



The mediating effect of sleep satisfaction on the relationship between stress and perceived health of adolescents suffering atopic disease: Secondary analysis of data from the 2013 9th Korea Youth Risk Behavior Web-based Survey



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ABSTRACT

Background: Difficulty in sleep is one disturbing symptom in adolescents with atopic diseases including asthma, allergic rhinitis, and atopic dermatitis. Assuming psychological stress can affect adolescents' health status, impaired sleep quality can be one mediator that negatively impacts the health status of adolescents with atopic disease.

Objectives: This study aimed to identify the mediating effect of sleep satisfaction on the relationship between stress and perceived health status in Korean adolescents with atopic disease and to examine the differences among three types of atopic disease.

Design: A cross-sectional descriptive study was completed based on secondary analysis of raw data from the 2013 9th Korea Youth Risk Behavior Web-based Survey.

Settings and participants: The 21,154 adolescents (29.2%) ever diagnosed and treated for at least one atopic disease regardless of the symptom presence in a recent year were extracted out of 72,435 survey participants. Then, the 13,216 individuals with exclusively single atopic diseases were included in analyzing the mediation model.

Methods: Variables including demographics, stress, perceived health status, and sleep satisfaction were included. Pearson correlation, one-way ANOVA, path analysis to define direct/indirect effects with bootstrapping analysis, and multi-group variance analysis were conducted.

Results: High levels of stress in adolescents with atopic diseases had a significant and direct effect on their negative health status perception for all atopic disease groups. A significant negative mediating effect of sleep satisfaction was identified on the relationship between stress and perceived health status, irrespective of the type of atopic disease. Total effect and remaining direct effect on the path from stress and perceived health status via sleep satisfaction was high in adolescents with atopic dermatitis and allergic rhinitis compared to those with asthma.

Conclusions: To improve sleep satisfaction for adolescents with atopic diseases, interventions are needed to enhance the adolescents' perceived health status through stress reduction and sleep quality improvement.

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What is already known about the topic?

- Impaired sleep quality is one of the frequent symptoms presented in adolescents with atopic diseases (asthma, allergic rhinitis, and atopic dermatitis).
- Adolescents with atopic diseases experience physical and psychological stress related to their illnesses, which may affect their poor health status.

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What this paper adds

- High levels of stress in adolescents with atopic diseases had a statistically significant direct effect on negative health status perception in teenagers with atopic diseases.
- A statistically significant negative mediating effect of sleep satisfaction was identified on the relationship between stress and perceived health status in this sample, regardless of the specific type of identified atopic disease.
- Total effect and remaining direct effect on the path from stress and perceived health status via sleep satisfaction was high in adolescents with atopic dermatitis and allergic rhinitis compared to those with asthma.

1. Introduction

Atopic disease is a representative chronic disorder in childhood and adolescence that usually initiates from young childhood (Won and Shoon, 2012). It is known as atopic syndrome, which is a predisposition toward a high IgE-mediated immune response in reaction to an allergen, and typically presents with one or more of the following disorders: atopic dermatitis, asthma, and allergic rhinitis (Pols et al., 2016; Wright et al., 2005). A prevalence of atopic disease has been increasing in developed as well as developing countries during the last several decades (Kim and Lee et al., 2010; Yan et al., 2005; Zar et al., 2007). The reported prevalence is 8.3–10.3% for asthma, 18.9–19.2% for allergic rhinitis, and 11.2–17.9% for atopic dermatitis based on the national data of Korean children aged 6–7 and 13–14 years old (Ahn et al., 2011).

Young patients with chronic atopic disease not only suffer physical suboptimal conditions due to disease symptoms but also affirm disturbed psychosocial health including high stress levels, fatigue, poor health, low quality of life, decreased self-esteem, depression, and psychosomatic symptoms (Yan et al., 2005; Kim et al., 2015; Meltzer et al., 2009; Shyu et al., 2012). Psychological stressors cause the disturbed balance of the immune defensive responses and increased secretion of inflammatory cytokines, and perceived stress in allergic patients leads to worsening atopy symptoms (Tomljenovic et al., 2014; Wright et al., 2005; Wamboldt et al., 2003). Teenagers with atopic dermatitis reported higher stress and ideas of unhealthy health condition compared to those without a disease (Won and Shoon, 2012). In young patients with atopic disease, their disturbed psychosocial health, which is signified by high stress level, can affect their perception of their poor health status (Koinis-Mitchell et al., 2012).

