

## Impact of Bronchial Asthma on Medical Student Attendance

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### ABSTRACT

**Background:** Asthma symptoms may result in student absenteeism and affect their academic performance. We aimed to assess the rate of absenteeism among medical students with asthma.

**Patients and methods:** An online survey was conducted among medical students with asthma at King Abdulaziz University. The survey questions domain included: 1) demographic data; 2) the student's asthma management; 3) the effect of asthma on attendance by estimating the missing days in the academic year; 4) the student's opinions on the effect of asthma on their attendance, and 5) the student's asthma control status.

**Results:** A total of 70 asthmatic students responded to our survey. Twelve (17.1%) students had missed at least one examination, and 27 (38.6%) students reported having missed at least one teaching session due to asthma symptoms. Severe asthma attacks requiring emergency room visits or hospital admission in the last 12 months, ongoing exposure to asthma triggers, and male gender were associated with a higher rate of missing examinations: 4 students (40%,  $p = 0.038$ ), 12 students (23.1%,  $p = 0.025$ ), and 11 students (25.6%,  $p = 0.018$ ), respectively. No clinical features were associated with an increased rate of missing teaching sessions. Associations between absenteeism, asthma control in the preceding four weeks, and the use of asthma medications were not significant.

**Conclusion:** History of severe asthma attacks, ongoing antigen exposure, and male gender were associated with an increased rate of absenteeism from examinations among medical students. Accommodating medical health issues is an important step in optimizing the academic environment for medical students.

**Keywords:** Asthma, Absenteeism Academic performance, Medical students, King Abdulaziz University

### INTRODUCTION

Asthma is one of the most common chronic illnesses in Saudi Arabia. The prevalence has increased in past decades <sup>(1)</sup>, and its substantial morbidity and mortality require prompt identification and treatment <sup>(2)</sup>.

Asthma prevalence among medical students is estimated to be between 10% and 19.2%, which is a substantial proportion of medical students suffering from this respiratory morbidity that can affect their attendance and academic achievement <sup>(3-5)</sup>.

Studies have shown a relationship between days of school absenteeism and uncontrolled asthma among schoolchildren <sup>(6)</sup>.

In addition, an inverse relationship between asthma and academic performance has been suggested in prior research, highlighting the potential influence of asthma on how students proceed with their academic journey <sup>(7)</sup>.

The aim of this study was to assess the effect of asthma on medical students' attendance at King Abdulaziz University for written tests, clinical examinations, and clinical teaching sessions and their perception of its effect on their academic performance.

### PATIENTS AND METHODS

#### Study design

A cross-sectional online-based survey was conducted among fourth-, fifth-, and sixth-year medical students in a Medical College at King Abdulaziz University, Jeddah, Saudi Arabia. The study was conducted from April 15, 2022, to May 15, 2022.

#### Data collection

The questionnaire consisted of 14 questions in 5 parts: 1) demographic data; 2) asthma management, including current asthma treatment and follow-up with a pulmonologist; 3) effect of asthma on attendance at written tests or clinical examinations and clinical teaching sessions by estimating the missing days; 4) opinions on the effect of asthma on attendance at written tests or clinical examinations and clinical teaching sessions, its effect on the students' concentration during written tests or clinical examinations and clinical teaching sessions and their examination scores; and 5) asthma control status using the Global Initiative for Asthma (GINA) tool, the number of severe asthma attacks needing emergency room visits or hospital admission in the last 12 months,

and the presence of risk factors for severe asthma exacerbation.

The survey was distributed to the medical students via telephone text messages with an instruction stating that only students with a diagnosis of asthma should participate in the survey. The participants' consent was secured once they agreed to complete the survey. The survey took 5 minutes to complete.

### **Validation process**

The questionnaire was developed, and then revised by two pulmonologists for face and content validation in line with the study design and objectives. Their comments regarding the questions' clarity and comprehensibility, the length of the survey, the grammar and linguistic structure, and the relevance of the questions to the study objectives were taken into account. A pretest respondent-driven method was conducted with 8 asthmatic medical students who assessed the preliminary questionnaire. Their feedback on the questionnaire items regarding the relevance, difficulty, appropriateness, clarity, and length of the questionnaire was collected.

### **Sample size determination**

Given a 19% prevalence of asthma among medical students as determined by a prior study (5) and using a population of 1200 medical students enrolled in the fourth, fifth, and sixth clinical year, the sample size was estimated to be 158 asthmatic students with a 5% margin of error and a 95% confidence interval (CI).

