
Association Between Consumption of Halal-Certified Food Groups and Sleep Quality Among Adult Filipino Muslims: An Analytical Cross-Sectional Study

Lalaine P. Bagtas, RPh¹, Potre Samsiah A. Azis, RMT¹, Frances Geri D. Baaco, RMT¹, Beatrice Anne D. Babasoro¹, Dave Michael L. Baccay¹, Eunice Julian G. Bagay¹, Gian Carlo R. Banatao¹, Vinzon Linus M. Bantilan, RMT, MLS(ASCPi)CM¹, Franz Aljounf A. Batol, RMT¹, Bianca Denise R. Bautista¹, Jam Cailah B. Bauzon, RPh¹, Isabella Marie N. Belleza¹, Aila Edzmier A. Diansuy-De Torres, LPT, MD, MMHoA¹, April Fatima J. Hernandez, MD²

Abstract

Background Diet is an important modifiable factor that may influence sleep quality, with several foods, nutrients, and dietary patterns reported to affect sleep-related outcomes. However, evidence regarding the relationship between Halal dietary practices and sleep quality remains limited. This study aimed to determine the association between the frequency of consumption of Halal-certified food groups and sleep quality among adult Filipino Muslims.

Methods An analytical cross-sectional study was conducted among 323 adult Filipino Muslim members of the Greenhills Muslim Traders Association in San Juan City, Philippines. Participants were selected using purposive sampling based on predefined inclusion and exclusion criteria. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), while dietary intake was measured using a structured questionnaire on the frequency of consumption of Halal-certified food groups. Descriptive statistics were used to summarize participant characteristics, dietary patterns, and sleep quality. Multivariable logistic regression analysis was performed to determine the association between Halal-certified food group consumption and sleep quality.

Results Halal-certified grain products were the most frequently consumed food group (mean = 2.39), while Halal-certified combination foods were the least frequently consumed (mean = 1.21). The mean global PSQI score was 4.62, indicating generally good sleep quality, and 67.8% of participants were classified as good sleepers (PSQI ≤ 5). Sleep efficiency had the highest mean component score (1.16), whereas subjective sleep quality had the lowest (0.00). Multivariable logistic regression showed no significant association between the frequency of consumption of most Halal-certified food groups and sleep quality ($p > 0.05$). However, more frequent consumption of Halal-certified combination foods was significantly associated with lower odds of good sleep quality (OR = 0.697, 95% CI: 0.529–0.919, $p = 0.010$).

Conclusion The frequency of consumption of most Halal-certified food groups was not significantly associated with sleep quality among adult Filipino Muslims. However, increased consumption of Halal-certified combination foods was associated with lower odds of good sleep quality. Further studies should explore other dietary and behavioral factors that may influence sleep outcomes.

Key words: Halal diet, sleep quality, Pittsburgh Sleep Quality Index, Filipino Muslims, dietary patterns.

Correspondence: Aila Edzmier A. Diansuy-De Torres, LPT, MD, MMHoA; aadiansuy@uerm.edu.ph

¹Department of Preventive and Community Medicine, University of the East Ramon Magsaysay Medical Center, Quezon City, Philippines

²Department of Psychiatry, University of the East Ramon Magsaysay Medical Center, Quezon City, Philippines

Sleep is an important physiological activity required for the restoration of physical systems, facilitating brain repair and recovery, and improving general memory and learning.¹ An insufficient sleep has been associated with multiple physical and mental health risks which have resulted in weakened immunity and impaired cognitive performance.² This highlights the need to identify the modifiable lifestyle factors that may influence in improving sleep quality and duration with diet as the emerging key component of sleep regulation.³⁻⁴ Covering this context, religion and culture also impact dietary preferences and consequently, indirectly contribute to health outcomes especially sleep.⁵⁻⁶ In Islam, Halal certification is implemented to ensure that the food being consumed by the community both adheres to their religious requirements and to the principles of cleanliness, hygiene, and animal welfare.⁷⁻⁸

