Turk Thorac J 2015; 16: 158-65 DOI: 10.5152/ttd.2015.4869

ORIGINAL INVESTIGATION

Effects of an Asthma Training and Monitoring Program on Children's Disease Management and Quality of Life

Behice Ekici[1], Güler Cimete[2]

[1]Department of Children's Health and Diseases Nursing, Maltepe University, School of Nursing, İstanbul, Turkey
[2]Department of Nursing, Cyprus International University, Faculty of Health Science, Nicosia, Turkish Republic of Northern Cyprus

Abstract

OBJECTIVES: To determine the effects of an asthma training and monitoring program on children's disease management and quality of life.

MATERIAL AND METHODS: The sample consisted of 120 children and their parents. Data were collected during, at the beginning, and at the end of the 3-month monitoring period using four forms and a quality of life scale. After an initial evaluation, approaches to control symptoms and asthma triggers and measures that might be taken for them were taught to the children and parents. The children recorded the conditions of trigger exposure, experience of disease symptoms, their effects on daily activities, and therapeutic implementations on a daily basis.

RESULTS: During the 3-month monitoring period, the number of days when the children were exposed to triggers (p=0.000) and experienced disease symptoms decreased to a statistically significant level (p=0.006). Majority of domestic triggers disappeared, but those stemming from the structure of the house and non-domestic triggers indicated no change (p>0.05). Moreover, 30.8% of the children applied to a physician/hospital/emergency service, 4.2% of the children were hospitalized, and 30% of them could not go to school. The number of times when the children applied to a physician/hospital/emergency (p=0.013), the number of times they used medicines (p=0.050), and the number of days they could not go to school (p=0.002) decreased at a statistically significant level, and their quality of life increased (p=0.001).

CONCLUSION: Asthma training and monitoring program decreased children's rate of experiencing asthma symptoms and implementations of therapeutic purposes and increased their life quality.

KEYWORDS: Asthma, asthma management, child, quality of life

Received: *02.04.2015* ***Accepted:*** *10.07.2015*

INTRODUCTION

The morbidity of asthma is gradually increasing across all age groups [1]. In addition to genetic factors, individual factors, such as age and lack of education, economic factors such as poor domestic conditions, and environmental pollution as a result of industrialization play a role in the continuous increase of asthma [1-6].

An asthmatic child is constantly exposed to triggers in domestic and outdoor environments. Moreover, some children developing certain symptoms of the disease cannot continue their education or meet their nutrition, sleep, and hygienic requirements. Consequently, the children's quality of life decreases [7-11]. Asthma attacks result in an increased number of emergency service consultations, hospital-administered treatments [1], and medication uses [7,12]. The quality of life of parents also decreases, and the number of days the parents are unable to go to work increases [7,10]. All these factors result in additional expenses affecting the family and national budgets [1].

A study conducted in four countries has shown that the cost of asthma treatment depends on preventing attacks; emergency treatment is more expensive than planned treatment. By means of non-medical applications, asthma control can be achieved, and the cost of treatment can be reduced [1]. Another study has shown that hospital admission rates, the number of days a preventive inhaler was used, and absence from school/work due to asthma significantly decrease with an indoor reduction strategies program [13]. A systematic review found thatmeasurements

Address for Correspondence: Behice Ekici, Maltepe Üniversitesi Hemşirelik Okulu, Çocuk Sağlığı ve Hastalıkları Hemşireliği Bölümü, İstanbul, Türkiye Phone: +90 216 626 10 50 E-mail: behiceekici@maltepe.edu.tr

preventing exposure to home triggers decrease the number of days with symptoms, absence from school, and hospital applications for children [14].

Because medications cannot completely control the disease [4], asthma-management programs are of vital importance. The primary aims of these programs are to minimize symptoms, prevent attacks, find ways to avoid triggers, and decrease dependence on physicians [1,4]. In such programs, environmental triggers and cultural characteristics must be taken into account. Asthmatic children living in poverty and who received disease management training through 3-4 home visits by public-health personnel are less exposed to triggers; in addition, the frequency of their symptoms decreased by 35%, and the use of medical sources decreased by 75% [15]. Therefore, it would be beneficial for physicians/nurses closely acquainted with communities and their associated environments to provide services, as well as to develop and implement asthma-management programs.

