



Review Article

Parental Factors Related To the Asthma Control among Children and Adolescents: A Systematic Review

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ABSTRACT

Background: Factors influencing asthma control are complex and undetermined among children and adolescents. Previous studies have consistently identified that individual factors. Recently, more attention has been focused on the impact of family factors on asthma control.

Objective: To identify common parental factors influencing asthma control among children and adolescents.

Methods: Literature reported parental factors that influenced asthma control among children and adolescents published from 2005 to 2015 were searched in PubMed, , CINAHL, Proquest , The Cochrane Library , Science Direct, Wiley, SAGE and Ebscohost databases . Inclusion criteria: children aged 0–18 yrs with diagnosed or suspected asthma and/or their parents, full text, quantitative designs, and English language. Exclusion criteria: Clinical and drug trials. References of eligible studies were also screened to avoid missing important articles.

Results: 6 studies encompassing 1,303 children and 4,800 parents were included. Two studies found significant association between parental health literacy and asthma control ($P < 0.01$). Only one study reported that asthma knowledge of parents were positively associated with Asthma Control ($P < 0.05$). However, two studies reported that the parents underestimate their child's asthma severity and overestimate asthma control due to low parental asthma knowledge was a major potential barrier to successful asthma treatment in children. Two studies reported that There was a statistically significant relationship between the level of asthma control of the child and the efficacy expectations of the parents ($r = 0.59, P < 0.001$).

Conclusion: The parental factors were found to influence asthma control among children and adolescents were: Health literacy, Parent asthma-related knowledge and Self-Efficacy.

Keywords: asthma control, factors influence, children, adolescents and parents.

INTRODUCTION

Asthma is the most common chronic disease in children and adolescents. Globally, about 300 million people have asthma. ⁽¹⁾ Increases in asthma prevalence,

morbidity and mortality have intensified public health concern. ⁽¹⁾ Besides acquired immune deficiency syndrome (AIDS) and tuberculosis, asthma is the only chronic disease with an increasing death rate. ⁽²⁾ The

World Health Organization (WHO) estimates about 250 000 deaths from asthma every year, mainly in low- and middle-income countries. ⁽³⁾ According to a recent Center for Disease Control and Prevention (CDC) report 6.2 million (8.5%) children less than 18 years of age have asthma. ⁽⁴⁾ Over 16% of high school students reported a current diagnosis of asthma, of which nearly 38% had experienced asthma attacks during the preceding 12 months. ⁽⁵⁾ Asthma mortality among adolescents (4.4 per 1,000,000) is approximately twice that of younger children. ⁽⁶⁾

Asthma control is a multidimensional concept which is defined as “patient reports of daytime and nocturnal symptoms, activity limitations due to asthma, need for rescue medications, and measures of lung function. ⁽⁷⁾ The Asthma Guidelines of the National Asthma Education and Prevention Program (NAEPP) published by the National Institutes of Health (NIH) emphasize the need to evaluate asthma control as a key component for asthma treatment and management. ⁽⁷⁾ The NAEPP guidelines provide clear and explicit direction regarding the management of pediatric asthma. Despite these guidelines, asthma morbidity and mortality continue to rise in children (CDC, 2002). Well-controlled asthma is associated with improved health status, ⁽⁸⁾ and fewer physician visits, hospitalizations and emergency room visits among children and adults. ⁽⁹⁾ In contrast, poor asthma control is directly linked with increased school absenteeism and loss in work productivity among asthma children and adults/caregivers, respectively. ^(10,11) Unfortunately, studies report that asthma remains uncontrolled in many asthmatic patients, despite receiving appropriate treatments. ⁽¹²⁾

Factors influencing asthma control are complex and undetermined. ^(7,13)

Previous studies have consistently identified that individual factors such as genetics, smoking, poor design of inhaler device, improper medication compliance, as well as environmental factors such as pets in the home, air pollution, and pollen exposure are important determinants of poorly controlled asthma. ^(14,15) Recently, more attention has been focused on the impact of individual and family factors on asthma outcomes. For example, Parental health literacy of children with asthma is one such factor that might directly contribute to the optimal asthma care of their children. ⁽¹⁶⁾ Low health literacy levels could influence parents’ understanding of asthma etiology and impact capability of engaging in the decision-making process with providers, and compliance with the treatment plan patients, despite receiving appropriate treatments. ⁽¹⁴⁾ Furthermore, children and adolescents are at greater risk for psychosocial impairments, lower Self-efficacy and Poor attitudes toward asthma were associated with poor asthma control. ⁽¹⁷⁾

Once the factors are identified, the interventions can be implemented in order to overcome them and improve outcomes. Therefore a systematic review of parental factors related to controlled asthma among children and adolescents were undertaken. The aim of this review is to answer the question What are the parental factors that influencing controlled asthma among children and adolescents?.

