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Evaluation of the self-management of patients with asthma in the Primary Health Care (PHC) during the COVID-19 pandemic in Greece: Cost Assessment

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S u m m a r y: *Asthma is a chronic inflammation of the airways and is one of the most common diseases worldwide. Worldwide, asthma affects more than 334 million people. The UK has the highest prevalence rates, while in Europe there are 5.4 million people with asthma, affecting one in five households. A quarter of asthma patients have poor symptom control, and in the UK 185 people are admitted to hospital every day due to an asthma exacerbation. Asthma exacerbations result in significant social, psychological and health costs. Best practices in managing asthma patients in primary health care (PHC) are the foundation for strengthening public health. The novel coronavirus pandemic (coronavirus 2019-nCoV) has gained intense attention and vigilance both nationally and globally with a significant burden on the health system as it has significant implications where the provision of behavioral health support to patients is required. Early detection of the disease and the effective support for asthma patients during the Covid-19 pandemic is of utmost importance because asthma is a global Public Health problem, affecting all age groups. Its economic burden is an important measure of its impact on society. Asthma costs increase as disease control declines, and significant cost savings could be achieved through proper management of asthma patients.*

Study design: The purpose of this study is the Evaluation of the self-management of patients with asthma in the PHC during the COVID-19 pandemic in Greece as well as the cost assessment. The participants of the study attended five years ago the "Asthma School" of the health center of Peristeri under the auspices of Hellenic Centre for Diseases Control and Prevention (HCDCP) Ministry of Health, where they were trained in the management of asthma and a cohort follow up study was conducted regarding this, including the last 12 months.

INTRODUCTION

Asthma is a global public health problem and the number could increase by an additional 100 million in 2025. While some analysts had speculated that the death rate from asthma would decrease, initial data indicates an increase which has led to significant morbidity, resulting in a measurable and sustained increase in emergency room visits, as uncontrolled asthma has been known to have serious consequences on patients' health and has been estimated to cause greater numbers of cases of disability in asthma patients [1].

The prevalence of asthma is estimated at approximately 8% of the population of our country and 36% are active smokers. Passive smoking during pregnancy and early life is linked to the development of asthma. Smokers with asthma may experience an accelerated decline in lung function making it difficult to distinguish them from patients with Chronic Obstructive Pulmonary Disease (COPD). According to clinical reports, asthmatic smokers have an increased prevalence and incidence of asthma attacks. They lead to more frequent and more severe exacerbations and worse asthma control [2]. On the other hand, quitting smoking can reduce symptoms and medication use within a few months. It additionally improves lung function and asthma severity. The medical and nursing team should educate patients with asthma to stop smoking at each visit, strongly encouraging both themselves and their close contacts [3].

The Evaluation of the self-management of patients with asthma in the PHC during the COVID-19 pandemic in Greece is a major factor for its total cost assessment, therapy planning and the promotion of Public Health.

MATERIALS AND METHODS

A structured questionnaire was used as the study tool, allowing respondents to report their point of view without restrictions.

Asthmatics having visited the Health Center of Peristeri for diagnosis, treatment and disease management training in the pre-pandemic period, participated in a cross-sectional telephone survey.

It was achieved by investigating a special questionnaire for which information was gathered about the demographics of the incoming users, their medical history, giving basis to education as well as health behaviour changes, such as cessation of addictions (smoking) as well as status of their health (COVID-19 infection) by reassessing self-reported and diagnosed chronic asthma with the Asthma Control Test (ACT) questionnaire. According to the use of the special asthma questionnaire, the ACT was applied as an important picture was formed for the patients as to whether they control their asthma. The statistical analysis was performed using the Statistical Package for Social Sciences (SPSS), version 20.0, and statistical significance was set at $p<0.05$. Descriptive statistics were used for continuous variables. The non-parametric Chi-square test was used for the analysis of statistical hypotheses and possible differences of demographic variables within particular ACT groups. Was additionally implemented the Paired Samples t-Test in order to compare the means of two measurements taken (ACT).

ETHICAL ISSUES

The study was approved by the Ethics Committee of the University of West Attica (approval reference number: 45896/10-06-2021). The research was carried out in accordance with the Declaration of Helsinki. All participants provided informed consent and were informed that they could withdraw from the study at any time.

RESULTS

A total of 113 people attended the "Asthma School", of which 69.03% were women and 30.97% were men of Greek nationality. The mean age was 51.07±14.59 years (diag. 1).

In the 69.91% of the total number of patient's seasonal asthma attack were manifested in the last 12 months. In the 22.12% a few crises, in 6.19% frequent crises and in 1.77% no crises at all. In the 68.14% it was moderately controlled asthma, during the last 12 months. In the 16.81% it was well-controlled asthma and 14.16% reported their asthma to be mildly uncontrolled and 0.88% had not at all controlled asthma. 97.35% had never been transported by ambulance due to an asthma attack in the last 12 months. 99.12% of asthma patients did not require ventilator support due to an asthma attack in the last 12 months.

The majority of patients, 99.12%, had never fainted due to an asthma attack in the past 12 months. Asthma attacks during sleep in the last 12 months were severe, reporting shortness of breath during mild fatigue at a rate of 43.36%.

Shortness of breath during great fatigue was reported by 37.17%. 16.81% reported being able to lie down and sleep. Just 2.65% reported being unable to lie down and sleep as they reported having severe asthma attacks during sleep in the past 12 months.

98.23% reported never having an asthma attack triggered by anti-inflammatory, analgesic or antipyretic drugs for the common cold in the past 12 months (diag. 2).

66.37% reported that they experienced nose or eye allergies in the last 12 months while on the contrary 33.63% had no allergic symptoms at all (diag. 3).

75.22% were not absent from work due to an asthma exacerbation in the last 12 months, while on the contrary 24.78% reported being absent from work (diag. 4).