### **Ethical approval**

Approval of the study was obtained from King Abdulaziz University Faculty of Medicine, Unit of Biomedical Ethics Research Committee (registration No. 198-22). This work was carried out following The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

### **Statistical analysis**

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 26 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were tested for normal distribution using the Shapiro-Walk test. Qualitative data were represented as frequencies and relative percentages. Fisher's exact test and Pearson's chi-square test were used to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean and standard deviation (SD). Independent samples t-test was used to compare between two independent groups of normally distributed variables (parametric data). P-value  $\leq 0.05$  was considered significant.

## **RESULTS**

The mean age of the participants was 23.1 (SD 1.03) years. About two-thirds of the participants (61.4%) were male (n = 43). Most were fourth-year students (38.6%), followed by fifth-year students (34.3%), and sixth-year students (31.4%).

Three students (4.3%) were married. While more than a third of the participants (38.6%) had missed clinical teaching sessions (n = 27), only 17.1% (n = 12) had missed written tests or clinical examinations. Only 10 participants (14.3%) had experienced asthma exacerbations that needed emergency department visits or hospital admission within the previous 12 months. However, almost three-quarters (n = 52) had had asthma risk factors during the previous 12 months. Most (71%) of the participants did not follow up regularly with a pulmonologist. A little more than two-thirds of the participants (n = 48, 68.6%) were taking asthma medications either regularly or as needed. Only 21.43% of the participants had poorly controlled asthma, while the rest had either partly controlled (41.43%) or well controlled asthma (37.14%). The participants' demographic and medical characteristics are shown in Table 1.

Being male was associated with a nine-fold chance of missing an exam compared to being female (odds ratio [OR] = 8.94, 95% CI = 1.08–73.83, p = 0.018). Experiencing severe asthma exacerbations within the previous 12 months increased the chance of missing an exam by 4 times (OR = 4.3), which was statistically significant (95% CI = 0.99–18.8, p = 0.038). Experiencing risk factors of asthma exacerbation during the previous 12 months was significantly associated with missing an exam (p = 0.025). The OR was not calculated, as none of the students without risk factors missed exams. The associations between demographic/medical factors and missing exams are shown in Table 2.

Although some factors, including poorly controlled asthma, experiencing severe asthma exacerbations or risk factors during the previous 12 months, and taking asthma medication, increased the chance of missing clinical teaching sessions, none of these factors showed significant associations, as shown in Table 3.

Figure 1 illustrates the students' rates of missing a written test or clinical examination and a clinical teaching session due to asthma symptoms. Figure 2 illustrates the Likert-type scale responses regarding the effects of asthma symptoms on missing a written test or clinical examinations and clinical teaching sessions and whether asthma symptoms negatively affected the students' examination scores and concentration.

**Table 1: Demographic and medical characteristics of the study participants (n = 70).**

<b>Variable</b>	<b>Mean</b>	<b>SD</b>
<b>Age</b>	23.1	1.03
<b>Variable</b>	<b>n</b>	<b>%</b>
<b>Gender</b>		
Male	43	61.4
Female	27	38.6
<b>Medical year</b>		
4 <sup>th</sup> year	27	38.6
5 <sup>th</sup> year	24	34.3
6 <sup>th</sup> year	19	27.1
<b>Marital status</b>		
Single	67	95.7
Married	3	4.3
<b>Asthma control</b>		
Poorly controlled	15	21.43
Partly controlled	29	41.43
Well controlled	26	37.14
<b>Severe asthma exacerbation needing ER visit or hospital admission in last 12 months</b>		
Yes	10	14.3
No	60	85.7
<b>Risk factors for asthma exacerbation in last 12 months</b>		
Yes	52	74.3
No	18	25.7
<b>Visiting a pulmonologist</b>		
Yes	20	28.6
No	50	71.4
<b>Asthma medication</b>		
Takes medication (regularly or as needed)	48	68.6
No medication	22	31.4
<b>Missed exam</b>		
Yes	12	17.1
No	58	82.9
<b>Missed teaching session</b>		
Yes	27	38.6
No	43	61.4

