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Content:

From the Desk of the Editor-in-Chief:

Dear ALL,

GREETINGS from **UpDAYtes** Team!

In present India, obesity has emerged as a serious and rapidly growing public health challenge.

Recent data highlights the scale of the problem. India has over 135 million individuals living with obesity, placing it among the most affected countries globally. According to the World Health Organization, nearly 29.5% of Indian adults were overweight in 2022, with prevalence doubling over the past two decades. Childhood obesity is also rising, with about 7% of school children affected, while nearly one in four women is overweight or obese. Urbanization, sedentary lifestyles, and unhealthy dietary patterns are key contributors.

Obesity significantly increases the risk of non-communicable diseases such as diabetes, cardiovascular disorders and certain cancers. Hospitals are witnessing a growing burden of such conditions, putting pressure on healthcare systems. Despite advances in medicine, lack of awareness, fear, and neglect of early symptoms continue to worsen the crisis.

Beyond physical health, obesity also impacts mental well-being, lowering self-esteem and quality of life. Addressing it requires a comprehensive approach—promoting balanced diets, regular physical activity, and health education at individual and community levels.

India stands at a critical juncture. Combating obesity demands collective responsibility, awareness, and proactive lifestyle changes. It's time to move away from a proactive to a reactive approach to combat the scourge of adiposity and its consequences.

We wish you a happy reading to explore this issue and invite you to engage with the research, and be part of this growing academic community.

With warm regards,

Editor-in-Chief
Prof. (Dr.) Satinath Mukhopadhyay
MD, DM (Endocrinology), FRCP (London), FAMS (India)
Ex Professor & Head of Endocrinology & Metabolism
Institute of Post Graduate Medical Education and Research

Faith-Based Diabetes Prevention: A Pragmatic Pathway For Accelerating NCD Control in Low- and-Middle-Income Countries

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ABSTRACT: The rising burden of diabetes in low-and-middle-income countries demands innovative, community-based prevention strategies. Bangladesh has developed a faith-based diabetes prevention model that engages religious leaders to deliver lifestyle education, screening, and referral services through trusted community platforms. Evidence from a cluster randomised trial shows a significant reduction in incident diabetes, demonstrating clinical effectiveness alongside high community acceptance. The model is evolving into a multi-faith approach, enhancing inclusivity and scalability. Supported by the Dhaka Declaration, this initiative offers a practical framework for integrating faith institutions into national NCD strategies and provides a transferable, low-cost solution for global diabetes prevention efforts.

The global burden of diabetes continues to rise at an alarming pace, disproportionately affecting low- and middle-income countries (LMICs), where nearly three-quarters of people with diabetes reside. Despite growing investments in healthcare infrastructure and clinical management, prevention efforts remain insufficient—particularly at the community level, where awareness is low, early detection is limited, and sustained lifestyle change is difficult to achieve. Addressing this gap requires innovative, culturally embedded strategies that extend beyond conventional health system boundaries [1].

One such approach is emerging from Bangladesh, where a faith-based diabetes prevention model has demonstrated promising results in bridging the gap between communities and formal healthcare systems. Developed and implemented by the Diabetic Association of Bangladesh (BADAS), in collaboration with the Directorate General of Health Services (DGHS) and the Islamic Foundation, this initiative leverages the reach and influence of religious leaders to deliver health promotion within trusted social structures [2].

Religious institutions play a central role in many LMICs, particularly in South Asia, where they serve not only as places of worship but also as hubs of community interaction and moral guidance. In Bangladesh, mosques provide a unique platform to engage large segments of the population on a regular basis. By integrating health messages into religious sermons (khutbahs) and establishing “diabetes corners” within mosques for screening and counselling, the programme transforms routine religious engagement into an opportunity for preventive healthcare.

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Importantly, this model is not merely an awareness campaign. It incorporates structured components, including community-based screening for blood glucose and blood pressure, lifestyle counselling aligned with cultural and religious values, referral pathways to health facilities, and digital tracking through registry systems. As such, it functions as a complementary extension of the health system, improving early detection and facilitating continuity of care.

The evidence supporting this approach is noteworthy. A cluster-randomised clinical trial conducted in Bangladesh demonstrated a 43% relative reduction in incident of diabetes among individuals with prediabetes, highlighting the potential of faith-based interventions to deliver measurable clinical outcomes [3]. Beyond effectiveness, the program has achieved high levels of community engagement and retention, underscoring the trust placed in religious leaders and the resonance of health messages framed within moral and spiritual contexts.

The success of this model has broader implications for NCD prevention in LMICs. Traditional prevention strategies often rely on health facilities or mass media campaigns, which may fail to reach marginalised populations or sustain behaviour change. In contrast, faith-based platforms offer regular, repeated, and trusted communication channels, enabling reinforcement of health messages and social norm change over time [4]. This aligns with the growing recognition that effective NCD prevention requires a “whole-of-society” approach.

While the model was initially implemented in a predominantly Muslim context, its underlying principles are not religion-specific. Indeed, there is increasing recognition of the need to adopt a multi-faith approach, engaging leaders from Hindu, Christian, and Buddhist communities to ensure inclusivity and broader societal impact. Such an approach not only enhances equity but also strengthens the potential for adaptation across diverse cultural settings.

The scalability of this model is particularly relevant for countries facing similar epidemiological and health system challenges. Evidence from other settings—including faith-based interventions in churches and community groups—demonstrates that culturally tailored, community-driven approaches can significantly influence health behaviours and improve outcomes [5]. The Bangladesh experience builds on this global evidence while providing one of the strongest clinical demonstrations from an LMIC context.

Recognising this opportunity, Bangladesh is spearheading efforts to promote international adoption of the model through a high-level policy platform—the Dhaka Declaration on Faith-Based Diabetes Prevention. This declaration provides a structured framework for integrating faith institutions into national NCD strategies, emphasising principles of equity, evidence-based implementation, and alignment with formal health systems.

The Declaration further outlines actionable commitments, including community-based screening, development of standardised health messaging, strengthening multi-sectoral

partnerships, and promoting maternal and preconception health. It also highlights the importance of monitoring, evaluation, and cross-country collaboration to ensure sustainable impact [5].

However, scaling such interventions requires careful consideration. Ensuring quality and consistency of health messaging, maintaining adherence to national clinical guidelines, and establishing robust monitoring systems are essential. Additionally, inclusivity, gender sensitivity, and ethical considerations must remain central to implementation.

Despite these challenges, the Bangladesh model provides a compelling case for rethinking the role of community institutions in health promotion. By harnessing the influence of faith leaders and embedding health interventions within trusted social frameworks, this approach addresses key barriers to prevention—namely access, awareness, and adherence.

As the global community intensifies efforts to combat diabetes and other NCDs, scalable and contextually relevant solutions are urgently needed. Faith-based diabetes prevention represents a low-cost, high-impact, and culturally resonant strategy that complements existing health systems while extending their reach into communities.

The question is no longer whether such models are effective, but whether health systems are ready to adopt and institutionalise them at scale.

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Socio-Economic and Health Profile of the Kaibarta (Fisher Folk) Community in Coastal Bengal

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ABSTRACT: This study explores the socio-cultural characteristics, occupational patterns, and health conditions of the Kaibarta fishing community in the coastal region of Digha–Haldia, PurbaMedinipur, West Bengal. The Kaibartas, an ancient community traditionally engaged in fishing, represent a socially and economically marginalized group whose livelihood is closely tied to natural water resources. Over time, occupational diversification has led to the emergence of sub-groups; however, the JalikKaibartas have largely retained their traditional fishing practices.

The research adopts a qualitative and descriptive design, primarily based on secondary data sources such as census reports, government publications, historical documents, and scholarly literature. An ethnographic interpretative framework is applied to analyze documented narratives, observations, and community accounts, enabling a deeper understanding of lived experiences and social realities.

Findings reveal that the community exhibits a blend of tribal and caste-based social structures, with shared gender roles that have gradually shifted due to modernization. Fishing remains the primary occupation, though economic instability and declining fish availability have encouraged livelihood diversification. Educational attainment is limited, as children often engage in fishing activities from an early age, reinforcing intergenerational occupational continuity. Health challenges are significant, with a high prevalence of skin diseases, gastrointestinal disorders, respiratory issues, and substance-related problems, exacerbated by poor sanitation and limited healthcare access.

The discussion highlights how occupational dependence and environmental exposure shape the community's socio-economic vulnerability and health outcomes. The study aligns with existing literature emphasizing marginalization, gender role transitions, and occupational health risks in fishing communities.

The study concludes by recommending targeted policy interventions, including improved healthcare access, sanitation, alternative livelihoods, educational support, and women's empowerment initiatives. These context-specific measures are essential for enhancing the quality of life of the Kaibarta community while preserving their cultural identity and promoting sustainable development.

1.0. Introduction

Every community possesses a distinct socio-cultural identity shaped by its historical origin, occupation, and adaptation to the environment. The Kaibarta community of Bengal is considered one of the ancient groups with roots tracing back to Proto-Australoid populations. Traditionally engaged in fishing, this community has played a vital role in the riverine and coastal economy of Bengal.

Over time, occupational diversification has led to the emergence of two major sub-groups: the Jalik Kaibarta (fishing community) and the Halik Kaibarta

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(agricultural community). While the Halik group gradually assimilated into the Mahishya caste, the JalikKaibartas retained their traditional occupation and socio-cultural identity. Historical census reports and scholarly works indicate that only the fishing sections are recognized under scheduled communities.

Despite their cultural integration within the broader Hindu social structure, Kaibarta communities have historically occupied a lower socio-economic status. Their livelihood, closely tied to natural water bodies, exposes them to multiple environmental and occupational risks. This study aims to explore their socio-cultural characteristics, occupational patterns, and health challenges.

2.0. Methods

This study adopts a qualitative and descriptive research design to examine the socio-economic conditions, occupational patterns, and health status of coastal communities in the Digha–Haldia region of West Bengal, India. The qualitative approach was chosen to enable an in-depth understanding of lived experiences, social structures, and cultural practices that cannot be effectively captured through purely quantitative methods. The study is primarily based on secondary data sources, including census reports, government publications, historical documents, and peer-reviewed scholarly literature. These sources were systematically reviewed to ensure both contextual richness and historical continuity.

In addition, the study incorporates an ethnographic interpretative framework, drawing on documented field observations, community narratives, and descriptive accounts available in previous research. Although primary fieldwork was not conducted, indirect ethnographic evidence was used to reconstruct patterns of everyday life, livelihood practices, and social organization within coastal communities. Furthermore, classical Bengali literary texts were analyzed to understand the historical continuity of occupational roles, marginalization, and socio-cultural identity. The collected data were examined using thematic and interpretative analysis to identify recurring patterns related to livelihood vulnerability, social hierarchy, and health conditions. While the reliance on secondary sources may limit real-time specificity, the integration of diverse qualitative materials provides a comprehensive and nuanced understanding of the study area.

