.06%)</td>
<td>124 (65.61%)</td>
</tr>
<tr>
<td></td>
<td>197 (63.55%)</td>
<td>69 (75.00%)</td>
</tr>
<tr>
<td>Smoking habits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never smoked</td>
<td>310 (48.74%)</td>
<td>71 (37.57%)</td>
</tr>
<tr>
<td></td>
<td>134 (43.23%)</td>
<td>33 (35.87%)</td>
</tr>
<tr>
<td>Former smoker</td>
<td>88 (13.84%)</td>
<td>20 (10.58%)</td>
</tr>
<tr>
<td></td>
<td>49 (15.81%)</td>
<td>14 (15.22%)</td>
</tr>
<tr>
<td>Current smoker</td>
<td>238 (37.42%)</td>
<td>98 (51.85%)</td>
</tr>
<tr>
<td></td>
<td>127 (40.97%)</td>
<td>45 (48.91%)</td>
</tr>
<tr>
<td>CCI</td>
<td>0.61 ± 0.91</td>
<td>1.05 ± 2.00</td>
</tr>
<tr>
<td></td>
<td>0.72 ± 1.19</td>
<td>1.02 ± 1.50</td>
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</tbody>
</table>

CCI = Charlson comorbidity index
Prevalence of mild asthma

- N=1,191 respondents reported an asthma diagnosis (2.01% of the total adult population)

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<tr>
<td>Among adults</td>
<td>1.52%</td>
<td>0.77%</td>
</tr>
<tr>
<td>Among patients with asthma</td>
<td>75.72%</td>
<td>77.22%</td>
</tr>
</tbody>
</table>

Results weighted to project to the total adult urban population of China
Analyses were performed prior to excluding patients with COPD
Mild and moderate/severe asthma had significantly worse QOL than matched controls. No QOL differences were observed between mild and moderate/severe asthma defined by GINA2014 guidelines.

*MCS = mental component summary; PCS = physical component summary score
All models controlled for sex, household income, body mass index, smoking habits, and the Charlson comorbidity index.
Mild and moderate/severe asthma had significantly more impairment than matched controls. No differences in impairment were observed between mild and moderate/severe asthma defined by GINA2014 guidelines.

Self-report

GINA2014 guidelines

*\( p < .05 \) relative to matched controls; †\( p < .05 \) between mild and moderate/severe asthma

All models controlled for sex, household income, body mass index, smoking habits, and the Charlson comorbidity index.
Mild and moderate/severe asthma had significantly more HCRU than matched controls. No differences in ER visits and hospitalizations were observed between mild and moderate/severe asthma regardless of definition.

*\( p < .05 \) relative to matched controls; †\( p < .05 \) between mild and moderate/severe asthma

All models controlled for sex, household income, body mass index, smoking habits, and the Charlson comorbidity index.
Limitations

• All data were self-reported
  – No verification of diagnosis or treatment history

• Potential for misclassification of severity
  – Only patients with treatment data could be classified using GINA2014 guidelines
  – “Mild” patients in GINA2014 guidelines may represent combination of “mild” and undertreated “moderate” patients

• NWHS primarily (but not exclusively) relied upon respondents with Internet access and these patients could be different from the broader population

• China NHWS was focused on an urban population and the results may not generalize to more rural areas.
Conclusions

- Prevalence of asthma was estimated at 2%
- Using both the GINA2014 guidelines and self-report definitions, most patients with asthma in urban China are mild (~75%)
- A significant burden was observed with respect to QOL, work productivity, activity impairment, and healthcare resource use
  - When defining severity based on GINA2014 guidelines, few differences were observed between “mild” and “moderate”/”severe” patients
- Better asthma management may provide benefits to both the patients and society
GINA2014 Guidelines

**Mild**
- Short-acting beta-agonists (SABA):
  - salbutamol, levosalbutamol, terbutaline, pirbuterol, procaterol, clenbuterol, metaproterenol, fenoterol, bitolterol mesylate, ritodrine, isoprenaline
- Inhaled corticosteroids (ICS) (Step 2) only:
  - beclomethasone, budesonide ciclesonide, flunisolide, fluticasone mometasone, triamcinolone
- Leukotriene receptor antagonist (LTRAs) (Step 2) only:
  - montelukast, pranlukast, zafirlukast, zileuton
- Theophylline (Step 2) only

**Moderate/severe**
- ICS (defined above) + long-acting beta-agonist (LABA) (Step 3/4):
  - salmeterol, formoterol, salbutamol
- ICS (defined above) + LTRA (defined above) (Step 3/4)
- ICS + theophylline (Step 3/4)
- Omalizumab (Step 5)