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Prevalence of Malnutrition Among JenuKuruba (A PVTG) and HakkiPikki (A Schedule Tribe) Community in Karnataka

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Abstract

Introduction: Tribal communities in India, particularly the *Particularly Vulnerable Tribal Groups (PVTGs)*, face a dual burden of malnutrition due to rapid socio-economic and lifestyle transitions. The paper aims to assess and compare the prevalence of undernutrition and obesity among two tribal groups of Karnataka—JenuKuruba and HakkiPikki. **Methods:** A cross-sectional study was conducted among n=430 adults (JenuKuruba = 210, HakkiPikki = 220). Anthropometric measurements were taken, and BMI was computed. The nutritional status was classified according to the WHO–Asian Indian BMI cut-offs. **Results:** Among JenuKuruba had a significantly higher prevalence of underweight (26.2%) and lower obesity levels (approximately 12%). In contrast, HakkiPikki, the prevalence of underweight was 4.1%, while overweight and obesity combined accounted for nearly 80%. HakkiPikki are undergoing a nutrition transition with high obesity prevalence, whereas JenuKuruba continue to experience undernutrition. **Conclusion:** These contrasting patterns highlight the need for tribe-specific health interventions.

Keywords: Tribal Health, Nutritional Transition, Undernutrion and Obesity, Particularly Vulnerable Tribal Groups (PVTGs)

Resumen

Introducción: Las comunidades tribales en India, en particular los Grupos Tribales Especialmente Vulnerables (PVTG), se enfrentan a una doble carga de malnutrición debido a las rápidas transiciones socioeconómicas y de estilo de vida. Este artículo tiene como objetivo evaluar y comparar la prevalencia de desnutrición y obesidad entre dos grupos tribales de Karnataka: Jenu Kuruba y Hakki Pikki. **Métodos:** Se realizó un estudio transversal con una muestra de 430 adultos (Jenu Kuruba = 210, Hakki Pikki = 220). Se tomaron medidas antropométricas y se calculó el IMC. El estado nutricional se clasificó según los puntos de corte de IMC de la OMS para la población asiática. **Resultados:** Entre los Jenu Kuruba, se observó una prevalencia significativamente mayor de bajo peso (26,2%) y menores niveles de obesidad (aproximadamente 12%). En contraste, en los Hakki Pikki, la prevalencia de bajo peso fue del 4,1%, mientras que el sobrepeso y la obesidad combinados representaron casi el 80%. Los Hakki Pikki están experimentando una transición nutricional con alta prevalencia de obesidad, mientras que los Jenu Kuruba continúan padeciendo desnutrición. **Conclusión:** Estos patrones contrastantes resaltan la necesidad de intervenciones de salud específicas para cada tribu.

Palabras Clave: Salud tribal, Transición nutricional, Desnutrición y obesidad, Grupos Tribales Especialmente Vulnerables (PVTG)

Introduction

Malnutrition, encompassing both undernutrition and over nutrition, remains one of the foremost public health challenges globally. According to the World Health Organization (WHO), nearly one in three people worldwide is affected by at least one form of malnutrition, ranging from underweight and micronutrient deficiencies to overweight and obesity (Global Nutrition Report, 2021). Low- and middle-income countries, including India, are experiencing a

double burden of malnutrition, where undernutrition coexists with rapidly rising rates of overweight and obesity (Popkin *et al.,* 2020; Jaacks *et al.,* 2019).

In India, tribal populations constitute about 8.6% of the total population, many of whom are classified as *Scheduled Tribes (STs)* (Census of India, 2011). Within this category, certain groups are recognized as *Particularly Vulnerable Tribal Groups (PVTGs)*, owing to their pre-agricultural level of technology, low literacy, subsistence economy, and declining or stagnant population (Ministry of Tribal Affairs, 2013). Studies across India indicate that tribal groups often exhibit poorer nutritional outcomes compared to the general population, with high levels of chronic energy deficiency (CED), stunting, and anemia (Rao *et al.,* 2006; Meshram *et al.,* 2014). At the same time, changing livelihoods, increased market dependence, and lifestyle shifts make some tribes susceptible to overweight and obesity (Venkaiah *et al*., 2002; Muralidharan *et al.*, 2023).

Tribal communities comprise6.95% of Karnataka's population (Roy *et al.,* 2015).JenuKuruba and the Koraga are exclusively notified as Particularly Vulnerable Tribal Groups (PVTG). The JenuKuruba are traditionally forest-dwellers, largely dependent on honey collection, forest produce, and wage labor. HakkiPikkis are semi-nomadic and have had greater exposure to urban markets and mobility (Prabhakar &Rajgopal, 2009; Kumar *et al*, 2016). These contrasting socio-economic and cultural contexts make them valuable for comparative nutritional analysis. However, literature documenting the nutritional status of these groups is scarce, particularly with reference to obesity and overweight prevalence, which is often overlooked in tribal health research.

The present study assessed and compared malnutrition prevalence among JenuKuruba and HakkiPikki adults in Karnataka, using anthropometric measures and BMI classification based on WHO–Asian Indian cut-offs. This study aims to provide insights for developing tribe-specific health and nutrition interventions by highlighting the dual burden of malnutrition within these groups.