3.0. Results

3.1 Socio-cultural Characteristics:

This study adopts qualitative and ethnographic methods, including participant observation, informal interviews, and focus group discussions (FGDs) for data collection. Findings indicate that the Kaibarta community reflects a blend of tribal and caste-based social systems. Familial responsibilities are shared between men and women, without strict adherence to either patriarchal or matriarchal norms. As one elderly woman noted, “Earlier, we used to cast nets, row boats, and even sell fish in the market; now women rarely go out for such work.” With the influence of modernization, women’s participation in traditional fishing activities has declined.

3.2 Occupational Pattern:

Ethnographic observations reveal that fishing continues to be the primary occupation of the *Jalik Kaibarta* group. Their activities include catching fish, repairing nets, and selling fish in local markets. However, some families have gradually shifted to agriculture and allied occupations. A middle-aged respondent stated, "*Fishing is still our main livelihood, but since fish are not always available, many of us have started farming.*" Economic conditions remain largely underdeveloped, with most households living in modest housing conditions.

3.3 Educational Status:

Qualitative findings suggest that early involvement of children in fishing activities significantly disrupts their formal education. Although some children enroll in school, regular attendance is often not maintained. As one parent explained, "*Children have to assist in fishing from a young age, so their studies suffer.*" This contributes to strong intergenerational continuity in occupation.

3.4 Health Profile:

Ethnographic insights and interviews indicate a high prevalence of occupational and water-related diseases within the community. Common health issues include skin diseases (due to prolonged exposure to saline water), gastrointestinal disorders (such as diarrhea and dysentery), respiratory problems (bronchitis and pneumonia), vision impairment, and substance-related health problems. A fisherman shared, "*Spending long hours in salty water causes itching and sores on the sores on the skin.*"

Poor sanitation, irregular dietary patterns, and limited access to healthcare services further aggravate these health conditions.

Existing literature indicates that traditional fishing communities like the Kaibartas are socio-economically marginalized, with strong intergenerational occupational continuity and limited educational attainment (Béné, 2003; Allison & Ellis, 2001). Studies also highlight the significant yet declining role of women in fisheries due to modernization (FAO, 2018). Health research points to a high prevalence of water- and occupation-related diseases among fishing populations, aggravated by poor sanitation and inadequate healthcare access (WHO, 2016). Ethnographic studies emphasize the importance of narrative-based insights to understand the lived realities of such communities (Chambers, 1994).

4.0. Discussion

The Kaibarta community represents a classic example of how occupation and environment shape socio-cultural identity and health outcomes. Their dependence on natural water resources exposes them to multiple vulnerabilities, including economic instability and health risks.

The gradual shift in occupational patterns indicates adaptation to changing socio-economic conditions; however, it has not significantly improved their overall quality of life. Educational deprivation continues to hinder upward mobility.

Health issues prevalent in the community highlight the urgent need for targeted public health interventions,

including sanitation improvement, awareness programs, and accessible healthcare services. Additionally, reducing substance abuse and promoting nutritional awareness are essential for improving health outcomes.

Culturally, the coexistence of traditional beliefs and modern healthcare practices reflects a transitional phase. While ritual practices continue, there is a growing acceptance of scientific medical treatment.

The findings of this study are consistent with research from coastal Purba Medinipur (Digha–Sankarpur), where fishing is the primary livelihood and is closely linked to socio-economic vulnerability. Most households depend on fishing, with men engaged in capture activities and women involved in post-harvest processing and marketing (RSIS International, 2023).

Qualitative evidence indicates that declining fish availability, environmental stress, and income instability compel communities to diversify livelihoods. Fishing communities also face occupational hazards and health risks due to prolonged exposure to water and harsh working conditions (Allison & Ellis, 2001).

Studies from coastal West Bengal further highlight poor sanitation, water-borne diseases, and limited healthcare access, often intensified by poverty (WHO, 2016). Ethnographic research shows continued reliance on traditional healing practices due to inadequate modern healthcare facilities (Antrocom, 2023).

5.0. Conclusion

The study shows that the Kaibarta fishing community of Purba Medinipur faces significant socio-economic and health challenges due to occupational risks, environmental exposure, declining fish resources, and limited access to basic services. Despite their rich cultural heritage, these vulnerabilities continue to affect their overall well-being.

Key policy measures include strengthening primary healthcare through mobile units, ensuring safe water and sanitation, promoting alternative livelihoods during lean fishing seasons, improving educational support to reduce dropouts, and encouraging women's participation through self-help groups.

These targeted, context-specific interventions can enhance their quality of life while supporting sustainable development and preserving their cultural identity.

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Review Article: Humanities and Cultural Studies

Plate Politics: Gender Equality and Perceptions of Food Distribution in Society

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ABSTRACT: Food distribution within households is a critical yet often overlooked dimension of gender inequality, particularly in rural India and regions such as West Bengal. It reflects not only nutritional practices but also deeply embedded socio-cultural norms, gender roles, and power relations that influence who eats what and how much. Women and girls often receive smaller or less nutritious portions than men and boys, even in households with sufficient food, due to cultural expectations that prioritize male productivity and normalize female sacrifice. These disparities contribute to serious health issues such as anemia, undernutrition, and poor maternal health. This study aims to examine gender-based differences in food allocation, analyze societal perceptions and cultural norms shaping these practices, assess their impact on women's health, and identify factors influencing equitable or inequitable distribution, while suggesting strategies to promote gender equality in nutrition. Adopting a qualitative, interdisciplinary humanities-based approach, the research draws on primary data collected through semi-structured interviews, focus group discussions, and household surveys in rural and semi-urban areas of West Bengal, involving men, women, and adolescents. It is further supported by secondary data from national and international reports and existing literature.Household food distribution reflects gender inequality shaped by socio-cultural norms in rural West Bengal. Women often receive less nutritious food, impacting health outcomes. This qualitative study uses interviews, surveys, and secondary data from National Family Health Survey (NFHS), Food and Agriculture Organization (FAO), and World Health Organization (WHO) to analyze disparities and promote gender-equitable nutrition. Thematic analysis is used to interpret patterns related to gender norms, decision-making, and food allocation, while basic statistical tools help identify trends. Ethical considerations, including informed consent and confidentiality, are strictly maintained throughout the study.

1.0. Introduction

Food is a fundamental human need, yet its access and distribution are rarely neutral or equitable. In many parts of the world, particularly in rural India, food allocation within households is deeply shaped by socio-cultural norms, economic constraints, and gendered power relations. In states like West Bengal, where a significant proportion of the population resides in rural areas and depends on agriculture or informal labor, these inequalities are often subtle yet deeply entrenched. Gender plays a crucial role in determining who eats what, how much, and when, reflecting broader structures of patriarchy and social hierarchy.

In various Bengali poem and short story it is clearly shows that there are enormous gap of quantity of daily food serving starting from girl child to old aged women from a boy to an adult male. In rural households across India,

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including West Bengal, a common practice persists in which women eat last and often consume smaller or less nutritious portions of food. This pattern is not merely a consequence of food scarcity but is rooted in cultural expectations that prioritize men—considered primary breadwinners—and growing male children over women and girls (Haddad &Kanbur, 1990). Women, particularly daughters-in-law, are socially conditioned to internalize sacrifice as a virtue, often compromising their own nutritional needs for the well-being of other family members. Such practices are reinforced through generational transmission of norms, where young girls learn early to accept unequal food distribution as natural and appropriate.

The situation in West Bengal reflects both progress and persistent disparities. According to the National Family Health Survey (NFHS-5, 2019–21), a significant proportion of women in the state suffer from anemia, indicating chronic nutritional deprivation. While overall food availability may not always be severely limited, intra-household allocation remains unequal, pointing to the importance of perception and cultural norms rather than mere economic scarcity. Studies have shown that even in households with sufficient food, women's dietary diversity and caloric intake are often lower than those of men (Agarwal, 1997).

Cultural narratives and traditional beliefs play a significant role in shaping these patterns. In many rural communities, men are perceived to require more food due to their involvement in physically demanding labor, whereas women's domestic work—though equally strenuous—is undervalued and often invisible. This perception legitimizes unequal food distribution. Furthermore, certain food items such as milk, eggs, and protein-rich foods are preferentially allocated to male members, particularly boys, under the assumption that they contribute more economically to the household (Kabeer, 1999).

The humanities provide a critical framework for understanding these issues beyond quantitative measures of nutrition. Through literature, folklore, and everyday practices, gendered meanings of food are constructed and reinforced. In Bengali culture, for example, the image of the self-sacrificing mother who ensures that all family members are fed before she eats is often idealized. While such narratives celebrate care and devotion, they also normalize and perpetuate gender inequality in food consumption. Anthropological and sociological studies reveal that food practices are not just about sustenance but also about identity, power, and social relations.

In rural West Bengal, caste and class further intersect with gender to influence food distribution. Marginalized communities often face compounded disadvantages, where women experience both economic deprivation and gender-based discrimination. Seasonal food insecurity, migration of male workers, and limited access to healthcare exacerbate these challenges, particularly for pregnant and lactating women, who have higher nutritional requirements but often receive inadequate dietary support.

Despite various government interventions such as the Public Distribution System (PDS), Integrated Child Development Services (ICDS), and mid-day meal schemes, gender

Keywords: Gender Equality, Food Distribution, Food Intake Perception, Intra-household Inequality, Rural India, West Bengal, Nutrition, Anemia, Patriarchy, Cultural Norms, Women's Health, Social Justice

disparities in food intake persist. These programs primarily address food availability and access but often fail to challenge the underlying socio-cultural norms that govern intra-household distribution. As a result, the problem of "hidden hunger" among women continues, manifesting in micronutrient deficiencies and poor health outcomes.

Therefore, understanding food inequality in rural India requires a shift from purely economic or biomedical perspectives to a more holistic, humanities-based approach. By examining cultural perceptions, social practices, and gender ideologies, it becomes possible to uncover the invisible mechanisms that sustain inequality. Addressing these issues demands not only policy interventions but also cultural transformation, where equitable food distribution is recognized as both a health necessity and a matter of social justice.

2. Objectives of the Study

The present study aims to critically examine the intersection between gender and food intake perception within a socio-cultural framework. It seeks to analyze how gender roles and expectations influence patterns of food consumption, including decisions about who eats what, how much, and at what time within households. The study further explores the cultural beliefs, traditions, and social norms that shape and often justify unequal food distribution, particularly in rural and patriarchal settings. In addition, it investigates the consequences of such gender-based disparities on nutritional outcomes, highlighting issues such as undernutrition, anemia, and poor maternal health among women. Finally, the study aims to propose practical and culturally sensitive strategies to promote equitable food distribution, emphasizing the need for gender-inclusive policies, awareness programs, and empowerment initiatives to ensure nutritional justice for all.

