

ORIGINAL ARTICLE



OPEN ACCESS

Received: 11-08-2025

Accepted: 11-05-2026

Published: 26-08-2026

Citation: Bayaskar S. A Qualitative Study Exploring the Impact of Evening Meal Composition and Timing on Sleep Efficiency and Next-Day Alertness among Indian Adults. 2026; 14(1):7-10. <https://doi.org/10.55289/jnutres/v14i1.25.77>

* **Corresponding author.**

sabayaskar@gmail.com

Funding: None

Competing Interests: None

Copyright: © This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Published By India Association for Parenteral and Enteral Nutrition (IAPEN)

ISSN

Electronic: 2348-1064

A Qualitative Study Exploring the Impact of Evening Meal Composition and Timing on Sleep Efficiency and Next-Day Alertness among Indian Adults

Sagar Bayaskar^{1*}

¹ Independent Public Health Researcher, 444902, Maharashtra, India.

Abstract

Background: Sleep efficiency and next-day alertness are essential for cognitive performance, mood stability, and overall well-being. While lifestyle factors such as screen time and stress influence sleep, dietary habits—specifically evening meal composition and timing—remain underexplored, particularly in young to middle-aged adults. **Objectives:** To explore the perceived relationship between evening meal composition, dinner timing, sleep efficiency, and next-day alertness among Indian adults aged 18–45 years. **Methods:** A qualitative study involved 35 participants (20 females, 15 males) through in-depth, semi-structured interviews. Participants described their typical evening meals, categorized thematically as high-fat/heavy, high-carbohydrate, or balanced, along with meal timing (early: ≥ 2 hours before bedtime; late: < 2 hours). Thematic analysis identified patterns in self-reported sleep quality and next-day alertness. **Results:** High-fat or heavy meals consumed late were commonly associated with delayed sleep onset, restlessness, and morning grogginess (prevalent in many participants reporting this pattern). Balanced meals with earlier timing were linked to uninterrupted sleep and higher morning energy (most frequent positive reports). High-carbohydrate meals were associated with faster onset but occasional early awakenings. The strongest positive outcomes emerged from combining balanced meals with earlier timing, while poorest from heavy meals late at night. **Conclusion:** Evening meal composition and timing appear to interactively influence perceived sleep efficiency and next-day alertness. Lighter, balanced meals and earlier dinner timing may offer simple interventions for better sleep.

Keywords: Meal composition, Meal timing, Sleep efficiency, Next-day alertness, Late-night eating, Dietary patterns, Indian adults

1 Introduction

Sleep efficiency—the ratio of total sleep time to time spent in bed—is a key determinant of physical health, cognitive performance, and emotional well-being⁽¹⁾. Poor sleep quality links to impaired attention, mood disturbances, and reduced productivity⁽²⁾. While stress, screen time, and irregular schedules contribute significantly, emerging evidence points to dietary patterns, particularly evening meal composition and timing, as influential factors⁽³⁾.

High-fat or high-sugar meals near bedtime can disrupt circadian rhythms, delay sleep onset, and increase awakenings⁽⁴⁾. Balanced meals earlier in the evening may

promote better sleep continuity and next-day alertness⁽⁵⁾. However, qualitative insights into lived experiences remain limited, especially in diverse cultural contexts like India, where meal patterns often include spiced, carbohydrate-rich, or heavy foods.

This qualitative study explores how evening meal types and timings influence perceived sleep efficiency and next-day alertness among Indian adults aged 18–45 years.

2 Review of Literature

Dietary habits increasingly influence sleep quality and efficiency. High-fat meals, especially late at night, associate with longer sleep latency, reduced REM sleep, and

fragmentation⁽⁶⁾. Conversely, diets rich in fruits, vegetables, and complex carbohydrates support melatonin production and sleep onset⁽⁷⁾.