23.89% received sick leave due to asthma exacerbation in the last 12 months while the remaining percentage which amounts to 76.11% stated that they did not receive a sick leave (diag. 5).

Then the table 1 shows the use of health services for asthma in the last 12 months. It is observed that the majority of patients visited a doctor in a private office at a rate that reached 69.03% for asthma while 35.40% visited the structures of the primary care center or the outpatient clinics of hospitals.

91.15% medicate for other conditions and health problems other than asthma in the last 12 months. While only 8.85% do not receive medication for other ailments and health problems (diag. 6).

Then the table 2 shows the use of health services in general in the last 12 months except for asthma management. It is observed that the majority of patients visited a doctor in a private office in a percentage that amounted to 84.07% while 44.25% visited the emergency departments of hospitals.

69.03% medicated for a respiratory infection in the last 12 months while 30.97% have not (diag. 7).

The table 3 shows the total cost of asthma in the last 12 months for which the average price was 311.52 euros and the standard deviation was calculated to be 139.74. Also shown are Medical Costs/Doctor Visits (in Euros), Drug Costs (participation) (in Euros) and Hospitalization Costs/Hospital Expenses (in Euros). In addition, the overall cost evaluation is presented in the last 12 months where the total cost of health services amounted to 491 euros, the average price and the standard deviation was calculated to be 252.20. It is worth noting that the table recognizes the Medical cost / Visits to the doctor (in euros) (including informal payments), the Cost of Medicines (including the participation of medicines) and Hospital costs / Hospital costs (including "Public or Private Hospital).

The distribution of the responses of the ACT questionnaire across the groups of patients according to overall asthma control are presented in table 4. None of the patients in this sample had well-controlled asthma. The distribution of the responses to all the ACT questions across the groups of patients with intermediate and poor control, both before the COVID-19 pandemic and at present, showed statistically significant differences ($p<0.001$), and poor control was associated with less work, more breathlessness, waking up at night more frequently, more frequent use of an inhaler or nebulizer, and worse asthma control over the past four weeks.

From the table 5 below it is observed that there is a statistically significant relationship between people diagnosed or not with the disease of COVID-19 and the ACT asthma control classification, in terms of Intermediate control and Poorly controlled asthma $P \leq 0.001$.

The mean score ACT for Current Situation was 15.49 and 3.38 Std. Dev. while before 5 years the mean score ACT was 17.51 and 3.74 Std. Dev. (diag. 8).

From the table 6 below, it is observed that there is a statistically significant difference in the degree of asthma control ACT, before the five years and the current asthma control $P \leq 0.001$.

The distribution of the responses of the ACT questionnaire across the groups of patients according to smoking status, before and after the COVID-19 pandemic, are presented in table 7. The proportion of patients who reported waking up at night due to asthma-related symptoms differed by smoking status ($p=0.042$), with non-smokers waking up less frequently compared to current and past smokers. The proportion of patients using an inhaler or nebulizer also differed by smoking, and past smokers were more frequent users ($p=0.023$). On the other hand, in the period before COVID-19, the distribution of the responses to all ACT questions across the groups of patients with intermediate and poor control, didn't show statistically significant differences.

The majority of patients in terms of asthma symptoms in the last 12 months reported morning (diag.9.A) 87.61% cough, during the evening (diag. 9.B) 60.18% had wheezing while 39.82% reported waking up at night (diag. 10.C) due to chest tightness.

All patients have been taking medication to control asthma in the last 12 months while

currently 99.12% take inhalers to manage their asthma.

In the question about smoking habits, the percentages are reported in the chart below, where it can be seen that 29.20% are smokers while 45.14% do not use tobacco, while only 25.66% reported that they are ex-smokers (diag. 11).

Subsequently, from the 29.20% of those who use tobacco, it appears that during the training on smoking cessation by the Public Health Officer and the instructions of the Pulmonologist, 66.67% stopped smoking, 18.52% reported that they smoke often, while 9.26% did not stop (diag. 12).

Moderately satisfied with their daily life reported 54.87% while 32.75 are quite satisfied. Just 9.73% reported being slightly dissatisfied with their daily lives while 1.77% were dissatisfied. 0.88% reported that they are very satisfied with their daily life.

DISCUSSION

Studies show that there is no clear indication that patients with asthma are at higher risk for SARS-CoV-2 infection, but patients with controlled asthma may be exacerbated by a viral infection [4]. The majority of asthma patients have poor control of their symptoms, and asthma exacerbations lead to increased health costs. For example, it has been shown that exacerbations are associated with doubling the cost of health care management for severe asthma [5]. Cigarette smoking is still surprisingly common in asthma patients. Smoking is associated with worse levels of asthma control, more symptomatology, more frequent exacerbations, and higher mortality [6]. In this study, asthma control was compromised in smokers, particularly regarding night awakenings and use of inhaler or nebulizer. The literature generally agrees that asthmatic smokers have more severe asthma symptoms, greater need for rescue medication, and worse health status indicators than individuals who have never smoked [7]. Even ex-smoker asthmatics have higher asthma symptom scores and lower lung function than never smokers [8].

Asthma, as a chronic disease with available treatment, should be managed in the outpatient setting, instead of the emergency department. Best practices in managing asthma patients in primary health care (PHC) are the foundation for strengthening public health [9,10]. Asthma education programs are a cornerstone of asthma management, and when administered in conjunction to medical review, have been shown to improve health outcomes for individuals with asthma, as well as and to reduce use of the emergency department [11]. The management of asthma, especially in the PHC setting can be expected to help control this “epidemic”, and its socioeconomic impact on primary health care management, especially through reducing visits to secondary health facilities and costs associated with the management of this disease and hence strengthening the relationship between public health and public policy [12].