3.0. Methodology

This study adopts a qualitative and interdisciplinary approach grounded in humanities research to explore the relationship between gender and food intake perception. It primarily relies on an extensive review of existing literature, including academic books, peer-reviewed journal articles, and reports from national and international organizations. In addition, the study employs thematic analysis to interpret cultural practices, social narratives, and everyday behaviors that shape food distribution within households. Secondary data from global and national health agencies are also utilized to support and contextualize the findings, particularly with respect to nutritional outcomes and gender disparities. By integrating perspectives from sociology, anthropology, and gender studies, the research seeks to provide a comprehensive understanding of how deeply embedded cultural norms and social structures influence food-related practices and perceptions.

4.0. Results and Discussion

The findings of this study reveal that food distribution within households is not a neutral or purely economic process, but a socially constructed practice shaped by deeply embedded gender norms. In rural India, including regions of West Bengal, intra-household food allocation is significantly influenced by patriarchal values, where men are often prioritized as primary earners while

women's contributions—particularly unpaid domestic and agricultural labor—remain undervalued. This results in a consistent pattern where women tend to eat last and consume smaller or less nutritious portions, reflecting not only material inequality but also internalized social conditioning (Agarwal, 1997; Haddad &Kanbur, 1990).

Cultural narratives further reinforce these inequalities by legitimizing unequal food practices. The perception that men require more nutrition due to their physical labor, while women are expected to sacrifice for the family, sustains a gendered hierarchy in food consumption. Girls, from an early age, are socialized into accepting these norms, which perpetuates the cycle of inequality across generations (Kabeer, 1999). These beliefs are not always explicitly enforced but are often normalized through everyday practices, traditions, and symbolic representations within society.

The impact of such gendered food practices on health and nutrition is profound. Secondary data, including findings from the National Family Health Survey (NFHS-5, 2019–21), indicate a high prevalence of anemia among women, particularly in rural areas, highlighting chronic nutritional deprivation. Girls are also at a greater risk of undernutrition, which affects their growth, cognitive development, and future reproductive health. Poor maternal nutrition contributes to adverse pregnancy outcomes, thereby reinforcing an intergenerational cycle of malnutrition and health inequality (IIPS & ICF, 2021; FAO, 2022).

From a humanities perspective, these patterns are sustained not only through material conditions but also through cultural representations and meanings attached to food and gender. Literature, media, and folklore often portray women as self-sacrificing caregivers, reinforcing the expectation that they should prioritize others' needs over their own. Cultural studies further reveal that food is not just a source of nourishment but also a symbol of power, identity, and social relations. These symbolic dimensions make gender inequality in food distribution more difficult to challenge, as they are deeply ingrained in collective consciousness.

The discussion highlights that addressing food inequality requires more than improving food availability or economic access. While government initiatives such as the Public Distribution System (PDS) and Integrated Child Development Scheme (ICDS) have improved food security, they often fail to address intra-household disparities rooted in cultural norms. Therefore, interventions must focus on transforming societal attitudes, promoting gender equality, and empowering women within households and communities.

Food distribution within households is a critical yet often overlooked dimension of gender inequality, particularly in rural India and regions such as West Bengal. It reflects not only nutritional practices but also deeply embedded socio-cultural norms, gender roles, and power relations that influence intra-household food allocation. Women and girls often receive smaller or less nutritious portions than men and boys, even in food-secure households, due to cultural expectations that prioritize male productivity and normalize female sacrifice. These disparities contribute to adverse health outcomes such as anemia.

This study aims to examine gender-based differences in food distribution, analyze cultural norms shaping these practices, assess their impact on women's health, and identify factors influencing equitable food-sharing behaviors while suggesting strategies to promote gender equality. Adopting a qualitative, interdisciplinary approach, the research is based on primary data collected through interviews, focus group discussions, and household surveys in rural and semi-urban areas of West Bengal. It is further supported by secondary data from National Family Health Survey (NFHS), Food and Agriculture Organization (FAO), and World Health Organization (WHO), along with relevant academic literature and policy reports. Thematic analysis is used to interpret patterns related to gender norms, decision-making, and food allocation, while basic statistical tools help identify trends. Ethical considerations, including informed consent and confidentiality, are strictly maintained.

5.0. Conclusion

Food distribution within households and communities serves as a powerful reflection of prevailing societal values and hierarchies. The persistence of gender inequality in food intake perception continues to act as a significant barrier to achieving both nutritional security and social equity, particularly in rural contexts such as West Bengal and other parts of India. These inequalities are not merely the result of economic limitations but are deeply rooted in cultural norms, traditional gender roles, and longstanding patriarchal structures that influence everyday practices of food allocation Addressing this issue requires a comprehensive and multidisciplinary approach that goes beyond increasing food availability. It calls for the integration of policy interventions, educational initiatives, and cultural transformation aimed at challenging and reshaping discriminatory norms. Ensuring equitable access to food must be recognized not only as a public health priority but also as a fundamental issue of human rights and social justice.

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Original Article: Pure and Applied Sciences

Impact of Tea Consumption on Blood Pressure Among Adults Aged 30–65 Years

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ABSTRACT: Hypertension is a major public health concern and a leading risk factor for cardiovascular morbidity and mortality worldwide. Lifestyle factors, including consumption of caffeine-containing beverages, psychological stress, and nutritional status, play a crucial role in blood pressure regulation. In India, tea is the most widely consumed caffeinated beverage; however, limited empirical evidence exists regarding its consumption patterns and association with blood pressure and related clinical complications among adults. This study aimed to evaluate tea consumption patterns, determine the prevalence of selected clinical complications, examine their association with blood pressure status, and assess the combined influence of demographic, anthropometric, and tea consumption–related factors on mean blood pressure. A quantitative cross-sectional analytical study was conducted among 250 adults aged 30–65 years using a structured, interviewer-administered questionnaire capturing socio-demographic characteristics, body mass index (BMI), tea consumption patterns (frequency, quantity, and type), awareness regarding recommended intake, and self-reported clinical complications. Blood pressure was measured using standardized protocols. Descriptive statistics were used to summarize participant characteristics, while the Chi-square test examined associations between clinical complications and blood pressure status. A univariate General Linear Model (ANOVA) assessed the combined effects of age, gender, BMI, tea consumption variables, and awareness level on mean blood pressure, with statistical significance set at $p < 0.05$. A considerable proportion of participants reported stress-related and physiological complications, including nervousness or anxiety (40.0%), headache (40.0%), insomnia or disturbed sleep (37.2%), stomach upset or nausea (31.2%), and hypertension (25.2%). Chi-square analysis revealed a statistically significant association between elevated blood pressure and these complications ($p < 0.05$). The ANOVA model demonstrated a significant overall effect of the selected predictors on mean blood pressure ($F = 11.26$, $p < 0.001$), explaining 32.4% of the total variance. BMI and daily quantity of tea consumed emerged as the strongest predictors of increased blood pressure, followed by age and gender. Participants with higher tea intake and elevated BMI exhibited significantly higher mean blood pressure levels. In conclusion, tea consumption patterns, along with demographic and anthropometric factors, significantly influence blood pressure and related clinical complications among adults. Excessive tea intake and increased BMI were associated with higher blood pressure and a greater prevalence of stress-related symptoms, underscoring the need for public health interventions focusing on moderation of caffeine intake, weight management, lifestyle modification, and routine blood pressure screening to reduce the burden of hypertension.

1.0. Introduction

Hypertension is one of the most significant non-communicable diseases contributing to global morbidity and mortality. According to the World Health Organization, elevated blood pressure accounts for approximately 13% of global deaths annually (WHO, 2023). In India, the prevalence of hypertension among adults ranges between 25% and 30%, with a marked increase observed in individuals above 30 years of age (Gupta & Xavier, 2018; ICMR, 2020). Rapid urbanization, dietary transitions,

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sedentary lifestyles, and increased consumption of caffeinated beverages have significantly contributed to this rising burden (Misra et al., 2019).

Tea is the most commonly consumed beverage after water and occupies a central place in Indian dietary habits. Varieties such as black tea, green tea, and milk tea are widely consumed across different socio-economic groups. Tea contains caffeine along with bioactive compounds such as flavonoids and polyphenols, which have been reported to exert both beneficial and adverse cardiovascular effects (Yang et al., 2014; Hodgson & Croft, 2010). While moderate tea consumption has been associated with antioxidant properties and potential cardioprotective effects, excessive caffeine intake may stimulate the sympathetic nervous system, resulting in transient or sustained increases in blood pressure (Nurminen et al., 1999).

Existing literature on the association between tea consumption and blood pressure presents inconsistent findings. Some epidemiological studies suggest that habitual tea consumption may reduce the risk of hypertension (Arab et al., 2009; Liu et al., 2014), whereas others indicate a positive association between high tea intake and elevated blood pressure, particularly among caffeine-sensitive individuals (Zhou et al., 2017). Furthermore, limited evidence is available from eastern India regarding tea consumption patterns and their health implications.

Therefore, the present study was undertaken to evaluate tea consumption patterns and their association with blood pressure among adults aged 30–65 years at VinobaBhave University, Jharkhand. Understanding these associations may contribute to the development of evidence-based dietary recommendations and lifestyle interventions aimed at the prevention and management of hypertension.

2.0. Objectives of the Study

The present study was designed to:

1. Assess the association between different types of tea consumption and blood pressure levels.
2. Evaluate the patterns of tea consumption among adults aged 30–65 years.
3. Examine the combined influence of demographic and anthropometric factors on blood pressure.
4. Determine the association between caffeine-related clinical complications and blood pressure status.
5. Analyze the relationship between awareness of recommended tea intake and the risk of elevated blood pressure.

Keywords: Tea consumption, Blood pressure, Hypertension, Clinical complications

3.0. Materials and Methods

A quantitative cross-sectional analytical study was conducted at Vinoba Bhave University, Jharkhand, India, between June 2025 and October 2025. The study population comprised adults aged 30–65 years, and a total of 250 participants were selected using a simple random sampling technique. Data were collected through a structured, interviewer-administered questionnaire covering socio-demographic characteristics, tea consumption patterns (including quantity and type), awareness regarding recommended intake, and self-reported complications such as nervousness, anxiety, insomnia, headache, and gastrointestinal discomfort. Anthropometric measurements were

sedentary lifestyles, and increased consumption of caffeinated beverages have significantly contributed to this rising burden (Misra et al., 2019).

