

# Association Of Sleep Quality with Dietary Diversity And BMI

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## Abstract

Adequate quality sleep is important for ideal health condition. The recommended hours of sleep are 7-9 hours for children, adolescents, adults and elderly to maintain good health. Recent developments in the field of technology have changed the habits and lifestyles of students which causes sleep disorders among students. Sleep quality of the people is affected by several factors such as gender, age, occupation, psychological state but recently it has been recognized that dietary diversity and BMI are also implicated in sleep quality of people. Dietary diversity is the variety or the number of different food group's people eats over the time given. Studies done in the past have indicated that sleep duration is associated positively with fruits and vegetables intake while the consumption of sweet and snack food items including junk food would lead to lesser sleep duration. Also, short sleep duration and poor sleep were associated with an increase in BMI and fat mass. Another study indicate that poor sleep quality predict obesity and high body fat mass among adults. Several studies have argued that excessive introduction of food, which leads to an increased risk of obesity in people with short term sleep, is associated with changes in hormones responsible for hunger and appetite control especially leptin and ghrelin. Adults and children that sleep less, have an increase in obesity and overweight risk with dysfunctional eating behaviors, decreased physical activity and metabolic changes. The review aims to see how the sleep quality is associated with BMI and dietary diversity in different age group people.

**Keywords:** Dietary diversity, sleep quality, BMI.

## Introduction

Dietary diversity has been universally identified as a key element of high-quality diets. Several studies have also shown that the overall nutritional quality of the diet is improved with diverse diet. Therefore, diversity in the diet is important to meet the requirements for energy and other essential nutrients especially for those who are in the risk of nutrition deficiencies.

According to a simple behavioral definition, sleep is a reversible behavioral state of perceptual disengagement from and unresponsiveness to the environment. It is also true that sleep is a complex amalgam of physiological and behavioral processes. Sleep is typically, but not necessarily, accompanied by postural recumbence, behavioral quiescence, closed eyes, and all the other indicators one commonly associates with sleeping. Adequate and quality sleep are both crucial to ideal health conditions. The recommended hours of sleep by the National Sleep Foundation are 7–9 hours for adults to maintain health.

Body Mass Index is a measurement of a person's weight with respect to his or her height. It is more of an indicator than a direct measurement of a person's total body fat. BMI correlates with total body fat. This means that as the BMI score increases, so does a person's total body fat. The WHO defines an adult who has a BMI between 25 and 29.9 as overweight, an adult who has a BMI of 30 or higher is considered obese and between 18.5 to 24.9 a healthy weight. **(Flegal K.M.et.al,2017)**

### **Importance of Quality Sleep**

Quality sleep, a deep sleep without interruption is necessary to keep us healthy and safe. Like nutrition and exercise, sleep is necessary for overall health. Poor sleep quality is marked by waking up during the night, inability to fall asleep, and tiredness during the day. Sleep quality differs from individual to individual. Sleep quality affects our both physical and mental health. Physically, poor sleep increases the risk of heart disease, high blood pressure and diabetes. Poor sleep also weakens immune system. A study found that men and women who slept less than seven hours were almost three times more likely to develop a cold than those who slept eight hours or more. Sleep is important for concentration, performance and productivity. It is typical for employees to make more mistakes on the job after a night of poor sleep. An estimated 90 percent of patients with depression complain about sleep quality and those who suffer from sleep disorders also typically complain about feelings of depression. **(Prather et.al,2015)**

### **Importance of Dietary Diversity**

Dietary diversity is defined as the variety and number of food groups consumed by the people over a given period of time. Dietary diversity and eating a variety of foods from each food group is crucial for supplying the individual with all the essential nutrients that the body needs, including carbohydrates, proteins, fats, vitamins, minerals and water, so that the body can function properly and generate energy, grow, repair damaged tissue, and regulate the body's biochemical reactions. It is generally recommended to avoid foods and beverages containing large amounts of calories, and are high in fat, sugar, or salt to reduce the risk of developing chronic diseases such as obesity, type 2 diabetes, heart disease, osteoporosis and cancer. It is also important to maintain dietary diversity because relying on one type of food will not be enough to sustain the body's nutritional needs. **(Mozaffair et. al, 2021)**

### **Association**

Diet quality indicator and sleep time span, are the two principal constituents of our lifestyle and both are individualistic factor of weight status and obesity. Diet quality indicator may differ from individual to individual according to the duration of sleep they take and in consequence both relate with obesity and worse sleep.