Self-rated health (SRH) is used as a strong predictor of morbidity [13]. The Asthma Control Test helped patients better manage their asthma to assess whether asthma symptoms are well controlled during the Covid-19 pandemic. The novel coronavirus pandemic (coronavirus 2019-nCoV) has gained intense attention and vigilance both nationally and globally with a significant burden on the health system as it has significant implications where the provision of behavioral health support to patients is required [14-16]. Early detection of the disease and the effective support for asthma patients during the Covid-19 pandemic is of utmost importance because asthma is a global Public Health problem, affecting all age groups. Its economic burden is an important measure of its impact on society. Asthma costs increase as disease control declines, and significant cost savings could be achieved through proper management of asthma patients [17].

Improved control of the disease results in cost savings [18]. While the severe asthma accounts for a greater proportion of costs and health care utilization compared with controlled asthma [19].

In another study the direct cost accounted for 82.3% of the estimated total cost. The cost of medications for asthma accounted for 62.2% of the direct costs of asthma. Asthma medications, environmental control measures, and long-term health leaves had the greatest potential impact on total cost variation. Severity and control level were independently associated with higher cost ($p = 0.001$ and 0.000, respectively) [20].

Measuring the current economic burden of asthma provides important information on the impact of asthma on society, because asthma is a chronic disease that affects quality of life, productivity at work and school, and healthcare use and it can cause death. This can be used to make informed decisions about limited public health resources [21].

Better access to improved asthma education healthcare, and bridging the gap between

disparities in the treatment and management of asthma may help to control this epidemic, promote better outcomes, and prevent continued rising costs related to the management of this widespread disease [22].

In another study based on a population, random-digit-dialed telephone nationwide survey was conducted to recruit patients with asthma in Greece (n=353). The findings indicate that asthma imposes a high economic burden on society and the healthcare system in Greece. Specifically in Greece, the self-reported prevalence of asthma reached 9% in 2017. The total annual economic burden of asthma in Greece was estimated at €727 million and €547 million from the societal and payer perspective, respectively. Therefore, greater investment in interventions aimed at asthma control and prevention of exacerbations may reduce the overall burden of asthma in Greece [23].

According to this study of evaluation of the self-management of patients with asthma in the PHC during the COVID-19 pandemic in Greece as well as the cost assessment, the participants of the study attended 5 years ago the "Asthma School" of the health center of Peristeri, where they were trained in the management of asthma and a cohort follow up study was conducted regarding this, including the last 12 months and total cost of asthma in the last 12 months went up to Mean±SD/€311.52±€139.74. Additionally, the total cost of health services in the last 12 months overall rose to Mean±SD/€491±€252.20. It is worth mentioning the importance of my present survey concerning the cost that is lower than the cost of the mentioned above survey. It turns out that the self-management of patients with asthma in the Primary Health Care (PHC) is of great importance as well as their training in the control of their disease.

In another study it is confirmed that asthma is an expensive disease for the society and it is the main non-infectious diseases of the respiratory system with substantial economic burden worldwide [24]. In general, important information should be provided and analysis of the economic consequences of asthma to policy makers in order to strengthen surveillance of the disease as well as draft the national health policy in Greece accordingly.

Air pollution is associated with increased severity and mortality due to its effects on chronic diseases such as asthma as it can increase the risk of infection by acting as a carrier of COVID-19 and affecting quality of life [25, 26]. Besides the SARS-CoV-2 coronavirus (COVID-19) pandemic is a major public health issue [27].

In our study one of the main factors for the worsening of asthma according to patient data was reported to be air pollution (97.35%). One of the strengths of this study is that the cohort includes asthmatics who have been trained in the pre-pandemic period in the self-management of their disease, by attending the “Asthma School” offered by the model public Health Center of Peristeri where they were screened, diagnosed and trained with passive methods (lectures, slides, videos, posters and leaflets), active methods (completing questionnaires and active participation in educational processes), as well as experimental methods (e.g. for developing skills for correctly using inhaled bronchodilators, advice on what to watch out for in their diet, etc.) [28, 29]. Another positive aspect of this study is the use of validated patient-reported outcome measures (ACT) [30]. However, there are also some limitations which should be taken into consideration. As the data was collected during the COVID-19 pandemic, face-to-face contact with the patients was practically impossible, and telephone interviews were conducted instead. While telephone surveys can offer many advantages, and are an efficient and cost-effective way to gather data, they are also linked to shortcomings such as fatigue, where those contacted are hesitant to participate [31]. Furthermore, the sample in the present study are part of an urban population which has easier access to PHC, compared to patients in more isolated regions such as small islands, implying that the findings cannot be generalized to the entire asthmatic population in Greece.

CONCLUSION

Although asthma is incurable, it is controllable and its treatment should be focused on improving disease control, as better asthma control has appositive impact contributing to a better disease management. In conclusion, the asthmatics in this study showed a poor and intermediate disease control, as a result of the interruption of the Asthma School and due to the COVID-19 lockdown. However, the majority of patients used health services both for asthma and for other diseases in general, by visiting private doctors in the last 12 months. Although asthma is incurable, it is controllable and its treatment should be focused on improving disease control, as better asthma control has positive, contributing to a better disease management. This, in turn, can be facilitated by

educating patients to self-manage deteriorating factors of asthma, such as smoking. During a pandemic, such as the recent COVID-19, telephone contact with patients can be a valuable asset to provide guidance, despite some of its noted limitations. It is important that the asthmatic patient is treated as a psychosomatic entity, and that the symptoms of asthma and the patient's living conditions are observed and recorded, with the ultimate goal of limiting exacerbations, while maintaining a good level of quality of life. Although further research is needed to investigate the interaction of multiple determinants of asthma, with innovative strategies for controlling the disease, it is fair to assert that support for systematic services provided in the management of asthma patients in PHC is important in formulating new health policy strategies, as well as that targeted patient education can play an important role in terms of better compliance and treatment effectiveness, by helping to reduce visits to secondary health facilities, thus strengthening social policy. Targeted education of asthma patients is important in PHC, leading to better compliance and treatment effectiveness. Asthma patients who smoke are a Public Health challenge in terms of their diagnosis and management. Smokers with asthma should be provided with comprehensive smoking cessation advice from their healthcare team in addition to other medication. Asthma affects the daily life of patients and covid-19 has even more affected asthma patients both in the management of their disease and in increasing the psychosomatic cost of Public Health.