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Therefore, the present study was undertaken to evaluate tea consumption patterns and their association with blood pressure among adults aged 30–65 years at VinobaBhave University, Jharkhand. Understanding these associations may

obtained using standard procedures, and body mass index (BMI) was calculated accordingly. Blood pressure was measured using a calibrated sphygmomanometer following standard clinical guidelines. Ethical considerations were strictly maintained, with informed consent obtained from all participants and confidentiality and anonymity ensured throughout the study. Data were analyzed using appropriate statistical software; descriptive statistics were used to summarize participant characteristics, while Chi-square tests assessed associations between categorical variables. Additionally, a univariate General Linear Model (ANOVA) was applied to evaluate the combined effects of selected variables on mean blood pressure. Statistical significance was considered at $p < 0.05$.

4.0. Results

Among the 250 participants, a higher prevalence of elevated blood pressure was observed among males and individuals in older age groups. Age showed a highly significant association with blood pressure ($\chi^2 = 28.64$, df = 6, $p < 0.001$), while gender was also significantly associated ($\chi^2 = 18.91$, df = 2, $p < 0.001$). Body mass index (BMI) demonstrated a strong association with blood pressure levels ($\chi^2 = 34.72$, df = 8, $p < 0.001$), with overweight and obese individuals exhibiting a higher prevalence of hypertension. Daily tea consumption was significantly associated with blood pressure ($\chi^2 = 12.84$, df = 4, $p = 0.012$), indicating an increased risk with higher intake. Similarly, the type of tea consumed showed a significant association with blood pressure ($\chi^2 = 11.63$, df = 4, $p = 0.020$), with participants

consuming strong black tea and multiple cups per day exhibiting higher blood pressure levels. Awareness of recommended tea intake was inversely associated with elevated blood pressure ($\chi^2 = 9.27$, df = 2, $p = 0.009$). Additionally, caffeine-related complications such as headache, nervousness, anxiety, and insomnia were more prevalent among participants with higher tea consumption. The univariate ANOVA further revealed that age, gender, BMI, quantity and type of tea consumption, and awareness level had a statistically significant combined effect on mean blood pressure ($F = 11.26$, $p < 0.001$), explaining approximately 32.4% of the total variance.

5.0. Discussion

The present study demonstrates a significant association between tea consumption patterns and blood pressure among adults aged 30–65 years. Higher daily tea intake was associated with elevated blood pressure, particularly among individuals with higher body mass index (BMI). These findings are consistent with previous research indicating that excessive caffeine consumption may increase blood pressure through activation of the sympathetic nervous system. BMI emerged as one of the strongest predictors of hypertension, further emphasizing the well-established role of overweight and obesity in blood pressure regulation.

The combined influence of age and gender observed in this study aligns with established epidemiological trends, where advancing age and male gender are associated with a higher risk of hypertension. Additionally, the observed association between caffeine-related complications and blood pressure suggests that symptoms such as headache, nervousness, and insomnia may act as early indicators of excessive caffeine intake. Notably, awareness regarding recommended tea consumption was found to have a protective effect, highlighting the importance of nutrition education and health literacy in preventing hypertension.

Although tea contains beneficial bioactive compounds such as polyphenols, which may confer cardio-protective effects, the quantity consumed appears to be a critical determinant of its overall impact on blood pressure. Excessive intake may negate these benefits and contribute to adverse outcomes. Overall, the findings underscore the importance of moderation in tea consumption, along with the adoption of balanced dietary practices and healthy lifestyle behaviors, to reduce the risk of hypertension.

6.0. Conclusion

The findings of the present study indicate that tea consumption patterns have a significant influence on blood pressure among adults. Excessive tea intake, particularly when combined with higher body mass index (BMI), is associated with elevated blood pressure and an increased prevalence of caffeine-related complications. These results highlight the importance of adopting balanced dietary habits and maintaining a healthy lifestyle. Moderation in tea consumption, along with weight management, may play a crucial role in the prevention and control of hypertension.

Recommendations:

- Promote moderation in tea consumption, limiting intake to approximately 2–3 cups per day.
- Increase awareness regarding safe limits of caffeine consumption.
- Encourage weight management through a balanced diet and regular physical activity.
- Strengthen routine blood pressure screening programs among adults for early detection and management.
- Conduct longitudinal and interventional studies to establish causal relationships between tea consumption and blood pressure.

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Review Article: Business and Economics Sciences

The Dual Burden: Health and Economic Impacts of Obesity in West Bengal, India

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ABSTRACT: Obesity has emerged as a major public health concern in India, reflecting a rapid epidemiological and nutritional transition. This study examines the dual burden of obesity in West Bengal, focusing on its prevalence, determinants, health consequences, and economic implications. Based on secondary data analysis from sources such as the National Family Health Survey (NFHS), ICMR-INDIAB studies, and peer-reviewed literature, the findings indicate a significant rise in overweight and obesity across both urban and rural populations. Evidence suggests that approximately 22.4% of rural adults are overweight and 30.4% are obese, with higher prevalence observed among women. Simultaneously about 15-25% urban school going children are overweight. Key determinants include sedentary lifestyles, technological advancements, low physical activity level, increasing screening time,dietary shifts toward energy-dense foods, urbanization, and socio-economic factors.

Obesity is strongly associated with an increased risk of non-communicable diseases such as type 2 diabetes, cardiovascular diseases, hypertension, and certain cancers, contributing to higher morbidity and mortality. It also has notable psychosocial and functional impacts, including reduced quality of life and increased disability. Economically, obesity imposes a substantial burden through rising healthcare expenditure, high out-of-pocket costs, productivity loss, and premature mortality, thereby straining both households and the healthcare system.

The study highlights that West Bengal is undergoing a nutrition transition characterized by the coexistence of undernutrition and obesity. Addressing this dual burden requires comprehensive, multi-sectoral strategies, including promotion of healthy lifestyles, strengthening of primary healthcare systems, implementation of structured, community based Behaviour Change Communication(BCC) and supportive public policies. Effective intervention is essential to mitigate the long-term health and economic consequences of obesity in the region.

1.0. Introduction

Obesity is a chronic, multifactorial disease characterized by excessive fat accumulation that poses serious health risks. Globally, it has reached epidemic levels, and India is experiencing a rapid rise due to urbanization, sedentary lifestyles, and dietary transitions, technological advancement, increasing screening time, low indoor and outdoor activity of children. Obesity is a major contributor to non-communicable diseases (NCDs), including cardiovascular diseases, type 2 diabetes, and certain cancers (World Health Organization, 2023).

India currently faces a dual burden of malnutrition, where undernutrition coexists with increasing obesity. In West Bengal, this transition is evident across urban, semi-urban, and rural populations. Recent evidence suggests that approximately 22.4% of rural adults are overweight and 30.4% are obese, as well as 15-20% urban school going children are overweight, indicating a shift from obesity being a “disease of affluence” to a widespread public health concern affecting lower- and middle-income groups (Ghosh et al., 2023).

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Obesity results from a complex interaction of genetic, environmental, and behavioral factors and has increased nearly threefold globally since the 1970s (WHO, 2023). It is commonly assessed using Body Mass Index (BMI) and Waist-Hip Ratio, two useful screening tools for categorizing overall nutritional status, though not a definitive diagnostic measure.

Given the rising prevalence and wide-ranging consequences, it is essential to examine obesity not only as a medical condition but also as a socio-economic issue. This study therefore explores the dual burden of obesity in West Bengal by analyzing its prevalence, determinants, health consequences, and economic implications. Understanding these interconnected factors is crucial for designing effective prevention strategies and policy interventions aimed at reducing the long-term health and economic impacts of obesity in the region.

The health consequences of obesity are extensive and include both metabolic effects (such as diabetes, hypertension, cardiovascular diseases, and certain cancers) and mechanical effects (such as osteoarthritis, sleep apnea, and reduced lung function). These conditions significantly increase morbidity and mortality risk (Hruby & Hu, 2015). Evidence shows that higher BMI is directly associated with increased risk of death, particularly from cardiovascular diseases and metabolic disorders (Prospective Studies Collaboration, 2009).

2. Objectives

This study aims to comprehensively examine the growing issue of obesity in West Bengal by assessing its prevalence and identifying key determinants such as lifestyle, dietary patterns, and socio-economic factors. It further seeks to analyze the major health consequences associated with obesity, particularly its role in increasing the risk of non-communicable diseases and how dietary behaviours influence our daily functioning including –stress levels, concentration, emotional stability and physical activity. By integrating nutritional assessment with behavioural outcomes the study provides a comprehensive understanding of how diet impacts both physical and mental health. In addition, the study evaluates the economic burden of obesity in terms of healthcare expenditure, loss of productivity, and financial strain on households and the public health system. It also evaluates the effectiveness of the intervention in improving lifestyles behaviours. Finally, it aims to propose appropriate policy measures, nutritional intervention programmes and preventive strategies to address and reduce the rising impact of obesity in the region.

Keywords: Obesity, West Bengal, Non-communicable diseases, Economic burden, Public health, Nutrition transition

3. Methodology

This study is based on secondary data analysis derived from sources such as the National Family Health Survey (NFHS), ICMR-INDIAB studies, as well as various peer-reviewed journals and government reports. A descriptive and analytical approach was employed to systematically synthesize and interpret data related to obesity trends, associated health outcomes, and economic impacts in West Bengal and across India.

The data were systematically reviewed and synthesized to identify trends in overweight and obesity across different population groups, including gender,

age, and rural–urban distribution. Information on lifestyle factors such as physical inactivity, dietary patterns, and socio-economic determinants was also analyzed. Particular attention was given to studies conducted in West Bengal and eastern India to ensure regional relevance.

For assessing health impacts, evidence linking obesity with non-communicable diseases such as diabetes, hypertension, cardiovascular diseases, and certain cancers was examined. In addition, psychosocial consequences including reduced quality of life, stress level, emotional stability, mental health concerns, and functional limitations were reviewed. The economic burden was evaluated by analyzing direct costs such as healthcare expenditure, hospitalization, and medication, as well as indirect costs including loss of productivity, absenteeism, and premature mortality.

A descriptive analytical approach was used to interpret the findings and identify patterns and relationships between obesity prevalence, health outcomes, and economic consequences. The study also incorporates a comparative perspective where necessary, using national-level data to contextualize the situation in West Bengal. The synthesized findings were then used to highlight key challenges and suggest potential policy and public health interventions.

As this study is based entirely on secondary data, no primary data collection involving human participants was conducted. All information used in the analysis was obtained from publicly available and ethically approved sources. This approach ensures reliability while providing a comprehensive overview of the dual burden of obesity in West Bengal.