The purpose of this study was to determine the effects of an asthma training and monitoring program on children's disease management and quality of life.

Hypotheses

1. Teaching children about asthma triggers and precautions reduces their exposure to them.
2. Teaching about asthma symptoms and symptom control approaches decrease the extent to which children experience these symptoms.
3. Measures taken against asthma triggers and symptoms decrease the rate of medical requirements, number of school absences, and number of hospitalization days, resulting in an increased quality of life.

MATERIAL AND METHODS

This study was in pre-test, post-test design in one group. The study was performed in Kocaeli on a research population consisted of 372 asthmatic children who were registered in the pediatric asthma-allergy polyclinic. Exemptions to the sample group were determined as follows: 141 children who were registered in the polyclinic were outside the 8–13-year age range (The "How Are You?" scale was developed to measure the quality of life of quality of asthmatic children in the 8–13-year age group), 24 were diagnosed less than 3 months ago, and 42 were living outside the city center. In total, 20 children and their parents who were eligible were subsequently excluded because they were included within the preliminary poll group; another 13 children did not want to be included in the research, and a further 12 children were not included because they did not attend interviews. The remaining 120 eligible children with asthma and their parents comprised the sample group.

The approval of the ethical committees of Kocaeli University, as well as the permissions of the hospital and five school administrations were received for the study.

The children and parents were informed about the aim of the research, their responsibilities, where data storage would take place, and that they could leave the research any time they wished. Those who agreed to participate in research were added to the sample group. Written consent was received for the application of the How Are You? scale.

Instruments

Data were collected with four forms (information form, asthma knowledge assessment form, indoor–outdoor triggers form, and daily asthma monitoring-management form) and one scale.

The How Are You? scale was developed by LeCoq et al. [16] to measure the quality of life of the asthmatic children in the 8–13-year age groups. The scale has child and parent versions and measures the child's quality of life for the past 7 days. The scale consists of two components (generic and asthma-specific), four domains (frequency, quality of performance, desired performance, and feelings), and eight categories (physical, cognitive, social activities, physical complaints, positive emotions, emotions related to asthma, self-management, and self-concept). Higher scores indicate a higher quality of life (scores of 77–308). Cronbach's alpha values of the original scale are between 0.71 and 0.83 [16]. In this study, the estimated Cronbach's alpha value is 0.82 for the child's version and 0.89 for the parents' version. Cronbach's alpha values of the scale components are 0.76 and 0.96, and the correlation coefficients are between 0.70 and 0.88.

Training Material

The Living with Asthma booklet, which was written for asthma training, contains information about asthma causes, symptoms and triggers, measures that might be taken to prevent these triggers, effects of asthma medications, and how to use them. In addition, the process of evaluating respiration levels and the use of a peak flow (PEF) meter are explained with illustrations.

Data Collection

The research was performed from September to May (for a period of 9 months) because it was the school term and asthma triggers are present at a higher degree at that time. In the first interview, the information and asthma knowledge evaluation forms and How Are You? scale were applied by face-to-face interviews. It was found that 36.7% of the children and 26.7% of the parents were unable to correctly respond to any questions of the asthma knowledge evaluation form**.** On the day following the first interview, families' homes were visited, and the presence of asthma triggers was determined via face-to-face interviews and a self-reported method (researcher) using the indoor–outdoor triggers form.

The researcher revisited the same homes when their 3-month monitoring period was over and used the indoor–outdoor trigger form to record asthma triggers that were

present in home environments, as well as measures taken to address the triggers, administered the How Are You? scale by face-to-face interviews, and obtained self-reported (by the child and parent) monitoring forms of 3 months.

