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# Assessment of Asthma Control Level at Outpatients Clinic, Wad Medani Teaching Hospital

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**Abstract**

Asthma is a heterogeneous disorder associated with chronic airway inflammation, its prevalence is increasing globally and more prevalent in developed countries. This study aimed to determine the level of asthma control at *Wad Medani* Teaching Hospital Outpatient Clinic. A cross-sectional study was performed in 130 adult asthmatics in *Wad Medani* Teaching Hospital Outpatient Clinic between March to June 2021. Data were collected using a standardized questionnaire, and Asthma Control Test (ACT) was used to determine the level of the control. Multivariate analysis and Logistic Regression were used to determine the most factors that have a role in asthma control. The mean age of the study participants was 35 years (±14) and females were predominant (68.5 %). Among all asthmatics, the prevalence of uncontrolled asthma was 75.4% according to the ACT Score. The following factors were shown to be significantly associated with asthma control; education level (P = <0.001), current occupation(P = 0.02), social status (P =0.002), duration of disease (P = <0.01), frequency of asthma attacks during the last year that required an emergency department (P = 0.002), and follow-up with a physician (P = <0.001). This study showed a high rate of uncontrolled asthma at *Wad Medani* Teaching Hospital Outpatient Clinic. Factors associated with uncontrollable asthma can be used as targets for future intervention programs.

**Key Words:** Asthma control level, Assessment, Asthma control predictors, Outpatients clinics.

## Introduction:

Asthma is a heterogeneous disorder associated with chronic airway inflammation [1]. Although there is no known cause of asthma, risk factors have been found [2]. Asthma is considered a major public health issue as stated in a systematic analysis for the Global Burden of Disease Study 2015 [3]. Asthma prevalence is increasing globally and more prevalent in developed countries [4]. As well as developing countries [5]. It is an emerging public health problem in Africa [6]. Sudanese adults were found to have a 10% prevalence of asthma symptoms [7]. Standard case management of asthma in Sudan (2007–2008) was applied by a local adaptation of guidelines, and a study found a significant reduction in the frequency of emergency visits and hospitalizations [8]. A study also conducted in Sudan showed that more than half (57%) of asthmatic patients are not receiving treatment by international asthma management guidelines [9]. The most important aims in asthma management according to asthma guidelines are the control of asthma symptoms and the reduction of future risks, such as exacerbations, fixed airway obstruction, and side effects [10]. The failure of asthma control can be attributed to various factors, considering the importance of guidelines and their applications, as well as some disease-related and patient-related issues [11]. Inadequate asthma inhalers technique is linked to low asthma control levels and more emergency room visits [12]. According to previous studies done in Cork University Hospital, Ireland and Metered Dose Inhalers (MDIs) are the most commonly mishandled inhalers, with an average of (68 %) of patients having improper technique [13].

Several studies have found that asthma control is suboptimal around the world. The World Health Survey (WHS) was developed and conducted by the World Health Organization (WHO), from 2002 to 2003, the greatest prevalence was reported in South East Asia (57.9%) (4). In the United States, uncontrolled asthma was found to be prevalent in (58 %) of primary care provider sites [14]. Ethiopia has more prevalent poorly controlled asthma ( 71.67 %) [15]. Asthma control was poor in all 11 Middle East and North African countries according to ESMAA study evaluation (41.5%) [16]. Data on asthma control in other regions around the world is available. However, there has been fair information on the level of asthma control in some African countries, although data from Sudan is limited, and the components correlated with asthma control are not thoroughly explored. This study aims to identify the level of asthma control and its related

properties in all asthmatic patients who attended an outpatient clinic.

## Methods:

### Study design and Setting:

This study was a cross-sectional hospital-based survey. It was carried out at *Wad Medani* Teaching Hospital outpatient clinic containing 5317 beds and the number of Specialists 2019, and 164 only 7 of them are the chest physicians, located in Gezira State, Sudan, Outside of Khartoum the capital of Sudan, which is the state's largest government hospital, Gezira State is populated one, with a population approximately of five million people, Both private and public health facilities are accessible, there are 90 governmental hospitals, 402 health centers [17]. The study was conducted from March to June 2021.

### Study Population:

Patients in this study were aged more than 18 years and were diagnosed with asthma and were on treatment. Patients were excluded if they had visited the clinic for less than three months, if they had been diagnosed with chronic respiratory disorders other than asthma, or did not have an entirely satisfactory questionnaire.

### Data collection

A standardized structured interview questionnaire was used to collect data, which included the patient's socioeconomic and demographic information as well as patient-related characteristics, such as follow-up with physician, duration of disease, the frequency of asthma attacks during the last year, and inhaler technique. The Asthma Control Test(ACT), a well-validated test, was used to assess asthma control levels [18]. The ACT score is calculated by adding all of the choices collectively, with a maximum highest score of 25. The optimum cutoff value for well-controlled asthma over the past four weeks is a score of 20. It consisted of five questions that measure activity restriction, trouble breathing, overnight symptoms, use of preventer inhaler, and patient health assessment of asthma control over the past four weeks. The questions were graded on a scale of 1 (lowest) to 5 (highest), in this study asthma control was assessed by an established, authorized, and Arabic version of the ACT [19].