4. Result and Discussion

The prevalence of obesity in India has risen sharply, with over 135 million individuals affected and rates ranging from 11.8% to 31.3% depending on region population determinants contribute to this rise, including sedentary lifestyles, reduced physical activity, increase groups. In West Bengal, recent cohort studies highlight a significant increasing population in overweight and obesity, particularly among adults, with prevalence among men rising from 15.2% to 21.0% and among women from 24.1% to 33.8%. This upward trend reflects a rapid nutritional and lifestyle transition in the state. Several key like-consumption of high-calorie dense food, low- socio-economic status, urbanization, increasing screening time, low physical activity level and shifts in occupational patterns. Additionally, socialization, educational level, and gender disparities—especially the higher prevalence among women—play an important role. Overall, lifestyle changes, particularly decreased physical activity and greater reliance on processed foods, are major driving forces behind the growing burden of obesity.

Obesity has profound health consequences and significantly increases the risk of multiple chronic conditions. It is a major contributor to non-communicable diseases (NCDs) such as type 2 diabetes, cardiovascular diseases, hypertension, and certain cancers, thereby elevating morbidity and mortality rates. In addition to its physical health effects, obesity also has important psychosocial impacts, including higher risks of depression, stress and anxiety, reduced quality of

life, and experiences of social stigma and discrimination. Furthermore, it leads to functional limitations such as reduced mobility and an increased risk of disability, affecting daily activities and overall well-being. The growing prevalence of obesity is contributing to a shift in India's disease profile from communicable to non-communicable diseases, thereby increasing long-term healthcare demands and burdening the healthcare system.

Obesity imposes a substantial economic burden through both direct and indirect costs. Direct costs include increased healthcare expenditure for the treatment and management of non-communicable diseases, along with higher hospitalization and medication expenses. In West Bengal, this burden is further intensified by high out-of-pocket health expenditure, socio-economic inequalities, and limited health insurance coverage. Indirect costs arise from loss of productivity due to illness, increased absenteeism, reduced work efficiency, and premature mortality. At the macroeconomic level, obesity places significant strain on the healthcare system and diminishes workforce productivity, ultimately impacting overall economic growth. Recent evidence indicates that obesity is emerging as a major financial challenge for governments and healthcare systems, highlighting the urgent need for effective policy-level interventions.

The findings highlight that West Bengal is experiencing a nutrition transition, characterized by the coexistence of undernutrition and obesity. Urbanization, lifestyle changes, and socio-economic factors are accelerating the obesity epidemic.

The health consequences are severe, with obesity acting as a major driver of NCDs, which are now the leading cause of morbidity and mortality in India. Economically, the burden is substantial, affecting both households and public health systems.

The interplay between health and economic impacts creates a vicious cycle, where poor health increases financial strain, and economic constraints limit access to preventive healthcare.

Beyond physical health, obesity also impacts mental and social well-being, contributing to depression, anxiety, low self-esteem, and social stigma. Discrimination in education, employment, and healthcare settings further exacerbates the psychosocial burden (Puhl & Heuer, 2009).

Economically, obesity imposes a substantial burden through both direct costs (healthcare expenditure, hospitalization, medication) and indirect costs (loss of productivity, absenteeism, premature mortality). Studies estimate that obesity accounts for 2–7% of total healthcare expenditure in developed countries, with rising trends in developing nations like India (Tremmel et al., 2017). In West Bengal, high out-of-pocket expenditure further intensifies the economic strain on households.

Addressing the growing burden of obesity requires a comprehensive and multi-sectoral approach. Efforts should focus on promoting healthy dietary practices and increasing physical activity through public awareness and behavior change initiatives. Strengthening primary healthcare systems is essential for early detection, screening, and management of obesity and related conditions. School-based and community-level awareness programs can play a crucial role in prevention by

targeting younger populations and vulnerable groups. Policy measures such as taxation on unhealthy foods and sugar-sweetened beverages may help reduce their consumption. Additionally, expanding health insurance coverage can alleviate the financial burden on affected individuals and families. Effective control of obesity also requires coordinated action across multiple sectors, including health, education, and urban planning, to create supportive environments for healthier lifestyles.

5. Conclusion

Obesity in West Bengal represents a growing public health and economic challenge. Its increasing prevalence, coupled with severe health consequences and rising healthcare costs, underscores the urgency of preventive and policy interventions. Addressing obesity requires a comprehensive approach involving individual behavior change, community engagement, and systemic policy reforms.

The economic burden of obesity is substantial and multifaceted. Rising healthcare expenditure, increased out-of-pocket payments, and long-term treatment costs create financial strain on households. Indirect costs such as productivity loss, absenteeism, disability, and premature mortality further impact economic growth and workforce efficiency. In West Bengal, limited health insurance coverage and socio-economic inequalities intensify these financial challenges.

Addressing the dual burden of obesity requires comprehensive and multi-sectoral strategies. Public health interventions should focus on promoting healthy diets, increasing physical activity, and raising awareness about obesity-related risks. Strengthening primary healthcare systems for early screening and management is also essential. School-based programs, community-level initiatives, and supportive policy measures such as regulation of unhealthy foods and urban planning for active lifestyles can contribute to long-term prevention.

In conclusion, obesity in West Bengal represents a growing public health and economic challenge. Addressing this dual burden requires integrated interventions focusing on prevention, lifestyle modification, and policy-level strategies.

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Original Article: Humanities and Cultural Studies

Diabetes Awareness Among Secondary School Students in West Bengal: A Cross-Sectional Study Across Urban and Rural Settings (2023–2025) During 'Student Awareness Program on NCD' Conducted by 'Diabetes Awareness & You (DAY)'

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ABSTRACT:

Background: Diabetes mellitus is an escalating public health challenge in India, with increasing prevalence among younger populations. Early awareness is critical to prevention. This cross-sectional study assessed diabetes-related knowledge and its sociodemographic correlates among secondary school students from urban and rural areas of West Bengal. Methods: Data were collected from 1,386 students across multiple schools during 'Student Awareness Program on NCD' conducted by 'Diabetes Awareness & You (DAY)' across 2023–25, using a structured questionnaire covering demographics, anthropometric measurements, lifestyle behaviours, and diabetes awareness. Awareness was quantified as a composite score (0–5). Statistical analyses included independent t-tests, Pearson correlation, one-way ANOVA, chi-square tests, and OLS regression. Results: The mean awareness score was 1.75 (SD = 1.10), indicating generally limited knowledge. Female students (mean = 2.13) demonstrated significantly higher awareness than males (mean = 1.99; $p = 0.037$). BMI category was significantly associated with awareness levels (ANOVA, $F = 5.547$, $p < 0.001$). Rural–urban differences in awareness were not statistically significant ($p = 0.419$). Regression modelling revealed that neither age nor BMI independently predicted awareness. Conclusions: Diabetes awareness among adolescent students in West Bengal remains inadequate. Targeted, school-based educational interventions are urgently required, with particular focus on male students, rural communities, and students across all BMI categories.

1.0. Introduction

Diabetes mellitus (DM) is one of the fastest-growing non-communicable diseases (NCDs) worldwide, affecting an estimated 537 million adults globally as of 2021, a figure projected to reach 783 million by 2045(2021; Mandal et al., 2024). India bears a particularly high burden, with approximately 77 million diagnosed individuals, earning it the designation of the diabetes capital of the world. Critically, the epidemiological profile of diabetes is shifting towards younger age groups, driven by urbanisation, dietary transitions, physical inactivity, and rising rates of childhood obesity (Muralidharan, 2024)

Prevention strategies hinge upon public awareness and early knowledge of risk factors, disease mechanisms, and lifestyle modification. Adolescence represents a uniquely important window for health education interventions; behaviours established during this period—dietary choices, physical activity patterns, and health literacy—tend to persist into adulthood and influence long-term disease risk. Secondary school students in India, therefore, constitute a high-priority population for diabetes awareness research and education (Kusumawati et al., 2025).

Despite this, evidence on diabetes knowledge among secondary school

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students in West Bengal—a state encompassing a diverse mix of urban, semi-urban, and rural populations—remains sparse. Most existing studies have focused on adult populations or clinical settings, leaving a significant gap in understanding adolescent awareness across sociodemographic strata. Furthermore, the role of anthropometric characteristics such as body mass index (BMI) in shaping or correlating with diabetes knowledge among this age group has been insufficiently explored (Lubinda, 2024).

The present study addresses these gaps through a structured, large-scale cross-sectional survey conducted across multiple schools in West Bengal during 2023–2025, examining the level of diabetes awareness among students and its associations with gender, residential setting, age, and BMI (Pattanayak et al., 2026).The primary objective of this study was to assess the level of diabetes awareness among secondary school students in urban and rural areas of West Bengal. Even diabetes awareness scores across gender groups, differences in awareness between rural and urban student populations, the association between BMI category and awareness scores, and whether age or BMI independently predict diabetes awareness through regression modelling were examined.

2. Materials and Methods

2.1 Study Design and Setting

A cross-sectional, observational study design was employed during 'Student Awareness Program on NCD' conducted by 'Diabetes Awareness & You (DAY)'. Data collection was conducted across two academic years (2023–24 and 2024–25) at secondary schools in West Bengal, India, spanning diverse demographic settings including urban localities (City), rural areas (Rural), and peri-urban/semi-rural areas (Mafarshal, Chandibari, Baruipur, and others). Participating institutions included Naktala High School (urban, Kolkata), Krishnachandrapur High School (rural), and other schools across the South 24 Parganas and associated districts.

Keywords: Diabetes Mellitus; Adolescent health; Awareness; BMI; Rural-urban; West Bengal; School-based intervention

2.2 Participants and Sampling

The study population comprised students enrolled in Classes IX through XII (approximately ages 14–18). A convenience sampling approach was adopted, enrolling all consenting students present on the days of data collection. The final analytic dataset included 1,386 students across 184 measured variables. For the sub-analysis involving complete anthropometric and awareness data, a refined sample of 42 participants with full observations was used for regression modelling.

2.3 Data Collection Instrument

A comprehensive, pre-tested structured questionnaire was administered to students with the assistance of trained field investigators. The questionnaire captured: (a) sociodemographic information (name, school, class, date of birth, gender, family details, economic status); (b) anthropometric measurements (height in cm, weight in kg; BMI calculated as kg/m^2); (c) lifestyle behaviours (dietary patterns, physical activity, sleep duration, food sources, screen time, and substance use); and (d) diabetes awareness, assessed through

five Likert-style knowledge items covering aetiology, hereditary risk, preventive lifestyle modifications, diagnostic indicators, and symptomatic changes associated with diabetes.

2.4 Awareness Score Computation

An Awareness Score (range: 0–5) was derived as a composite of correct responses to five targeted knowledge questions. Higher scores indicate greater diabetes awareness. The mean awareness score across the total sample was 1.75 (SD = 1.10), with scores ranging from 0 to 5(Sathish et al., 2023).

