



An Investigation of the Quality of Sleep in Diabetic Patients

Sadegh Dehghanmehr¹, Saeideh Varasteh², Safooranooraen³,
Saeid Emami¹, Sina Mohammadi¹, Omolbanin Asrari¹

¹ Student, Student Research Committee, Nursing and Midwifery School, Zabol University of Medical Sciences, Zabol, Iran

² Faculty member, Community Nursing research Center, Zahedan school of Nursing and Midwifery, Zahedan University of Medical Sciences, Zahedan, Iran

³ Nursing and Midwifery School, Zabol University of Medical Sciences, Zabol, Iran

*Correspondence : **Saeideh Varasteh** : Faculty member, Community Nursing research Center, Zahedan school of Nursing and Midwifery, Zahedan University of Medical Sciences, Zahedan, Iran

Abstract

Introduction: Unfortunately, despite the breakthroughs in medical sciences, the incidence of diabetes, which is a common disease in human communities, has not only not decreased but also been increasing daily.

Method: The present study was conducted by searching Farsi and English databases including Science Direct, Google Scholar, SID, Magiran, and PubMed with the key words “sleep”, “sleep quality”, and “diabetes”. At first, numerous studies related to sleep quality, diabetes and sleep quality, and the sleep-related problems in diabetic patients were found.

Result: Factors such as weight management, physical activity, and diet have always been mentioned as the foundation of diabetes prevention and control. Nowadays, the importance of good sleep and its relationship with the incidence and intensification of diabetes has also been well-established. The diabetic patients’ lifestyle is one of the most important factors whose modification can improve the results of healthcare measures in these patients. Beside, exercising and physical activity, sleep and rest are important components of lifestyle in diabetic patients and are like the two sides of the same coin.

Conclusion: Diabetic patients show some degrees of pain and anxiety for different reasons, including disease, regularly controlling blood sugar, and continual insulin injection, etc. It can be concluded that relieving pain and reducing anxiety is an important factor in improving the quality of sleep in diabetic patients.

Keywords: Quality, Sleep, Diabetic

Introduction

Unfortunately, despite the breakthroughs in medical sciences, the incidence of diabetes, which is a common disease in human communities, has not only not decreased but also been increasing daily (1). The diabetes disease is a chronic hyperglycemia and a disorder in the metabolism of carbohydrates, proteins, and lipids, which is caused by an increase in insulin secretion or impairment of its receptors or by both of the two conditions (2). Diabetes is the fourth most

important cause of death in developed countries (3) and one of the largest problems for world health, in a way that the World Health Organization calls it a silent epidemic (4). According to the estimations of the World Health Organization, there were 171 million diabetic patients around the world in 2000, and the number is estimated to double, namely 366 million patients, by the year 2030 (5). According to the latest statistics by the Iranian Diabetes Association, 5.5

million people suffer from diabetes in Iran (6). In addition to physical complication, diabetes causes several psychological and behavioral complications which extensively affect the patients' quality of life. The effects could be due to the change in the diet, permanent dependency on medicine, the short and long term complications caused by the disease, or the associated expenses imposed by the disease (7). Sleep is a reversible condition of existence which is identified by a reduction in consciousness level and interaction with the environment, a reduction in muscular activity or movements, and a relative or complete interruption of voluntary behavior. People's quality of life is directly affected by their quality of sleep. Sleep disorder generally causes excessive sleepiness during the day, which can affect a person's mood, consciousness, memory, security, and performance (8). Healthy sleep encompasses multiple dimensions, including adequate amount of sleeping time, adequate quality of sleep, appropriate and orderly timing of sleep, and lack of disturbance in sleep. The relationship between good sleep and health has been well-documented (9). During sleep, the hormones norepinephrine, serotonin, and growth hormone are released, and chemical changes and an increase in cell nutrition happen, so that the body can get ready for the activities of the following day. Also, restoration, reorganization, memory enhancement, and learning happen in nervous system during sleep. Furthermore, sleep reduces anxiety, stress, and psychological tensions and helps the person to regain energy to better concentrate, adapt, and get pleasure from everyday life activities. People who have sleep disorders not only suffer from tiredness but also suffer from problems in cell regeneration, defects in memory and learning, increased stress and anxiety, and decreased quality of life (10). According to studies conducted in this area, the indirect costs associated with the destructive effects of insomnia on daily consciousness and behavior (i.e., accidents and lack of efficiency) are estimated to be around 80 billion dollars annually (11). Insomnia can leave destructive effects on different aspects of human life, relations with others, career, and the health conditions of the patients and can cause depression, decreased performance of the immune system, and heart diseases (12). People with type two diabetes are exposed to the risk of such sleep disorders as stops in breathing apnea, insomnia, restless leg syndrome and the sleep disorders caused by it, and increased number of nocturnal urinations, which caused fragmented sleep and decrease the quality of sleep (13). Deep and comfortable sleep can play an important role in the treatment of diabetic patients (5). Diabetic patients

