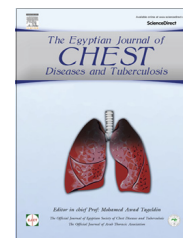




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ORIGINAL ARTICLE

Influence of altitude on pediatric asthma severity and quality of life in southwestern Saudi Arabia



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KEYWORDS

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Abstract *Objectives:* The study investigates the influence of altitude on asthma severity and quality of life in asthmatic children in southwestern Saudi Arabia.

Methods: Comparative hospital based study was conducted on 90 bronchial asthma patients aged 5–12 years prospectively underwent consultations in pediatric clinics at Maternity and Children Hospital (MCH) in moderate altitude area and 90 age and sex matched patients during consultation in pediatric clinics at MCH in low altitude area. For both groups, asthma severity was assessed according to GINA 2002 criteria and patients responded pediatric quality of life inventory generic core scales. Altitude and climatic conditions were abstracted from standardized sources.

Results: Asthma severity was significantly lower in moderate altitude compared to low altitude. Also, severity of symptoms and need for controller medications were negatively associated with altitude. In multiple regression analysis, the physical and psychosocial domains of quality of life were positively predicted by altitude and negatively with asthma severity.

In conclusion: Moderate altitude was significantly associated with lower degree of asthma disease severity, lower need for controller medication and better quality of life.

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Introduction

Bronchial asthma represents one of the prominent health problems for all age groups, but especially in children and adolescents due to its wide prevalence, growth of annual morbidity, frequent complications, as well as evident decline in work ability and quality of life [1,2]. Typical consequences of bronchial asthma include; sleep disorders, impaired daily activity and inability of exercising, lack of sufficient rest, lack

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of opportunity to study and work, leading to general quality of life worsening, increase of both direct and indirect economic government losses take place [3,4].

The worldwide prevalence of asthma ranges from 1% to 18% [1,5] with nearly 10% of patients suffer from severe disease, which remains difficult to control despite inhaler therapy [5]. In Saudi Arabia, it is one of the most common chronic diseases affecting more than 2 million Saudis [6]. The modernization of Saudi society, changes in dietary habits, and exposure to environmental factors, such as indoor allergens, tobacco, outdoor air pollution, dusts and sand storms may be responsible for the growing burden of bronchial asthma especially among children [7].

The most important goal in the management of bronchial asthma is the maintenance of a normal quality of life for the patients. The health related quality of life in asthma can be assessed by either a generic or a disease-specific instrument. Pediatric quality of life questionnaire is a valid and reliable tool that could be used to assess the quality of life among asthmatic children and found to be correlated well with disease severity [9].

There is a growing concern about the effect of living at moderate and high altitudes in minimizing asthma severity and improving asthma control, performance and sense of well-being [8,10]. This may related to the environmental privileges of moderate to high-altitude area which is characterized by dry, clean air, with reduced levels of house dust mites, particulate matters and molds [10].

The main objective of the current study was to examine whether living in moderate altitude area minimizes the severity bronchial asthma disease, need for corticosteroid controller medication and improves pediatric quality of life compared with living at low level.

Subjects and methods

A comparative hospital based study was conducted on 180 patients of either gender with different grades of bronchial asthma. Patients were recruited from outpatient clinics of Maternity and Children Hospitals in two large cities in the southwestern Saudi Arabia- Abha and Jizan- during the period March–September 2015.

Abha town is the capital of Aseer region; it is situated at an elevation of 2270 m (7500 feet) above sea level and it has a generally moderate climate, heavy rainfall, green pasture and agricultural plateaus. [11]. Thus, the population in Abha city is living at moderate altitude climate [12]. The average annual outdoor annual temperature is 17.5 °C and ranges from 12.7 °C (in January) to 22.4 °C (in June). The relative humidity typically ranges from 42% to 69% over the course of the year, rarely dropping below 24%, or exceeding 81% [13].

Jizan town is the capital of Jizan region; it is located to the west of Abha on the tropical Red Sea coast. It has subtropical desert, low level arid hot climate. The mean annual temperature is 29.6 °C and ranges from 25 °C in January to 33 °C in June. The relative humidity typically ranges from 47% to 85% over the course of the year, rarely dropping below 37%, or exceeding 91% [14].

All asthmatic patients in the age group 5–12 year old who underwent consultation during the study period to pediatric

outpatient clinics in Maternity and Children Hospital in Abha and Jazan cities and who agreed to participate in the research were included in this study. The inclusion criteria include; asthmatic, age group 5–12 year old and free from other chronic diseases.

Recruited patients were diagnosed by observing the clinical findings compatible with bronchial asthma at the physical examination and classified into four categories: intermittent, mild persistent, moderate persistent or severe persistent according to asthma severity (level of symptoms, airflow limitation and lung function variability), taking into account the treatment dose and following the recommendations of the GINA 2002 [15].

The patients were subjected to specially designed questionnaire that included questions about; sociodemographic criteria, asthma symptoms (dyspnea, cough and wheezing) during the previous 4 weeks, current medication, time since diagnosis of asthma, and history of allergy.

Also, they responded to Arabic version for Pediatric Quality of Life Inventory™ Generic Core Scales (PedsQL Generic core scales 4.0) [16] by self-report. Trained research assistants were available to read the questions for some children in the 5–7 age-group and those who found difficulty in understanding the items.

The PedsQL 4.0 Generic core scales consist of four scales divided in 23 items assessing the level of physical and psychosocial functioning of children. Physical functioning consists of 8 items. Psychosocial functioning is divided into three subscales; emotional, social and school functioning, each consisting of 5 items. The instructions ask for the degree of a problem each item had been during the previous month. A five point Likert response scale is used (0 = never a problem, 4 = almost always a problem). Items are reverse-scored and linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0), so that higher scores indicate better health related quality of life. Scale scores are computed as the sum of the items divided by the number of items answered. It was found to be valid and reliable to assess quality of life among healthy and asthmatic children [17,18].

The Arabic version of PedsQL GCS was found to be a valid and reliable tool to measure the emotional, social, and school functioning domains of quality of life in pediatric age group [16].

The study was approved by the Research Committee at the King Khalid University. Participation in the study was entirely on voluntary basis after giving written informed consent signed by child's parent or his trustee.

Data entry and analysis

Data entry and analyses were done using SPSS, version 22. Continuous data were presented as mean and standard deviation and compared using Student's *t*-test and Mann–Whitney-U test for parametric and non-parametric data respectively. In categorical data, the Chi-squared test was used for comparison between groups. Significant factors predicting the quality of life on simple linear analysis were entered into multivariate linear regression analysis to find out the independent predictors of quality of life. $P < 0.05$ was considered statistically significant.

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