Intervention

According to the information obtained from the first evaluations, the children and parents were trained at school and home following the guidelines of the Living with Asthma booklet, which was given to them. The time, duration, and number of training sessions were determined by the results of the asthma knowledge assessment. The training process continued until the children and parents correctly answered all questions. The duration of the sessions was 45–90 min, and lectures, question–answer, drug samplings, and PEF meter demonstration methods were used as teaching methods. After two sessions, 25% of the children and parents learned all presented information, 51% learned after three sessions, 85% of them after 3 h of training, and 15% of them after 4 h of training. The daily asthma monitoring-management form was explained to the children and parents, and they were asked to continue regular monitoring and recording applications for a period of 3 months. Meanwhile, the researcher called the parents by phone once in a 2-week period to ask questions about their child's condition, what they did for asthma management, and to remind them to not neglect daily records.

Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) 17.0 package program, and $p<0.05$ was accepted to be signifi-

Table 1. Comparison of the number of days that the children could not perform some activities due to asthma during their 3 month-monitoring periods

Activities	n (%)	1st month	2nd month	3rd month	x^2 (Friedman)	p
Not able to see his/her friends	28.3 (34)	2.26	1.93	1.81	4.887	0.087
Not able to eat	20.8 (25)	2.20	1.82	1.98	2.167	0.338
Not able to take a bath	20.0 (24)	2.06	2.15	1.79	2.000	0.368
Not able to get dressed	12.5 (15)	1.87	2.10	2.03	0.520	0.771
Not able to get out of bed	16.7 (20)	2.05	2.20	1.75	2.507	0.285
Not able to get outside the house, or walk	20.8 (25)	2.12	2.06	1.82	1.518	0.468
Number of days absent from school	30.0 (36)	2.42	1.82	1.76	12.811	0.002
Not able to stay active during class (not able to answer questions, solve problems, etc.)	28.3 (34)	2.43	1.84	1.74	12.365	0.002
Not able to be participate in sports, games, or climbing stairs	33.3 (40)	2.46	1.88	1.66	17.307	0.000

Table 2. Comparison of the number of days for different triggers of asthma in children during the 3-month monitoring periods

Triggers	n (%)	1st month	2nd month	3rd month	x^2 (Friedman)	p
Children not exposed to triggers	105 (87.5)	0	0	0	---	---
Cold air	71 (59.2)	2.44	2.03	1.53	36.52	0.000
Flu and cold	71 (59.2)	2.41	2.13	1.46	39.89	0.000
Carpet, rug, plush, and pets	74 (61.7)	2.47	2.08	1.63	19.84	0.000
Mold	25 (20.8)	2.17	2.25	1.83	5.92	0.52
Dust and dust mites	63 (52.5)	2.34	2.06	1.60	24.93	0.000
Chalk dust	86 (71.7)	2.26	2.11	1.63	29.87	0.000
Air pollution	63 (52.5)	2.28	2.03	1.69	16.15	0.000
Pollens	61 (50.8)	2.57	1.75	1.68	43.26	0.000
Paints, sprays, and cleaning solutions	46 (38.3)	2.42	1.91	1.66	17.20	0.000

Table 3. Asthma triggers found in children's houses in the assessment before the training process and later

Triggers	Before training n (%)	After training n (%)	χ^2 (McNemar)	p
Triggers inside the house				
Wall-to-wall carpeting	74 (61.6)	61 (50.8)	-	1.000
Pets	11 (9.2)	6 (5.0)	-	0.125
Smoking	52 (43.3)	15 (12.5)	32.02	0.000
Wallpaper	14 (11.7)	7 (5.8)	-	0.016
Sweeping	12 (10.0)	4 (3.3)	-	0.008
Chemical sprays and cleaning solutions	87 (72.5)	31 (25.8)	50.41	0.000
Humidifying with boiling water	54 (45.0)	23 (19.2)	25.41	0.000
Stove heating	54 (45.0)	56 (46.7)	-	1.000
Molds	25 (20.8)	16 (13.3)	-	0.004
Cockroaches	9 (7.5)	8 (6.7)	-	1.000
Triggers inside child's room				
Carpet, rug, and plush	99 (82.5)	43 (35.8)	50.41	0.000
Velvet/woolen curtain	61 (50.8)	25 (20.8)	32.23	0.000
Dry/natural flower	30 (25.8)	2 (1.7)	24.30	0.000
Picture	67 (55.8)	39 (32.5)	26.03	0.000
Wallpaper	19 (15.8)	7 (5.8)	-	0.002
Wool toys	25 (20.8)	9 (7.5)	43.18	0.000
Wool pillows, quilt, and mattresses	69 (57.5)	22 (18.3)	18.38	0.000
Excessive amount of furniture	97 (80.8)	71 (59.2)	-	0.000

cant. Paired-samples t-test, chi-square, Cronbach's alpha, and McNemar, Friedman, and Kuder–Richardson 20 formulae were used.