experience delayed falling asleep at night more often than normal people due to disorders in glucose level, and more than 80% of diabetic patients have a poor quality of sleep (14). The incidence of diabetes and disorder in glucose tolerance increases when there the length of sleep is less than 6 hours and more than 9 hours, and diabetic patients have shorter sleep length than the normal amount of sleep in the society (15). Diabetes is a risk factor for sleepiness during the day and low quality of sleep for the patients (16). Given the incidence of sleep disorders in diabetic patients and the direct and indirect effects of sleep on different aspect of an individual's life, it is necessary to identify the relevant causes and effective solutions in order to reduce these disorders and to improve the quality of life for diabetic patients. Therefore, the present study was conducted to investigate the incidence of sleep disorders in diabetic patients and to identify the causes for these disorders and to suggest some solutions to decreases the problems associated with sleep disorders.

Materials and methods

The present study was conducted by searching Farsi and English databases including Science Direct, Google Scholar, SID, Magiran, and PubMed with the key words "sleep", "sleep quality", and "diabetes". At first, numerous studies related to sleep quality, diabetes and sleep quality, and the sleep-related problems in diabetic patients were found. Then, of all the studies found, the studies that were not closely related to the topic of the present study were excluded, and only those studies that were directly related to the topic of the present study were used. This study investigated the incidence of sleep disorders and the quality of sleep in diabetic patients, the causes for these disorders, and the factors than can improve the quality of sleep in diabetic patients.

Results

Factors such as weight management, physical activity, and diet have always been mentioned as the foundation of diabetes prevention and control. Nowadays, the importance of good sleep and its relationship with the incidence and intensification of diabetes has also been well-established (9). The diabetic patients' lifestyle is one of the most important factors whose modification can improve the results of healthcare measures in these patients. Beside, exercising and physical activity, sleep and rest are important components of lifestyle in diabetic patients and are like the two sides of the same coin. Quality of

sleep and quality of life are the most important indices in evaluating healthcare in chronic diseases including diabetes (14). 37 to 50 percent of type two diabetes patients suffer from sleep disorders. Several studies have confirmed a mutual relationship between diabetes and sleep disorders (-19). Sleep as physiologic behavior and diabetes as a metabolic diseases interactively affect each other. Sleep disorders increases the incidence risk of diabetes by 4 to 8 times (2). Functional status is a concept defined as an individual's ability to satisfy their basic needs and their role expectations. Functional results include the ability to gain an active and generative lifestyle, maintain social relationships with friends and family, focus attention on duties and responsibilities, and maintain friendly relationships and healthy sexy relationships. The results show that, as a result of disorder in the quality of life, patients experience problems in their functional status, and their quality of life is not satisfactory. Due to inadequate and poor sleep, these patients suffer from excessive sleepiness during the day, decreased self-care and disease control ability, inability to stay on their diet, and increases complications of the disease (13). Sleep disorders results in an increase in blood cortisol level, prevent the generation of insulin, and reduce sensitivity to insulin and, as a result, increase the chances of developing diabetes. Also, blood glucose level increases in patients suffering from sleep disorders. Stops in breathing apnea has been reported as the most common sleep disorder among diabetic patients (17). Studies show that getting 5 or less than 5 hours, getting up early, and having problem maintaining sleep for 5 or more than 5 times a month is significantly related to the risk of developing diabetes, while no significant relationship was found between sleeping for more than 9 hours and more and the incidence of diabetes (18). Diabetic patients have a generally shorter sleep length than the society. Regarding sleep patterns in diabetic patients, sleep researchers made a number of diabetic patients get 4 hours of nocturnal sleep for 6 days and found that the patients had become tolerant to glucose and resistant to insulin and needed 12 hours or nocturnal sleep for period of one week to recover from the metabolic complications. In another study, which used intravascular glucose instead of oral glucose, people who got less than 5 hours of sleep became resistant to insulin (14). Sleep disorders leave a considerable effect on the quality of life in these patients, in a way that the chances of developing depression and anxiety in increased, and the patient's ability to deal with daily tensions is decreased. Also, the quality and amount of nocturnal sleep can affect an individual's cognitive

