Respiratory Medicine 140 (2018) 82–86

Contents lists available at ScienceDirect

Respiratory Medicine

journal homepage: www.elsevier.com/locate/rmed

Health-related quality of life in Canadians with asthma: A case-control study using census data

Amy Chen[a], Behdin Nowrouzi-Kia[b,c,d], Koyo Usuba[e,f,*]

[a] School of Health Science, Hibernia College, Dublin, Ireland
[b] Centre for Research in Occupational Safety and Health, Laurentian University, Sudbury, Ontario, Canada
[c] School of Rural and Northern Health, Laurentian University, Canada
[d] Department of Occupational Therapy and Occupational Science, University of Toronto, Ontario, Canada
[e] Research Centre for Evaluating Children's Health Outcomes (ECHO), Laurentian University, Sudbury, Ontario, Canada
[f] Child Health Evaluative Sciences, Hospital for Sick Children, Toronto, Ontario, Canada

ARTICLE INFO

Keywords:
Quality of life (QOL)
Health-related quality of life (HRQoL)
Asthma
Health utilities index mark 3 (HUI3)
Single-attribute utility (SAU)
Multi-attribute utility (MAU)
Canadian community health survey (CCHS)

ABSTRACT

Background: Asthma is a common medical condition that impacts the lives of many Canadians; yet the health-related quality of life (HRQoL) in persons with asthma relative to the general population (GP) is poorly studied. In this study, data from the Canadian Community Health Survey (CCHS) 2013 was used to quantify and compare the HRQoL of the asthmatic population (AP) and the GP.

Methods: A representative survey sample of Canadians was taken from the CCHS to compare the Health Utilities Index Mark 3 (HUI3) scores, a generic HRQoL measure, between the AP (n = 572) and the GP (n = 6518). The HUI3 multi-attribute utility (MAU) and the single-attribute utility (SAU) scores between the two sample groups were studied. The CCHS 2013 dataset was explored as the primary analysis, while the 2012 dataset was used as the confirmatory analysis to verify the consistency of the results.

Results: Clinically important difference was found in the MAU score between the AP and GP ($p < 0.001$, Effect size = 0.30). MANOVA on the eight SAU scores with post-hoc test revealed that the AP had a lower mean score of vision ($p < 0.001$, Effect size = 0.36) and pain/disconfort ($p < 0.001$, Effect size = 0.29). Those findings were consistent with the CCHS 2012 dataset result.

Conclusions: These results provided evidence that in Canada, having asthma significantly worsens asthma patients' overall HRQoL and imposes significant impacts on the patients' vision and pain/discomfort. Therefore, there is room for improvement in the currently available asthma therapies so patients could achieve better HRQoL; particular focus should be given to the pain/discomfort and vision health domains.

1. Introduction

Asthma, characterized by tightness in the chest, coughing, wheezing, shortness of breath, and in more severe cases, the impossibility to breathe due to airway obstruction, is a complex and highly prevalent chronic inflammatory disease of the airways that affects patients of all ages [1]. In Canada, asthma is the third-most common chronic disease [2] and according to Statistics Canada, in 2013, 7.9% of the Canadian population aged 12 and above reported that they have been diagnosed with asthma [3]. Globally, the prevalence of asthma has been on the rise over the last 20 years. The WHO estimated that in 2013, approximately 235 million people suffered from asthma in countries worldwide and approximately 250,000–345,000 death annually are attributable to asthma [4,5]. Current treatments for asthma involve the prescription of long-term control and short-term relief medicines. Some examples of these medicines include corticosteroids, Cromolyn sodium and nedocromil, immunomodulators (Omalizumab), or beta$_2$-adrenoceptor agonists [6,7]. Although a controllable disease, asthma could impose a substantial amount of burden on the society in morbidity, healthcare costs, and patients' quality of life.

Health-Related Quality of Life (HRQoL) is a broad, multi-dimensional concept that encompasses self-derived measurements on the physical, mental, emotion and social functioning aspects of a person's life [8]; and it excludes the economical and spiritual factors that are beyond the scope of healthcare [9]. According to Spilker, focusing on assessing an individual's wellbeing and functioning in each of the three core HRQoL domains (physical, psychological and social) is essential in assessing a person's overall health-related well-being or lack thereof

* Corresponding author. Research Centre for Evaluating Children's Health Outcomes (ECHO), Laurentian University, 935 Ramsey Lake Road, Sudbury, Ontario, P3E 2C6, Canada.
E-mail address: kusuba@laurentian.ca (K. Usuba).

https://doi.org/10.1016/j.rmed.2018.06.004
Received 31 December 2017; Received in revised form 19 May 2018; Accepted 4 June 2018
Available online 08 June 2018
0954-6111/

[9]. Thus, HRQoL measures render additional information that could expand our understanding of the extent of the impact of asthma and allow researchers and clinicians to generate a holistic view of how patients truly respond to an interventional therapy as opposed to just assessing a drug's therapeutic effects in a quantitative manner. Despite this, the health-related burden of having asthma is yet unclear as the study on HRQoL in a bigger asthmatic population (AP), in comparison to the general population (GP) at large, is rarely conducted to date.

