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Evaluation of Sleep Quality and Healthy Eating Status in Individuals with Type 1 Diabetes

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ABSTRACT

Study Objectives: *To investigate the relationship between blood sugar regulation, sleep quality, and dietary habits among individuals with type 1 diabetes.*

Methods: *195 type 1 diabetic patients (110 women and 85 men) between the ages of 18 and 65 undergoing insulin treatment. Participant's blood sugar levels (HbA1c), sleep quality (measured by the Pittsburgh Sleep Quality Index - PSQI), and dietary habits (measured by the Healthy Eating Index) were assessed. Statistical analysis was conducted to examine the relationship between PSQI scores, HbA1c levels, and Healthy Eating Index scores.*

Results: *A significant association was found between sleep quality and blood sugar regulation, as indicated by HbA1c levels. Participants with HbA1c levels greater than 7% tended to have poorer sleep quality compared to those with lower HbA1c levels. Conversely, participants with HbA1c levels of ≤7% demonstrated significantly better dietary habits, as reflected by higher Healthy Eating Index scores.*

Conclusions: *The study suggests a strong correlation between blood sugar regulation, sleep quality, and dietary habits in individuals with type 1 diabetes. Maintaining optimal blood sugar management, promoting good sleep hygiene, and adhering to a healthy diet are essential for managing type 1 diabetes effectively. Strategies to improve sleep quality and dietary habits may contribute to better blood sugar control and overall well-being in individuals with type 1 diabetes.*

Brief Summary

Current Knowledge/Study Rationale: The study explores the relationship between blood sugar regulation, sleep quality, and diet in type 1 diabetic patients, aiming to understand how these factors influence metabolic health and overall well-being.

Study Impact: Findings indicate a significant association between sleep quality, dietary habits, and HbA1c levels in type 1 diabetic individuals. This underscores the importance of promoting good sleep hygiene and healthy eating patterns to improve blood sugar management and overall health outcomes in this population.

Keywords

Type 1 diabetes, Blood sugar regulation, Sleep quality, Dietary habits, HbA1c, Pittsburgh Sleep Quality Index (PSQI), Healthy Eating Index, Insulin treatment, Metabolic health.

Abbreviations

BMI: Body mass index, CNPP: Center for Nutrition Policy and Promotion, HPI: Health and Nutrition Index, HRQ (SYI-2015): Healthy Eating Index, MUFA: Mono Unsaturated Fatty Acids, PSQI: Pittsburgh Sleep Quality Index, PUFA: Poly Unsaturated Fatty Acids, SPSS: Statistical Package Program for Social Sciences, SFA: Saturated Fatty Acids, USDA: United States Department of Agriculture.

Introduction

Quality sleep is crucial for managing blood sugar levels in individuals with type 1 diabetes. Sufficient sleep aids insulin use, while insufficient sleep can lead to insulin resistance and unstable blood sugar. Good sleep also reduces anxiety and stress, indirectly improving blood sugar. Therefore, maintaining proper sleep hygiene, including consistent schedules and comfortable environments, is vital for diabetes care [1].

Studies show that high glucose levels are linked to sleep problems in type 1 diabetes, affecting overall health. Insufficient sleep raises inflammation and disrupts glucose metabolism, exacerbating insulin resistance [2]. Moreover, irregular glycemic control can disturb sleep, and nocturnal hypoglycemia poses risks for individuals with type 1 diabetes [3,4].

A balanced diet supports better sleep and blood sugar control [5]. Nutrient-dense foods aid insulin utilization and stabilize blood sugar levels overnight, improving sleep quality. Conversely, diets high in fat and simple carbohydrates can disrupt sleep [5,6]. Opting for balanced diets with varied nutrients enhances sleep quality.

Sleep significantly influences endocrine function and glucose metabolism. People with type 1 diabetes often experience poor sleep due to various factors, impacting glucose tolerance and insulin secretion. Studies link short sleep duration to impaired glucose regulation in both diabetic and healthy individuals [6,7].

Poor sleep quality is prevalent among those with type 1 diabetes, affecting sleep stages and contributing to hyperglycemia. Sleep apnea is common in this population, exacerbating glycemic fluctuations [3]. The reciprocal relationship between sleep and glucose management underscores the importance of addressing sleep issues in diabetes care [4]. A balanced diet is essential for overall health, providing necessary nutrients for bodily functions. Inadequate nutrition contributes to various health problems, emphasizing the importance of dietary diversity and appropriate nutrient intake. The Healthy Food Plate model promotes a well-rounded diet, emphasizing five food groups and considering individual factors like physical activity and health status. Excessive or unbalanced nutrition can lead to health complications, highlighting the need for informed dietary choices and proper cooking techniques [7,8].