functioning and their concentration level in doing daily activities. Some studies have shown that problems in the quality of life, especially long sleep lengths and deprivation from sleep, is an important factor in the progress of the diabetes disease. Short-term sleep limitations are associated with different physiologic complications such as changes in blood pressure, sympathetic stimulation, and increased inflammation activities and disturb glucose tolerance by increasing nocturnal cortisol level and activating the axis of the adrenal-pituitary-hypothalamus. Other laboratory studies show that complete deprivation from nocturnal sleep for 24 hours, relative deprivation from nocturnal sleep for some days, and sleeping for 12 hours for some consecutive days all cause resistance to insulin in peripheral tissues, disorder in glucose tolerance, feelings of hunger, and consumption of food (12). Dawn phenomenon may occur in diabetic patients. The disorder usually happen between 2 a.m. to 8 a.m. in the morning following an increase in blood glucose level. The reason for the phenomenon is attributed to increased secretion of growth hormone, cortisol, and glucagon or epinephrine. Studies have shown that, given the creation of resistance to insulin and disorder in glucose tolerance, poor and inadequate quality of sleep can be a factor for the development of this phenomenon and the intensification of blood sugar increase in diabetic patients (19). Obesity in main reason for diabetes, in a way that 90% of diabetic patients are obese. Studies point to the high incidence of stops in breathing apnea in type two diabetes patients. 30% of diabetic patients suffer from stops in breathing during sleep. More than 40% of people who experience stops in breathing during sleep at night suffer from diabetes. Obesity is the most important risk factor for stops in breathing apnea. Fat deposition in the upper airway has been mentioned as the main cause of stops in breathing apnea in diabetic patients (20). Therefore, one of the most important causes for sleep disorders in diabetic patients is obesity and the stops in breathing associated with it. Restless leg syndrome and pain in the shin are other causes for sleep disorders in diabetic patients (21).

Discussion

Most diabetic patients complain about delayed falling asleep, inability in maintaining sleep, inadequate sleep, and repetitive waking up, and report sleep disorders (22). Sometimes, insomnia can be complication caused by diabetes, and sometimes it can be a cause for the development of diabetes. Also, modernization of life and factors such as pain in the

shin, muscle cramp, increase and decrease in blood sugar level, and repetitive urination during the night cause sleep disorders in diabetic patients. On the other hand, sleep disorders is associated with increased risk of developing diabetes, cardiovascular diseases, and increases mortality rates in these patients. Different studies have reported the incidence of sleep disorders among diabetic patients to be between 40 to 60 percent. Also, in many studies a significant relationship was found between sleep disorders in diabetic patients and reduced quality of life, increased blood glucose level, and increased HbA1C level (23). Factors such as age, the time length of having the disease, and cognitive disorders such as anxiety, and blood cholesterol level have been found to be significantly related to the quality of sleep in diabetic patients. This means that diabetic patients with high cholesterol levels and longer periods of suffering from the disease experience more sleep disorders (17). Sleep disorders have been mentioned as an important risk factor for the development of cardiovascular diseases and, as a result, death in diabetic patients. The mechanisms mentioned for the issue include increased sympathetic activity, increased oxidative stress, increased inflammation, and endothelial injury (24). This issue highlights the importance of treating sleep disorders in these patients. Improving the quality of sleep results in improved physical and mental health, efficiency, consciousness, social interactions, and people's performance. Poor quality of life is associated with negative physical and psychological results and performance in adults with type two diabetes (13). The management of diabetes requires measures more than insulin injection and oral medicine. Diet, activity and rest, changes in behavior and lifestyle including the quality of sleep and people's interactions are important factors in controlling diabetes. Sleep health can have a direct role in improving the quality of life and controlling the disease in diabetic patients. The following guidelines can be suggested for improving the quality of sleep: 1- suggestion on before going to bed: do not go to bed until you feel sleepy; avoid alcohol, tobacco, caffeine, and other stimulating substances before or, if possible, 4 to 8 hour before, going to bed; if you cannot go to sleep after 20 minutes in bed, get out of the bed and keep yourself busy doing something like reading a book, listening to music, etc.; 2- suggestions on bed and bedtime: wake up every morning (even on holidays); complete your night sleep so that you can feel calm and peaceful during the day; while you are in the bed, don't eat, read, talk on the phone, or watch TV and avoid thinking about the day after; have little light in your bedroom; control the factors that