Protein from tryptophan-rich sources (e.g., dairy, legumes) enhances serotonin synthesis and sleep regulation⁽⁸⁾. Spicy or heavy meals may cause gastric discomfort, delaying initiation⁽⁹⁾.

Meal timing proves critical: eating within two hours of bedtime elevates core temperature and metabolism, impairing efficiency⁽¹⁰⁾. Earlier meals link to improved next-day cognition and mood⁽¹¹⁾.

Recent studies reinforce these links. Chrononutrition research shows delayed meal timings and frequent eating correlate with poorer sleep quality⁽¹¹⁾. High-glycemic meals may shorten onset if timed earlier (≥ 4 hours before bed), but late heavy meals disrupt architecture⁽¹⁾. Time-restricted eating aligns with circadian rhythms, potentially enhancing sleep⁽¹²⁻²⁰⁾.

Qualitative research capturing cultural patterns in middle-income countries remains scarce, highlighting the need for in-depth exploration in Indian contexts⁽¹⁶⁾.

3 Methodology

Study Design

This qualitative, cross-sectional study explored perceived effects of evening meal composition and timing on sleep efficiency and next-day alertness.

Participants

35 participants aged 18–45 years (20 females, 15 males) recruited via purposive sampling from urban and semi-urban areas. Inclusion: regular evening meals, willingness to discuss sleep. Exclusion: diagnosed sleep disorders or sleep-affecting medications.

Data Collection

In-depth, semi-structured interviews (30–45 minutes, in-person or video) covered meal composition (self-described examples), timing, perceived sleep quality (onset, interruptions, depth), and morning alertness. Participants asked about potential confounders (e.g., caffeine, screen time, stress).⁶ Interviews audio-recorded with consent.

Data Analysis

Transcripts analyzed using thematic analysis (inductive approach). Two researchers independently coded, identifying themes (e.g., "delayed onset from heavy meals," "refreshing sleep with balanced early dinners"). Themes refined iteratively; data saturation achieved around 30 interviews.

Inter-coder agreement ensured through discussion. Meal types categorized based on participant descriptions: high-fat/heavy (e.g., fried items, rich curries), high-carbohydrate (e.g., rice-heavy, sweets), balanced (moderate protein/carbs/fats, vegetables). Prevalence noted qualitatively (e.g., "many," "most").

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all participants. Identifying details were anonymized during transcription and reporting.

4 Results

Participant Characteristics

The study included 35 participants aged 18–45 years, with a median age of approximately 32 years. There were 20 females (57%) and 15 males (43%). Participants represented diverse occupational backgrounds: students comprised 34% (n=12), IT professionals 26% (n=9), healthcare workers 23% (n=8), and service employees 17% (n=6). All resided in urban or semi-urban areas, providing a varied context for exploring lifestyle influences on sleep and dietary habits.

Influence of Meal Composition on Sleep Efficiency

Participants frequently linked evening meal composition to their perceived sleep quality. Those who described consuming high-fat or heavy meals—such as fried foods, rich curries, or oily preparations—commonly reported negative effects on sleep. Many experienced bloating and digestive discomfort, leading to delayed sleep onset, restlessness throughout the night, and a sense of incomplete restoration. For instance, one participant noted, "After an oily dinner, I toss and turn for hours before falling asleep" (P12, male, late eater). In contrast, participants who favored balanced meals, characterized by moderate portions of protein (e.g., lentils or lean meats), low-glycemic carbohydrates, vegetables, and healthy fats, overwhelmingly described positive sleep experiences. Most in this group reported easier digestion, fewer interruptions, and deeper, more continuous sleep. A typical reflection was, "A light meal with vegetables and dal allows me to sleep deeply without waking up" (P25, female).

High-carbohydrate meals, often rice-heavy or including sweets, presented mixed outcomes. Some participants appreciated faster sleep onset, attributing it to a calming effect, with comments like "A big rice meal helps me fall asleep quickly" (P7). However, others in this category mentioned occasional early-morning awakenings or a feeling of unrest, possibly related to fluctuations in blood sugar levels.