**RK Golley et al. 2008** found that people who sleep less had remarkably lower diet quality and higher value of Body Mass Index (BMI), waist circumference and abdominal adiposity in contrast to people who had longer sleep. Sleep limitation is connected with higher BMI. It was found that people with shorter sleep duration had remarkably higher consumption of energy and carbohydrate. It was found that sleep reduction is connected with less intake of protein, fiber, whole grains and beans. Short sleepers had higher energy intake which comes from mainly carbohydrates and have lower intake of dietary fiber such as whole grains and beans. These differences is the cause for high BMI value and waist circumference among people with short sleep because the reverse relationship between diets plentiful in

fruits, vegetables and whole grains which are classified as low glycemic index foods. Intake of healthy food is connected with good sleep status whereas increased consumption of refined or processed and free sugar rich food is connected with poor sleep status.

**Udeh C Mercy et al. 2022** found that people with short sleep duration had low intake of healthy ingredient like fruits, vegetables, greens and bean, whole grains, dairy protein and sea food whereas people with long sleep duration had high intake of unhealthy ingredients like refined grains, sugar, processed food as well as some healthy ingredients like dairy products and protein.

**Kristen L Knutson et al. 2005** find out whether sex differences in relation between less sleep duration and higher BMI exist in a sample and it was concluded that male adolescents who had longer sleep duration were having lower BMI and increased risk of overweight. The sex linked difference is due to the differences in the physiology puberty and sleep features.

**Kang et al. 2009** found that decreased sleep has been showed to forecast obesity in children and younger adults and it was concluded that in older men and women sleep duration are firmly correlated with greater adiposity.

**RK Golley et al. 2013** found that our behavior of sleep timing is associated with diet quality. Individual who proceed to bed late had poor diet quality and also had higher consumption of energy dense food and nutrient deficient foods. Individual who proceed to bed early consume more fruits and vegetables. Consumption of fat and fast foods leads to short sleep duration. The liking of late sleep was correlated with higher intake of junk food, low intake of dairy milk, and low consumption of fruits and vegetables. The study conducted by **Medic et al 2017** to investigate the whether sleep duration is a risk factor of overweight or obesity in early childhood and it was concluded that persistent short sleep duration during early childhood leads to the chance of developing overweight or obesity when compared with other children who sleep greater than 11 hour per night. This study firmly propose that sleeping less than 10 hour consistently through early childhood may develop the risk of overweight/obesity.

