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## Original Article

## Association of sleep quality components and wake time with metabolic syndrome: The Qazvin Metabolic Diseases Study (QMDS), Iran



Mohammadali Zohal<sup>a</sup>, Azam Ghorbani<sup>a,b,\*</sup>, Neda Esmailzadehha<sup>a</sup>, Amir Ziaee<sup>c,a</sup>, Zahrasadat Mohammadi<sup>a</sup>

<sup>a</sup>Metabolic Diseases Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

<sup>b</sup>School of Nursing & Midwifery, Qazvin University of Medical Sciences, Qazvin, Iran

<sup>c</sup>Growth and Development Research Center, Iran University of Medical Sciences, Tehran, Iran

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## ABSTRACT

**Purpose:** The aim of this study was to determine the association of sleep quality and sleep quantity with metabolic syndrome in Qazvin, Iran.

**Methods:** this cross sectional study was conducted in 1079 residents of Qazvin selected by multistage cluster random sampling method in 2011. Metabolic syndrome was defined according to the criteria proposed by the national cholesterol education program third Adult treatment panel. Sleep was assessed using the Pittsburgh sleep quality index (PSQI). A logistic regression analysis was used to examine the association of sleep status and metabolic syndrome.

**Results:** Mean age was  $40.08 \pm 10.33$  years. Of 1079, 578 (52.2%) were female, and 30.6% had metabolic syndrome. The total global PSQI score in the subjects with metabolic syndrome was significantly higher than subjects without metabolic syndrome ( $6.30 \pm 3.20$  vs.  $5.83 \pm 2.76$ ,  $P=0.013$ ). In logistic regression analysis, sleep disturbances was associated with 1.388 fold increased risk of metabolic syndrome after adjustment for age, gender, and body mass index.

**Conclusion:** Sleep disturbances component was a predictor of metabolic syndrome in the present study. More longitudinal studies are necessary to understand the association of sleep quality and its components with metabolic syndrome.

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### 1. Introduction

Sleep/wake cycle and circadian system have considerable effects on behavioral activities, day/night rhythms, and physiological processes (e.g., endocrine function) which may result in health problems [1]. Human behaviors and habits may suppress the control mechanisms of physiological processes that cause alterations of sleep quality and duration [2].

It has been shown that insufficient sleep duration and sleep fragmentation change sympatho-vagal balance with an increase in sympathetic nervous system activity [3] which inhibits insulin secretion, promotes insulin resistance, and contributes to the development of metabolic syndrome [4]. Sleep pattern especially sleep duration plays an essential role in rhythms of releasing hormones related to the energy homeostasis and weight gain such

as ghrelin, leptin, insulin, cortisol, and growth hormone [5,6]. In addition appropriate sleep/wake cycle decreases serum catecholamine and cortisol concentration [7] that finally prevents metabolic syndrome. Okubo et al. in a cross-sectional study reported that men with poor sleep quality had 2.37 times increased risk of developing metabolic syndrome [8]. Moreover, Hall et al. found that short and long sleep duration (less or more than 7 to 8 h per night) are associated with 45% increased risk of metabolic syndrome [9].

There are evidences that short sleep duration is associated with increased risk of metabolic syndrome components (i.e. obesity, impaired glucose metabolism . . . ) but the knowledge on the relevance of sleep quality and metabolic syndrome is not yet enough. Studies on the association of sleep quality and its components with metabolic syndrome are limited in the world and Iran [10–12] and more investigations are needed. Therefore, the aim of this study was to determine the association of sleep quality and sleep quantity with metabolic syndrome in Qazvin, Iran.

\* Corresponding author at: Metabolic Diseases Research Center, Boali-Sina Hospital, Boali-Sina Street, Qazvin, Iran.

E-mail address: [ghorbani\\_az@yahoo.com](mailto:ghorbani_az@yahoo.com) (A. Ghorbani).