SD, standard deviation; ER, emergency room

**Table 2: Associations between participants' factors and missing written tests or clinical exams.**

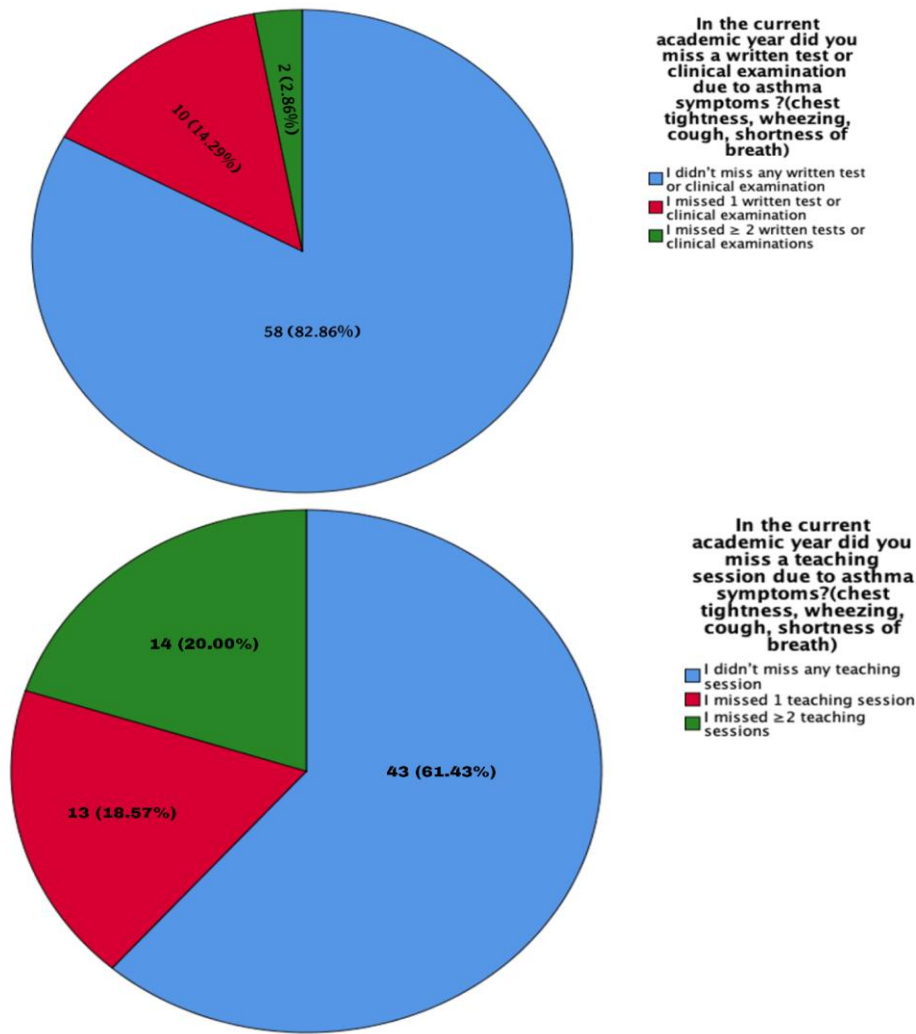
Variable	Missed exam		OR	95% CI	P-value
	Yes	No			
	n (%)	n (%)			
Gender					
Male	11 (25.6)	32 (74.4)	8.94	1.08–73.83	<b>0.018</b>
Female	1 (3.7)	26 (96.3)	ref	-	-
Academic year					
4th year	4 (14.8)	23 (85.2)	0.652	0.141–3.015	0.7*
5th year	4 (16.7)	20 (83.3)	0.75	0.161–3.495	0.507*
6th year	4 (21.1)	15 (78.9)	ref	-	-
Asthma control					
Poorly controlled	5 (33.3)	10 (66.7)	3.833	0.764–19.224	0.090
Partly controlled	4 (13.8)	25 (86.2)	1.227	0.248–6.079	1*
Well controlled	3 (11.5)	23 (88.5)	ref	-	-
Severe asthma exacerbation needing ER visit or hospital admission in last 12 months					
Yes	4 (40)	6 (60)	4.333	0.998–18.81	<b>0.038</b>
No	8 (13.3)	52 (86.7)	ref	-	-
Risk factors for asthma exacerbation in last 12 months					
Yes	12 (23.1)	40 (76.9)	-	-	<b>0.025</b>
No	0 (0)	18 (100)			
Visiting a pulmonologist					
Yes	5 (25)	15 (75)	2.048	0.564–7.434	0.270
No	7 (14)	43 (86)	ref	-	-
Asthma medication					
Take medication (regularly or as needed)	10 (20.8)	38 (79.2)	2.632	0.525–13.19	0.226
No medication	2 (9.1)	20 (90.9)	ref	-	-

\*Fisher's exact test, OR, odds ratio; CI, confidence interval; ER, emergency room

