

Research Article

An attempt to identify the sleep related disorders in asthmatic children

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Received: 04 June 2016

Accepted: 02 July 2016

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ABSTRACT

Background: Asthma is the most common chronic respiratory disorder of children. A significant feature that has not received the attention it deserves is the effect of asthma on quality of sleep itself and the consequent adverse effect on individuals' performance in day to day activities. Increased daytime sleepiness and tiredness because of frequent nocturnal awakenings has been documented even in clinically stable asthmatic children. Hence this study is an attempt at identifying the prevalence of sleep related disorders in asthmatic children and once identified the therapy can be directed towards these nocturnal symptoms so that these children have a better sleep quality and day time performance.

Methods: 125 asthmatic children in the age of 3 – 12 years as per the criteria IAP asthma by consensus attending the outpatient department of a tertiary care centre were classified into the category of asthma. The parents of the children were given the questionnaire sleep disturbance scale for children (SDSC) and were asked to recall the sleep related questions in the preceding 6 month period.

Results: Out of the 125 children, 115 (92.0%) of children overall had significant sleep disturbance. The areas of sleep affected were disorders of initiating and maintaining sleep (88.8%); sleep wake transition disorders (87.2%) and disorders of excessive somnolence (89.6%). The use of inhaled corticosteroids with long acting beta 2 agonists showed a reduction of sleep related disorders in these children.

Conclusions: It can be concluded that there is significant sleep disturbances in asthmatic children. These children have difficulty in initiating sleep and also have excessive daytime sleepiness and tiredness due to poor quality of sleep.

Keywords: Asthma, Sleep, SDSC

INTRODUCTION

Asthma, known as reactive airway disease is a chronic inflammatory condition of the lung airways resulting in episodic airflow obstruction. It is the most common chronic respiratory disorder of children.¹

A significant feature that has not received the attention it deserves is the effect of asthma on quality of sleep itself and the consequent adverse effect on individuals' performance in day to day activities. Increased daytime sleepiness and tiredness because of frequent nocturnal awakenings has been documented even in clinically stable asthmatic children.²

These children have a self-imposed restriction of physical activity and a generalized fatigue during the day, possibly due to sleep disturbance.¹ Lack of awareness of asthma sleep association and its clinical implications could lead to poor asthma control and impaired day time activity.

METHODS

This was a questionnaire based cross sectional study done for a period of 6 months from January 2013 to July 2013. 125 children were identified to have asthma based on the clinical criteria in the IAP asthma by consensus 2012.³ They were further classified into the severity of asthma according to the symptoms. The parents of these children were requested to answer the questionnaire titled Sleep

Disturbance Scale for Children (SDSC) in English version.⁴

The sleep disturbance scale for children is a 26 part likert type scale which assesses the children on various areas of sleep. The parents were asked to recall the symptoms in the preceding 6 month period. Each part has graded response for the quality of sleep from 1 to 5. The parents will be asked to circle the number corresponding to the response. The total score and scores in each area of sleep will be calculated and put in the scoring sheet. After plotting the scores, a cut off score was calculated for the individual areas of sleep as well as the total score above which we could conclude that the child is having sleep disturbance.

Analysis of data

After collecting the data, the total scores and the scores obtained in the individual areas of sleep were obtained using the SDSC scoring sheet. The data was entered into Microsoft excel worksheets. The analysis was carried out using the Statistical Package for the Social Sciences (SPSS) program for Windows (SPSS Inc., Chicago, version 19.0). ROC curves were drawn using the sensitivity vs. 1-specificity for the total scores and the scores obtained in the individual areas of the sleep. Using the ROC curve, the cut off score above which it can be considered significant for sleep disturbances was obtained. Frequencies of the number of children having a score greater than the cut off score in the total and individual areas of sleep were calculated. Using this, the chi square test was applied to obtain the p value and to assess the significant areas in which sleep was affected.

RESULTS

Table 1: Category of asthma.

Category of asthma	No. of children	Percentage
Mild intermittent	23	18.4%
Mild persistent	29	23.2%
Moderate persistent	73	58.4%

A total of 125 children as per the inclusion criteria were evaluated in the study period. All children were attending the outpatient department of the tertiary care hospital. Out of the 125 children, 88 (70.4%) were male and 37 (29.6%) were females. Most of the children under study were in the age group of less than 5 years (53.6%); 31 (24.8%) of the children were from 5-10 years; and 27 (21.6%) of children were greater than 10 years of age. Based on the IAP asthma by consensus guidelines, the children were categorised into the following groups:

After categorisation, the type of preventer therapy the child was currently taking was asked: inhaled corticosteroids (ICS) with or without long acting beta 2 agonists (LABA) or montelukast.

Table 2: Type of preventer therapy.

Type of preventer	No. of children	%
ICS only	42	33.6%
ICS + LABA	55	44.0%
Montelukast only	5	4.0%
ICS + Montelukast	23	18.4%
ICS + LABA+ Montelukast	15	12.0%

After categorization of the children the SDSC questionnaire was applied to all these children as the methods explained. The individual scores in each of the areas of sleep and the total score was plotted in the scoring sheet.