Influence of Meal Timing on Sleep and Alertness

Meal timing emerged as a prominent theme independent of composition. Participants who consumed dinner at least two hours before bedtime generally reported superior sleep quality and next-day alertness, irrespective of the meal type. Earlier timing was associated with reduced nighttime disturbances and a smoother transition to sleep. Late dinners, particularly those after 10:00 PM, were consistently linked to poorer outcomes, including prolonged time to fall asleep, fragmented rest, and feelings of sluggishness the following morning. One participant explained, "Eating past 10 PM makes me feel sluggish and unfocused the next day, no matter what I eat" (P8).

Combined Effects of Meal Composition and Timing on Next-Day Alertness

The interaction between meal composition and timing appeared to amplify effects on both sleep efficiency and daytime functioning. The most favorable reports came from participants who combined balanced meals with earlier dinner timing. These individuals frequently described high morning energy, improved concentration, and stable mood throughout the day. A representative quote was, "Simple roti-sabzi by 8 PM leaves me waking up energetic and ready for work" (P31).

Table 1: Participant-Reported Associations Between Evening Meal Patterns and Sleep/Alertness Outcomes

Meal Composition	Timing	Common Reported Sleep Effects	Common Reported Next-Day Alertness	Prevalence in Themes
High-fat/heavy (e.g., fried items, rich curries)	Late (<2 hours before bed)	Delayed onset, restlessness, interruptions, bloating/discomfort	Grogginess, low energy, mood fluctuations	Many participants (poorest outcomes)
High-fat/heavy	Early (≥2 hours before bed)	Mild discomfort, but better than late	Moderate energy	Less common
High-carbohydrate (e.g., rice-heavy, sweets)	Any	Faster onset; occasional early awakenings	Variable; some hunger-related sluggishness	Some participants (mixed)
Balanced (e.g., moderate protein/carbs/fats, vegetables, dal)	Early (≥2 hours before bed)	Uninterrupted, deep sleep; easy onset	High energy, focus, refreshed	Most participants (best outcomes)
Balanced	Late	Mild interruptions possible	Good, but not optimal	Occasional

Conversely, the least favorable outcomes were observed among those consuming high-fat or heavy meals late at night. This combination was associated with pronounced morning grogginess, low energy, reduced focus, and occasional mood fluctuations. One participant shared, "Late-night fried chicken

gives me heartburn and I wake up feeling tired and irritable" (P19). Although potential confounders such as stress, caffeine intake, and screen time were discussed during interviews, participants primarily attributed sleep and alertness variations to dietary patterns rather than these factors (Table. 1).

Thematic Distribution of Meal Patterns

Overall, balanced meals with earlier timing represented the most commonly reported pattern linked to positive sleep and alertness outcomes, while heavy, late-night eating was the predominant pattern among those with poorer experiences (See (Table. 2) for a descriptive thematic distribution of reported meal patterns).

Table 2: Representative Participant Quotes by Theme

Theme	Quote Example	Participant Details (Anonymized)	Meal Pattern
Heavy late meals → Poor sleep	"Fried chicken at night... heartburn, wake up tired."	P19	High-fat/heavy, late
Heavy late meals → Discomfort	"After oily dinner, I toss and turn."	P12, male	High-fat/heavy, late
Balanced early → Good sleep	"Simple roti-sabzi by 8 PM, wake up energetic."	P31	Balanced, early
Balanced → Refreshing	"Light veg and dal lets me sleep deeply."	P25, female	Balanced
High-carb → Faster onset	"Rice helps fall asleep quick..."	P7	High-carbohydrate
Timing → Disturbances	"Eating past 10 PM makes me sluggish next day."	P8	Late (any composition)

5 Discussion

The findings of this qualitative study suggest that evening meal composition and timing interactively influence perceived sleep efficiency and next-day alertness in Indian adults aged 18–45 years. High-fat or heavy meals consumed late (<2 hours before bedtime) were frequently linked to digestive discomfort, delayed sleep onset, restlessness, and morning grogginess. Conversely, balanced meals eaten earlier (≥2 hours before bedtime) were associated with uninterrupted sleep and greater morning energy. High-carbohydrate meals had mixed effects: faster onset for some, but early awakenings for others, likely due to glycemic fluctuations.