cause noise and distract you; use comfortable bed, mattress, and pillows; 3- suggestions on daily activities: have an orderly schedule for doing all your daily activities like eating, meeting others, etc.; avoid stress and try to avoid situations that expose you to tension and anxiety; managing anxiety and depression is an important aspect of sleep health; avoid self-prescribing hypnotics; do daily exercises and activities (25, 26). Given the many side effects of hypnotics which are the first line in treating sleep disorders, other methods like supplementary medicine has been used. Acupressure is one of the most popular techniques for improving people's psychological and spiritual state and improving their quality of sleep. Different studies have confirmed the effect of acupressure on improving the quality of sleep and reducing insomnia. Acupressure is a safe, secure, fast, cheap, and nonaggressive technique that does not need special equipment and can be easily done by a nurse or even the patients themselves or their families at any time at any place (23). Insomnia and inadequate quality of sleep are among the factors closely related to pain and anxiety, and pain and anxiety are among the factors causing insomnia in patients (5, 27). Diabetic patients show some degrees of pain and anxiety for different reasons, including disease, regularly controlling blood sugar, and continual insulin injection, etc. It can be concluded that relieving pain and reducing anxiety is an important factor in improving the quality of sleep in diabetic patients.

References

- 1-Ghashghaie S, naziry G, Farnam R. THE EFFECTIVENESS OF MINDFULNESS-BASED COGNITIVE THERAPY ON QUALITY-OF-LIFE IN OUTPATIENTS WITH DIABETES. *ijdd*. 2014; 13 (4) :319-330.
2. Ebrahimi M, Guilan-Nejad TN, Pordanjani AF. Effect of yoga and aerobics exercise on sleep quality in women with Type 2 diabetes: a randomized controlled trial. *Sleep Science*. 2017;10(2):68-72.
- 3- Azimi, P Ghiasvand, R Feizi, A Hariri, M Abbasi, B. Effects of Cinnamon, Cardamom, Saffron, and Ginger Consumption on Markers of Glycemic Control, Lipid Profile, Oxidative Stress, and Inflammation in Type 2 Diabetes Patients. *The review of diabetic studies: RDS*.2013;11(3-4):258-266.
- 4- Zamzam S, Munira, Ahmadi F. Syrian women with diabetes psychosocial problems. *Journal of Diabetes and Metabolism*2011; 11 (1): 68-77.