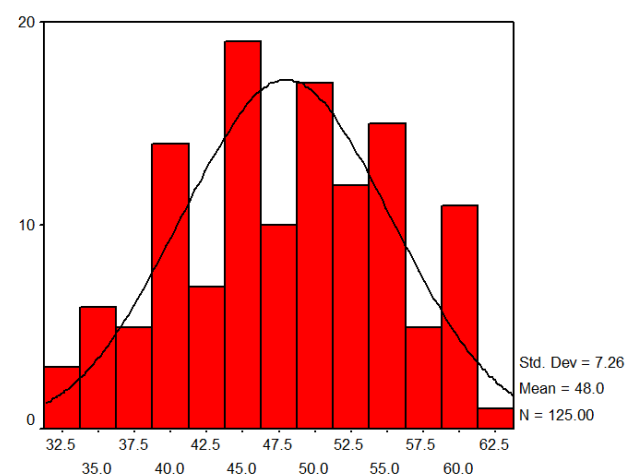


Figure 1: ROC curves.

ROC curves

Based on the total score and also the scores in each of the areas of sleep, ROC curves were plotted against sensitivity vs 1-specificity by which a cut off score was identified above which we can conclude that the child had sleep disturbance or not.

Table 3: Summary of results.

Area of sleep	Cut off score	No. of children	Percentage
DIMS	10	111	88.8%
SBD	4	111	88.8%
DA	3	86	68.8%
SWTD	7	109	87.2%
DOES	6	112	89.6%
SHY	3	92	73.6%
Total	37	115	92.0%

Computing the results, 115 (92.0%) of the asthmatic children had significant sleep disturbance (p value: 0.002). Amongst the individual sleep areas significant disturbance was found in the areas of difficulty in initiating and maintaining sleep (p value: 0.002) in the

form of increased sleep latency, frequent night time awakenings; sleep wake transition disorders (p value: 0.005) also called as parasomnias most common of which was bruxism and sleep talking and disorders of excessive somnolence (p value: 0.020) in the form of excessive daytime sleepiness, tiredness during the day.

With respect to the use of controller medications, the use of ICS + LABA had a significant association in reduction of sleep disturbances both overall (p value: 0.024) as well in the areas of DIMS (p value: 0.003), DA (p value: 0.017), SWTD (p value: 0.029) & DOES (p value: 0.028).

Plotting the total scores obtained in a bar chart showed all the scores obtained by the children had a normal distribution with a mean score of 48 with a standard deviation of 7.26.

DISCUSSION

Asthma is the most common chronic illness of childhood and it is possibly increasing in its prevalence and severity worldwide.^{5,6} As per the ISAAC phase 3 worldwide studies, there has been an overall increase in the prevalence of allergic diseases as a whole: asthma, allergic rhino conjunctivitis and eczema as a whole. The median age of the children in our study was around 6 years (56 months) out of which 70.4% were males. As per Nelson textbook of paediatrics, 80% of all children experience symptoms of asthma before 6 years of age and male gender has been identified as an early childhood risk factor for developing asthma.¹ In our study 115 out of 125 children (92%) had significant sleep disorders. This is comparable to another study done by Chugh IM, Khanna P and Shah A in Outpatient Department of the Vallabh Bhai Patel Chest Institute, University of Delhi which showed 95% of stable asthmatic children had significant sleep disturbances.² Quoting other similar studies done in the same institute showed 93% of the subjects who were young asthmatic adults had significant sleep disturbances.⁷ A study in the Netherlands of consisting of 2529 children also showed significant sleep disturbances in asthmatic children.⁸ Fagnano et al showed 41 % of the asthmatic children had significant sleep disturbance.⁹ We can conclude that even clinically stable asthmatic children do have significant sleep disturbance. Another area of sleep which was significantly affected was the disorders of excessive somnolence in the form of increased daytime sleepiness and tiredness in the daytime. Most of the studies of sleep disturbances in asthmatic children show that this is a major area of sleep disturbance in children in the form of excessive daytime somnolence/tiredness or impaired daytime activity. Li et al showed that daytime sleepiness mediated asthma related quality of life in children and said there was a need to address the sleep quality in asthmatic children.¹⁰ The use of controller medications has been shown to reduce the sleep related problems in children.¹¹ In our study the use of inhaled corticosteroids with long acting

beta 2 agonists was found to be significant in reduction of overall sleep disorders in children. This is in similar pattern with other studies where inhaled fluticasone propionate has been associated with reduction in asthma symptoms and improvement in sleep quality.¹²

The limitations of the study were:

The diagnosis of asthma was based on clinical criteria as per the IAP asthma by consensus. Peak flowmetry was not done in these children.

The study was based on the recall of sleep quality by the parents over a 6 month period hence there is a possibility of recall bias.

Polysomnography is the gold standard for assessment of the quality of sleep and sleep related breathing.^{13,14} Pediatric Polysomnography shows validity, reliability, and clinical utility that is commensurate with most other routinely employed diagnostic clinical tools or procedures.¹⁵

CONCLUSION

From this study, it is seen that even stable asthmatic children have significant sleep disturbances. The areas of sleep affected were disorders of initiating and maintaining sleep, disorders of excessive somnolence and sleep wake transition disorders. With respect to the use of controller medications, the use of inhaled corticosteroids with long acting beta 2 agonists showed reduction in sleep related disorders in these children. Hence focus on controller medications and proper technique and compliance in its administration will help in reducing sleep related disorders in asthmatic children.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Vidhyasagar K, Sundar S. An attempt to identify the sleep related disorders in asthmatic children. *Int J Contemp Pediatr* 2016;3:1037-40.