Evaluation of sleep quality and anxiety–depression parameters in asthmatic children and their mothers

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Received 6 December 2006; accepted 11 July 2007
Available online 14 September 2007

KEYWORDS
Asthma; Anxiety; Depression; Children; Mother; Sleep quality

Summary
Background: Having a child with a chronic disease may cause anxiety and depression and impair the sleep quality in the mothers. The aim of this study was to evaluate sleep quality in asthmatic children and their mothers as well as the status of anxiety–depression in the mothers.

Methods: Study group consisted of 75 asthmatic children aged between 7 and 16 years (mean ± SD 8.4 ± 2.9) and the control group consisted of 46 healthy children aged between 7 and 15 years (mean ± SD 9.1 ± 3.6). Pittsburgh Sleep Quality Index (PSQI) was administered to both the children and their mothers while Hospital Anxiety and Depression Scale (HADS) was administered only to the mothers.

Results: Total PSQI score of the mothers in the asthmatic group was significantly correlated with asthma severity of the children ($r = 0.49$, $p = 0.00$). There was a significant correlation between asthma symptom score and sleep disturbing factors subscore in children with asthma ($r = 0.34$, $p = 0.01$). Moreover, anxiety and depression subscores of the mothers in the asthma group were significantly higher ($p = 0.02$).

Conclusion: Asthma may be associated with altered sleep quality in children and their mothers. Similarly, mothers of children with asthma may have disorder of anxiety and depression. Therefore, children with and their mothers need to be assessed for the requirement of support regarding sleep quality and anxiety–depression status.

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0954-6111/$ - see front matter © 2007 Elsevier Ltd. All rights reserved.
doi:10.1016/j.rmed.2007.07.025
Introduction

Asthma is one of the most common chronic debilitating diseases of childhood and constitutes a considerable health problem among children, with high and increasing prevalence in many countries. Nocturnal symptoms such as cough, wheezing, or breathlessness have been reported in 47–75% of asthmatic children. These symptoms may disrupt sleep quality in asthmatic children and their mothers who are usually the care providers. Disruption of sleep in the mother might affect the daytime life and behavior of both the child and the mother. All these stressful conditions associated with disease may impair sleep quality and lead to psychological problems such as anxiety and depression in mothers of children with asthma. Decreased sleep quality may also be associated with psychological problems.

Depression has been reported to be common among mothers of children with asthma. Sleep quality disorders may also play a role in increasing anxiety–depression sensitivity in these mothers. Moreover, it has been reported that symptoms of depression in mothers may increase asthma morbidity of the child. Sleep disorders in children with asthma have been studied in previous research. However, the impact of disease on mothers’ sleep quality has not been evaluated before.

In this study, we aimed to assess sleep quality in asthmatic children and their mothers as well as the anxiety–depression parameters in the mothers.

Materials and methods

Subjects

Study group consisted of 75 children with asthma (40 male and 35 female) aged between 7 and 16 years (mean ± SD 8.4 ± 2.9) who are followed up in the Pediatric Allergy and Pulmonology Department and their mothers. Control group consisted of 46 healthy children without any chronic diseases (31 male and 15 female) aged between 7 and 15 years (mean ± SD 9.1 ± 3.6) and their mothers. Children with similar socioeconomic characteristics as the asthmatic group were included in the control group with the aid of the questionnaire described below. Mothers with a chronic disease themselves were excluded as well as those who had a family member with a chronic disease other than asthma.

Study design

Pittsburgh Sleep Quality Index (PSQI) was administered to the children and their mothers; Hospital Anxiety and Depression Scale (HADS) was administered only to the mothers. Duration of asthma, asthma symptom score and number of emergency department visits were recorded for asthmatic children.

Evaluation of sociodemographic characteristics

In order to have similar asthma and control groups and in order to be able to compare anxiety–depression scales and sleep quality between the two groups, education of mothers and fathers, socioeconomic level and presence of chronic disease were looked into the format of a separate questionnaire.

Evaluation of asthma severity

Diagnosis and severity of asthma were defined prospectively according to the Global Initiative for Asthma guideline. Number of emergency visits was determined based on patient history and file records.

Turkish validation of asthma symptom score was performed by Yuksel et al. It is a 6-item scale that reflects chronic asthma symptomatology (e.g., shortness of breath, tightness in the chest, daytime wheezing, nocturnal wheezing, daily performance and variability of peak expiratory flow). Scoring for items 1, 2, 3, 4, and 5 are 0,1,2,3 while that for item 6 is 0,1.

Evaluation of sleep quality

Evaluation of sleep quality was based on Pittsburgh Sleep Quality Index (PSQI). It is a 23-item questionnaire that generates scales reflecting daytime dysfunction (e.g., “How often have you had trouble staying awake while driving, eating meals, or engaging in social activity?”), sleep latency (e.g., “How long has it usually taken you to fall asleep at night?”), disturbance (e.g., “How often have you had trouble sleeping because you wake up in the middle of the night or in the early morning?”), duration (e.g., “How many hours of actual sleep did you get at night?”), quality (e.g., “How would you rate your sleep quality overall?”) and efficiency (time asleep vs. total time in bed). As the score increases, sleep quality decreases and daytime dysfunction due to sleep quality disorder increases. PSQI is composed of three main scores: total PSQI score, PSQI subscores and sleep quality status score. PSQI subscores are subjective sleep quality, time needed to fall into sleep, sleep effectivity, use of hypnotics and daytime sleepiness.