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TABLES AND DIAGRAMS

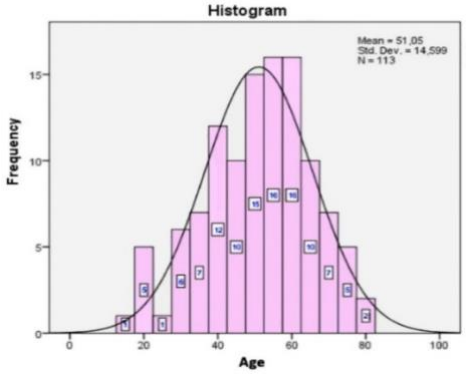

Diagram 1. Distribution of the sample according to age.

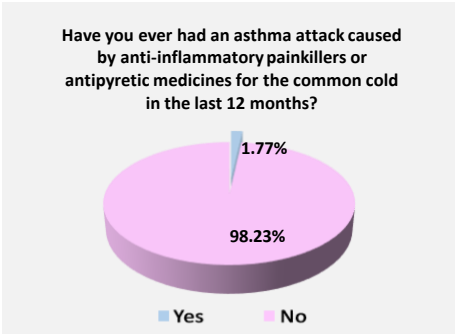

Diagram 2. Percentage of ratio in asthma attack caused by anti-inflammatory painkillers.

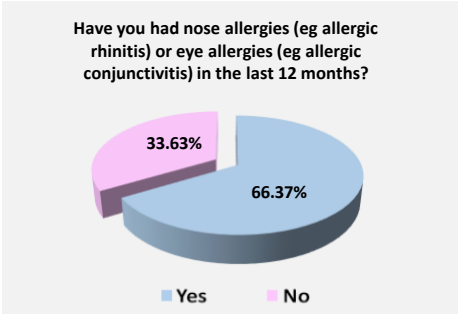

Diagram 3. Percentage of ratio regarding nose or eye allergies.

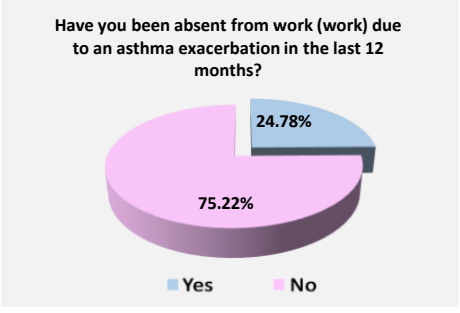

Diagram 4. Percentage of ratio absent from work due to an asthma exacerbation**.**

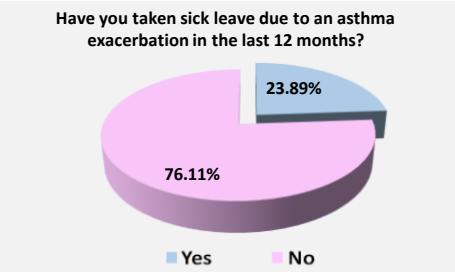

Diagram 5. Percentage of ratio in sick leave due to an asthma exacerbation.

Table 1. Percentage of ratio in sick leave due to an asthma exacerbation.

Use of health services for asthma in the last 12 months	N	(%)
1. Hospitalization for asthma	9	(7.96%)
2. Visits to the emergency room	27	(23.89%)
3. Visit to a private doctor	78	(69.03%)
4. Visit to a primary public health care unit/ or Outpatient Clinics	40	(35.40%)
5. Home visit	1	(0.88%)
6. Reexamination	1	(0.88%)
7. Nursing care/Physiotherapy	8	(7.08%)
8. Performing diagnostic tests (e.g. spirometry)	33	(29.20%)
9. Additional tests-imaging (e.g. x-ray)	23	(20.35%)

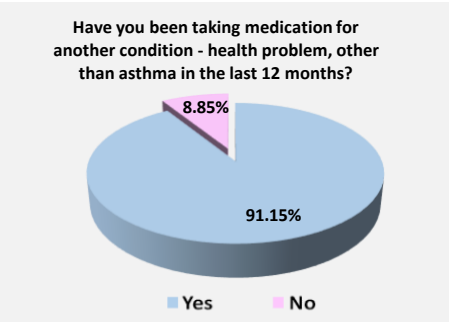

Diagram 6. Percentage of ratio medication for another condition - health problem.

Table 2. Percentage of ratio in sick leave due to an asthma exacerbation.

Use of health services in general in the last 12 months	N	(%)
1. Hospitalization for any other health problem presented in general	27	(23.89%)
2. Visits to the emergency room	50	(44.25%)
3. Visit to a private doctor	95	(84.07%)
4. Visit to a primary public health care unit / or Outpatient Clinics	46	(40.71%)
5. Home visit	0	(0.00%)
6. Reexamination	17	(15.04%)
7. Nursing care/Physiotherapy	12	(10.62%)
8. Carrying out diagnostic tests (e.g. laboratory testing)	82	(72.57%)
9. Additional tests-imaging (e.g. x-ray)	66	(58.41%)

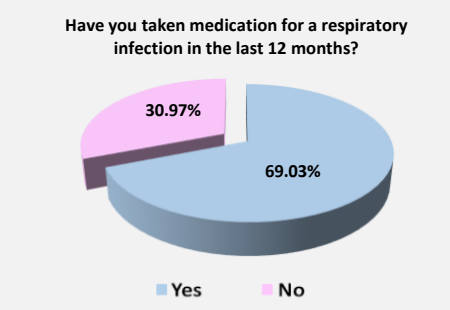

Diagram 7. Percentage of ratio medication for a respiratory infection.