RESULTS

In total, 53.3% of the children (n=64) were girls, 40% (n=48) were in the 10–11-year age group, and 83% (n=99) of them traveled to school on foot walking for 5–15 min. All parents were mothers, and 72.5% (n=87) of them were primary-school graduates and 86% (n=43) were within the 36–40-year age range. Approximately 41.7% (n=50) of families comprised 5–7 family members, 46.7% (n=56) of families lived in small houses, and 45% (n=54) of the houses were heated with stoves, 50% (n=50) of houses were located along the side of a highway and close to factories, and 28.3% (n=34) of them were not exposed to sunlight. None of these triggers changed during the 3-month monitoring periods.

More than half the children experienced asthma symptoms, used various medications, and were unable to perform certain activities (Table 1) such as leaving the house/walking (20.8%). The children's rate of experiencing triggers significantly decreased every month (Table 2). A statistically significant decrease was observed in all triggers related to domestic conditions (Table 3) and in a number of therapeutic applications (Table 4), while a statistically significant increase was determined in their quality of life (Table 5). Although 20–90% of the children experienced many asthma symptoms a few times during each month, the frequency of their symptoms significantly decreased in the second and third months (Table 4). During this period, the mean ranks of activities in which the children could not engage due to asthma gradually decreased. The number of days they were absent, while 2.42 in the first month and 1.82 in the second, dropped to 1.76 days in the third month (x^2=12.81, p=0.002) (Table 1).

DISCUSSION

During the 3-month monitoring period, the proportion of children exposed to various triggers ranged from 20.8% to 71.7% (Table 3). However, the number of days they were exposed to triggers decreased at a statistically significant level every month; this finding verifies first hypothesis (Table 2). The fact that the number of triggers to which the children were exposed to decreased over time was an anticipated finding because decreasing or eliminating triggers in a domestic environment and changing the children's nutritional habits and activity patterns is a process

Table 4. Comparison of the number of days where asthma symptoms experienced by children are shown and therapeutic implementations within the 3-month monitoring period

Symptoms	n (%)	1st month	2nd month	3rd month	X^2 (Friedman)	p
Those who do not experience symptoms	3 (2.5)	0	0	0	---	---
Nasal discharge	108 (90.0)	2.47	2.01	1.52	73.858	0.000
Sneezing	98 (81.7)	2.36	1.90	1.73	25.019	0.000
Coughing	88 (73.3)	2.54	2.08	1.38	71.051	0.000
Wheezing	50 (41.7)	2.58	1.92	1.50	36.593	0.000
Dyspnea	67 (55.8)	2.47	2.03	1.50	37.167	0.000
Insomnia	48 (40.0)	2.35	1.96	1.69	14.192	0.001
Nasal breathing	24 (20.8)	2.21	2.21	1.58	10.000	0.007
Cyanosis (lip and nail)	24 (20.0)	2.21	2.10	1.96	4.268	0.118
Palpitation	36 (30.0)	2.21	2.19	1.60	10.177	0.006
Difficulty walking	28 (23.3)	2.13	2.05	1.82	1.717	0.424
Speech impediment	31 (25.8)	2.32	1.87	1.81	5.846	0.054
Tachypnea during play	57 (47.5)	2.48	1.90	1.61	26.196	0.000
Therapeutic applications						
Those who did not get the treatment	64 (53.3)	0	0	0	----	----
Hospital and physician visits	37 (30.8)	2.05	2.26	1.69	8.629	0.013
Emergency service visits	16 (13.3)	2.44	1.84	1.72	6.040	0.049
Hospitalizations	5 (4.2)	1.50	2.40	2.10	2.800	0.247
Use of bronchodilators	34 (28.3)	2.15	2.06	1.79	3.319	0.190
Use of anti-inflammatories	6 (5.0)	2.50	2.00	1.50	6.000	0.050
Use of a corticosteroids	26 (21.7)	2.21	2.21	1.58	9.945	0.007
Use of antihistamines	11 (9.2)	2.50	1.77	1.73	8.273	0.016
Use of antiasthma medicines	10 (8.3)	2.25	1.95	1.80	2.000	0.368