5. Amiri z, Amiri z. Depression prediction model based on perception of disease and quality of sleep with mediating disaster pain in patients with diabetes. *Quarterly Journal of Diabetes Nursing*. 2016;4(2):48-58.
6. Kalkhoran J F , Shibak A. effect compound the aqueous extract of saffron on some indicators Hepatic oxidative stress in Diabetic male rats. *journal of life sciences sports*. 2013;5(4):1-19
- 7- Larejani B, Zahedi F. EPIDEMIOLOGY OF DIABETES MELLITUS IN IRAN. *ijdl*. 2001; 1 (1) :1-8
8. Behrouzifar S, Zenouzi S, Nezafati M, Esmaily H. Factors Affecting the Quality and Quantity of Sleep in Coronary Artery Bypass Graft Patients. *JSSU*. 2008; 16 (3) :321-321.
9. Dutil C, Chaput J-P. Inadequate sleep as a contributor to type 2 diabetes in children and adolescents. *Nutrition & Diabetes*. 2017;7(5).
10. ZAKERI front M. Shepherd m, Kazemnejad A. Ghadiani I. Comparison of factors affecting sleep by nurses and patients. *life magazine*. 2006;12(2):5-12
11. Jafarian S. R. Amiri, Z. A., F. Babaei principle, Sfydchyan A. Sleep quality and related factors in patients admitted in hospitals of Babol. *Hormozgan Medical Journal*. 2011;15(2):144-151.
12. Torabi M, Izadi A, Naderi far M, Shamsaei F. Sleep Quality and Quality of Life in Adults with Type 2 Diabetes. *J Diabetes Nurs*. 2014; 2 (1) :51-61.
13. Chasens ER, Sereika SM, Burke LE, Strollo PJ, Korytkowski M. Sleep, Health-Related Quality of Life and Functional Outcomes in Adults with Diabetes. *Applied nursing research :ANR*. 2014;27(4):237-241.
14. Hemmati z, Alidoosti M, Head of M. Sleep quality in patients with type 1 diabetes compared with non-diabetics. *Monitoring Journal*. 2012;11(6):863-867.
15. Wang, H Leng, J Li, W Wang, L Zhang, C Liu, H Chan, J Hu, G Yu, Z. Sleep duration and quality, and risk of gestational diabetes mellitus in pregnant Chinese women. *Diabetic Medicine journal*. 2016;1464-5491.
16. Jung, Stefanie Wollmer, M Axel Kruger, Tillmann HC. The Hamburg–Hannover Agitation Scale (H 2 A): Development and validation of a self-assessment tool for symptoms of agitation. *Journal of psychiatric research*. 2015;69:158-169.
17. Shamshirgaran SM, Ataei J, Malek A, Iranparvar-Alamdari M, Aminisani N. Quality of sleep and its determinants among people with type 2 diabetes mellitus in Northwest of Iran. *World Journal of Diabetes*. 2017;8(7):358-364.
18. Engeda J, Mezuk B, Ratliff S, Ning Y. Association between duration and quality of sleep and the risk of pre-diabetes: evidence from NHANES. *Diabetic medicine : a journal of the British Diabetic Association*. 2013;30(6):676-680.
19. Huang Y, Wang H, Li Y, Tao X, Sun J. Poor Sleep Quality Is Associated with Dawn Phenomenon and Impaired Circadian Clock Gene Expression in Subjects with Type 2 Diabetes Mellitus. *International Journal of Endocrinology*. 2017;1-8.
20. GhaneiR, RezaeiK, MahmoudiR. The Relationship between Preoperative Anxiety and Postoperative Pain after Cesarean Section. *The Iranian of obstetrics, Gynecology and infertility*. 2012;15(39):16-22.
21. Razvanfar M R, Kaveh V, Rafiei M, RezaeiAshtiani A, Talaei A. Investigating the relationship between restless leg syndrome and pre-sleep blood glucose levels in diabetic patients. *Journal of Diabetes and Metabolism of Iran*. 1390; 10 (5) : 514-519.
22. Farabi SS, Quinn L, Carley DW. Validity of Actigraphy in Measurement of Sleep in Young Adults With Type 1 Diabetes. *Journal of Clinical Sleep Medicine : JCSM : Official Publication of the American Academy of Sleep Medicine*. 2017;13(5):669-674.
23. Shahdadi H, Ahhahyari J, Mansouri A. Acupressure study on sleep quality in diabetic patients. *J Diabetes nurs*. 2017;5(2):78-85.
24. Sokwalla SMR, Joshi MD, Amayo EO, Acharya K, Mecha JO, Mutai KK. Quality of sleep and risk for obstructive sleep apnoea in ambulant individuals with type 2 diabetes mellitus at a tertiary referral hospital in Kenya: a cross-sectional, comparative study. *BMC Endocrine Disorders*. 2017;17:7.
25. Sousa A, Kalra S. Sleep hygiene and diabetes: Suggestions for primary care. *J Pak Med Assoc*. 2017;67(5):814-815.
26. Kumar S, Hari Kumar KVS. Sleep hygiene and diabetes. *J Pak Med Assoc* 2016; 66: 1665-8.

27. Dehghanmehr S, Shahdadi H, Mansouri A, Noor Aein S. Effect of Saffron Oral Capsules on Anxiety Level of Patients with Diabetes Mellitus. J Diabetes Nurs. 2017; 5 (1) :10-19.
28. RezaeeKhorasany, Hosseinzadeh A, Therapeutic effects of saffron (*Crocus sativus* L.) in digestive disorders: a review Iranian Journal of Basic Medical Sciences. 2016;19(5):455-469.

Access this Article in Online	
	Website: www.ijarbs.com
	Subject: Medical Sciences
Quick Response Code	
DOI: 10.22192/ijarbs.2017.04.11.014	

How to cite this article:

Sadegh Dehghanmehr, Saeideh Varasteh, Safooranooraen, Saeid Emami, Sina Mohammadi, Omolbanin Asrari. (2017). An Investigation of the Quality of Sleep in Diabetic Patients. Int. J. Adv. Res. Biol. Sci. 4(11): 112-117.

DOI: <http://dx.doi.org/10.22192/ijarbs.2017.04.11.014>