Table 3. Percentage of ratio in sick leave due to an asthma exacerbation.

Cost Estimate	N	Mean ±SD
Comprehensive assessment of the cost of asthma in the last 12 months	113	
Total prescriptions in the last 12 months		3.85±0.81
Total cost of asthma in the last 12 months		311.52±139.74
Medical costs / Visits to the doctor (in euros)		90.97±79.70
Cost of Medicines (participation) (in euros)		211.43±77.43
Hospital costs / Hospital costs (in euros)		9.12±41.67
Overall assessment of costs over the last 12 months		
Total prescriptions in the last 12 months		8.81±30.52
Total cost of health services in the last 12 months		491±252.20
Medical costs / Visits to the doctor (in euros) (including informal payments)		154.78±152.55
Cost of Medicines (including participation of medicines)		299.81±131.47
Hospitalization costs / Hospital costs (including "Public or Private Hospital)		36.42±108.36

Table 4: Asthma control levels by responses to ACT.

ACT Questions	Asthma control Test [N (%)] Current Situation					Asthma control Test [N (%)] Situation before 5 years				
	Total sample	Well-controlled	Intermediate control	Poorly controlled	*p-sig.*[1]	Total sample	Well-controlled	Intermediate control	Poorly controlled	*p-sig.*[1]
1. Work done										
All time	2 (1.8)	0 (0)	0 (0)	2 (100)		2 (1.8)	0 (0.0)	0 (0.0)	2 (100)	
Most time	6 (5.3)	0 (0)	0 (0)	6 (100)		6 (5.3)	0 (0.0)	0 (0.0)	6 (100)	
Some time	35 (31.0)	0 (0)	0 (0)	35 (100)	**<0.001**	27 (23.9)	0 (0.0)	1 (3.7)	26 (96.3)	**<0.001**
Little time	66 (58.4)	0 (0)	15 (22.7)	51 (77.3)		50 (44.2)	0 (0.0)	9 (18.0)	41 (82.0)	
None time	4 (3.5)	0 (0)	4 (100)	0 (0)		28 (24.8)	3 (10.7)	15 (53.6)	10 (35.7)	
2. Breathlessness										
> Once/day	10 (8.8)	0 (0)	0 (0)	10 (100)		12 (10.6)	0 (0.0)	0 (0.0)	12 (100)	
Once/day	12 (10.6)	0 (0)	0 (0)	12 (100)		9 (8.0)	0 (0.0)	0 (0.0)	9 (100)	
3-6 times/week	34 (30.1)	0 (0)	0 (0)	34 (100)	**<0.001**	15 (13.3)	0 (0.0)	0 (0.0)	15 (100)	**<0.001**
1-2 times/week	49 (43.4)	0 (0)	11 (22.4)	38 (77.6)		49 (43.4)	0 (0.0)	9 (18.4)	40 (81.6)	
Not at all	8 (7.1)	0 (0)	8 (100)	0 (0)		28 (24.8)	3 (10.7)	16 (57.1)	9 (32.1)	
3. Wake up										
4+ nights/week	16 (14.2)	0 (0)	0 (0)	16 (100)		15 (13.3)	0 (0.0)	0 (0.0)	15 (100)	
2-3 nights/week	18 (15.9)	0 (0)	0 (0)	18 (100)		9 (8.0)	0 (0.0)	0 (0.0)	9 (100)	
Once / week	31 (27.4)	0 (0)	1 (3.2)	30 (96.8)	**<0.001**	15 (13.3)	0 (0.0)	1 (6.7)	14 (93.3)	**0.003**
Once or twice	43 (38.1)	0 (0)	13 (30.2)	30 (69.8)		29 (25.7)	0 (0.0)	6 (20.7)	23 (79.3)	
Not at all	5 (4.4)	0 (0)	5 (100)	0 (0)		45 (39.8)	3 (6.7)	18 (40.0)	24 (53.3)	
4. Inhaler / nebulizer										
3+ times / day	12 (10.6)	0 (0)	0 (0)	12 (100)		4 (3.5)	0 (0.0)	0 (0.0)	4 (100)	
1-2 times / day	73 (64.6)	0 (0)	8 (11.0)	65 (89.0)		73 (64.6)	0 (0.0)	14 (19.2)	59 (80.8)	
2-3 times / week	15 (13.3)	0 (0)	1 (6.7)	14 (93.3)	**<0.001**	10 (8.8)	0 (0.0)	1 (10.0)	9 (90.0)	**<0.001**
<1 time / week	12 (10.6)	0 (0)	9 (75.0)	3 (25.0)		13 (11.5)	0 (0.0)	7 (53.8)	6 (46.2)	
Not at all	1 (0.9)	0 (0)	1 (100)	0 (0)		13 (11.5)	3 (23.1)	3 (23.1)	7 (53.8)	
5. Asthma Control										
Not at all	1 (0.9)	0 (0)	0 (0)	1 (100)		3 (2.7)	0 (0.0)	0 (0.0)	3 (100)	
Poor	15 (13.3)	0 (0)	0 (0)	15 (100)		16 (14.2)	0 (0.0)	0 (0.0)	16 (100)	
Somewhat	47 (41.6)	0 (0)	0 (0)	47 (100)	**<0.001**	21 (18.6)	0 (0.0)	0 (0.0)	21 (100)	**<0.001**
Well	45 (39.8)	0 (0)	15 (33.3)	30 (66.7)		45 (39.8)	0 (0.0)	9 (20.0)	36 (80.0)	
Complete	5 (4.4)	0 (0)	4 (80.0)	1 (20.0)		28 (24.8)	3 (10.7)	16 (57.1)	9 (32.1)	

[1] According to Chi-square test

Table 5: Asthma control levels by responses to Diagnosis with disease of COVID-19.