Method

Working group

A total of 195 type 1 diabetic patients (110 women) who applied to the Gaziantep City Hospital Neurology Polyclinics voluntarily agreed to take part in thestudy were the subjects of this research. It was done on eighty-five guys. The following criteria were established for research participation: having a diagnosis of type 1 diabetes, being diagnosed before the age of sixty-five, being over the age of eighteen, receiving insulin treatment, and not having any communication obstacles. Those who use medications that could interfere with sleep, women who are pregnant or nursing, and people who have not had their HbA1c levels checked in the past month are the exclusion criteria from the study.

Data Collection Tools

A 19-item survey form was used to gather participant sociodemographic data, anthropometric data, nutritional habits, and diabetes-related features as part of the research methodology. Additionally, a 24-hour food consumption log was kept assessing the participants' levels of fiber and macronutrient consumption as well as their nutritional status. These statistics were used to generate the Healthy Eating Index. The duration, frequency, and quality of the individuals' nocturnal awakenings were assessed using the "Pittsburgh Sleep Quality Index (PSQI)".

Pittsburgh Sleep Quality Index (PSQI): The globally recognized Pittsburgh Sleep Quality Index (PSQI) was utilized to assess the participants' sleep quality. Develops this index(1989) Buysse et al. Ağargün et al. carried out the "validity and reliability" investigation in Turkey. The PSQI is the sleep assessment questionnaire with the broadest translation range and is one of the most widely used instruments in the assessment of sleep health and disorders.There are twenty-four questions in all, nineteen of which can be answered directly by the respondent and the remaining five of which need to be answered by their bed partner or roommate. Nevertheless, only the nineteen questions that are answered separately are scored. These questions are divided into seven categories, with a score range of 0 to 3 for each category.Subjective sleep quality, sleep latency (the amount of time it takes to fall asleep), length of sleep, habitual sleep efficiency, sleep disruptions, usage of sleeping drugs, and dysfunction throughout the day are all components of the PSQI. The PSQI score is the sum of these seven components' scores; a high score denotes inferior quality of sleep. A PSQI score of 0 to 21 indicates poor sleep quality, whereas a score of 5 or less indicates good sleep quality [9,10].

Healthy Eating Index (SYI-2015): The Healthy Eating Index-2015 was used to assess the quality of the diets of the participants (SYI-2015). The Health and Nutrition Index (HPI) isa dietary quality measurement tool that was created in partnership with the US Department of Agriculture (USDA) and the Center for Nutrition Policy and Promotion (CNPP). To assess the overall nutritional quality, SYI-2015 is a score system made up of numerous components that represent various nutritional characteristics. This index, which consists of thirteen components overall, assigns a score between 0 and 100 to each individual to indicate the quality of their diet. The following thirteen categories are included in this list: "legumes," "whole grains," "milk and dairy products," "total protein sources," "seafood," and "vegetable proteins." Other categories include "fatty acids," "refined grains," "sodium," "added sugar," and "saturated fat." Nutrients that should be ingested in sufficient amounts are represented by the first nine components, whereas nutrients that should be consumed in limited amounts are represented by the final four components. The added sugar category was introduced in the most recent update, bringing the total number of ingredients up to thirteen. The SYI scoring yields

the following scores: "A" for scores between 90 and 100, "B" for scoresbetween 80 and 89, "C" for scores between 70 and 79, "D" for scores between 60 and 69, and "F" for scores of fifty-nine and lower. Five categories are used to categorize diet quality [11,12].

Analysis Method

For statistical analysis, SPSS (Statistical Package Program for Social Sciences) version 27.0 was recommended. The study's recognized significance level was α=0.05. The data was analyzed using descriptive statistical techniques, including mean, standard deviation, minimumand maximum values for continuous variables. Presentations of frequency and percentage distributions are used in the analysis of categorical variables. The presence of a normal distribution was tested using the Shapiro-Wilk and Kolmogorov-Smirnov tests, and it was found that the data had a normal distribution. The independent samples t-test was employed inthis instance to compare the two groups. To look at the link between the data, a Pearson correlation analysis was done.