Table 5. Comparison of children's "How Are You?" quality of life scores before the training process and after

Domains and lower and higher scores	Evaluation	Child form		Parent form	
		Mean±SD	p	Mean±SD	p
Frequency (39–156)	First	105.54±12.83	0.000	106.64±11.92	0.000
	Last	110.72±14.33		110.40±12.12	
Quality of performance (13–52)	First	40.88±7.66	0.000	43.32±7.26	0.082
	Last	43.33±6.81		42.06±7.63	
Desired performance (13–26)	First	22.40±3.43	0.000	22.56±3.60	0.074
	Last	23.84±3.32		23.22±3.69	
Feelings (25–100)	First	60.45±14.04	0.001	43.71±15.90	0.913
	Last	57.14±15.64		43.88±14.81	
General health assessment (3–12)	First	13.46±4.25	0.001	13.70±3.76	0.003
	Last	14.75±3.54		14.72±3.56	
*Total score	First	206.88±26.40	0.000	193.68±23.23	0.166
	Last	211.20±29.95		196.35±20.66	

*Total score of frequency, performance quality, feelings domains. SD: standard deviation

that takes time. Children's exposure to many triggers, despite the fact that they got information on how to take measures against them, is derived from the fact that no action was taken to change triggers in their external environment (such as air pollution and home environment (such as wall-to-wall carpeting). Other studies found a decrease in the total number of domestic triggers in the follow-up process [13,15].

Because 96.7% of the children lived in basement residences or close to highways, factories, and forestry areas and none of the families were able to change their place of residence during this 3-month period, majority of the children went walking to school, which caused them to breathe polluted air and made it impossible for them to avoid exposure to triggers and consequently resulted in them experiencing asthma symptoms. Almost all children experienced different symptoms, but the number of days with symptoms gradually decreased (Table 4). Lee and Kim [5] found that rate of asthma symptoms increased in children who lived in industrial areas, and McConnell et al. [17] found that children who lived in areas close to highways have a higher rate of asthma cases.

As a majority of families lived in small houses and 45% of them lived in a single room heated by a stove, the children are also at risk of breathing polluted air inside the house (Table 3). This is verified by the fact that the number of days where asthma symptoms are experienced by the children who live in houses with 5–7 people is found to be at statistically significant levels. However, because living in big, centrally heated houses constitutes an economic burden, it is difficult for families move to houses with central heating.

Data obtained from the first evaluation indicates that there were lots of triggers in the children's houses and rooms, and a statistically significant decrease/improvement took place during the 3-month period following the training process (Table 3). This finding indicates that the asthma training and monitoring program was effective. Despite the fact that particular importance is attached to household goods, which are considered to be indicators of wealth in Turkish culture, during the 3-month monitoring process, triggers such as carpets, velvet/woolen curtain, flowers, and areas where drains were present, decreased at a statistically significant level. In a few families, some triggers inside the home environment were unchanged. The reasons for not changing household goods, such as carpets and curtains, relate to economic conditions, and the reason for not removing carpeting may be to protect house heat. Largo et al. [18] found that triggers in children's bedrooms decreased but were not completely eliminated after the implementation of an asthma management program.

Education for protection against asthma triggers showed its positive effect, and during the 3-month monitoring period, the number of symptoms the children experienced, use of medications, and attempts to obtain medical help from physicians/hospitals/ emergency services significantly decreased (Table 4). In total, 2.5% of the children did not have any symptoms. The number of days for which each symptom was experienced gradually decreased during the 3-month monitoring process; for many symptoms, this decrease was supported with statistical analysis (Table 4). These findings support the second hypothesis. In other studies, the rate of children experiencing asthma symptoms was between 59% and 69% [3,10], and the number of days children experienced asthma symptoms was 1.3–5.31 [7,10,15].