Asthma Control Test - ACT	Diagnosis with disease of COVID-19		total	*p-sig.*[1]
	Yes (N=68)	No (N=45)		
20-24: Intermediate control	4	15	19	P ≤ 0.001
< από 20: Poorly controlled	64	30	94	

[1] According to Chi-square test

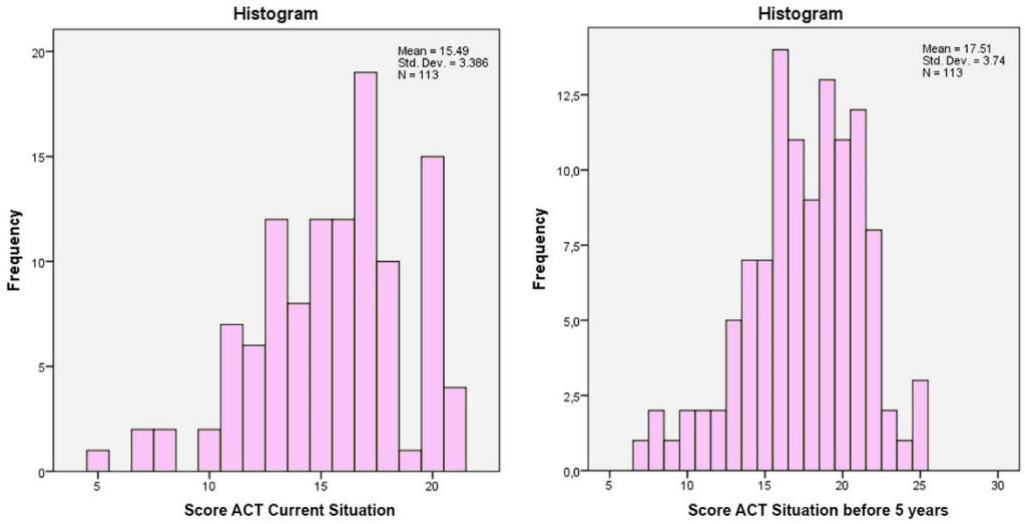

Diagram 8. Distribution of the sample according to the Score ACT.

Table 6. Grade differentiation Asthma Control Test - ACT (Total Score).

Grade differentiation Asthma Control Test - ACT (Total Score)	N	Mean ±SD	Mean ±SD	Correlation	*p-sig.*[1]
Total Score Asthma Control Test – ACT Current Situation	113	15.49±3.38	-2.027±1.63	0.899	P ≤ 0.001
Total Score Asthma Control Test – ACT Situation before 5 years		17.51±3.74			

[1] According to paired sample t-test

Table 7. Smoking status and asthma control levels by responses to ACT.

ACT Questions	Smoking status [N (%)] Current Situation					Smoking status [N (%)] Situation before 5 years				
	Total sample	Smoker	None-smoker	Past smoker	*p-sig.*[1]	Total sample	Smoker	None-smoker	Past smoker	*p-sig.*[1]
1. Work done										
All time	2 (1.8)	0 (0)	0 (0)	2 (100)		2 (1.8)	0 (0.0)	1 (50.0)	1 (50.0)	
Most time	6 (5.3)	2 (33.3)	2 (33.3)	2 (33.3)		6 (5.3)	3 (50.0)	1 (16.7)	2 (33.3)	
Some time	35 (31.0)	11 (31.4)	15 (42.9)	9 (25.7)	0.414	27 (23.9)	7 (25.9)	12 (44.4)	8 (29.6)	0.685
Little time	66 (58.4)	19 (28.8)	31 (47.0)	16 (24.2)		50 (44.2)	13 (26.0)	24 (48.0)	13 (26.0)	
None time	4 (3.5)	1 (25.0)	3 (75.0)	0 (0)		28 (24.8)	10 (35.7)	14 (50.0)	4 (14.3)	
2. Breathlessness										
> Once/day	10 (8.8)	3 (30.0)	4 (40.0)	3 (30.0)		12 (10.6)	4 (33.3)	5 (41.7)	3 (25.0)	
Once/day	12 (10.6)	3 (25.0)	6 (50.0)	3 (25.0)		9 (8.0)	1 (11.1)	5 (55.6)	3 (33.3)	
3-6 times/week	34 (30.1)	12 (35.3)	10 (29.4)	12 (35.3)	0.417	15 (13.3)	4 (26.7)	4 (26.7)	7 (46.7)	0.328
1-2 times/week	49 (43.4)	13 (26.5)	25 (51.0)	11 (22.4)		49 (43.4)	17 (34.7)	21 (42.9)	11 (22.4)	
Not at all	8 (7.1)	2 (25.0)	6 (75.0)	0 (0)		28 (24.8)	7 (25.0)	17 (60.7)	4 (14.3)	
3. Wake up										
4+ nights/week	16 (14.2)	3 (18.8)	5 (31.2)	8 (50.0)		15 (13.3)	2 (13.3)	6 (40.0)	7 (46.7)	
2-3 nights/week	18 (15.9)	7 (38.9)	6 (33.3)	5 (27.8)		9 (8.0)	6 (66.7)	2 (22.2)	1 (11.1)	
Once / week	31 (27.4)	8 (25.8)	13 (41.9)	10 (32.3)	**0.042**	15 (13.3)	6 (40.0)	5 (33.3)	4 (26.7)	0.096
Once or twice	43 (38.1)	15 (34.9)	22 (51.2)	6 (14.0)		29 (25.6)	6 (20.7)	16 (55.2)	7 (24.1)	
Not at all	5 (4.4)	0 (0)	5 (100)	0 (0)		45 (39.8)	13 (28.9)	23 (51.1)	9 (20.0)	
4. Inhaler / nebulizer										
3+ times / day	12 (10.6)	0 (0)	4 (33.3)	8 (66.7)		4 (3.5)	0 (0.0)	1 (25.0)	3 (75.0)	
1-2 times / day	73 (64.6)	22 (30.1)	35 (47.9)	16 (21.9)		73 (64.6)	19 (26.0)	35 (47.9)	19 (26.0)	
2-3 times / week	15 (13.3)	6 (40.0)	5 (33.3)	4 (26.7)	**0.023**	10 (8.8)	2 (20.0)	4 (40.0)	4 (40.0)	0.085
<1 time / week	12 (10.6)	4 (33.3)	7 (58.3)	1 (8.3)		13 (11.5)	6 (46.2)	7 (53.8)	0 (0.0)	
Not at all	1 (0.9)	1 (100)	0 (0)	0 (0)		13 (11.5)	6 (46.2)	5 (38.5)	2 (15.4)	
5. Asthma Control										
Not at all	1 (0.9)	0 (0)	0 (0)	1(100)		3 (2.6)	0 (0.0)	2 (66.7)	1 (33.3)	
Poor	15 (13.3)	2 (13.3)	7 (46.7)	6 (40.0)		16 (14.2)	4 (25.0)	4 (25.0)	8 (50.0)	
Somewhat	47 (41.6)	16 (34.0)	18 (38.3)	13 (27.7)	0.103	21 (18.6)	7 (33.3)	10 (47.6)	4 (19.0)	0.141
Well	45 (39.8)	15 (33.3)	21 (46.7)	9 (20.0)		45 (39.8)	16 (35.6)	18 (40.0)	11 (24.4)	
Complete	5 (4.4)	0 (0)	5 (100)	0 (0)		28 (24.8)	6 (21.4)	18 (64.3)	4 (14.3)	