### Sample size and Sampling Technique:

The following formula was used to determine the sample size N = population size. e = Margin of error (percentage in decimal form). z = z-score $Z\alpha/2$ is the critical value of the Normal distribution at $\alpha/2$ (e.g. for a confidence level of 95%, $\alpha$ is 0.05 and the critical value is

1.96), MOE is the margin of error, p is the sample proportion, and N is the population size. The total number of asthmatic patients was 1281, and the prevalence of asthma in Sudan was 10% was used for calculation[7]. Thus a sample size of 130 patients was estimated. A convenience sampling technique was used.

$$sample\ size = \frac{\frac{Z^2 X\ P(1-P)}{e^2}}{1+(\frac{Z^2\ X\ P(P-1)}{e^2 N})}$$

**Data analysis**:

The essential features of the study participants were reported by descriptive statistics. For normally distributed continuous data, means and standard deviations (SDs) were computed. For cross-tabulation, Pearson's $\chi^2$ test or Fisher's exact were utilized, as well as Multivariate analysis and Logistic Regression to identify the variables linked to asthma control. The data was organized and analyzed using the Statistical Package for the Social Sciences software (version-24).

**Ethical Approval**:

Ethical approval for this study was obtained from the Research Ethical Committees, Faculty of Medicine, University of Gezira. Approval was obtained from the Ministry of Health, Gezira State, Sudan.

## Results:

This study included 130 asthmatic patients approached at the outpatient clinic, every participant was offered consent after being fully informed and completing the questionnaire.

**Social and demographic features:**

The research participants' average age was 35 years (±14). And the females were predominant (68.5 %), half of the participants (51%) were from rural origin. More than half of the participants graduated from university (58.5%), only (6.2%) of participants were smokers, half of them (50%) were married. The current occupation of the participants were either housewives (29.2%) or students (28.5%) and only (23.1%) were employed, the majority of participants had a duration of disease more than 10 years (60.8%). The frequency of asthma attacks (40.8 % ) that were needed in an emergency hospital more than 3 times in the last year. Most of the participants (83.1%) were not following their physician.

**Asthma control:**

The majority of the participants were poorly controlled (75.4%) while the control was only (24.5%) with a mean of 16.05 (±4.6).

**Association of asthma control with other factors:**

Except for social status (p-value =0.04 ), no sociodemographic parameters demonstrated a significant relation to asthma control (Table 1).

**Table1:** Association between social and demographic features and asthma control

| | | asthma status classification | | | |
|---|---|---|---|---|---|
| | | controlled n(%) | poorly controlled n(%) | Total | P-Value |
| Age | 18-25 | 12 (24) | 38 (76) | 50 (100) | 0.78 |
| | 26-35 | 7 (22) | 26 (78) | 33 (100) | |
| | 36-50 | 8 (28) | 21 (72) | 29 (100) | |
| | 51-65 | 5 (28) | 13 (72) | 18 (100) | |
| gender | Male | 10 (25) | 31 (75) | 41 (100) | 0.25 |
| | Female | 22 (25 ) | 67(75) | 89 (100) | |
| Residence | rural | 18 (27) | 49 (73) | 67 (100) | 0.67 |
| | urban | 14 (23) | 49 (77) | 63 (100) | |
| Education level | Illiterate | 0 (0.0) | 1(100) | 1 (100) | 0.05 |
| | primary school | 4 (22) | 15 (78) | 19 (100) | |
| | secondary school | 10 (30) | 24 (70) | 34 (100) | |
| | University. Graduate | 18 (24) | 58 (76) | 76 (100) | |
| current occupation | employed | 7 (24) | 23 (76) | 30 (100) | 0.09 |
| | housewife | 7 (19) | 31 (81) | 38 (100) | |
| | free worker | 7 (28) | 18 (72) | 25 (100) | |
| | student | 11 (30) | 26 (70) | 37 (100) | |
| social status | married | 18 (28) | 47 (72) | 65 (100) | 0.04 |
| | single | 14 (22) | 51 (78) | 65 (100) | |
| | | | | | |
| Household monthly | < 20000 | 27 (28) | 71 (72) | 98 (100) | 0.19 |

| income | 20000 to 40000 | 2 (11) | 17 (89) | 19 (100) | |
|---|---|---|---|---|---|
| | > 40000 | 3 (24) | 10 (76) | 13 (100) | |