Findings

There were 195 participants in the study, 110 of whom were women (56.4%) and eighty- five of whom were men (43.6%) who had Type 1 diabetes. According to our data, 42.9% of the people with type 1 diabetes in our study are between the ages of 20 and 30; 21.4% are between the ages of 31 and 40; 19.8% are between the ages of 41 and 50; and 15.9% are older than fifty- one. When type 1 diabetics' educational backgrounds are examined, 11.7% of the participants have graduate degrees, 45.8% have university degrees, 22.4% have high school diplomas, 9.1% have secondary school diplomas, and 11% have elementary school diplomas. 69.2% of them were found to be married, and 30.8% to be single, when examined based on their marital status.

Male type 1 diabetes patients in this study had an average height of 179.21 ± 7.45 cm, an average body weight of 79.89 ± 14.13 kg, and an average body mass index (BMI) of 24.12 ± 3.67 kg/m². has been noted. The average height, body weight, and BMI of female participants with type 1 diabetes were found to be 162.58 ± 6.11 cm, 65.48 ± 9.29 kg, and 23.27 ± 4.04 kg/m², respectively. For female participants, the BMI ranged from 16.23 to 38.14 kg/m², whereas for male participants, it was between 20.85 and 36.20 kg/m².

While 59.4% of male type 1 diabetic patients had a HbA1c value more than 7%, female type 1 diabetic patients had a higher rate—62.7%.

It was shown that 46.2% of female type 1 diabetes patients and 22.9% of male type 1 diabetes patients did not have a family history of the disease. While neurological diseases accounted for 12.1% of non-diabetic health problems among male participants, other endocrine diseases accounted for 18.8% of such problems among female participants. Among the study participants with type 1 diabetes, 13.4% of women and 9.5% of men use an insulin pump.

There are no participants in categories A or B in our study. Eight percent fell into categoryC, 19.8% into category D, and 72.1% of our participants were in category F.

The greatest number of points that could be earned was used to assess the eating patterns of the participants in this study. Average fruit consumption is 2.83 ± 1.71, whole fruit consumption is 3.50 ± 2.09, total vegetable consumption is 4.13 ± 1.28, and consumption of dark green leafy vegetables and legumes is 2.37. ± 2.15, 2.79 ± 1.88 for whole grains, 4.62 ± 3.37 for dairy group, 1.70 ± 1.22 for total protein, consumption of seafood and vegetable protein sources (oilseeds 1.80 ± 1.55), fatty acid consumption (PUFA+MUFA/SFA), consumption of processed grains is 2.33 ± 2.59, sodium consumption is 4.59 ± 3 points, and added sugar consumption is 9.79 ± 1.48 points. The participants' average SYI-2015 (Table 1) score was found to be 58.43 ± 8.15. These findings make it possible to assess each person's nutritional quality according to a number ofvaried factors.

"Good sleep quality" is reported by 38% of male and 40% of female type 1 diabetics (Table 2).

Table 1: Individuals' Findings Regarding SYI-2015 Component Scores.

HEI-2015 components	Maximum scores	Standard for maximum score	Standard for minimum score
Total fruits	5	≥0.8 cup	No Fruits
Whole fruits	5	≥0.4 cup	No Whole Fruits
Total vegetables	5	≥1.1 cup	No Vegetables
Greens and beans	5	≥0.2 cup	No Greens and Beans
Whole grains	10	≥1.5 oz	No Whole Grains
Dairy	10	≥1.3 cup	No Dairy
Total Protein Food	5	≥2.5 oz	No Protein Foods
Seafood and Plant Proteins	5	≥0.8 cup	No Seafood and Protein food
Fatty Acids	10	(PUFAs + MUFAs)/SFAs ≥ 2.5	(PUFAs + MUFAs)/SFAs ≤ 1.2
Refined Grains	10	≤1.8 oz	≥4.3 oz
Sodium	10	≤1.1 g	≥2.0 g
Added sugars	10	<6.5% of energy	≥26% of energy
Saturated fats	10	<8% of energy	≥16% of energy

The mean PSQI score for the male participant was 6.56±3.11, while the female participant's score was 5.64±2.19. Gender differences were found to be substantial; men have "poor sleep quality" and a significantly higher PSQI score (Table 2).