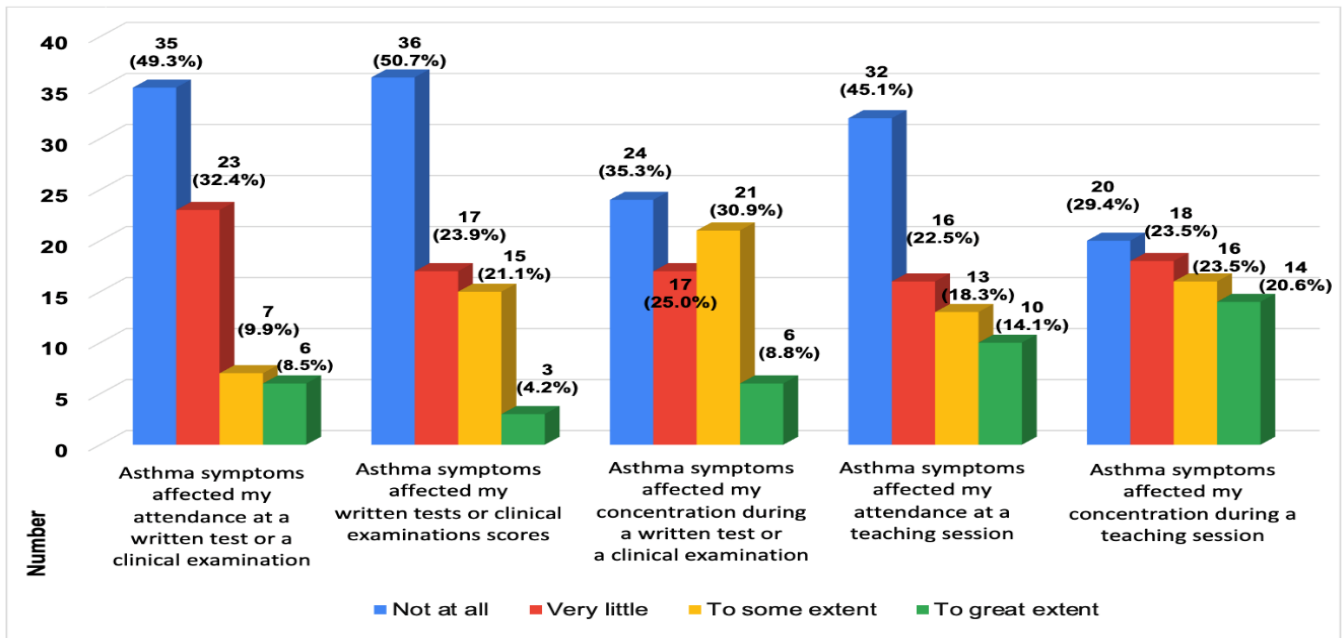
**Table 3: Associations between participants' factors and missing clinical teaching sessions.**

Variable	Missed teaching session		OR	95% CI	P-value
	Yes	No			
	n (%)	n (%)			
<b>Gender</b>					
Male	19 (44.2)	24 (55.8)	1.88	0.677–5.23	0.223
Female	8 (29.6)	19 (70.4)	ref	-	-
<b>Academic year</b>					
4th year	9 (33.3)	18 (66.7)	0.688	0.205–2.31	0.544
5th year	10 (41.7)	14 (58.3)	0.98	0.29–3.33	0.977
6th year	8 (42.1)	11 (57.9)	ref	-	-
<b>Asthma control</b>					
Poorly controlled	9 (60)	6 (40)	2.833	0.763–10.516	0.115
Partly controlled	9 (31)	20 (69)	0.850	0.275–2.625	0.778
Well controlled	9 (34.6)	17 (65.4)	ref	-	-
<b>Severe asthma exacerbation needing ER visit or hospital admission in last 12 months</b>					
Yes	6 (60)	4 (40)	2.786	0.707–10.983	0.133
No	21 (35)	39 (65)	ref	-	-
<b>Risk factors for asthma exacerbation in last 12 months</b>					
Yes	23 (44.2)	29 (55.8)	2.776	0.804 – 9.579	0.098
No	4 (22.2)	14 (77.8)	ref	-	-
<b>Visiting a pulmonologist</b>					
Yes	8 (40)	12 (60)	1.09	0.376-3.144	0.877
No	19 (38)	31 (62)	ref	-	-
<b>Asthma medications</b>					
Take medications (regularly or as needed)	21 (43.8)	27 (56.3)	2.074	0.692-6.218	0.189
No medication	6 (27.3)	16 (72.7)	ref	-	-

OR, Odds Ratio; CI, Confidence Interval; ER, emergency room



**Figure 1:** Students’ rates of missing written tests, clinical examinations, or clinical teaching sessions due to asthma symptoms.



**Figure 2.** Likert-type scale responses to the effect of asthma symptoms on missing clinical examinations and clinical teaching sessions and whether asthma symptoms affected students’ examination scores and concentration negatively.