An important criterion in determining the intensity and effect of asthma is children's attempts to obtain medical help from physicians/hospitals/emergency services and their number of hospitalizations [1,8,13]. It was found that 13.3% of the children applied for emergency services, 30.8% applied for treatment by physicians/hospitals; in addition, the number of applications decreased at a statistically significant level within the 3-month period (Table 4). These findings verify the third hypothesis. In other studies, the rates of children's admission to emergency services were between 16.0% and 66.7% [3,18,19]. Although this study was conducted in a city with heavy air pollution, these rates showed similarity with rates obtained in other studies or were better than those from other studies. This suggests that the asthma management program in the present study was effective.

Totally, 21.7% of the children used corticosteroids, 28.3% used bronchodilators, and the number of days that medications were used showed a statistically significant decrease (Table 4). This finding suggests that the rate of exposure to triggers, experiencing disease symptoms, and using medications for these reasons decreased because of the asthma management program used in this study. Other studies also indicated that bronchodilators and corticosteroids are frequently used [12,20].

The number of days the children were unable to go to school decreased at a statistically significant level every month (Table 1). This finding also verifies the hypothesis suggesting that trigger and symptom control decrease the rate of school absence of children. Another other study has been found that 12% of children could not go to school due to asthma [12], and absence from school varied between 2 and 5 days [11,21].

The children's quality of life scores measured at the end of the 3-month period increased to a statistically significant level (Table 5). This finding verifies the hypothesis suggesting that the children's quality of life will increase with an asthma management program. This program helped decrease triggers in the home environment; the children were subsequently able to avoid triggers and experience less asthma symptoms , thereby increasing their quality of life. Moreover, other studies found that various asthma

management programs increase the children's quality of life [21-24].

Study Limitations

One of the limitations was that the children were followed-up at only 3 months, while triggers outside home environment vary according to seasons. The other limitation was that only 10 children had a PEF meter. Consequently, because the respiratory capacity of the children could not be measured, it was not possible to classify asthma as mild, moderate, or heavy.

In conclusion, despite 3–4 h of training that was provided to the children and their parents, the number of children exposed to asthma triggers and disease symptoms, the number of attempts by the children to obtain medical help, and the number of absence times they were absent from school decreased, whereas the quality of life increased.

These results suggest that this program is effective for asthma management even for children living in a city with heavy air pollution and that it should be used by health care personnel providing care to asthmatic children.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Kocaeli University Faculty of Medicine.

Informed Consent: Written informed consent was obtained from patients and patients'parents who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - B.E., G.C.; Design - B.E., G.C.; Supervision - G.C.; Funding - B.E.; Materials - B.E.; Data Collection and/or Processing - B.E.; Analysis and/or Interpretation - B.E., G.C.; Literature Review - B.E.; Writer - B.E.; Critical Review - G.C.