Table 2: " Individuals' *Findings Regarding PSQI Scores and Subcomponent Scores".*

PSQI Scores	Male (n=85)		Female (n=110)		Total		p
	Cover. ± SD	Min-max	Cover. ± SD	Min-max	Cover. ± SD	Min-max	
"Subjective SleepQuality Score"	1.92 ± 0.87	0-3	0.89 ± 0.56	0-3	1.08 ± 0.88	0-3	0.000*
"Sleep LatencyScore"	1.19 ± 0.65	0-3	1.06 ± 0.88	0-3	1.01 ± 0.91	0-3	0.023*
"Sleep Time Score"	1.11 ± 0.74	0-3	0.64 ± 0.89	0-3	0.66 ± 0.87	0-3	0.000*
"Usual Sleep Efficiency Score"	0.65 ± 0.55	0-3	0.45 ± 0.82	0-3	0.42 ± 0.82	0-3	0.000*
"Sleep DisorderScore"	1.39 ± 0.71	0-3	1.34 ± 0.75	0-3	1.33 ± 0.60	0-3	0.372
"Sleeping PillScore"	0.30 ± 0.69	0-3	0.10 ± 0.43	0-2	0.14 ± 0.52	0-3	0.000*
"Daytime Dysfunction Score"	0.99 ± 0.84	0-3	1.01 ± 0.77	0-3	1.08 ± 0.88	0-3	0.289
"Total PSQI Score"	6.56 ± 3.01	0-16	5.64 ± 2.19	1-16	5.74 ± 3.08	0-16	0.000*
"Good Sleep Quality" (<5)	32	38.0	44	40.0	76	39.0	0.000*
"Poor Sleep Quality(≥5)"	53	62.0	66	60.0	119	61.0	0.000*

p<0,0

The category of "good sleep quality" was much higher scored by females.

Sixty-two percent of males and sixty percent of females with type 1 diabetes report having "poor sleep quality". Gender differences were found to be considerable, with men havingsignificantly greater rates of "poor sleep quality"(Table 2).

The scores for daytime dysfunction and sleep disorders did not differ significantly (p>0.05). The mean score for "subjective sleep quality" among women was found to be 0.89 ± 0.56,while the mean score for males was found to be 1.92 ± 0.87, with a significant difference for themale gender (Table 2).

For men, the habitual "sleep efficiency" score is 0.65 ± 0.74, while the "sleep latency" score is 1.19 ± 0.65) for men and 1.06 ± 0.88) for women. Additionally, the "sleep duration" scoreis considerably higher in men (1.11 ± 0.74) than in women (0.64 ± 0.89). 55), with a notably greater value in men (0.45 ± 0.82) than in women. The "sleep disorder" score was found to be 1.39 ± 0.71 for men and 1.34 ± 0.75 for women, with no discernible difference between the two groups (Table 2).

Men's "sleeping pill" scores were (0.30 ± 0.69), but women's scores (0.10 ± 0.43) were noticeably higher. The findings of "daytime dysfunction" showed no significant difference between men and women, with 0.99 ± 0.84 for men and 1.01 ± 0.77 for women (Table 2).

Table 3 presents the results of our study comparing the PSQI scores of people with type 1 diabetes based on HbA1c values. 42.1% of people with type 1 diabetes had a HbA1c score ≤7%, compared to 57.9% who reported having good sleep quality. Thirty-seven percent of type1 diabetics with poor sleep quality had a HbA1c value ≤ 7%, compared to 63.0% who had a value > 7%. Regarding PSQI scores and HbA1c groups, a significant difference was seen (p>0.05). People who had trouble sleeping had a HbA1c value higher than 7% (Table 3).

Table 3: Comparison of Individuals' "PSQI Scores" According to their " HbA1c Values ".

	PSQI Sleep Quality				p
	Good Sleep Quality		Poor Sleep Quality		
	n	%	n	%	
HbA1c ≤ 7%	32	42.1	44	37.0	0.000*
HbA1c > 7%	44	57.9	75	63.0	

The HRQI score varies significantly amongst the HbA1c groups. HbA1c values ≤7% in personshave been found to be significantly elevated. In the study, those with a healthy eating status andgood sleep quality had a HbA1c value of ≤7%. People with poor sleep quality have been foundto have a HbA1c value greater than 7%. The same SYI score with significantly reduced time values has been released (Table 4).

Table 4: Comparison of SYİ-2015 scores with HbA1c groups.

Variables	Groups	n	Average	Standard Deflection	t	p
HbA1c	≤7%	76	59.76	7.28	4,962	0.000*
	>7%	119	48.51	8.94		

*p<0.01

When it comes to SYI scores, PSQI groups significantly differ between people withtype 1 diabetes. People who had high-quality sleep had considerably higher SYI scores (Table 5).