METHODS

Search strategy:

An information research were derived and searched the following 8 databases and web resources: PubMed, CINAHL, Proquest, The Cochrane Library , science direct, Wiley, SAGE and Ebsco host from 2005 to2015. The search strategy included terms for factors influencing controlled asthma, parents, asthma control,

uncontrolled asthma, children or childhood and adolescents or adolescences. B For example, the search strings used for Proquest were: Asthma AND factors influencing controlled asthma AND adolescents.

The articles retrieved on the basic of above searching were firstly screened by reviewing their titles and abstracts based on the inclusion and exclusion criteria. Then, full text of eligible literature was carefully reviewed and determined whether to be finally included in this review or not. The bibliographies of all retrieved studies were screened for additional relevant articles .Inclusion criteria were i) Participants: children from 0-18 years old with diagnosed or suspected asthma and/or their parents. ii) parental factors. iii) full text. iv) quantitative designs. v) English language. Exclusion criteria were i) Drug trials ii) Clinical trials. After determining included studies, the following information were extracted regarding the authors, year of publication, country where the studies were conducted, research design, sample size, demographic characteristics of the study population, location, results and discussion of the findings.

Assessment of the methodological quality of the studies

The methodological quality of the studies was assessed using the STROBE statement. The STROBE statement is a checklist of 22 items, These items relate to the article's title and abstract (item 1), the introduction (items 2 and 3), methods (items 4–12), results (items 13–17), and discussion sections (items 18–21), and other information (item 22 on funding). The reason why the STROBE statement was chosen, is because the development of the STROBE statement has involved extensive

discussion among numerous experienced epidemiologists and statisticians. ⁽¹⁸⁾ Furthermore, a systematic review to Tools for assessing quality in observational epidemiological studies, revealed that tools should be a simple checklist rather than a scale and show evidence of careful development, and of their validity and reliability. ⁽¹⁹⁾

RESULTS

The database search yielded 148 references. After reviewing the titles, abstracts or complete articles, only six studies fulfilled the inclusion criteria (Figure 1).

Table I presents the results of the methodological quality assessment using the STROBE Statement - Checklist for included studies. The most important information of the included articles was extracted and summarized in Table II

Studies Included and Quality Assessment:

6 studies comprising of 1,303 children aged between 4 to 20 years and 4,800 parents of children were included. All of studies were quantitative (5cross-sectional study and 1 cohort study). Three studies involved parents and children, two studies involved parents only and one study involved the adolescents aged 13-20 years. The use of STROBE checklist to analyze the methodological quality of the studies, demonstrated that only two studies Described efforts to address potential sources of bias. However, all of them were scored more than two third of items. The items which were performed poorly by the studies were those related to the define variables, bias, study size, statistical methods, give reasons for non-participation at each stage and generalizability.