The Philippines is reported to have one of the highest rates of sleep deprivation in Asia. According to studies, Filipinos sleep with an average of only 6.30 to 6.45 hours per night.¹⁻² Tryptophan, an essential amino acid, is a precursor of melatonin and serotonin, both of which are regulators of the sleep-wake cycle.³ A study has proposed that Halal meat, containing higher levels of amino acids (E.g., Histidine, tyrosine, tryptophan), compared to non-Halal meat may improve sleep regulation.⁹ In spite of this, there is no current research that has looked into the relationship between the Halal-certified food groups and sleep quality among adult Filipino Muslims. The Philippines, being a multicultural nation, includes a significant Muslim community that consistently practices a Halal diet. This population comprises one of the largest communities in the Philippines. This study holds incredible value as this community has 6.98 million members nationwide and 173,346 members in Metro Manila alone.¹⁰ Despite these statistics, there are still no studies evaluating the implications of consumption of Halal food with regards to sleep quality of adult Filipino Muslims, whether favorable or unfavorable. The data regarding sleep quality among Filipinos are merely focused on general dietary practices and non-communicable disease, rarely touching on Halal dietary practices. Thus, a critical gap remains in understanding how the Halal diet interacts with cultural and environmental influences on sleep.

This study aimed to determine the association between the consumption of Halal-certified food groups and sleep quality among adult Filipino Muslim members of the Greenhills Muslim Traders Association in San Juan City from June to July 2025. Specifically, it sought to describe participants' demographic characteristics, dietary consumption patterns, and sleep quality, and to assess the association between Halal-certified food group consumption and sleep quality.

Methods

The study was conducted after receiving ethics committee approval from the University's Ethics Review Committee (Code 1825/C/2025/006). An analytical cross-sectional study design was done to explore the relationship between dietary patterns and sleep quality among adult Filipino Muslim members of the Greenhills Muslim Traders Association. A structured questionnaire collected information on the frequency and type of Halal-certified food groups consumed, together with the PSQI to assess sleep quality.

A sample size of 322 respondents was calculated from an estimated population of 2,000 members of the Greenhills Muslim Traders Association. Participants were required to have adhered to a strict Halal-certified diet for at least one month prior to participation to allow sufficient time for potential dietary effects on sleep quality to manifest.¹⁶ Participants were included regardless of comorbidities and were required to have a basic understanding of English.

Lactating mothers were excluded because physiological and caregiving factors may affect sleep quality and duration.¹² Individuals working night shifts and those taking sleep supplements, such as melatonin, were also excluded because these factors may alter sleep patterns and circadian rhythms, potentially confounding the assessment of sleep quality.¹³⁻¹⁵

The study site was selected based on its accessibility and the high concentration of Muslim traders who actively adhere to a Halal diet.

Data were collected using a structured questionnaire consisting of demographic characteristics, Halal-certified food consumption adapted from a previous study,¹¹ and sleep quality assessed using the Pittsburgh

Sleep Quality Index (PSQI), a validated instrument with scores >5 indicating poor sleep quality.

Descriptive statistics were used to summarize the data. Demographic characteristics, including age, sex, educational attainment, occupation, and monthly income, were presented as frequencies and percentages. The consumption of Halal-certified food groups and PSQI domain scores were summarized using means and standard deviations. Participants were classified as having good sleep quality (PSQI ≤ 5) or poor sleep quality (PSQI >5), and frequencies and percentages were reported for each category. Data were analyzed using SPSS® version 22. Multivariable logistic regression was performed to assess the association between the consumption of Halal-certified food groups and sleep quality. Statistical significance was set at $p < 0.05$, with 95% confidence intervals reported for all estimates.

Results

A total of 323 participants were screened and found eligible for inclusion in the study. Table 1 presents the demographic characteristics of the respondents. Nearly half of the participants were aged 20–29 years (47.06%), whereas 11.76% were aged 50–59 years. Most participants were female (77.40%), with 1.55% preferring not to disclose their sex. Regarding educational attainment, 40.56% had reached the college level, while 1.24% had vocational education. The majority were employed (75.54%), and only 0.62% were retired. In terms of monthly income, 47.37% reported earning less than PhP 40,000 per month, whereas 9.29% reported earnings between PhP 60,000 and PhP 99,999.