Table 5: Comparison of individuals' healthy eating index scores with PSQI sleep quality.

	PSQI Sleep Quality				p
	Good Sleep Quality		Poor Sleep Quality		
	Cover. ± Sd	Min-max	Cover. ± Sd	Min-max	
SYI Score	55.89 ± 5.23	48-67	47.48 ± 9.16	40-53	0.013*

*p<0.01

For statistical analysis, SPSS (Statistical Package Program for Social Sciences) version 27.0 was recommended. The study's recognized significance level was α=0.05. The data was analyzed

using descriptive statistical techniques, including mean, standard deviation, minimumand maximum values for continuous variables. Presentations of frequency and percentage distributions are used in the analysis of categorical variables. The presence of a normal distribution was tested using the Shapiro-Wilk and Kolmogorov-Smirnov tests, and it was found that the data had a normal distribution. The independent samples t-test was employed inthis instance to compare the two groups. To look at the link between the data, a Pearson correlation analysis was done.

Discussion and Conclusion

The purpose of this study is to assess the relationship between healthy eating and sleep quality in people with type 1 diabetes. 195 Type 1 diabetes patients (110 women and eighty-five men) between the ages of 18 and 65 who were getting insulin treatment were the subjects of the study. A thorough assessment was conducted on the individuals' eating patterns, glycemic management, and sleep quality.

People with Type 1 diabetes can control their blood sugar by using strategies like glucose monitoring, modifying their carbohydrate intake, engaging in regular physical activity, receiving diabetes education, and using insulin. Most people with type 1 diabetes have trouble maintaining their blood sugar on a daily basis, and this is most noticeable in adolescence. The HbA1c test has been shown to be the most accurate way to measure glycemic control [12]. Studies show that adolescents and adults with Type 1 diabetes have substantial physiological and behavioral changes as a result of sleep length and quality, which can have a direct effect on glucose management [12,13]. Whether or not length and quality of sleep have a significant role in managing diabetes remains to be determined. On the other hand, methods to lessen sleep disturbances could aid in better diabetes management if it is discovered that these problems have an effect on controlling diabetes. Patients with diabetes need the same macro- and micronutrients, as well as energy, as people without the disease. According to the Diabetes Dietetic Association's "Evidence-Based Nutrition Therapy Guide in the Prevention and Treatment of Diabetes" [14], diabetic patients should consume at least 130 grams of carbohydrates per day, as they account for 45– 60% of daily energy. Proteins and fats should make up the remaining 20–35% of daily energy intake. It was discovered that these suggestions were in line with the standard intake ranges established by the TÜBER-2015 Guide [15]. According to the American Diabetes Association [16], it is more effective to set specific targets for diabetic individuals rather than imposing a preset carbohydrate consumption. It is advised that goods with added sugar be consumed in moderation and that sources of carbohydrates, such as fruits, vegetables, whole grains, legumes, and dairy products, have a high nutritional value. The research participants with type 1 diabetes consumed an average of 126.1 ± 43.1 grams of carbs per day, and the percentage of daily energy derived from carbohydrates was determined to be 39.1 ± 10%. These rates do not meet the specified requirements. Diets in which 26-40% of total energy comes from carbs are considered low-carbohydrate diets, while the exact definition of this term is unclear [13]. The usefulness of low-carb diets for people with type 1 diabetes is still up for question [14]. The average fruit consumption score of the participants was found to be 2.83 ± 1.71, and the average "whole fruit" consumption score was found to be 3.50 ± 2.09, taking into account the maximum values evaluated within the parameters of our study. Moreover, the average score for the intake of "legumes" and "dark green leafy vegetables" was 2.37 ± 2.15, while the average score for the consumption of "total vegetables" was 4.13 ± 1.28. The group consumption of "dairy products" had an average score of 4.62 ± 3.37, whereas the group consumption of "whole grain" was 2.79 ± 1.88 on average. The average consumption score for "seafood" and "vegetable protein sources (oilseeds)" was 1.80 ± 1.55, whereas the average score for overall protein consumption was 1.70 ± 1.22. The average score for processed grain consumption was 2.33 ± 2.59, and the average score for the fatty acids' ratio (PUFA+MUFA/SFA) was 1.64 ± 2.18. The average score for added sugar consumption was 9.79 ± 1.48 and for sodium consumption it was 4.59 ± 3.17. 2.24 ± 2.08 was the average score for "saturated fat" consumption. These results offer a thorough examination of people's eating patterns and preferences for different food groups. The final SYI-2015 score was (58.43 ± 8.15). It is well known that eating a lot of protein can raise blood sugar levels and insulin needs after meals. Furthermore, it has been suggested that an increase in protein intake may have an impact on hormones such ghrelin, cortisol, growth hormone, and IGF-1, which could lead to an increase in the need for insulin [16]. According to our study, the average protein intake of people with type 1 diabetes is 71.9 ± 25.1 grams, and proteins account for 22 ± 5.1% of daily energy intake. It was shown that, on average, our participants' daily calorie intake from protein was higher than the advised range of 10–20%. This implies that there was a tendency among our participants to consume more protein than is advised. When the dietary preferences of the participants in our study were analyzed, it was found that they tended to favor foods high in protein. Those who with type 1 diabetes frequently believe that protein does not raise blood sugar levels; therefore, diets high in protein are favored.