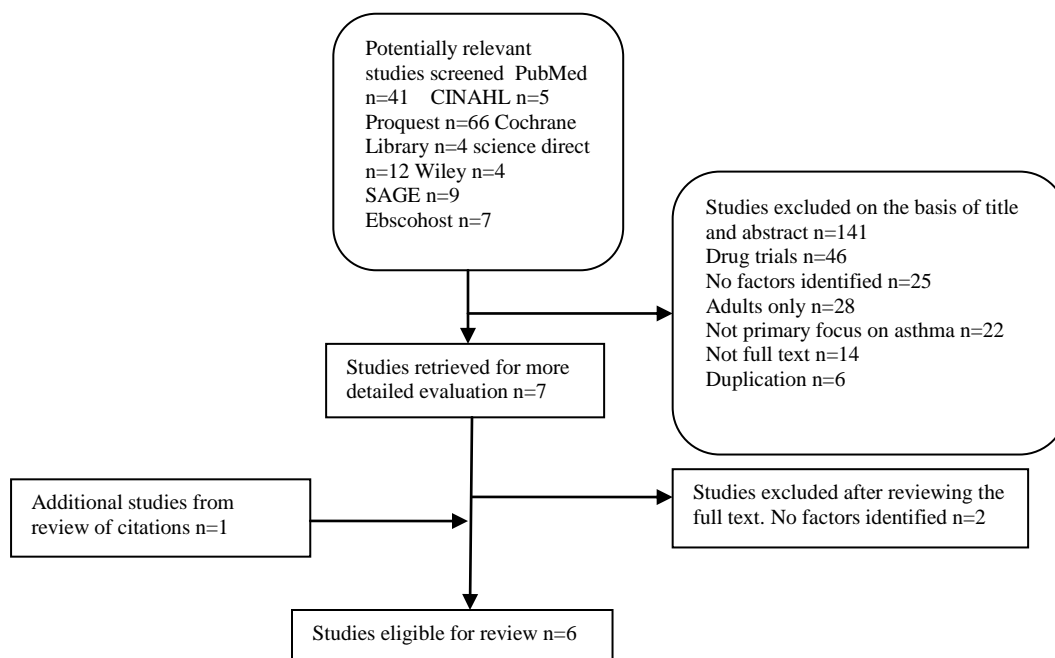


Fig. 1. Diagrammatic flow of study selection process

Table1: Quality scores and criteria list for the methodological assessment of reviewed articles.

Study	Scores on STROBE statement*																						Total score†
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Gandhi et al., 2013 ⁽²¹⁾	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21/22	
Wood et al., 2010 ⁽²²⁾	+	+	-	+	+	+	+	-	+	+	+	-	+	+	-	+	-	+	-	+	-	16/22	
DeWalt et al., 2007 ⁽²³⁾	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	-	+	+	20/22	
Silva and Barros. 2013 ⁽²⁴⁾	+	+	+	-	+	+	-	+	-	-	+	-	+	+	+	+	+	+	-	+	+	15/22	
Carroll et al., 2012 ⁽²⁵⁾	+	+	+	+	+	+	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+	20/22	
Zhao et al., 2013 ⁽²⁶⁾	+	+	+	+	+	-	+	-	+	+	-	-	+	+	+	+	+	+	+	+	+	18/22	

+the criterion was clearly satisfied; -the criterion was not clearly satisfied; †The total score is determined by counting the number of criteria that are satisfied.

*Column numbers correspond to the following criteria on the STROBE Statement—Checklist: 1: Title and abstract; 2: Background/rationale; 3:Objectives; Methods 4: Study design; 5: Setting;6: Participants; 7: Variables; 8: Data sources/measurement; 9: Bias; 10: Study size; 11:Quantitative variables; 12: Statistical methods; Results 13: Participants; 14: Descriptive data;15: Outcome data; 16: Main results; 17: Other analyses; Discussion 18: Key results 19:Limitations;20: Interpretation; 21:Generalisability;22: Funding

Factors identified

The factors identified from the studies and reviews were Parental were: Health literacy, parent asthma-related knowledge and self-efficacy.

Health literacy

Health literacy means patients are able to read, understand, remember medication instructions, and act on health information. ⁽²⁰⁾

The study done by Gandhi et al ⁽²¹⁾ showed the Parents with higher health literacy were less likely to report poor asthma control in children through indirect pathway by satisfaction with shared decision-making for parents(SDM) as mediating variable. Parental health literacy was significantly associated with satisfaction with SDM(P < 0.05). Satisfaction with SDM was significantly associated with asthma

control ($P < 0.01$). Another cohort study supports the finding of Gandhi et al. ⁽²³⁾ The authors found that children of parents with low literacy reported more severe asthma symptoms; 56% of children of parents with low literacy had moderate or severe persistent asthma, compared with 35% of children of parents with

higher literacy ($P = .03$). Children of parents with low literacy had greater incidence of emergency department visits (adjusted incidence rate ratio [IRR] 1.4; 95% confidence interval 0.97, 2.0) and hospitalizations (IRR 4.6; 95% confidence 1.8, 12).