Materials and Methods

Study Design and Setting: This community-based cross-sectional study was conducted as part of a doctoral research project in Anthropology. The study focused on HakkiPikki and JenuKuruba communities. Data collection was carried out in selected tribal hamlets located in various parts of Karnataka.

Study Population and Sample: The study included 430 adults (≥18 years), comprising 220 HakkiPikki and 210 JenuKuruba individuals. Participants were selected through stratified random sampling during the fieldwork. Individuals who were unwilling or unable to participate were excluded.

Data Collection: Data collection was undertaken as part of the PhD fieldwork using a structured schedule, including socio-demographic details and anthropometric assessments including height (m) and weight (kg). The systematic measurements were recorded twice, and the average was used to ensure accuracy. Physical Characteristics like Height and body weight was taken according to the standard methods standardised by International Society for the Advancement of Kinanthropometry (ISAK) following the ISAK manual (Esparza-Ros 2019).

Classification of Nutritional Status: Body Mass Index (BMI) was calculated as weight (kg) divided by height (m^2). Nutritional status was classified according to the WHO–Asian Indian BMI cut-offs (WHO Expert Consultation, 2004):

a) Underweight: <18.5 kg/m^2
b) Normal: 18.5–22.9 kg/m^2
c) Overweight: 23.0–27.4 kg/m^2
d) Obese - I: 27.5–32.4 kg/m^2
e) Obese - II: 32.5–37.4 kg/m^2
f) Obese - III: ≥37.5 kg/m^2

Ethical Considerations: This research is part of the doctoral work of the first author and received prior approval from the Doctoral Committee at the Department of Anthropology, Karnatak University, Dharwad. Informed consent was obtained from all participants. Privacy and confidentiality were strictly maintained during fieldwork.

Statistical Analysis*:* Data were entered and analyzed using Microsoft Excel and SPSS 26. Descriptive statistics (mean ± standard deviation for continuous variables, frequency, and percentage for categorical variables) were computed. Comparative analysis between tribes and genders was carried out using the Chi-square test (categorical variables) and t-test/ANOVA (continuous variables). A $p < 0.05$ was considered statistically significant.

Results

A total of 430 adults participated in the study, of whom 220 (51.2%) were HakkiPikki and 210 (48.8%) were JenuKuruba. The gender distribution was nearly equal in both tribes, with 110 males and 110 females among HakkiPikki, and 105 males and 105 females among JenuKuruba.

Nutritional Status by BMI

The distribution of nutritional status, classified using WHO–Asian Indian BMI cut-offs, showed marked differences between the two tribes (Table 1).

Table 1. Distribution of BMI Categories by Tribe (Asian Indian cut-offs)

BMI Category	HakkiPikki (N=220)	JenuKuruba (N=210)
Underweight (<18.5)	9 (4.1%)	55 (26.2%)
Normal (18.5–22.9)	35 (15.9%)	87 (41.4%)
Overweight (23–27.4)	56 (25.5%)	43 (20.5%)
Obese I (27.5–32.4)	85 (38.6%)	21 (10.0%)
Obese II (32.5–37.4)	26 (11.8%)	2 (1.0%)
Obese III (≥37.5)	9 (4.1%)	2 (1.0%)

Among HakkiPikki, only 4.1% were underweight, while nearly 80% were overweight or obese. In contrast, JenuKuruba had a much higher proportion of underweight individuals (26.2%) and fewer obese participants (~12%). These findings clearly indicate a dual burden of malnutrition across the two tribes.

Gender-wise BMI Distribution

When stratified by gender, HakkiPikki females showed the highest prevalence of overweight and obesity, whereas JenuKuruba males had the highest prevalence of underweight. This table demonstrates distinct gender–tribe interactions in malnutrition patterns.

Table 2. Gender-wise BMI Classification by Tribe

Tribe	Gender	Normal	Obese I	Obese II	Obese III	Overweight	Underweight
Hakki Pikki	Men	15 (13.6%)	38 (34.5%)	13 (11.8%)	4 (3.6%)	34 (30.9%)	6 (5.5%)
Hakki Pikki	Women	20 (18.2%)	47 (42.7%)	13 (11.8%)	5 (4.5%)	22 (20.0%)	3 (2.7%)
JenuKuruba	Men	48 (45.7%)	7 (6.7%)	1 (1.0%)	0 (0.0%)	20 (19.0%)	29 (27.6%)
JenuKuruba	Women	39 (37.1%)	14 (13.3%)	1 (1.0%)	2 (1.9%)	23 (21.9%)	26 (24.8%)

Mid-Upper Arm Circumference (MUAC)

MUAC measurements as mean ± SD are presented in Table 3. HakkiPikki had significantly higher MUAC values than JenuKuruba, which is consistent with the BMI results. Among HakkiPikki, the mean MUAC was 28.82 ± 4.86 cm for males and 28.49 ± 3.44 cm for females. In JenuKuruba, the corresponding values were 23.98 ± 3.43 cm for males and 23.38 ± 3.31 cm for females.