Table 2 presents the mean frequency of Halal-certified food consumption among the respondents. The overall mean score of 1.80 indicates that Halal-certified foods were generally consumed 3–4 times per week. Grain products had the highest mean score (2.39), corresponding to consumption more than 5 times per week. Vegetables and fruits (1.94), meats and alternatives (2.07), and other foods (1.76) were consumed 3–4 times weekly, whereas milk products (1.44) and combination foods (1.21) were consumed less frequently, averaging 1–2 times per week.

Table 3 presents the PSQI scores and sleep quality classification of the respondents. The mean global PSQI score was 4.62 out of a possible 21, indicating

generally good sleep quality among respondents. Among the seven PSQI components, sleep efficiency had the highest mean score (1.16), indicating the poorest aspect of sleep, whereas subjective sleep quality had the lowest mean score (0.00), indicating the best aspect. Overall, 67.8% ($n = 219$) of respondents were classified as having good sleep quality (PSQI ≤ 5).

In Table 4, a multivariate logistic regression was conducted to determine the association between the frequency of consumption of Halal-certified food groups and sleep quality. Among the different Halal-certified food groups, only Halal-certified combination foods were significantly associated with sleep quality (OR = 0.697, 95% CI: 0.529–0.919, $p = 0.010$). An odds ratio below 1 suggests that increased consumption of Halal-certified combination foods was associated with reduced odds of having good sleep quality, indicating a greater likelihood of poor sleep quality among participants who consumed these foods more frequently. No statistically significant associations were observed for the other Halal-certified food groups ($p > 0.05$).

Discussion

The demographic profile indicated a predominantly young, female, college-educated, and employed sample within the lower to middle-income brackets. The predominance of females may reflect the active participation of Muslim women in trading and other self-employment activities.^{17–22}

The consumption patterns of Halal-certified food groups observed in this study are consistent with previous findings highlighting the influence of religious beliefs, health consciousness, and product accessibility on Halal food practices.^{23–24} The regular consumption of Halal-certified foods among respondents also reflects the strong preference of Muslim consumers for Halal products.²⁵ Grain products were the most frequently consumed food group, which may be attributed to the central role of rice and meat in the Filipino diet. In predominantly Muslim areas of the Philippines, increasing demand for Halal products has been associated with higher prices for Halal-compliant meat, yet Filipino Muslims remain willing to pay a premium for these products.²⁶ Lower consumption of milk products and combination foods may be related to the limited availability of Halal-certified specialty products and establishments

Table 1. Sociodemographic characteristics of adult Filipino Muslims in the Greenhills Muslim Traders Association.

		Frequency	Percent
Age	20 to 29	152	47.06
	30 to 39	79	24.46
	40 to 49	54	16.72
	50 to 59	38	11.76
	Total	323	100.00
Sex	Male	68	21.05
	Female	250	77.40
	Prefer not to say	5	1.55
	Total	323	100.00
Education	Elementary	17	5.26
	High School	102	31.58
	College	131	40.56
	Bachelor	46	14.24
	Graduate	21	6.50
	Vocational	4	1.24
	No response	2	0.62
	Total	323	100.00
Occupation	Retired	2	0.62
	Student	18	5.57
	Unemployed	58	17.96
	Employed	244	75.54
	Others	1	0.31
	Total	323	100.00
Income	<40,000	153	47.37
	40,000 to 59,999	34	10.53
	60,000 to 99,999	30	9.29
	100,00 to 249,999	47	14.55
	>250,000	56	17.34
	No response	3	0.93
	Total	323	100.00

Table 2. Halal-certified food groups consumed by adult Filipino Muslims in the Greenhills Muslim Traders Association

	Mean	SD	Interpretation
Grain Products	2.39	0.85	5 times a week
Vegetable and Fruit	1.94	0.96	3 to 4 times a week
Milk and Milk Products	1.44	1.01	1 to 2 times a week
Meat and Alternatives	2.07	0.90	3 to 4 times a week
Other Foods	1.76	1.05	3 to 4 times a week
Combination Food	1.21	1.00	1 to 2 times a week
Overall mean	1.80		3 to 4 times a week

Table 3. Pittsburgh Sleep Quality Index (PSQI) results.