2.5 Statistical Analysis

Data cleaning involved standardising variable names, recoding YES/NO responses, managing missing values, and converting continuous variables. All statistical analyses were performed using Python (pandas, scipy, statsmodels). The following inferential tests were applied:

- Independent samples t-test: to compare awareness scores by gender and by rural/urban demography.
- Pearson correlation: to assess associations between age/BMI (continuous) and awareness score.
- One-way ANOVA: to examine awareness score differences across BMI categories.
- Chi-square test: to evaluate the association between gender and diabetes awareness (dichotomised).
- Ordinary Least Squares (OLS) regression: to identify independent predictors of awareness score (age, BMI).Statistical significance was set at $\alpha = 0.05$ for all tests.

3. Results

3.1 Sample Characteristics

The study enrolled 1,386 students across all participating schools. Among those with complete gender data, 648 (47%) were female, 366 (26%) were male, and 372 (27%) had missing gender entries. The demographic distribution included students from rural areas (n = 367), city/urban settings (n = 178), and various peri-urban localities. Table 1 presents a summary of the descriptive statistics for key continuous variables

Variable	n	Mean	SD	Min	Max
Age (years)	42	42.79	8.01	23	61
Weight (kg)	974	49.22	12.11	23	154
BMI (kg/m²)	939	20.02	4.17	11.1	50.87
Awareness Score (0–5)	1,386	1.75	1.1	0	5

Table 1. Descriptive Statistics of Key Continuous Variables (n = 1,386 total; sub-samples vary by variable availability)

3.2 Gender Differences in Awareness

An independent samples t-test revealed a statistically significant difference in awareness scores between male and female students ($t = -2.089$, $df \approx 37$, $p = 0.037$). Female students demonstrated higher mean awareness (Mean = 2.13) compared to male students (Mean = 1.99). This finding suggests that female students in this sample possessed relatively greater diabetes-related knowledge, a pattern consistent with prior literature on gender differences in health literacy among adolescents.

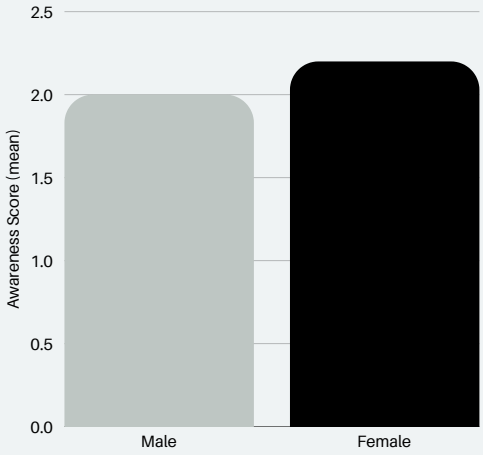

Figure 1. Gender Comparison of Diabetes Awareness Scores

3.3 Rural vs. Urban Awareness

A comparison of awareness scores between rural and urban students did not yield a statistically significant result (Rural Mean = 1.95 vs. City Mean = 1.87; $t = 0.809$, $p = 0.419$). While a marginal numerical difference was observed—with rural students scoring slightly higher on average—this difference did not reach statistical significance, indicating that residential setting alone may not be a strong determinant of diabetes awareness at the adolescent level.

3.4 BMI and Awareness

Pearson correlation analysis between BMI (continuous) and awareness score revealed a statistically significant positive association ($r = 0.113$, $p = 0.001$), suggesting that students with higher BMI tended to have marginally higher awareness scores. This relationship, while statistically significant, is of modest magnitude and should be interpreted cautiously.A one-way ANOVA comparing awareness scores

Test	Variables	Statistic	p-value	Result
Independent t-test	Gender vs. Awareness Score	$t = -2.089$	0.037	Significant
Independent t-test	Demography vs. Awareness Score	$t = 0.809$	0.419	Not Significant
Pearson Correlation	Age vs. Awareness Score	$r = -0.145$	0.36	Not Significant
Pearson Correlation	BMI vs. Awareness Score	$r = 0.113$	0.001	Significant
One-way ANOVA	BMI Category vs. Awareness Score	$F = 5.547$	< 0.001	Significant
Chi-square	Gender vs. Diabetes Awareness	$\chi^2 = 4.866$	0.088	Not Significant

Table 2. Summary of Statistical Significance Tests

across BMI categories (underweight, normal, overweight, obese) demonstrated a highly significant difference ($F = 5.547$, $p < 0.001$). Post-hoc analyses (not reported here in detail) would be required to identify which specific BMI category pairs differ, but the overall pattern suggests that BMI classification is meaningfully associated with variation in awareness levels.

3.5 Age and Awareness

The Pearson correlation between age and awareness score was negative but not statistically significant ($r = -0.145$, $p = 0.360$), indicating no meaningful linear relationship between students' age and their level of diabetes awareness in this sample.

3.6 Regression Analysis

An OLS regression model with awareness score as the dependent variable and age and BMI as predictors was estimated. The overall model was not statistically significant ($F = 0.524$, $p = 0.597$, $R^2 = 0.029$, Adjusted $R^2 = -0.026$), indicating that age and BMI together explain only approximately 2.9% of the variance in awareness scores, with no independent contribution reaching significance.

Predictor	Coefficient (β)	Std. Error	t	p-value	95% CI
Intercept	3.353	1.396	2.403	0.022	[0.520, 6.186]
Age	−0.024	0.026	−0.905	0.372	[−0.077, 0.030]
BMI	−0.013	0.055	−0.225	0.823	[−0.125, 0.100]

Table 3. OLS Regression Results: Predictors of Awareness Score

(Model fit: $R^2 = 0.029$; Adjusted $R^2 = -0.026$; $F(2, 35) = 0.524$; $p = 0.597$. Observations: n = 38).

The non-significance of age and BMI as independent predictors in the regression model, despite the significant bivariate findings for BMI (correlation and ANOVA), suggests that the association between BMI category and awareness may be mediated or confounded by other variables not included in this parsimonious model, such as school type, parental education, or prior health exposure.

4. Discussion

This study provides a comprehensive analysis of diabetes awareness among secondary school students in West Bengal during 'Student Awareness Program on NCD' conducted by 'Diabetes Awareness & You (DAY)', drawing on a large, multi-site dataset. Several key findings merit discussion.

Interestingly, the overall mean awareness score of 1.75 out of 5 reflects a concerning deficit in diabetes-related knowledge across the student population. Given the escalating prevalence of Type 2 diabetes and the established role of lifestyle factors—diet, physical inactivity, obesity—in its development, this level of knowledge is insufficient to support meaningful preventive behaviour change.

Surprisingly, the gender gap in awareness, with female students scoring significantly higher, aligns with global evidence suggesting that adolescent girls are more engaged in health-seeking behaviours and health information uptake. Cultural norms, differential health education exposure, or greater family-level discussions around health among female adolescents may partially explain this disparity. Targeted awareness campaigns should prioritise engaging male students through culturally resonant messaging and peer-based intervention(Al-Rukban et al., 2025).

Even the absence of a significant rural–urban difference in awareness scores is a noteworthy and somewhat counterintuitive finding. Prior studies have suggested that urban populations benefit from greater healthcare exposure and media access. The non-significant result here may reflect the reach of school-based health education programmes into rural areas, or may indicate that urban students in this sample did not meaningfully access diabetes information through non-school channels. It also underscores that geographic location is not a reliable proxy for health literacy in this context(Brucal et al., 2026).

The significant association between BMI category and awareness has been observed. Students with higher BMI may have had greater personal or familial exposure to metabolic health concerns, prompting greater awareness. However, the regression model's failure to establish BMI as an independent predictor of awareness, controlling for age, suggests that this relationship is nuanced and likely embedded within a complex web of socioeconomic and educational determinants(Sękowski et al., 2025).

The major finding of the study is that neither age nor BMI alone is sufficient to predict awareness. This points to the primacy of educational exposure and institutional factors, such as curriculum design, teacher training, and health programme outreach, as the principal drivers of diabetes knowledge among adolescents. Future research should incorporate these structural variables to build more explanatory models(Hussain et al., 2026).

5. Limitations

Several limitations should be acknowledged. The convenience sampling approach limits the generalisability of findings to the broader population of West Bengal students. The analytic subsample for regression (n = 38 with complete data) is small, reducing statistical power and increasing the risk of type II errors. The awareness questionnaire, while informative, captured a relatively limited domain of diabetes knowledge and may not fully represent health literacy. Social desirability bias, common in self-reported surveys, may have inflated or deflated certain responses. Longitudinal data to assess changes in awareness over time are absent. Future studies should employ random sampling, larger subsamples with complete data, validated instruments, and include structural variables such as curriculum exposure, parental education, and media access.

6. Conclusions

This cross-sectional study found that diabetes awareness among secondary school students in West Bengal is at a level well below what is needed for effective health behaviour adoption. Gender significantly predicts awareness, with female students demonstrating greater knowledge than their male peers. BMI category is associated with awareness levels, though not as an independent predictor in multivariate modelling. Rural–urban residence does not significantly differentiate awareness. The collective weight of these findings underscores the urgency of structured, school-based diabetes education programmes—standardised, gender-sensitive, and integrated across both urban and rural settings—to reduce the growing burden of diabetes in future generations.

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Review Article: Pure & Applied Sciences

Chrononutrition in Diabetes Management: A Circadian-Based Dietary Approach for Optimizing Glycemic Control

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ABSTRACT:
Chrononutrition integrates circadian biology with nutritional science and emphasizes that meal timing significantly influences metabolic regulation.[1,2] Increasing evidence suggests that disruption of circadian rhythm contributes to impaired glucose metabolism, insulin resistance, obesity, and progression of Type 2 Diabetes Mellitus (T2DM).[3,4] Current evidence supports early time-restricted eating (TRE) and regular meal timing for improving glycemic control and cardiometabolic outcomes.[4,6] Circadian regulation of metabolism involves molecular clock genes, hormonal signaling pathways, and peripheral metabolic clocks that coordinate energy homeostasis. Emerging evidence also highlights the influence of chronotype and gut microbiome rhythmicity on metabolic health. This narrative review critically evaluates current evidence regarding chrononutrition and diabetes management, focusing on biological mechanisms, meal timing, time-restricted eating, chronotype-based nutrition, and clinical implications. Although chrononutrition appears promising as a non-pharmacological strategy for optimizing glycemic control, further large-scale randomized controlled trials are necessary to establish standardized clinical recommendations.

1.0. Introduction

Diabetes Mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from impaired insulin secretion, insulin resistance, or both.[1] The global prevalence of Type 2 Diabetes Mellitus (T2DM) continues to rise, creating substantial public health and economic burdens worldwide. Lifestyle-related factors including diet quality, physical inactivity, obesity, and sleep disruption significantly contribute to the development and progression of T2DM.[2]

Recent evidence suggests that not only the quality and quantity of food intake but also the timing of eating significantly influence glucose metabolism, insulin sensitivity, and energy regulation.[2,5]] Chrononutrition has therefore emerged as an important field examining the interaction between circadian biology and nutritional intake.[3] The concept emphasizes aligning dietary behaviors with the body's biological clock to optimize metabolic health.