These results align with chrononutrition research, where late or heavy meals disrupt circadian rhythms, elevate core temperature, and fragment sleep, while earlier balanced meals support melatonin production and sleep continuity. High-

glycemic carbohydrates can aid onset if timed well but risk instability if late.

In the Indian context, where spiced or heavy late dinners are common due to lifestyles, shifting to earlier, lighter balanced meals (e.g., roti-sabzi with dal) appears culturally feasible and beneficial.

Although participants noted confounders like stress and screen time, dietary factors emerged as prominent in their experiences.

Limitations

This small-scale (n=35) qualitative study relies on self-reported data, potentially introducing bias. Objective

measures (e.g., actigraphy) were absent, and generalizability is limited to urban/semi-urban adults without sleep disorders.

6 Conclusion and Future Implications

This study underscores that lighter, balanced evening meals timed earlier may serve as accessible, non-pharmacological strategies to enhance perceived sleep efficiency and next-day alertness. Promoting such habits could address prevalent sleep complaints in Indian contexts. Future research should employ larger, quantitative designs with objective sleep tracking (e.g., wearables) and detailed dietary assessments to validate these interactions. Interventional trials testing shifts to earlier balanced dinners, tailored to cultural meals, could inform personalized chrononutrition guidelines.

References

1. Afaghi A, O'Connor H, Chow CM. High-glycemic-index carbohydrate meals shorten sleep onset. *The American Journal of Clinical Nutrition*. 2007;85(2):426-430. Available from: [10.1093/ajcn/85.2.426](https://doi.org/10.1093/ajcn/85.2.426)
2. Crispim CA, Zimberg IZ, dos Reis BG, Diniz RM, Tufik S, de Mello MT. Relationship between Food Intake and Sleep Pattern in Healthy Individuals. *Journal of Clinical Sleep Medicine*. 2011;7(6):659-664. Available from: [10.5664/jcsm.1476](https://doi.org/10.5664/jcsm.1476)
3. Grandner MA, Drummond SP. Who are the long sleepers? Towards an understanding of the mortality relationship. *Sleep Medicine Reviews*. 2007;11(5):341-360. Available from: [10.1016/j.smrv.2007.03.010](https://doi.org/10.1016/j.smrv.2007.03.010)
4. Jaussent I, Dauvilliers Y, Ancelin ML, Dartigues JF, Tavernier B, Touchon J, et al. Insomnia Symptoms in Older Adults: Associated Factors and Gender Differences. *The American Journal of Geriatric Psychiatry*. 2011;19(1):88-97. Available from: [10.1097/jgp.0b013e3181e049b6](https://doi.org/10.1097/jgp.0b013e3181e049b6)
5. Lundahl A, Nelson TD. Sleep and food intake: A multisystem review of mechanisms in children and adults. *Journal of Health Psychology*. 2015;20(6):794-805. Available from: [10.1177/1359105315573427](https://doi.org/10.1177/1359105315573427)
6. Mahoney CR, Giles GE, Marriott BP, Judelson DA, Glickman EL, Geiselman PJ, et al. Intake of caffeine from all sources and reasons for use by college students. *Clinical Nutrition*. 2019;38(2):668-675. Available from: [10.1016/j.clnu.2018.04.004](https://doi.org/10.1016/j.clnu.2018.04.004)