	Mean	SD	Rank
Subjective sleep quality	0.71	0.70	4
Sleep disturbance	1.13	0.87	2
Sleep latency	0.72	0.88	3
Daytime dysfunction	0.20	0.63	6
Sleep efficiency	1.16	0.60	1
Overall sleep quality	0.00	0.00	7
Sleep medication use	0.71	0.77	5
Actual Score	4.62	2.63	
	Frequency	Percent	
Good sleep	219	67.80	
Poor sleep	104	32.20	

Table 4. Association of Halal-certified food consumptions and their quality of sleep.

	BC	Odds Ratio	95% CI		p value
			LL	UL	
Grain Products	0.185	1.20	0.89	1.62	0.225
Vegetables and Fruits	-0.015	0.99	0.74	1.31	0.915
Milk and Milk Products	0.240	1.27	0.97	1.68	0.088
Meat and Alternatives	-0.080	0.92	0.67	1.27	0.620
Other certified Foods	-0.196	0.822	0.622	1.09	0.169
Combination Foods	-0.360	0.697	0.529	0.92	0.010

BC = Beta Coefficient; LL = lower limit; UL = upper limit;

in the country.²⁶⁻²⁷ Overall, these findings suggest that cultural, economic, and accessibility factors influence Halal food consumption among Filipino Muslims in the Philippines.

Pittsburgh Sleep Quality Index (PSQI) Results

The PSQI findings suggest generally good sleep quality among the respondents, as reflected by the mean global PSQI score of 4.62, which is below the cutoff score of 5. Furthermore, 67.8% of participants

were classified as good sleepers. Although respondents reported favorable overall sleep quality and minimal daytime dysfunction, higher scores in sleep efficiency, sleep disturbance, and sleep latency indicate difficulties in maintaining efficient and uninterrupted sleep. These findings suggest that while participants generally perceived their sleep positively, specific aspects of sleep may still warrant attention.²⁸

The generally good sleep quality observed among respondents may be partly explained by factors beyond diet. Previous studies have shown that subjective

health is an important determinant of sleep quality, with better perceived health being associated with more favorable sleep outcomes.²⁹ Although religious beliefs and practices were not directly assessed in this study, previous research has suggested that they may be associated with better sleep quality through their potential effects on psychological well-being and relaxation.⁶ Additionally, the predominance of employed participants in this study may have influenced the findings, as employment has been associated with fewer sleep disturbances and complaints, possibly due to more structured daily routines and regular engagement in work-related activities.^{30,31}

Diet is one of the factors known to influence sleep quality. A recent study reported that vegetarians had lower PSQI scores than non-vegetarians, indicating better overall sleep quality, which was attributed to higher serotonin levels among vegetarians.³² While the present study likewise found generally good sleep quality among respondents, direct comparisons should be interpreted with caution because a Halal diet differs substantially from a vegetarian diet in both composition and dietary principles. Nevertheless, the findings support the broader concept that dietary patterns may be associated with sleep quality and warrant further investigation among populations adhering to a Halal diet.

Association of the frequency of Halal-certified food consumption and their quality of sleep

No significant association was observed between the consumption of Halal-certified grain products and sleep quality. Although the direction of the association suggested a tendency toward better sleep quality with more frequent grain consumption, the relationship was not statistically significant. This finding may reflect the dietary habits of Filipinos, who commonly consume processed grains rather than whole grains, the latter of which have been associated with better health outcomes and improved sleep quality.³³⁻³⁴ Moreover, no previous studies have specifically examined the relationship between the consumption of Halal-certified grain products and sleep quality, limiting direct comparison with the present findings.