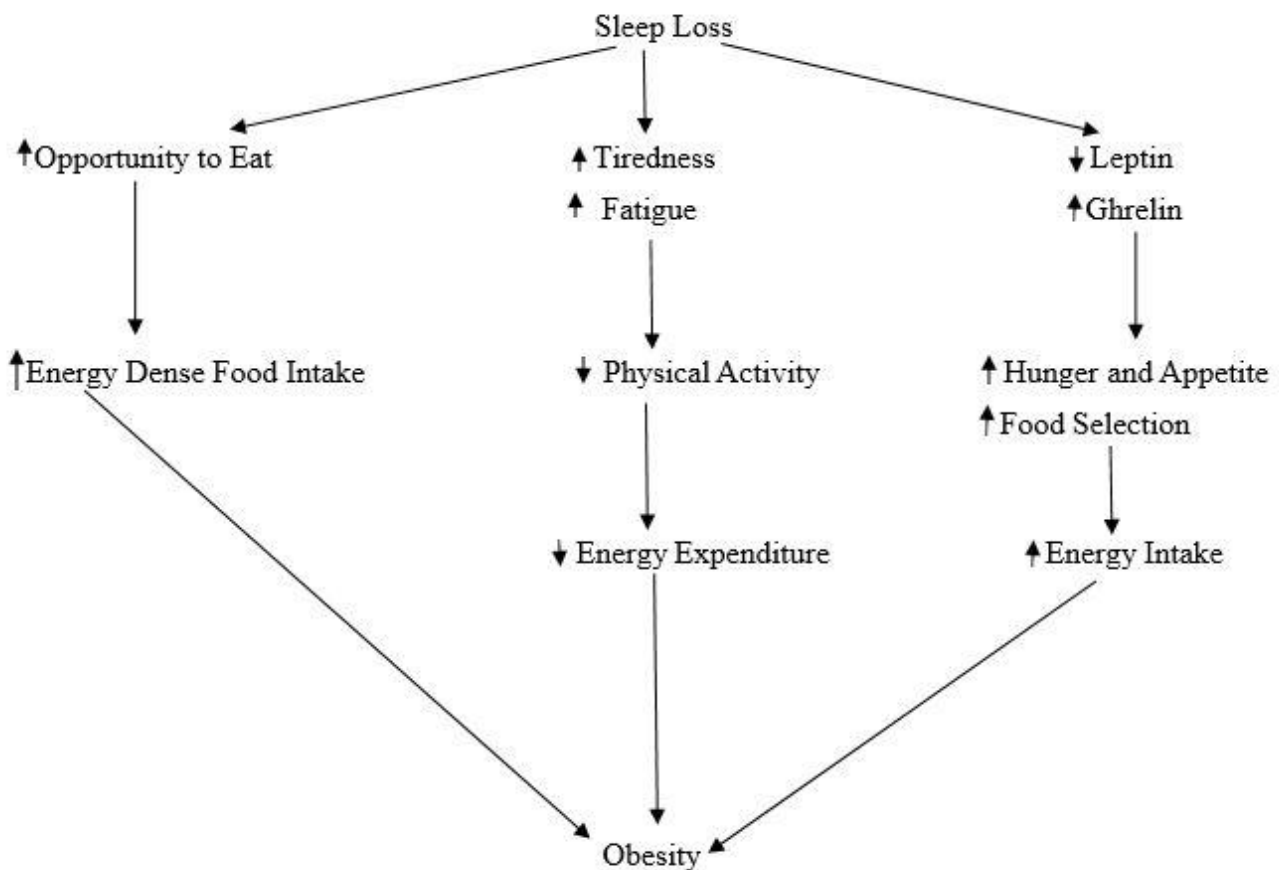
A study by **Spiegel et al. 2019** shows that sleep and weight are correlated with each other in youngsters. Their statistics indicate that this correlation vary according to the gender and grade level. The boys of middle school gives stronger correlation between sleep duration and weight as compared to boys of high school whereas girls of middle school shows inverse relationship between sleep duration and BMI, which means greater the body mass index, lower will be the sleep duration.

A cross section and prospective studies by **Simon et al. 2020** have establish a relationship between short sleep duration and increased risk of obesity and increased possibility of body fat and weight gain. The latest research shows a strong correlation between short sleep duration and high energy intake mainly from fats. Poor sleep quality is linked with dysregulation of metabolism.

A study conducted by **Kang et al 2009** to estimate the correlation between sleep timing and BMI and it has been found that individuals who sleep late consume greater amount of calories after 8:00 PM and less serving of vegetables and fruits. The strong detection from this study was that consumption of calorie after 8:00 PM is linked with BMI, sleep and duration. Hence it has been concluded that high calorie consumption in the evening time leads to increase in obesity risk.

**Mechanism showing Short Sleep Duration and Weight Gain**

Sleep Loss



**Conclusion**

People with less sleep tend to do more late-night snacking and high carbohydrate snacking is increased among them. People who sleep less eat larger portion of all foods which leads to weight gain. There is a evidence that people with less sleep have a risk of weight gain and obesity as compared to people who sleep eight hours a night. Low fiber diet and high saturated fat diet hamper our sleep quality by reducing the amount of deep sleep whereas high fiber diet including fruits, vegetables and whole grains improve our quality of sleep. B vitamin rich foods like fish, lean poultry and meat, legumes, eggs and dairy are need to be incorporated into the diet in order to improve the quality of sleep because B vitamin helps in the regulation of melatonin hormone. Melatonin is a hormone released by pineal gland and it releases high level melatonin during nighttime and low level during the day time. It is believed that we sleep better when we have the highest level of melatonin in our body.

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