7. Nedeltcheva AV, Kilkus JM, Imperial J, Kasza K, Schoeller DA, Penev PD. Sleep curtailment is accompanied by increased intake of calories from snacks. *The American Journal of Clinical Nutrition*. 2009;89(1):126-133. Available from: [10.3945/ajcn.2008.26574](https://doi.org/10.3945/ajcn.2008.26574)
8. Peuhkuri K, Sihvola N, Korpela R. Diet promotes sleep duration and quality. *Nutrition Research*. 2012;32(5):309-319. Available from: [10.1016/j.nutres.2012.03.009](https://doi.org/10.1016/j.nutres.2012.03.009)
9. St-Onge MP, Mikic A, Pietrolungo CE. Effects of Diet on Sleep Quality. *Advances in Nutrition*. 2016;7(5):938-949. Available from: [10.3945/an.116.012336](https://doi.org/10.3945/an.116.012336)
10. Wells AS, Read NW, Laugharne JD, Ahluwalia NS. Alterations in mood after changing to a low-fat diet. *British Journal of Nutrition*. 1998;79(1):23-30. Available from: [10.1079/bjn19980005](https://doi.org/10.1079/bjn19980005)
11. Yan LM, Li HJ, Fan Q, Xue YD, Wang T. Chronobiological perspectives: Association between meal timing and sleep quality. *PLOS ONE*. 2024;19(8):e0308172. Available from: [10.1371/journal.pone.0308172](https://doi.org/10.1371/journal.pone.0308172)
12. Hu F. The Effects of Food on Circadian Rhythm: A Comprehensive Review. *eFood*. 2025;6(5). Available from: [10.1002/efd2.70092](https://doi.org/10.1002/efd2.70092)
13. Abou-Khalil N. Nutritional Interventions for Enhancing Sleep Quality: The Role of Diet and Key Nutrients in Regulating Sleep Patterns and Disorders. *Food Science & Nutrition*. 2025;13(12). Available from: [10.1002/fsn3.71309](https://doi.org/10.1002/fsn3.71309)
14. Park JH, Park H, Bae S, Kang J. Associations between the Timing and Nutritional Characteristics of Bedtime Meals and Sleep Quality for Nurses after a Rotating Night Shift: A Cross-Sectional Analysis. *International Journal of Environmental Research and Public Health*. 2023;20(2):1489. Available from: [10.3390/ijerph20021489](https://doi.org/10.3390/ijerph20021489)
15. Lindseth GN, Murray A. Dietary Macronutrients and Sleep. *Western Journal of Nursing Research*. 2016;38(8):938-958. Available from: [10.1177/0193945916643712](https://doi.org/10.1177/0193945916643712)
16. Zadeh SS, Begum K. Comparison of nutrient intake by sleep status in selected adults in Mysore, India. *Nutrition Research and Practice*. 2011;5(3):230. Available from: [10.4162/nrp.2011.5.3.230](https://doi.org/10.4162/nrp.2011.5.3.230)
17. Godos J, Ferri R, Caraci F, Cosentino FII, Castellano S, Galvano F, et al. Association between diet and sleep quality: A systematic review. *Sleep Medicine Reviews*. 2021;57:101430. Available from: [10.1016/j.smrv.2021.101430](https://doi.org/10.1016/j.smrv.2021.101430)
18. Katagiri R, Asakura K, Kobayashi S, Suga H, Sasaki S. Healthy and Unhealthy Dietary Patterns Are Related to Sleep Duration and Quality in Japanese Adults. *Nutrients*. 2022;14(5):1031.
19. Mantantzis K, Campos V, Darimont C, Martin FP. Effects of Dietary Carbohydrate Profile on Nocturnal Metabolism, Sleep, and Wellbeing: A Review. *Frontiers in Public Health*. 2022;10. Available from: [10.3389/fpubh.2022.931781](https://doi.org/10.3389/fpubh.2022.931781)
20. Castro-Diehl C, Wood AC, Redline S, Clish C, Rosenberg L, Jasuja GK, et al. Mediterranean diet pattern and sleep duration and quality in adults: The Multi-Ethnic Study of Atherosclerosis. *Sleep*. 2022;45(2):zsab237.