[1] According to Chi-square test

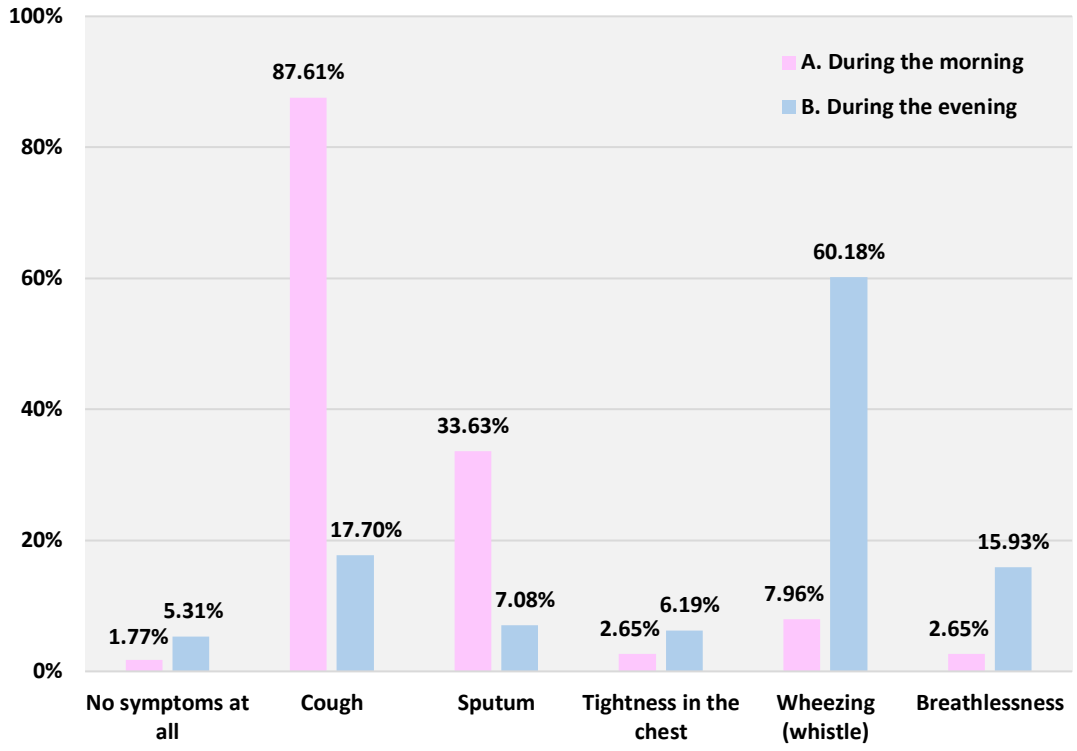

Diagram 9. Description of Morning and Evening Asthma Symptoms in the last 12 months.