## DISCUSSION

Prior studies have evaluated the absenteeism rate among school students; however, reports on asthma symptoms' effects on medical students' attendance are lacking. Our results are in concordance with prior studies<sup>(8-10)</sup>, which have shown that asthma symptoms can negatively affect attendance among medical school students. In our study, the rate of absenteeism from written tests or clinical examinations due to asthma symptoms was not high overall; 17.1% of the students missed at least one written test or clinical examination; however, 38.6% of the students reported having missed at least one clinical teaching session due to asthma symptoms. During the COVID-19 pandemic era, more clinical teaching sessions were transferred into online classes and stayed so until the middle of the academic year, which means that the students were unable to attend the online classes, signifying the magnitude of the effect of asthma symptoms on the students' academic attendance.

Previous research showed that the presence of uncontrolled asthma with prior hospitalization affected students' educational attainment<sup>(7)</sup>. We found statistically significant results that related absenteeism from written tests or clinical examinations to asthma severity assessed by the presence of severe asthma attacks in the preceding 12 months requiring emergency room visits or hospitalizations. In addition, almost two-thirds of the students had at least one ongoing asthma exacerbation trigger, which was associated with an increased rate of missing exams, in line with previous reports<sup>(11)</sup>. This observation again emphasizes the magnitude of the effect of active asthma symptoms on academic achievement.

We found a higher rate of missing exams among males. Previous research found that female school attendance was more affected by asthma than male attendance<sup>(9)</sup>. Factors such as concomitant comorbidities and administrative aspects of the facilitation of the examination-taking process for the males in addition to the small sample size could be potential reasons for this higher rate, but further research is needed to investigate the relationship with gender difference.

As part of the academic performance evaluation, we assessed the magnitude of the asthma effect on the students' scores. A quarter of the students reported that asthma symptoms affected their examination scores to a considerable degree. Prior research has shown that the negative effect of asthma on school achievement and scores may relate not only to absence, but also to the presence of uncontrolled asthma conditions<sup>(12,13)</sup>. Our results showed that over half of the students had partly or poorly controlled asthma in the preceding four weeks; however, we did not find a statistically significant association between asthma control status and

absenteeism. We utilized a GINA guideline questionnaire highlighting symptoms of asthma control in the preceding four weeks, which might account for not finding a statistically significant result between asthma being uncontrolled and the rate of absenteeism during the academic year, as that may not reflect their actual asthma status during the whole academic year.

In addition, the students' perceptions about the negative effect of asthma on their concentration were high, in line with a study that showed that asthma can affect the attention span of the student<sup>(14)</sup>. Understanding how asthma can alter students' academic achievement in relation to its predisposition to school absence and to the presence of ongoing asthma symptoms will help emphasize the significance of early identification and proper treatment of asthma in medical students<sup>(13)</sup>.

A high proportion of the students, around two-thirds, reported that they did not see a pulmonologist on a regular basis for their asthma, which might account for the low rate of students with well-controlled asthma among the respondents to whom no proper asthma management was offered. Medical students have a busy and overwhelming study environment, and finding time for their care may be challenging. The students highlighted the reasons for not being able to see a pulmonologist. One reason was that they believed that their asthma symptoms were mild and not worth seeing a pulmonologist for. Others reported a lack of time due to school and social commitments, while others reported that they avoided triggers as far as possible, thus there was no need to see a pulmonologist from their point of view, and some respondents stated that they believed that it was not easy to book an appointment with a pulmonologist. Emphasizing the importance of medical students' wellbeing and its potential effect on school performance should promote collaboration between the medical college administration and medical services to provide medical students with proper clinical assessment in a timely manner for their health issues.

Our study has a few limitations. The response rate among the asthmatic students was low, which could have affected the results. Second, our study lacked a control group of non-asthmatic students to compare their absenteeism rate to that of asthmatic students. Our survey questions were aimed at asthmatic patients, further research to compare asthmatic and non-asthmatic patients should be considered to better characterize the difference in school attendance among a wider group of participants, delineate the effect of asthma, and perhaps compare it to the effect of other medical conditions on medical students' school attendance.

In conclusion, absenteeism among asthmatic medical students was affected by the presence of severe asthma attacks and ongoing antigen exposure. There was a high negative perception among medical students about

the potential effects of ongoing asthma symptoms on their academic achievement. Studying the effect of asthma on medical students' performance using objective tools would be helpful to assess the magnitude of the effect of asthma on their performance. Our results may contribute to consideration by the educational system to engage in identifying students with chronic medical issues such as asthma, and to be flexible in accommodating them during their clinical evaluation processes.

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