Evaluation of anxiety and depression in mothers

HADS generated by Zigmond and Snaith was used to evaluate anxiety and depression in the mothers. Turkish validity of this scale was done by Aydemin et al. It is a 14-item questionnaire. Seven items measure anxiety and 7 measure depression. In HADS, anxiety–depression increases as the score increases.

Statistical analysis

Statistical analysis was performed by SPSS 11.0 (Chicago IL) computer program. Independent samples t-test and Pearson’s \( \chi^2 \) test were used for the statistical analysis. Pearson’s correlation analysis was performed for the correlations. Comparison of multiple variables about asthma and control groups were performed with \( \chi^2 \) test. \( p \) Values less than 0.05 were regarded as statistically significant.
Ethical approval

This study was approved by the Ethics Committee of the Celal Bayar University School of Medicine. Written informed consent was taken from parents of children.

Results

Disease severity

Among children with asthma, 65.7% had mild persistent asthma, 27.1% had moderate persistent asthma and 7.2% had severe persistent asthma.

Sleep disturbance

Total PSQI scores, subjective sleep quality score, frequency of healthy sleep and chronic sleep disturbance in children were not significantly different between the two groups ($p = 0.25, 0.98, 0.52$) (Tables 1 and 2).

Total PSQI score in mothers was not significantly different between the asthma and control groups ($p = 0.20$). On the other hand, subjective sleep quality score of the mothers in the asthma group were significantly higher ($p = 0.04$) (Table 3). However, the other subscores of the PSQI that include time needed to fall into sleep, sleep effectivity, use of hypnotics and daytime sleepiness were not significantly different. Frequency of healthy sleep and chronic sleep disturbance in mothers were not significantly different between the two groups when compared using the $\chi^2$ test ($p = 0.12$) (Table 4).

Anxiety–depression scores in mothers

Anxiety and depression subscores of the mothers were significantly higher in the asthma group ($p = 0.02$) (Table 3).

Sleep disturbance and anxiety-depression correlations

Total PSQI scores of the mothers in the asthma group was significantly correlated with asthma severity in children ($r = 0.49, p = 0.00$). Similarly, total scores of PSQI and depression subscores of the mothers in the asthma group displayed a significantly positive correlation with the number of emergency department visits of the children ($r = 0.39$ and $0.31$, respectively, both $p = 0.01$). Moreover, total PSQI scores and depression and anxiety subscores of the mothers in the asthma group were significantly correlated with asthma symptom score in children ($r = 0.42, 0.37, 0.41$, respectively, $p = 0.00$ for all) (Figures 1–3). Additionally, sleep duration of the mothers in the asthma group showed a significantly negative correlation with asthma severity and asthma symptom score ($r = -0.31, p = 0.02$ and $r = -0.26, p = 0.04$, respectively). Moreover, there was a significantly positive correlation between asthma symptom score and sleep disturbing factors subscore in children with asthma, but there was no significant correlation with the other subscores ($r = 0.34, p = 0.01$).

Discussion

Sleep disorders are common in childhood, and may affect multiple aspects of the child’s and other family members’ lives. Reduced quality of sleep might have important implications for the developing child because it can impair growth, learning and emotional development. A wide range of conditions related with respiratory disorders, including asthma, cystic fibrosis, etc. may lead to various sleep disturbances, sleep maintenance problems and circadian rhythm disturbances. Sleep studies in adults

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<th>Table 1</th>
<th>Mean Pittsburgh sleep quality scores of the asthmatic and healthy control children.</th>
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<tr>
<td></td>
<td>Asthma</td>
</tr>
<tr>
<td>Total PSQI score</td>
<td>$4.1 \pm 3.0$</td>
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<tr>
<td>Subjective sleep quality score</td>
<td>$0.5 \pm 0.6$</td>
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<th>Table 2</th>
<th>Evaluation of sleep quality according to Pittsburgh scale in asthmatic and healthy children.</th>
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<td></td>
<td>Chronic sleep disorder</td>
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<tr>
<td>Asthma (%)</td>
<td>3.8</td>
</tr>
<tr>
<td>Control (%)</td>
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<th>Table 3</th>
<th>Pittsburgh sleep quality and depression–anxiety scores of the mothers in asthmatic and control groups.</th>
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<tr>
<td></td>
<td>Asthma</td>
</tr>
<tr>
<td>Total Pittsburgh score</td>
<td>$5.0 \pm 3.1$</td>
</tr>
<tr>
<td>Subjective sleep quality score</td>
<td>$1.0 \pm 0.9$</td>
</tr>
<tr>
<td>Anxiety subscore</td>
<td>$8.5 \pm 4.1$</td>
</tr>
<tr>
<td>Depression subscore</td>
<td>$6.7 \pm 4.1$</td>
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<th>Table 4</th>
<th>Evaluation of sleep quality according to Pittsburgh scale in mothers of asthmatic and healthy children.</th>
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<td></td>
<td>Chronic sleep disorder</td>
</tr>
<tr>
<td>Asthma (%)</td>
<td>4</td>
</tr>
<tr>
<td>Control (%)</td>
<td>6.7</td>
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</table>
with asthma showed that asthmatic patients had more difficulty in initiating and maintaining sleep compared to the healthy subjects.\textsuperscript{15,16} A significant defect in sleep quality was not detected in children with asthma when compared to healthy children in our study. However, mothers of children with asthma displayed sleep quality impairment and anxiety–depression disorder correlated with this.