Circadian rhythms are endogenous 24-hour physiological cycles regulated by a central clock located in the suprachiasmatic nucleus (SCN) of the hypothalamus and peripheral clocks distributed in metabolic tissues including the liver, pancreas, adipose tissue, skeletal muscle, and gastrointestinal tract.[5,14] These biological clocks regulate hormonal secretion, glucose metabolism, lipid metabolism, appetite regulation, and energy expenditure.

Disruption of circadian alignment through irregular eating patterns, shift work, sleep deprivation, and late-night eating may impair metabolic homeostasis and increase the risk of obesity, insulin resistance, and T2DM.[9,12] Emerging evidence supports chrononutrition interventions such as early time-restricted eating (TRE), regular meal

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timing, and chronotype-based dietary strategies as potential adjunctive approaches for diabetes management.

This narrative review critically examines current evidence regarding chrononutrition and its role in optimizing glycemic control and metabolic health in individuals with T2DM.

2. METHODOLOGY

This article was conducted as a narrative review focusing on the role of chrononutrition in diabetes management and metabolic regulation. Literature searches were performed using PubMed, Scopus, ScienceDirect, and Google Scholar databases for studies published between January 2014 and March 2026. The search strategy combined keywords and Medical Subject Headings (MeSH) terms including "chrononutrition," "circadian rhythm," "meal timing," "time-restricted eating," "chronotype," "glycemic control," "insulin sensitivity," and "Type 2 Diabetes Mellitus."

Peer-reviewed randomized controlled trials, observational studies, systematic reviews, meta-analyses, and relevant mechanistic studies published in English were considered for inclusion. Priority was given to studies examining meal timing interventions, circadian biology, metabolic outcomes, and diabetes-related parameters in human populations. Animal studies were included selectively when essential for explaining molecular and physiological mechanisms.

Studies lacking relevance to diabetes or metabolic regulation, conference abstracts without full-text availability, duplicate publications, and non-English articles were excluded. Titles and abstracts were screened for relevance, followed by full-text evaluation of eligible articles. Approximately 85 articles were reviewed during manuscript preparation, with emphasis placed on recent evidence published between 2020 and 2026 to ensure contemporary clinical relevance.

Keywords: Chrononutrition; Circadian Rhythm; Time-Restricted Eating; Glycemic Control; Type 2 Diabetes Mellitus; Meal Timing

3. CIRCADIAN RHYTHM AND METABOLIC REGULATION

Circadian rhythms play a fundamental role in metabolic regulation through interactions between molecular clock genes and endocrine signaling pathways. Core clock genes including CLOCK, BMAL1, PER, and CRY regulate glucose metabolism, insulin secretion, lipid metabolism, mitochondrial function, and energy expenditure.[14]

At the molecular level, circadian regulation of metabolism is coordinated through transcriptional–translational feedback loops involving CLOCK and BMAL1 genes, which regulate expression of PER and CRY proteins. These molecular oscillations influence pancreatic beta-cell function, hepatic glucose production, skeletal muscle insulin sensitivity, and adipocyte metabolism. Experimental evidence suggests that circadian disruption may impair insulin signaling pathways, reduce GLUT-4-mediated glucose uptake, increase oxidative stress, and promote chronic low-grade inflammation, thereby contributing to insulin resistance and metabolic dysfunction.[14,19]

Hormonal mediators including cortisol and melatonin also exhibit circadian oscillations that influence metabolic regulation. Cortisol levels typically peak

in the early morning and promote glucose mobilization, while melatonin secretion increases during nighttime and may impair insulin secretion and glucose tolerance during late-night eating.[5]

Experimental studies demonstrate that circadian misalignment increases oxidative stress, inflammatory cytokines, appetite dysregulation, and metabolic abnormalities. Shift workers exhibit higher prevalence rates of obesity, metabolic syndrome, and T2DM, further supporting the relationship between circadian disruption and metabolic disease.[3]

4. ROLE OF MEAL TIMING IN DIABETES MANAGEMENT

Meal timing significantly influences glycemic control, insulin sensitivity, and overall metabolic health.[8] Studies demonstrate that consuming larger meals earlier in the day improves glucose tolerance, insulin responsiveness, satiety, and body weight regulation compared with late-night eating patterns.[8,10]

Several clinical investigations suggest that early daytime eating aligns more effectively with circadian physiology and promotes better metabolic outcomes. Early meal timing may enhance insulin sensitivity, reduce postprandial glucose excursions, and improve lipid metabolism. In contrast, late dinner consumption and nighttime snacking are associated with prolonged hyperglycemia, impaired lipid metabolism, and increased cardiometabolic risk.[12]

Although most short-term trials report improvements in insulin sensitivity and fasting glucose following meal-timing interventions, findings remain somewhat inconsistent due to variations in study design, participant characteristics, and adherence rates Some investigations suggest that improvements in glycemic outcomes may partly result from caloric restriction and weight loss rather than meal timing alone. Individual factors such as chronotype, sleep quality, medication use, and physical activity may additionally influence metabolic responses to chrononutrition interventions.

5. TIME-RESTRICTED EATING

Time-restricted eating (TRE) is a dietary intervention involving restriction of food intake to a fixed daily eating window, usually between 6 and 10 hours.[7] TRE has gained increasing attention as a practical chrononutrition strategy for improving metabolic health.

Studies indicate that TRE may improve fasting glucose levels, insulin sensitivity, blood pressure, body weight, inflammatory markers, and lipid metabolism.[4,6] Early time-restricted eating (eTRE), in which food intake occurs earlier during the day, appears particularly beneficial due to better alignment with circadian physiology.[4]

Despite encouraging findings, interpretation of TRE studies requires caution. Several intervention trials involve concomitant caloric reduction and weight loss, making it difficult to determine whether metabolic improvements result specifically from meal timing alignment or from reduced overall energy intake. Furthermore, adherence to early eating schedules may be challenging in free-living populations due to occupational demands, social

ABBREVIATIONS:
T2DM: Type 2 Diabetes Mellitus
TRE: Time-Restricted Eating
CLOCK: Circadian Locomotor Output Cycles Kaput
BMAL1: Brain and Muscle ARNT-Like 1
PER: Period Circadian Regulator
CRY: Cryptochrome Circadian Regulator
SCN: Suprachiasmatic Nucleus
RCTs: – Randomized Controlled Trials

eating patterns, and cultural dietary habits. Variability in eating window duration, participant metabolic status, and study endpoints further contributes to heterogeneity across published findings.[4,6,16]

Additional large-scale randomized controlled trials are necessary to determine optimal TRE schedules for patients with T2DM.

6. CHRONOTYPE-BASED NUTRITION

Chronotype refers to an individual's natural preference for sleep-wake timing and daily behavioral patterns.[11]] Chronotype significantly influences eating behavior, meal timing, sleep quality, physical activity, and metabolic outcomes.

Evening chronotypes are more likely to consume late-night meals, skip breakfast, experience irregular eating schedules, and demonstrate poorer glycemic control compared with morning chronotypes.[11]

Current evidence regarding chronotype-based nutrition remains preliminary, as most available studies are observational and cannot establish causality. Moreover, chronotype itself may interact with sleep duration, physical activity, psychosocial stress, and occupational schedules, creating potential confounding effects that complicate interpretation of metabolic outcomes.[11,18]

Emerging evidence suggests that individualized meal timing strategies based on chronotype may improve adherence and metabolic outcomes. Personalized chrononutrition approaches therefore represent a promising component of precision nutrition and diabetes care.

7. GUT MICROBIOME AND CHRONONUTRITION

Emerging evidence suggests that the gut microbiome also exhibits circadian rhythmicity and may interact closely with host metabolism.[13] Meal timing influences microbial diversity, intestinal permeability, nutrient metabolism, inflammatory signaling, and glucose regulation.

Disruption of circadian eating patterns may alter gut microbial composition and contribute to metabolic dysfunction. Conversely, time-restricted eating and circadian-aligned dietary patterns may help restore microbial rhythmicity and improve metabolic homeostasis.

Interactions between chrononutrition and the gut microbiome may therefore represent an important future direction for diabetes management and precision medicine approaches.

8. CLINICAL IMPLICATIONS

Chrononutrition offers a practical and non-pharmacological adjunctive strategy for diabetes management. Dietary counseling focusing on meal timing consistency, reduction of late-night eating, and alignment of eating patterns with circadian rhythms may improve glycemic control and cardiometabolic outcomes.

Healthcare professionals including dietitians, diabetes educators, and clinicians may incorporate chrononutrition principles into individualized diabetes care plans. Early meal timing and structured eating windows may additionally improve patient adherence and lifestyle modification outcomes.

However, chrononutrition interventions should be individualized according to

age, lifestyle, medication use, sleep patterns, work schedules, and cultural dietary practices.

9. LIMITATIONS OF CURRENT EVIDENCE

Despite increasing interest in chrononutrition, several limitations exist within the current body of evidence. Many available studies are observational or short-term clinical trials with limited sample sizes.[6,7] Considerable heterogeneity exists regarding meal timing protocols, duration of intervention, participant demographics, and metabolic endpoints assessed.

In addition, long-term adherence to chrononutrition interventions remains uncertain in free-living populations. Most studies have also been conducted in specific adult populations, limiting generalizability across different ethnic, cultural, and socioeconomic groups.

Further multicenter randomized controlled trials are needed to establish standardized and evidence-based chrononutrition guidelines for diabetes management.

10. FUTURE RESEARCH DIRECTIONS

Future research should focus on large-scale randomized controlled trials evaluating long-term effects of chrononutrition interventions in individuals with T2DM. Standardization of TRE protocols and meal timing interventions is necessary to improve comparability between studies.

Additional investigation is also required regarding chronotype-based nutrition, circadian gene expression, and interactions between meal timing and the gut microbiome. The integration of wearable technology and continuous glucose monitoring systems may further support personalized chrononutrition approaches.

Understanding cultural, behavioral, and socioeconomic influences on meal timing may additionally improve implementation of chrononutrition strategies in clinical practice.

11. CONCLUSION

Chrononutrition represents a promising adjunctive strategy for diabetes management by aligning dietary intake with circadian biology.[1,7] Evidence suggests that appropriate meal timing, early time-restricted eating, and circadian-aligned dietary patterns may improve glycemic control, insulin sensitivity, and overall cardiometabolic health.[4,8]

Emerging areas such as chronotype-based nutrition and gut microbiome modulation further support the role of personalized chrononutrition in precision medicine. However, additional large-scale longitudinal and randomized controlled studies are required before universal clinical recommendations can be established.