Table 3. Mean (±SD) of MUAC (cm) by Tribe and Gender

Tribe	Gender	mean	SD	n
Hakki Pikki	Male	28.82	4.86	110
Hakki Pikki	Female	28.49	3.44	110
JenuKuruba	Male	23.98	3.43	105
JenuKuruba	Female	23.38	3.31	105

Summary of Findings

Overall, the results indicate a dual burden of malnutrition in the study population. HakkiPikki adults were predominantly overweight and obese, with females particularly at risk. In contrast, JenuKuruba exhibited higher levels of undernutrition, especially among males. MUAC values paralleled the BMI findings, further validating the contrast in nutritional status between the two tribal groups.

Discussion

The present study highlights the contrasting nutritional profiles of two tribal communities of Karnataka—HakkiPikki (A Scheduled Tribe) and JenuKuruba (A PVTG). Using WHO–Asian Indian BMI cut-offs, a striking dual burden of malnutrition was observed. While the HakkiPikki exhibited a high prevalence of overweight and obesity (≈80%), the JenuKuruba were characterized by high levels of undernutrition (26.2%), particularly among males. MUAC values mirrored these patterns, reinforcing the validity of BMI-based classifications.

The findings for the JenuKuruba are consistent with earlier reports on tribal populations across India, where undernutrition remains a significant concern (Rao *et al*., 2006; Meshram *et al.,* 2014). Chronic energy deficiency among tribal men has been documented in Odisha, Jharkhand, and Madhya Pradesh, primarily due to poor dietary intake, high physical labor, and persistent socio-economic disadvantage (Venkaiah *et al.,* 2002). Our study reaffirms that JenuKuruba, being forest-dependent and economically marginalized, continues to face inadequate nutrition.

In contrast, the high prevalence of overweight and obesity among HakkiPikki reflects a nutrition transition, a phenomenon increasingly noted among urban-exposed and semi-nomadic tribes (Popkin *et al*., 2020; Jaacks *et al*., 2019). Greater integration with markets, consumption of calorie-dense foods, reduced physical activity, and lifestyle changes may explain the obesity trend among this community. Similar findings have been reported among tribes in Kerala and Gujarat, where exposure to urban environments was linked with rising obesity and metabolic risk (Muralidharan *et al.,* 2023).

Gender-specific analysis revealed that HakkiPikki females had higher obesity prevalence than males, whereas undernutrition was more common among JenuKuruba males. This finding aligns with broader evidence that women in marginalized groups may face a higher risk of overweight and obesity due to dietary practices, sociocultural roles, and reduced physical activity (Kshatriya & Acharya, 2016). Conversely, tribal men engaged in labor-intensive occupations are more prone to undernutrition, which may occur due to alcohol and tobacco consumption and nutritional illiteracy.

The coexistence of undernutrition in JenuKuruba and obesity in HakkiPikki underscores the complexity of addressing malnutrition in tribal populations. Conventional tribal health programs in India have historically focused on undernutrition and micronutrient deficiencies (Ministry of Tribal Affairs, 2013). However, the rapid emergence of overweight and obesity in certain groups calls for a dual-pronged strategy.

Public Health Implications: The coexistence of undernutrition in JenuKuruba and obesity in HakkiPikki underscores the complexity of addressing malnutrition in tribal populations. Conventional tribal health programs in India have historically focused on undernutrition and micronutrient deficiencies (Ministry of Tribal Affairs, 2013). However, the rapid emergence of overweight and obesity in certain groups calls for a dual-pronged strategy:

a) For JenuKuruba: interventions should emphasize food security, dietary diversification, and reducing chronic energy deficiency.

b) For HakkiPikki: awareness of balanced diets, lifestyle modification, and screening for obesity-related non-communicable diseases (NCDs) is essential.

Strengths and Limitations

This study is among the first to provide comparative data on BMI and MUAC between HakkiPikki and JenuKuruba adults. Its strengths include using Asian Indian BMI cut-offs, which are more appropriate for assessing obesity risk in South Asian populations. However, limitations must be acknowledged. Being cross-sectional, the study cannot establish causality. Further clinical studies must be conducted to establish causality.

Conclusion

The present study reveals a clear dual burden of malnutrition among two tribal communities in Karnataka. While the HakkiPikki, a scheduled tribe, demonstrate a predominance of overweight and obesity, the JenuKuruba, a PVTG, continue to experience high levels of undernutrition. Gender-specific patterns further emphasize that HakkiPikki women are more prone to obesity, whereas JenuKuruba men are more likely to be undernourished.

These contrasting trends highlight the urgent need for tribe-specific and gender-sensitive health interventions. For the JenuKuruba, policies should focus on improving dietary quality, food security, and chronic energy deficiency reduction. For the HakkiPikki, interventions should aim at obesity prevention, lifestyle modification, and screening for non-communicable diseases. Addressing these divergent nutritional challenges is crucial for improving health equity among Indian tribal populations.

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Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Informed Consent Statement

All the athletes included in the study provided written informed consent.

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