Table II: Over view of included studies

Reference And Study location	Parental factor	Study design	Population	Main findings
Gandhi et al., 2013 ⁽²¹⁾ United States	Health literacy self-efficacy	Cross-sectional study survey questionnaire	160 children aged 8–17 years with asthma and their parents .	Parents with higher health literacy and greater perceived self-efficacy with patient-physician interactions were associated with better asthma control ($P < 0.01$).
Wood et al., 2010 ⁽²²⁾ United States	Health literacy self-efficacy	Cross-sectional study	196 parents of asthmatic children (aged 5–14 yrs)	Although two thirds of the parents/guardians had inadequate health literacy, there was no significant association between parental health literacy and asthma control. There was a statistically significant relationship ($r^2 = .03$) between the level of asthma control of the child and the efficacy expectations of the parent/guardian
DeWalt et al., 2007 ⁽²³⁾ United States	Health literacy	Cohort study	150 children with asthma (aged 3-12 yrs) and their parents	Low parental literacy is associated with worse asthma control in the children . Children of parents with low literacy had greater incidence of emergency department visits (adjusted incidence rate ratio [IRR] 1.4; 95% confidence interval[0.97, 2.0]), hospitalizations (IRR 4.6; [1.8, 12]), and days missed from school (IRR 2.8;[2.3, 3.4]). Children of parents with low literacy were more likely to have moderate persistent or severe persistent asthma. ($P = .03$)
Silva and Barros 2013 ⁽²⁴⁾ Portugal	Asthma knowledge	cross-sectional study	Fifty children aged 7–13 years and their parents .	Portuguese parents revealed a tendency to overestimate their child's level of asthma control and a low level of asthma knowledge. In 75% of cases identified by the physician as uncontrolled asthma, parents reported "nothing serious".
Carroll et al., 2012 ⁽²⁵⁾ Canada, Greece, Hungary, the Netherlands, South Africa and the UK	Asthma knowledge	Questionnaire survey	1,284 parents of asthmatic children (aged 4–15 yrs) and children themselves (aged 8– 15 yrs; n=943)	Parents under estimate their child's asthma severity and overestimate asthma control is a major potential barrier to successful asthma control in children. Although 73% of parents described their child's asthma as mild or intermittent, only 14.7% achieved complete Global Initiative for Asthma (GINA)-defined control
Zhao et al., 2013 ⁽²⁶⁾ China	Asthma knowledge	cross-sectional study	parents of 2960 children (0–14 years) with asthma	Knowledge were positively associated with asthma control and adherence to medication regimen ($p \leq 0.05$). Only 18.31% of parents correctly answered $\geq 60\%$ of the knowledge questions. Knowledge of parents was positively associated with pulmonary function testing, and adherence to medication regimen and the Children's Asthma Control Test questionnaire, ($p \leq 0.05$).

However, Wood and colleagues (2010) found that the level of health literacy of the parent/guardian of an African American child with asthma did not predict the child's level of asthma control. Although 65% of the parents/guardians in this study were in the limited health literacy range, there was no significant association between

Parental health literacy and asthma control. The lack of relation may be due to the frequent asthma instruction at each physician visit that the parents/ guardians in this study received from the physicians and their staffs. All participants were actively involved in the physician's asthma education programs.

Parent asthma-related knowledge

Zhao et al. ⁽²⁶⁾ reported that Parents in China exhibited a low level of asthma-related knowledge. Only 18.31% (455/2485) of parents correctly answered $\geq 60\%$ of the knowledge questions. Parents were a better understanding of the nature of asthma (63.58% of parents), but a lack of awareness of clinical manifestations of the disease and the indicators of acute attacks (21% of parents). Parent asthma knowledge was positively associated with the Children's Asthma Control Test questionnaire ($p \leq 0.001$).

While Silva and Barros found that that there is no significant association between parents' knowledge and asthma control assessed by the physician ($p=0.265$).

In addition, two studies ^(24,25) reported that the parents underestimate their child's asthma severity and overestimate asthma control. This was a major potential barrier to successful asthma treatment in children. Carroll and colleagues explained that by the relationship between parents' asthma knowledge and their report of symptoms and estimation of asthma control. Parents reported mild asthma attacks at least weekly in 11% of children, and serious attacks at least annually in 35%. Although 73% of parents described their child's asthma as mild or intermittent, 40% of children/adolescents had C-ACT scores of < 19 , indicating inadequate control, and only 14.7% achieved complete Global Initiative for Asthma (GINA)-defined control.