Integration of chrononutrition principles into clinical practice may provide a cost-effective and non-pharmacological approach for improving metabolic outcomes in individuals with T2DM.

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An Analytical Study on the Prevalence and Nutritional Profile of Constipation

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ABSTRACT:
Constipation is a prevalent gastrointestinal disorder affecting individuals across diverse populations worldwide. Despite its high occurrence, it is frequently overlooked as a minor health issue. Chronic constipation, however, can substantially impair quality of life by causing physical discomfort, psychological stress, and increased healthcare burden. This study was conducted to evaluate the prevalence, nutritional profile, and clinical status of constipation in a community-based population.
A cross-sectional analytical design was adopted, including 100 participants selected through convenience sampling. Data collection involved structured questionnaires, anthropometric measurements, dietary assessments, and clinical evaluations. Statistical analysis was performed using descriptive methods and Analysis of Variance (ANOVA).
The results indicated a high prevalence of self-reported constipation (67%). Common symptoms reported were hard stools (71%), straining during defecation (60%), and a sensation of incomplete evacuation (64%). Nutritional analysis revealed a diet high in energy but poor in essential nutrients, particularly characterized by excessive carbohydrate intake and inadequate dietary fiber consumption. The mean daily fiber intake was 18 g, significantly below the recommended 30 g. ANOVA findings identified dietary fiber as the only nutrient significantly associated with constipation ($p < 0.001$). Additionally, sedentary lifestyle patterns and a high prevalence of overweight and obesity were observed among participants. Many respondents also reported reliance on Ayurvedic remedies for symptom management.
In conclusion, constipation is a multifactorial lifestyle-related disorder influenced by poor dietary habits, low fiber intake, and physical inactivity. These findings highlight the importance of targeted public health strategies focusing on nutrition education and lifestyle modification.

1.0. Introduction

Constipation is a common gastrointestinal disorder affecting individuals across all age groups and populations. It is clinically characterized by infrequent bowel movements, hard stools, excessive straining, and a sensation of incomplete evacuation. Although often perceived as a minor ailment, chronic constipation can significantly impair physical health, psychological well-being, and overall quality of life (Bharucha et al., 2013).

Globally, the prevalence of constipation varies widely, ranging from 2% to 30%, with an average prevalence of approximately 14% (Suares& Ford, 2011). These variations are largely attributed to differences in dietary habits, lifestyle patterns, diagnostic criteria, and sociocultural factors. In India, rapid urbanization, dietary transitions toward refined and processed foods, and reduced physical activity have contributed to an

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increasing burden of constipation and other lifestyle-related disorders (Rao et al., 2016).

Constipation is broadly classified into primary (functional) and secondary types. Primary constipation includes normal-transit constipation, slow-transit constipation, and defecatory disorders, whereas secondary constipation arises from underlying medical conditions, medication use, or metabolic abnormalities. The Rome IV criteria are widely accepted as the standard diagnostic framework for functional constipation (Drossman, 2016).

Dietary and lifestyle factors play a crucial role in the etiology of constipation. Low intake of dietary fiber and fluids, coupled with sedentary behavior, significantly impairs bowel motility. Traditional Indian diets, once rich in whole grains, fruits, and vegetables, are increasingly being replaced by energy-dense, nutrient-poor processed foods, thereby exacerbating the problem (Slavin, 2013).

This study aims to assess the prevalence, nutritional profile, and clinical status of constipation in a community-based population. By generating region-specific evidence, the research seeks to inform targeted dietary interventions and public health strategies.

Justification of the Study

The rationale for the present study is grounded in the increasing prevalence of constipation and the paucity of comprehensive community-based data in India. Existing literature is predominantly hospital-based, which may not accurately reflect the true burden and determinants of constipation in the general population. Therefore, a community-level assessment is essential to generate more representative and context-specific evidence.

This study addresses this gap by providing localized insights into the prevalence and determinants of constipation, with particular emphasis on regional dietary practices and lifestyle patterns. It underscores the critical role of nutrition—especially dietary fiber—in maintaining optimal gastrointestinal function. Furthermore, the study adopts a multidimensional approach by integrating clinical, anthropometric, dietary, and lifestyle parameters to better understand the multifactorial nature of constipation.

The findings are expected to contribute significantly to the existing body of knowledge and will be valuable for healthcare professionals, nutritionists, public health practitioners, and policymakers. They may facilitate the development of targeted preventive and therapeutic strategies, as well as evidence-based dietary guidelines and health promotion programs.

Keywords: Constipation, Dietary Fiber, Nutritional Assessment, Lifestyle Factors, Public Health Nutrition, Gastrointestinal Health.

2.0. Objectives of the Study

Primary Objectives:

1. To determine the prevalence of constipation among the study population.
2. To assess the nutritional status of the respondents.
3. To evaluate the clinical profile associated with constipation.
4. To analyze the demographic and anthropometric characteristics of the participants.

Secondary Objectives:

1. To examine dietary patterns and nutrient intake among the respondents.

2. To identify lifestyle factors associated with constipation.
3. To evaluate the role of dietary fiber in gastrointestinal health.
4. To assess the management practices adopted by individuals experiencing constipation

3.0. Materials and Methods

A cross-sectional analytical study was conducted to assess the prevalence and determinants of constipation in a community-based population. The study included a total of 100 respondents selected through convenience sampling, and informed consent was obtained from all participants prior to data collection. The research was carried out under the support and guidance of members, scientists, and researchers associated with the Nurture Academy Welfare Trust, ensuring methodological rigor and ethical compliance.

Data were collected using a combination of validated tools, including a structured questionnaire, anthropometric measurements, a 24-hour dietary recall, a Food Frequency Questionnaire (FFQ), and clinical assessment. Anthropometric parameters such as height and weight were measured using standardized procedures, and Body Mass Index (BMI) was calculated using the formula: weight (kg) divided by height (m^2).

Dietary intake was assessed and analyzed using the Nutritive Value of Indian Foods database and compared with the recommended dietary allowances prescribed by the Indian Council of Medical Research (ICMR). This enabled the evaluation of macro- and micronutrient adequacy, with particular emphasis on dietary fiber intake.

Statistical analysis was performed using appropriate descriptive and inferential methods, including mean, standard deviation, percentages, and Analysis of Variance (ANOVA), to determine associations between dietary, clinical, and lifestyle factors and the prevalence of constipation.

4.0. Results and Discussion

The socio-demographic profile of the study population revealed that the majority of respondents belonged to the 30–49 years age group, with females constituting 64% of the sample. A high proportion of participants (65%) reported engagement in sedentary occupations, reflecting limited physical activity levels.

Assessment of anthropometric status indicated that 55% of respondents were either overweight or obese, suggesting a considerable prevalence of metabolic risk factors within the study group. These findings are consistent with the observed lifestyle patterns and dietary habits.

Dietary analysis demonstrated a predominance of carbohydrate-rich foods with inadequate intake of dietary fiber. Daily consumption of fruits and vegetables was below recommended levels, and the inclusion of millets in the diet was minimal. The mean daily energy intake was estimated at 1950 kcal, whereas the average dietary fiber intake was 18 g/day, significantly lower than the recommended 30 g/day.

The prevalence of self-reported constipation was found to be 67%. The most commonly reported symptoms included hard stools, excessive straining during defecation, and a sensation of incomplete evacuation. Statistical analysis using ANOVA revealed that dietary fiber was the only nutrient significantly associated with

constipation ($p < 0.001$), highlighting its critical role in maintaining gastrointestinal health.

Lifestyle factors such as sedentary behavior, inadequate sleep, and low levels of physical activity were identified as significant contributors to constipation. In terms of management practices, the majority of respondents reported adopting dietary modifications and the use of Ayurvedic remedies for symptom relief.

Overall, the findings underscore the multifactorial nature of constipation, with strong associations between dietary inadequacies, lifestyle factors, and clinical outcomes.

5.0. Conclusion

The present study concludes that constipation is highly prevalent within the community and is predominantly associated with inadequate dietary fiber intake, sedentary lifestyle patterns, and suboptimal dietary habits. The findings emphasize the critical role of nutrition and physical activity in maintaining gastrointestinal health. Low consumption of fiber-rich foods, coupled with insufficient physical movement, appears to be a major contributing factor to the burden of constipation observed in the study population.

Furthermore, the study highlights the need for strengthened public health interventions focusing on nutrition education, lifestyle modification, and preventive healthcare strategies. Promoting balanced diets rich in whole grains, fruits, and vegetables, along with encouraging regular physical activity, can significantly reduce the risk of constipation. Additionally, the integration of evidence-based modern medical approaches with traditional Ayurvedic practices may provide effective, accessible, and culturally acceptable management options.

Recommendations

1. Encourage increased intake of dietary fiber through the consumption of fruits, vegetables, and whole grains.
2. Promote regular physical activity to improve bowel motility and overall health.
3. Advocate for adequate daily fluid intake to support digestive function.
4. Enhance public awareness regarding gastrointestinal health and preventive practices.
5. Integrate nutritional counseling and lifestyle education into primary healthcare services.
6. Conduct large-scale, population-based studies to generate more comprehensive and generalizable data.

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'Diabetes Awareness and You (DAY)' is a not-for-profit social welfare Organization. Since its inception in 2006, we have been instrumental in conducting a slew of initiatives in building up public awareness about prevention and management of Diabetes, conducting school awareness programs, adopting and conducting diabetes camps in villages, live workshops among communities, providing free insulin /medicines/tests to those who cannot afford treatment. We have also initiated the idea to establish the role of Diabetes Educators in our society and dedicate "5th September" as International Diabetes Educator's Day (IDED) since 2016 (launched by the then IDF President) and organizing DAYDEIC (DAY Diabetes Educator's International Conference) annually. The THEME of IDED (2022-26) is: 'Access to Diabetes Education for ALL'. To establish the role of Diabetes Educators in our society and to recognize their importance, we have also instituted the award of 'Best Indian Diabetes Educator of the year' since 2019-20.This year we have completed our **19** years of glorious journey. Please visit us at www.day.org.in and at FB www.facebook.com/day.org.in.

About NAWT:

Nurture Academy Welfare Trust (NAWT), a nonprofit organization established in 2020 in West Bengal, is dedicated to empowering marginalized communities through sustainable initiatives in education, health, hygiene, and environmental development. Guided by the vision of fostering long-term positive change through value-based education and social awareness, NAWT strives to democratize access to education and employability, nurturing sustainable community growth for a peaceful and inclusive world where every child can realize their full potential. NAWT believes that education is the lighting of a fire—an ignited lamp that can kindle countless others—guided by the spirit of innovation to "Learn to Teach, Learn to Earn," and "Connect Dream with Emotion." Please visit for more details: www.nurtureacademywelfaretrust.co.in

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