Table 2: Asthma control and health-related aspects:

| | | controlled n (%) | poorly controlled n (%) | Total | P-Value |
|---|---|---|---|---|---|
| **Duration of disease** | less than 5 years | 2 (13) | 14 (87) | 16 (100) | **0.012** |
| | 5-10 years | 7 (10) | 28 (80) | 35 (100) | |
| | more than 10 years | 23 (30) | 56 (70) | 79 (100) | |
| **Frequency of asthma** | never | 10 (34) | 20 (66) | 30 (100) | **0.002** |
| **attacks during the year** | one time | 5 (24) | 16 (76) | 21 (100) | |
| | two times | 3 (12) | 23(88) | 26 (100) | |
| | >= 3 time | 14 (27) | 39 (73) | 53 (100) | |
| **follow up with a physician** | yes | 0 (0.0) | 22(100) | 22 (100) | <0.001 |
| | no | 32 (30) | 76 (70) | 108(100) | |
| | | | | | |
| **smoker status** | smoker | 1 (13) | 7 (87) | 8 (100) | 0 .12 |
| | not smoker | 31 (26) | 91 (74) | 122(100) | |
| | | | | | |
| | | | | | |
| **use of inhaler** | improper use | 32 (25) | 97 (75) | 129(100) | 0.57 |
| | proper use | 0 (0.0) | 1 (100) | 1 (100) | |

**Table 3:** Factors associated with asthma control:

| | | **Asthma control** | **Odds ratios** |
|---|---|---|---|
| | | **P-Value** | |
| Age | 18-25 | 0.15 | 4.25 |
| | 26-35 | | |
| | 36-50 | | |
| | 51-65 | | |
| gender | male | 0.63 | 1.36 |
| | female | | |
| Residence | rural | 0.24 | 0.63 |
| | urban | | |
| Education level | Illiterate | **<0.001** | 0.17 |
| | primary school | | |
| | secondary school | | |
| | University. graduate | | |
| Smoker status | smoker | 0.13 | 0.15 |
| | not smoker | | |
| Current occupation | employed | **0.003** | 0.094 |
| | housewife | | |
| | free worker | | |
| | student | | |
| Social status | married | 0.001 | 20.83 |
| | single | | |
| | | | |
| Economic status | < 20000 | 0.19 | 1.94 |
| | 20000 to 40000 | | |
| | > 40000 | | |
| Duration of disease | less than 5 years | 0.86 | 0.067 |
| | 5-10 years | | |
| | more than 10 years | | |
| Frequency of asthma attacks during the | never | 0.004 | 0.32 |
| year | one time | | |
| | two times | | |
| | >= 3 time | | |
| Follow-up with the physician | Yes | 0.04 | 0.00 |

**Asthma control and health-related aspects:**

The following components were shown to be significantly related to asthma control: duration of disease (P-value = <0.01), frequency of asthma attack during the last year that required emergency hospital (P-value = 0.002), follow up with physician (P-value = <0.001), but there was no statistically significant association between asthma control and smoking status (P-value = 0.12) and the inhaler technique (P-value = 0.57) ( Table 2). The six factors were shown to be significantly related to uncontrolled asthma in the multivariate analysis; education level, current occupation, social status, duration of disease and the frequency of asthma attacks during the last year that required emergency hospital visits, and follow-up with physicians (Table 3).

## Discussion:

This study told about a relatively high prevalence of uncontrolled asthma (75.4%) among the participants, also revealed that education level, current occupation, social status, duration of disease, frequency of asthma attack during the last year that required an emergency hospital visit, and follow up with physician were found to be significantly linked to uncontrolled asthma. In other African nations, which also revealed high rates of poorly controlled asthma, such as Ethiopia (85.2%) the Maghrib countries (71.3%), the Democratic Republic of Congo (56%), and Cameroon (42%).[20, 21,22, 23]. A recent study in Sudan reported a great prevalence of poorly controlled asthma (84.5%) [24]. Although the majority of patients were assessed by specialists in hospitals, there was a high frequency of poorly controlled asthma (75.4%) in this study. The previous studies revealed Patients with asthma that they see physicians are better control than those who see non-specialists[25, 26].

In the current study various factors correlated to uncontrolled asthma were established;(duration of disease, frequency of asthma attacks during the last year, and follow-up with physicians). The Previous study has shown asthma for more than 30 years, inappropriate inhalation techniques, and asthma attacks in the last 12 months are all attributed to uncontrolled asthma [23, 15].

The Global Initiative of Asthma [27] UNION [28] recommends enhancing the level of performance efficiency delivered to asthma patients for obtaining optimal outcomes. Asthma guidelines recommend diagnostic tools like a peak-flow meter and a spirometer, as

well as the availability and affordability of high-quality drugs, and ongoing training of healthcare providers.

In practice, observed that all of the patients they diagnosed only clinically neither by using a peak-flow meter nor using a spirometer. Asthma treatment necessitates the determination of lung function, and its less use has been linked to asthma understatement, as well as poor asthma management [29].

In this study, uncontrolled asthma was found to be connected with education level in patients with adult-onset asthma. A lower educational level was found to be a risk factor for uncontrolled asthma, with primary education being the most common [28, 30]. Also, current occupation, social status, and monthly outcome have been associated with uncontrolled asthma, Asthma Control was better in those with a higher occupational class and higher monthly income [31].

## Conclusion:

This study showed a remarkably low level of asthma control, and the factors associated with poor control were education level, current occupation, social status, duration of disease, the frequency of asthma attacks during the last year, and follow-up with physicians. Interventional studies were required to encourage for more asthma control.

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