Self-Efficacy

The study by Wood et al. ⁽²²⁾ revealed that More than 80% of the parents/guardians strongly agreed and agreed about their confidence level in recognizing asthma triggers, knowing when medications were needed, when to manage their child's asthma themselves and when to go to the physician, understanding the

physician's directions, and helping their child use an inhaler Correctly. A statistically significant relationship ($r=0.155$, $r^2 = .02$) was found among the parents'/guardians' health literacy levels and their perceived efficacy expectations to manage their child's asthma. A Pearson's correlation coefficient was calculated and found that there was a statistically significant relationship ($r=0.177$, $r^2 = .03$) between the level of asthma control of the child and the efficacy expectations of the parent/guardian. Another study by Gandhi and colleagues supports the findings of Wood et al. parents that reported greater perceived self-efficacy were more likely to report greater satisfaction with SDM than parents with less perceived self-efficacy ($r = 0.59$, $P < 0.001$).

Satisfaction with SDM was significantly associated with asthma control ($P < 0.01$), where parents with greater satisfaction with SDM were less likely to report poor asthma control in children.

DISCUSSION

In this review we attempted to identify parental factors related to asthma control among children and adolescents which would have wide generalizability. Understanding and accounting for these factors may help practitioners identify patients at an increased risk of poor asthma control to better manage their asthma symptoms and improve their asthma management. Given the small number of studies conducted, within the time frame between 2005 and 2015, while the most of the studies exploring the individual factors were done, it is evident that there is a need for more research to be done to explore the parental factors that effect on asthma management. Several factors with consistent impact on asthma control have been identified through the review process.

Firstly, health literacy factor, one larger cross-sectional study ⁽²²⁾ didn't find

statistically significant association between limited parental health literacy and health and child's asthma control, although parents with limited HL were more likely to perceive greater asthma burden and believe that their children were sicker, to report lower asthma-related quality of life, and to have lower perceived efficacy expectations to manage their child's asthma than parents with adequate HL. The reasons behind this lack of association may be confounded due to the increased self-confidence in parents who have established a long term open and trusting relationship with their physicians. (27) Of the 3 studies (21-23) discussed the health literacy and asthma control, none of them reported analyses of health literacy and lung function measures. Another thing to point out is that, there is a limited of literature on parental health literacy and asthma control in children and adolescents. Given these limitations, we agree with Berkman et al in that there is low or insufficient evidence of a causal association between health literacy and asthma severity/control or asthma self-care. (28)

Another factor to consider is asthma knowledge. Patient's knowledge about their disease and treatment is not always adequate. One study reported that Knowledge of parents were positively associated with Asthma Control and adherence to medication regimen, (26) and two studies reported that the parents underestimate their child's asthma severity and overestimate asthma control could be related to the parental asthma knowledge. (24,25) For these reasons, patient education is very important to enhance asthma control. However, the study done by Silva and Barros found that there is no significant association between parents' knowledge and asthma control assessed by the physician. This is could be due to parents' asthma knowledge was also associated with time since diagnosis. As expected, parents whose

children had asthma for a longer period of time had better knowledge of asthma, indicating that experience and contact with the specialist may be an important opportunity for learning.

Lastly, parental Self-Efficacy is also related with asthma control. The association between self-efficacy and asthma control remains unclear. While one of the studies found that perceived self-efficacy was not directly associated with asthma control, (21) other study by Wood et al have noted this direct association. (22) Self-efficacy has been recognized as a central feature of asthma self-management. Zebracki reported self-efficacy as an important factor of adherence to treatment regimens with asthma. (29) A future study is warranted to test the causal paths among this factor with asthma control, which will provide invaluable information in designing an intervention to promote asthma self-management in children and adolescents.

Definitely, there are several limitations in the current review. Firstly, there is a shortcoming in the search strategy in that only articles with full text and only English articles were retrieved. Secondly, only quantitative designs were included. There are quite a number of qualitative studies were omitted. However, we do believe that the review so far has captured most of the parental factors which influence asthma control.

CONCLUSIONS

In conclusion, from the review of the literature starting from the 2005s to identify relevant parental factors relating to asthma control among children and adolescents, the factors identified were: Health literacy, Parent asthma-related knowledge and Self-Efficacy. The evidence indicates that asthma remains uncontrolled in many asthmatic patients, despite the large number of studies attempting to address and highlight the

problem. In addition, the small number of studies included in this review showed the need for further research to be conducted in this age group. More studies on parental factors influencing asthma control in children and adolescents would be particularly useful in identifying barriers to effective management of asthma and can be helpful to formulating intervention programs for managing uncontrolled asthma.

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