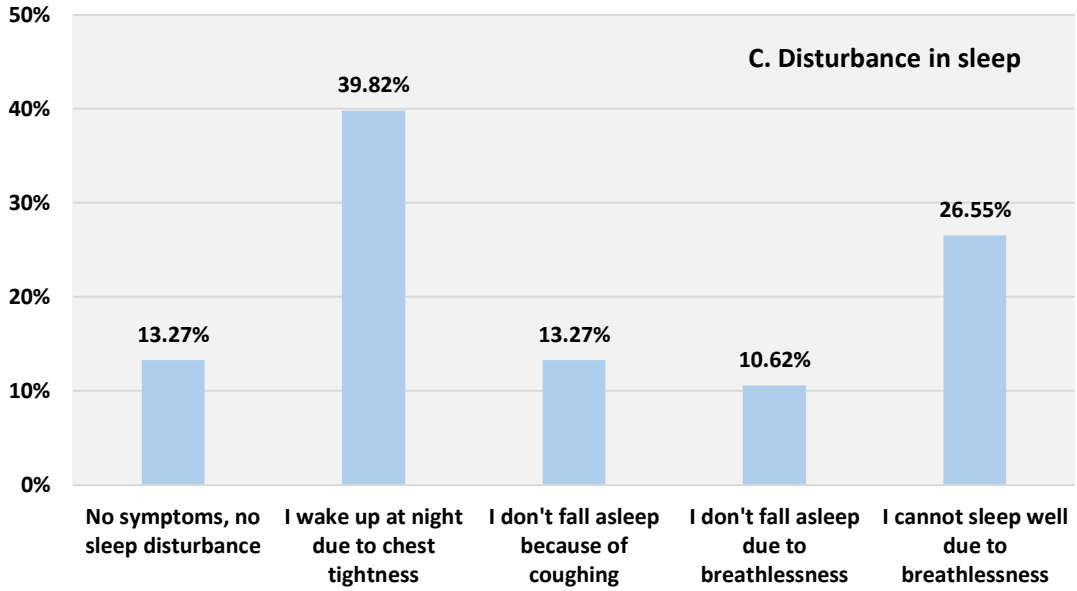

Diagram 10. Description of Evening Asthma Symptoms and Sleep Disturbance in the last 12 months.

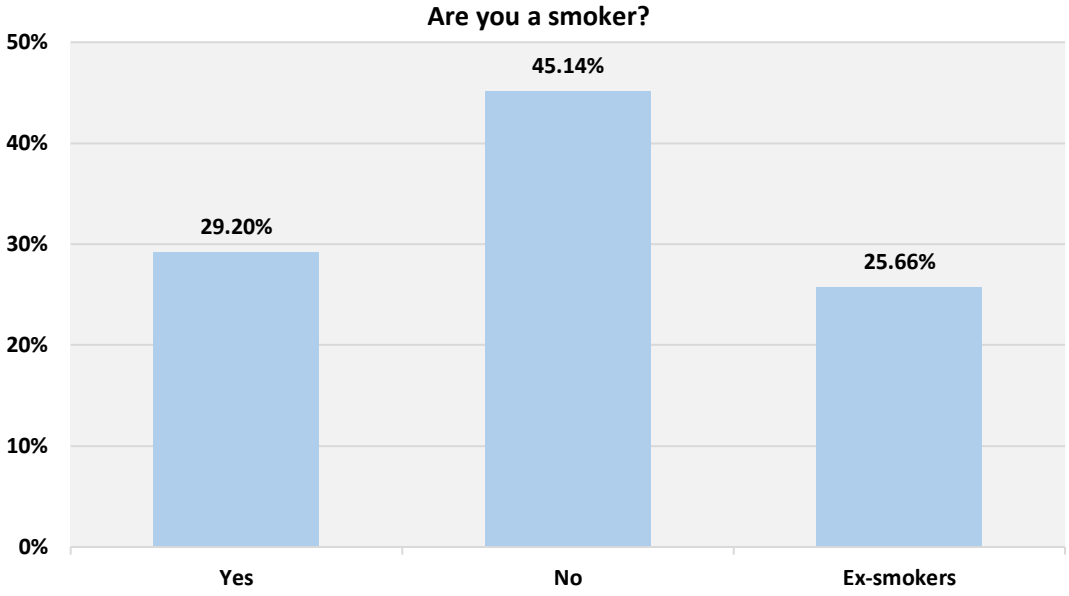

Diagram 11. Percentage destitution of the sample according to smoking habits.

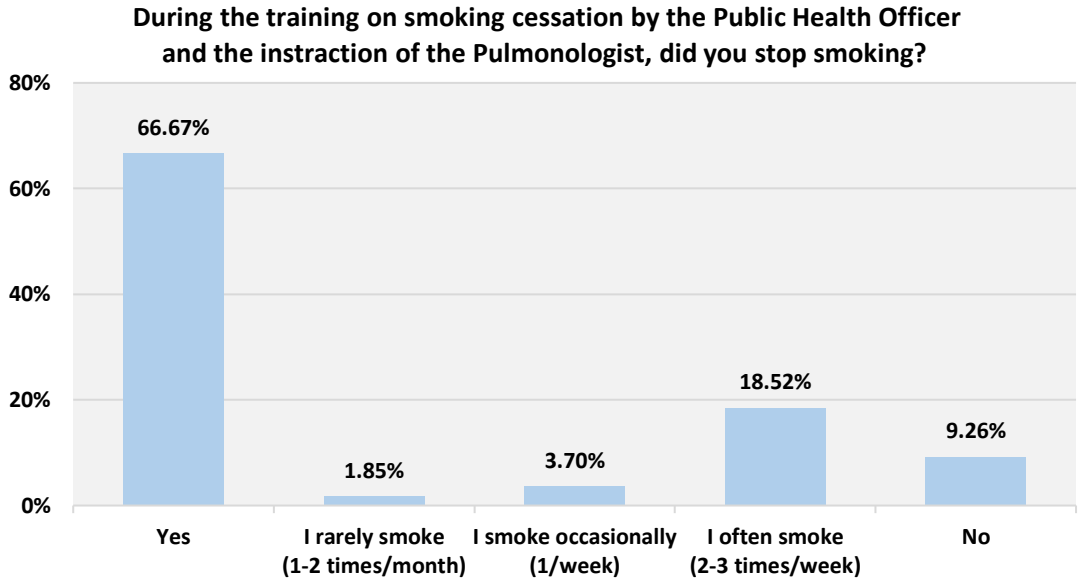

Diagram 12. Percentage distribution of responders who smoking.