Psychological burdens of teenagers with atopic disease are closely related to their impaired sleep quality (Meltzer et al., 2009; Koinis-Mitchell et al., 2012; Oh et al., 2015). Sleep quality plays an important role in the optimal growth and development in the young generation (Smaldone et al., 2008; Jernelov et al., 2013). Children who are sleep deprived, such as those with atopic disease, are more likely to experience suboptimal health and difficulties at school when compared with children with adequate sleep patterns (Derebery et al., 2008; Oh et al., 2015).

Particularly common symptoms affecting sleep quality for youth with atopic disease include frequent nighttime disturbances of airway obstruction in patients with asthma, nasal congestion in youth with allergic rhinitis, and increased itching

sensations for patients with atopic dermatitis. Adolescents with poorly controlled asthma may experience difficulty in initiating sleep and with nighttime waking due to perceived breathing problems (Mitchell et al., 2015). As a comorbid condition that shares pathophysiology with asthma, allergic rhinitis has a negative impact on quality of life due to its potential for sleep impairment (Meltzer et al., 2009; Derebery et al., 2008; Lunn and Craig, 2011). A greater number of shifts in sleep stages with frequent nighttime waking and longer periods of waking after sleep onset were evidenced by disrupted sleep in children with atopic dermatitis (Camfferman et al., 2013; Gupta and Gupta, 2013). Intense itching is a characteristic symptom of atopic dermatitis and may be a primary factor affecting sleep quality of youth (Won and Hong, 2010). Common features of disrupted sleep in patients with atopic disease include daytime sleepiness, regular insomnia, and frequent fatigue (Derebery et al., 2008; Kim et al., 2015; Koinis-Mitchell et al., 2012; Oh et al., 2015; Silverberg et al., 2015). Likewise, teenagers with atopic disease are vulnerable to sleep disruption caused by the presence of illness-related symptoms and the potential for poor illness control.

Increased stress and disturbed sleep can have a significant impact on allergy severity and symptom control (Wright et al., 2005). As one plausible pathway by which stressful experiences disrupt the diurnal cortisol profile among children and adolescents (Ly et al., 2015), psychological burdens associated with difficulty in sleep may precede a flare-up of the stress reactive symptoms in youth with atopic disease (Lunn and Craig, 2011).

Considering that the potential for poor health and decreased quality of life for adolescents with atopic disease coincided with psychosocial burden and deprived sleep, it is critical to address the detrimental effects of stress and inadequate sleep on the perceived health status of these patients. In particular, considering that disruptive sleep in atopic disease can have a significant negative impact on the course of disease and quality of life, further investigation is needed into the role of sleep deprivation in young patients, who are in the process of growth and development.

Therefore, given that the stress of adolescents with atopic disease can have a negative impact on their health status, inquiry into the mediating role of sleep problems, which are common characteristics of all types of atopic disease, can be helpful to plan a detailed care program for teenagers with atopic disease. Moreover, while there was a consistent pattern of sleep deprivation in all types of atopic disease, the findings on which type of atopic disease has the most or least significant impact from sleep problems on the path from perceived stress to perceived health status would be helpful to prioritize the target population for implementation of a care plan. In this regard, we propose a need for a study identifying the mediating effect of sleep satisfaction on the relationship between stress and perceived health status in Korean adolescents with atopic disease and to investigate the variance of a set of variables among groups with specific types of atopic disease. Comprehension of the effect of stress on perceived health status while focusing on the mediating role of sleep satisfaction will be useful in planning future nursing interventions for adolescents with atopic disease.

The present study aimed to identify the mediating effect of sleep satisfaction on the relationship between stress and perceived health status of adolescents with atopic disease using national data. Specific research questions were 1) to examine the direct effect of stress on perceived health and sleep satisfaction as well as

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