There are a few studies about the association between asthma and sleep disturbance during childhood. However, there has been no study that reported sleep quality and mood status in mothers of these children. Similar to our results, Ronchetti et al.\textsuperscript{17} failed to demonstrate an association between asthma and sleep disturbance in children. On the contrary, Camhi et al.\textsuperscript{18} found that respiratory diseases were associated with symptoms and complaints of sleep problems. There have been additional reports by other authors that found an association between asthma and wheezing and a higher prevalence of sleep disturbances in children, too.\textsuperscript{19–21}

A large cross-sectional study demonstrated that wheezing in school-aged children is associated with difficulty falling asleep and a more restless sleep when compared to the ones without wheezing.\textsuperscript{22} Stores et al.\textsuperscript{4} suggested that sleep was disrupted by higher rates of brief and long awakenings in children with asthma. However, there was no difference in PSQI subscore reflecting these in our study. Therefore, it seems like there is no problem in falling asleep and having an effective sleep in children with asthma. Similarly, Avital et al.\textsuperscript{23} demonstrated that sleep architecture was normal in asthmatic children compared to healthy subjects.

In our results, though there was no significant difference of sleep quality in children with asthma, there was a significant correlation between asthma symptom score and sleep disturbing factors subscore of PSQI. This may indicate that sleep disturbance may be observed in correlation with symptom score in children with asthma despite the absence of an obvious and pathological sleep disorder. Nevertheless, this association may be more evident in severe asthma than in mild asthma.

Considering sleep quality and mood in mothers of children with asthma, our findings demonstrate that the disease affects the mothers to a more extent on this aspect. In previous reports, mothers have higher rates of depressive symptoms than fathers in both population-based and clinically based studies.\textsuperscript{24,25} For example, maternal depression is exacerbated by the presence of a chronically ill child in the house.\textsuperscript{26,27} Therefore, sleep disturbance and mood disorders may be observed in mothers of children especially with unstable asthma. For example, Barlett et al.\textsuperscript{5} found that depression is common among mothers of asthmatic children and that maternal depression was a potent risk factor for emergency department use among young children with asthma. In our study, subjective sleep subscore of PSQI that is an important indicator of maternal sleep perception, was significantly worse in mothers of children with asthma compared to the mothers of healthy children. Although there is no previous report about maternal sleep quality in children with asthma, this disturbance in the perception of sleep may indicate that a disturbance of mood that is also a problem of perception may be observed.

Nevertheless, Akcakaya et al.\textsuperscript{28} found that despite there was no significant difference in the mean maternal anxiety...
score, mean maternal depression score was significantly higher in children with moderate and severe asthma than in those with mild asthma. However, we found that both maternal anxiety and depression subscores were significantly higher in children with asthma. Additionally, depression subscores of the mothers in children with asthma displayed a significantly positive correlation with the number of emergency department visits.

Considering the disturbance of sleep quality in mothers of children with asthma, little is known about the sleep patterns of parents within a stressful situation such as having a child who experiences asthma. In our study, total PSQI scores of mothers in the asthma group showed a significantly positive correlation with asthma severity in children. Similarly, maternal total PSQI score in our asthma group displayed significantly positive correlation with the number of emergency department visits. At the same time, total PSQI scores, depression subscores and anxiety subscores of the mothers in the asthma group displayed a significantly positive correlation with the asthma symptom scores of children. Maternal sleep duration, too, had a significant correlation with asthma severity and symptom scores of children. In summary, according to our results, chronic symptoms and severity of asthma in children may cause sleep disturbance in their mothers. It may be hypothesized that sleep disturbance in mothers of children with asthma may worsen her depression.

In conclusion, according to our results, asthma severity may be associated with sleep quality of children with asthma. Moreover, asthma symptoms, severity and the number of emergency department visits of children may be associated with impaired sleep quality and increased anxiety–depression sensitivity in their mothers. Therefore, asthmatic children and their mothers need to be assessed for the requirement of support regarding sleep quality and anxiety–depression. Psychologic support of mothers of asthmatic children may increase parent–physician communication, parental self-confidence and help treatment of the asthmatic child.

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