No significant association was observed between the consumption of Halal-certified vegetables and fruits and sleep quality. Although fruits and vegetables

are generally associated with positive health outcomes, the present findings suggest that frequency of consumption alone may not influence sleep quality. Previous studies have reported higher fruit and vegetable intake among individuals with both short and long sleep durations, while improvements in sleep have been associated more with meeting recommended intake levels than with consumption frequency.³⁵⁻³⁶ To the best of the researchers' knowledge, no previous studies have specifically examined the association between the frequency of consumption of Halal-certified vegetables and fruits and sleep quality, limiting direct comparison with the present findings.

No significant association was observed between the consumption of Halal-certified milk and milk products and sleep quality. Although milk contains tryptophan and other compounds that may influence sleep, current evidence supporting its sleep-promoting effects remains limited.⁴ The lack of association in the present study may be related to the relatively low frequency of consumption among respondents, which may not have provided sufficient amounts of bioactive compounds such as melatonin and tryptophan derivatives to influence sleep regulation.³⁷ Additionally, lactose malabsorption is highly prevalent among Filipino adults and may offset any potential sleep-related benefits of milk consumption.³⁸ The processing of commercial milk products may also reduce melatonin concentrations compared with raw sources, potentially diminishing their effects on sleep.³⁹ To the best of the researchers' knowledge, no published studies have specifically examined the association between the frequency of consumption of Halal-certified milk products and sleep quality, limiting direct comparison with the present findings. No significant association was observed between the consumption of Halal-certified meat and alternatives and sleep quality. This finding contrasts with a recent pilot study suggesting potential sleep-related benefits of Halal meat but is consistent with previous research reporting an association between higher meat consumption and poorer sleep outcomes.^{9,40} The absence of a significant association in the present study may be related to differences in the type and frequency of meat consumed. Among urban Filipino Muslims, meat intake may include preserved or cured Halal products, which contain sodium and nitrates that have been associated with adverse effects on sleep.^{8,41} Additionally, low fruit and vegetable intake

among Filipino adults may limit antioxidant intake, potentially offsetting any benefits associated with nutrients found in meat products.⁴²

Among the food groups studied, only Halal-certified combination foods demonstrated a significant association with sleep quality. More frequent consumption of these foods was associated with lower odds of good sleep quality, suggesting a greater likelihood of poor sleep among participants who consumed them more frequently. This finding is consistent with previous research showing that higher consumption of low-quality carbohydrates and total daily carbohydrates, which are commonly found in combination foods, is associated with an increased risk of poor sleep patterns.⁴¹ Given the cross-sectional design of the study, however, the observed relationship should be interpreted as an association rather than a causal effect.

Overall, no significant association was observed between the consumption of most Halal-certified food groups and sleep quality among adult Filipino Muslims from the Greenhills Muslim Traders Association. However, more frequent consumption of Halal-certified combination foods was associated with lower odds of good sleep quality. These findings suggest that, with the exception of combination foods, the frequency of consumption of Halal-certified food groups was not significantly associated with global PSQI scores.

Limitations

Several limitations should be acknowledged. First, the study assessed only the frequency of consumption of Halal-certified food groups and did not account for other dietary factors that may influence sleep quality, such as food preparation methods, portion sizes, caloric intake, and timing of consumption. Second, other known determinants of sleep quality, including caffeine and alcohol consumption, smoking, stress levels, and screen exposure, were not evaluated. Finally, although the PSQI is a validated instrument, it relies on self-reported responses, which may be subject to recall bias and may not accurately reflect actual sleep patterns.

Despite these limitations, the findings suggest that the frequency of consumption of most Halal-certified food groups was not significantly associated

with sleep quality among adult Filipino Muslims. Although respondents generally demonstrated good sleep quality, the significant association observed for Halal-certified combination foods and the potential influence of other behavioral, dietary, and cultural factors warrant further investigation.

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