The literature has reported that biological elements such circadian rhythm, sleep cycles, and gender-specific hormone production are linked to the impact of gender on sleep quality [17]. In this regard, 53.2% of participants in a study involving persons aged 20 to 65 reported having poor-quality sleep; the corresponding rate for males was 55.2%, and for women it was 51.5%. According to a study, [18] these findings indicated that there was no statistically significant difference between gender and sleep quality.

Sleep is an essential component of health maintenance, and experts have long been interested in how sleep affects diabetes in particular. The pathophysiology of type 2 diabetes is recognized to be influenced by sleep disturbances or low-quality sleep; however the pathophysiology of type 1 diabetes is not well understood. Thirty-seven percent of the individuals in our study reported having good sleep quality, while 67% reported having poor sleep quality. Nonetheless, new research suggests that sleep plays a

significant role in the regulation of type 1 diabetes's metabolism. It was highlighted in a meta-analysis by a study that there may be a reciprocal association between type 1 diabetes and poor sleep quality, and that this relationship is considerable and complex. It is believed that optimizing sleep may improve glycemic management, although further studies are required to confirm this theory. One study [19], found no significant correlation between individual sleep characteristics and poor sleep quality or impaired glycemic control in a research on people with type 1 diabetes. Two study research [20,21], that did not find a significant correlation between sleep and other biochemical indicators and HbA1c readings in people with type 1 diabetes. We found no correlation between glycemic control and PSQI scores that was statistically significant. A multidisciplinary approach is necessary for the management of type 1 diabetes, because glycemic control is dependent on numerous factors. Glycemic control may be determined by variables including the various problems that each person has, self-management awareness, having thorough diabetes education, and using the appropriate medication. Both glycemic control and sleep quality may be impacted by numerous factors that our study did not look at. On the other hand, 93% of patients with a HbA1c value.

The SYI-2015 scale was utilized in this study to assess the dietary quality of persons diagnosed with type 1 diabetes. The results showed that the participants' average SYI-2015 score was 54.135 (standard deviation ± 9.90). Based on these findings, the bulk of our participants (91.9%) fell into the D (60-69 points) and F (59-0 points) score categories, while none of them fell into the two highest categories, A (90-100 points) and B (80-89 points). Category C (70–79 points) comprised only 8.1% of the total. It can be observed that SPI scores differ when other studies in the literature that focus on related issues are looked at. For instance, the average HRQ score was 50.5 (± 10.2) in a study on type 1 diabetes the average HRQ score was reported as 69.75 (± 9.66)13.

Both of these studies and ours came to the conclusion that most participants' diets needed to be improved since they were far from being of high quality. The use of several SYI- 2015 scale iterations or the variation in the sociodemographic traits of the participants could be the cause of these variations between studies. According to literature, newer revisions have included things like a new system of classification for legumes and a separate assessment of added sugar and saturated fat—both of which are empty energy sources. Furthermore, it is believed that a person's sociodemographic traits influence the quality of their nutrition. It was noted in two different research [19,20]; that people with lower education levels had worse diets and slept less well. These results imply that sociodemographic variables might significantly affect the quality of a diet.

Thus, it would appear that eating a sufficient and well-balanced diet is crucial for people with type 1 diabetes. Dietitians can support and prevent these people, who often resort to low- carb diets, by educating them about nutrition. Additionally, it is well recognized that either sleep disturbances or poorly managed diabetes can have an impact on glycemic control. Our research highlights the significance of both the quantity and quality of sleep for those with type 1 diabetes. For this reason, it is highly advised that people with type 1 diabetes get 7-8 hours of sleep per night in addition to proper diet and insulin administration.

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