Acknowledgements: We would like to thank to the Director and employees of Department of Child Health and Disease, Kocaeli University Faculty of Medicine. Additionally, we also would like to thank to the children and parents who had contributed with their answers to our study.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Global Initiative for Asthma (GINA). Global burden of asthma. Available from: www.ginasthma.org/local/uploads/files/GINABurdenReport_1.pdf. Accessed April 21, 2013.
2. Chang C. Asthma in children and adolescents: a comprehensive approach to diagnosis and management. Clin Rev Allergy Immunol 2012;43:98-137. [CrossRef]
3. Meltzer EO, Blaiss MS, Nathan RA, et al. Asthma burden in the United States: results of the 2009 Asthma Insight and Management survey. Allergy Asthma Proc 2012;33:36-46.
4. Barıs I, Sahin A, Coplu L, et al. Bronchial asthma manual. In: Kalyoncu, F; ed. 2nd ed. Kent Printing. Ankara. 1996.
5. Lee H, Kim GS. Geographical and socio demographic risk factors for allergic diseases in Korean children. Asian Nurs Res (Korean Soc Nurs Sci) 2011;5:1-10. [CrossRef]
6. Ones U. Bronchial asthma. In: Neyzi, O. Ertuğrul T; eds. Pediatrics. 3rd ed. Volume I, Nobel Tıp Kitabevleri. Istanbul. 2002:616-30.
7. Halterman JS, Fagnano M, Montes G, et al. The school-based preventive asthma care trial: results of a pilot study. J Pediatr 2012;161:1109-15. [CrossRef]
8. Turkish Thoracic Society (TTS). Tanım ve Epidemiyoloji. Erişim linki: http://www.toraks.org.tr/uploadFiles/book/file/4102011173155-TANIM-VE-EPIDEMIYOLOJI.pdf. Erişim tarihi: April 27, 2013.
9. Fagnano M, Bayer AL, Isensee CA, et al. Nocturnal asthma symptoms and poor sleep quality among urban school children with asthma. Acad Pediatr 2011;11:493-9. [CrossRef]
10. Bellin MH, Kub J, Frick KD, et al. Stress and quality of life in caregivers of inner-city minority children with poorly controlled asthma. J Pediatr Health Care 2013;27:127-34. [CrossRef]
11. Dean BB, Calimlim BC, Sacco P, et al. Uncontrolled asthma: assessing quality of life and productivity of children and their caregivers using a cross-sectional Internet-based survey. Health Qual Life Outcomes 2010;8:96. [CrossRef]
12. Yawn BP, Yawn RA. Measuring asthma quality in primary care: can we develop better measures? Respir Med 2006;100:26-33. [CrossRef]
13. Nguyen KH, Boulay E, Penq J. Quality of life and cost-benefit analysis of a home environmental assessment program in Connecticut. J Asthma 2011;48:147-55. [CrossRef]
14. Crocker DD, Kinyota S, Dumitru GG, et al. Effectiveness of home-based, multi-trigger, multicomponent interventions with an environmental focus for reducing asthma morbidity: a community guide systematic review. Am J Prev Med 2011;41(2 Suppl 1):S5-32. [CrossRef]
15. Margellos-Anast H, Gutierrez MA, Whitman S. Improving asthma management among African-American children via a community health worker model: findings from a Chicago-based pilot intervention. J Asthma 2012;49:380-9. [CrossRef]
16. le Coq EM, Boeke AJ, Bezemer PD, et al. Which source should we use to measure quality of life in children with asthma: the children themselves or their parents? Qual Life Res 2000;9:625-36. [CrossRef]
17. McConnell R, Berhane K, Yao L, et al. Traffic, susceptibility, and childhood asthma. Environ Health Perspect 2006;114:766-72. [CrossRef]
18. Healthy Homes University: a home-based environmental intervention and education program for families with pediatric asthma in Michigan. Public Health Rep 2011;126(Suppl 1):14-26.
19. Onder N, Hatipoglu S, Inanc BB, Sıkar D. Sociodemographic characteristics and risk factors of children 5-15 years of age with asthma. Türk Aile Hek Derg 2013;17:60-4.
20. Zemek R, Plint A, Osmond MH, et al. Triage nurse initiation of corticosteroids in pediatric asthma is associated with improved emergency department efficiency. Pediatrics 2012;129:671-80. [CrossRef]
21. Bozkurt G, Yıldız S. Effect of education provided to asthmatic children for disease management on the quality of life. Florence Nightıngale Journal of Nursing 2004;13:101-13.

22. Chini L, Lannini R, Chianca M, et al. Happy air, a successful school-based asthma educational and interventional program for primary school children. J Asthma 2011;48:419-26. [CrossRef]
23. Raymond KP, Fiese BH, Winter MA, et al. Helpful hints: caregiver-generated asthma management strategies and their relation to pediatric asthma symptoms and quality of life. J Pediatr Psychol 2012;37:414-23. [CrossRef]
24. Terpstra JL, Chavez LJ, Ayala GX. An intervention to increase caregiver support for asthma management in middle-school-aged youth. J Asthma 2012;49:267-74.[CrossRef]