HRQoL can be measured by Health Utilities Index Mark 3 (HUI3), a generic preference-based multi-attribute measure that is comprised of eight single-attributes (vision, hearing, speech, mobility, dexterity, cognition, emotion, and pain/discomfort) [10]. The advantages of the HUI3 scoring system include: it 1) is designed to collect responses from a wide variety of subjects in the GP and has been used throughout many different nations [10], 2) can be applied to many chronic diseases, 3) determines the overall health profile, which is measured by HUI3 multi-attribute utility (MAU) scores, and 4) measures the HUI3 single-attribute utility (SAU) scores [10,11]. The MAU score is a single-summary score of HRQoL generated using all the required information for each health state defined by the classification system. Whereas, SAU score is a single-attribute score of morbidity for each attribute. It is valuable to determine the SAU scores of morbidity, in addition to measuring the MAU score, as this allows researchers or healthcare providers to gain additional insights into the health status of each health attribute and facilitate the development of additional studies or future healthcare plans to address any health attribute deficits [10]. However, despite of its advantages, HUI3 does not seem to be a popular HRQoL measure used among researchers as there are only a few publications relating to HUI3 scores in the asthmatic populations. Furthermore, for those studies that included HRQoL measures, assessments at its single-attribute level are rarely reported.

To better understand the burden of asthma, it is beneficial to study the HRQoL relationship between the AP and the GP and the use of HUI3 MAU and SAU scores would enable this comparison. The purpose of this study is to examine whether having asthma has any impacts on the HRQoL of the AP compared to GP in Canada and to identify the effect of asthma on each of the HUI3 single-attributes in the AP. This study should be of interest to data analysts, policymakers, researchers, healthcare practitioners, asthma healthcare programs and pharmaceutical industry as the results would be useful in evaluating the effectiveness of currently existing therapies and healthcare programs.

2. Materials and methods

This is a case-control study using Canadian census data. The electronic data file from the published Canadian Community Health Survey (CCHS) (year 2013) was obtained from Statistics Canada and used for the analysis in this study. The CCHS is a voluntary, cross-sectional survey that collects information related to the health status, health determinants and health care utilization in a large sample of the Canadian population over the age of 12 living in the ten provinces and three territories, using either computer-assisted personal interview or computer-assisted telephone interview method [3]. The survey represents approximately 98% of the Canadian population and excludes less than 3% Canadian population who reside on reserves and other remote areas, are full time members of the Canadian Forces, and are institutionalized. CCHS used three sampling frames in 2013 to select the sample of households and theses are Area frame (40.5% of sample households), Telephone Number frame (58.5%) and Random Digit Dialing sampling frame (1%), thus that a multi-stage stratified cluster sampling design combined with random sampling methods were used to select a sample representing the Canadian population [3,12]. About 65,000 respondents were interviewed for the survey in 2013.

2.1. Samples of asthmatic and general population

Our study sample was drawn from the 2013 CCHS dataset. GP sample was the general Canadian population who responded to the CCHS 2013 annual component with the AP sample excluded.

The AP sample was composed of respondents aged 12 and older who have reported that they have been diagnosed of having asthma expected to last or have already lasted six months or more by a healthcare professional at the time of the survey in 2013 [3].

2.2. Health-related quality of life measure

The HUI3 was selected in this research as the assessment tool to describe the health status and HRQoL of the AP and GP in Canada. It was selected because it has been proven to be a reliable, responsive and valid measure in providing a comprehensive description of the health status and overall assessment of HRQoL [13]. It describes functional rather than performance health status using eight attributes (vision, hearing, speech, ambulation, dexterity, emotion, cognition and pain/discomfort), each attribute with five or six ordinal levels [10]. The SAU score for each attribute ranges from 0 (most highly impaired) to 1 (not impaired). The MAU score, on the other hand, suggests the overall health status and ranges from -0.36 to 1; where a negative score indicates health states considered worse than death, 0 indicates health states equivalent to death, and 1 being the perfect health state [10]. Moreover, Grootendorst *et al.* reported that a difference in mean MAU score of 0.03 or more is considered to be clinically important [14].

2.3. Statistical analysis

Descriptive statistics was employed to summarize the characteristics of the Canadian AP and GP samples in this study and the MAU and SAU scores were also calculated for both samples. Welch's *t*-test was employed to detect the difference in MAU scores between the AP and GP. Another area of interest was to determine the effect of asthma on the health status of each single-attribute and a Multivariate Analysis of Variance (MANOVA) was employed to detect this. Multivariate significance was tested by Pillai's trace because this test is reported as robust even when some assumptions were not met [15]. If a MANOVA was found to be significant, Least Significant Difference (LSD) post-hoc comparison tests were to be performed to further explore the difference seen in the SAU scores of each single-attribute between the two samples. LSD post hoc analyses were used to protect against increases in Type 1 errors by limiting the number of comparisons that can be made [16]. To aid in interpretation of the effect of having asthma, effect size (ES) was calculated for the MAU and SAU scores using Hedges's g [17]. Threshold values recommended by Kazis et al. were used to categorize the effect as not significant ($ES < 0.2$), small ($0.2 \leq ES < 0.5$), moderate ($0.5 \leq ES < 0.8$), and large ($ES \leq 0.8$) [18].

2.4. Confirmatory analysis

In this study, CCHS data from 2012 was taken and used to conduct a confirmatory analysis to confirm the results obtained from the 2013 CCHS data. The same statistical analyses were performed to confirm whether the results from the 2012 and 2013 dataset were consistent.

3. Results

The 2013 CCHS dataset was filtered to exclude missing data and invalid data in which the respondents answered “Don't know”, “Refusal”, “Not stated”. In this study, a total of 7090 valid survey data were used for the analysis. Of those, 572 were categorized as AP group and the rest, 6,518, were categorized as non-asthmatic group or hereafter referred to as GP. Basic demographic information was used to describe the population. Overall, in this community-based population,