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IMPACT OF LIFESTYLE AND DIETARY HABITS ON MALNUTRITION IN ELDERLY INDIVIDUALS WITH GASTROINTESTINAL ISSUES.

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Abstract
This study investigated the nutritional status of elderly individuals with gastrointestinal issues who had a long history of eating commercially prepared meals or outside foods. Using the Subjective Global Assessment (SGA) tool and dietary history with 150 elderly individuals aged 60-75 years with GI symptoms such as malabsorption and maldigestion. It has been found that there is a high prevalence of malnutrition (76.7%), with 62.7% moderately malnourished and 14% severely malnourished. Risk factors such as irregular sleep patterns, which tripled (3.2-fold higher odds) the risk of malnutrition (OR=3.2, p=0.002), irregular meal timing (OR=2.5, p=0.006), and smoking (OR=2.1, p=0.012). The findings highlight that malnutrition persists in older age with disturbed sleep and meal pattern along with smoking habit when there is a significant history of eating outside foods frequently at young age. These are mostly modifiable lifestyle and dietary factors and can be improved with proper guidance and support. Further research is required to explore the relationships in depth with a larger sample and with in-depth techniques.

Keywords: Elderly, malnutrition, gastrointestinal issues, lifestyle, smoking, dietary habits, sleep

Introduction:

As of 2022, approximately 1.1 billion individuals worldwide were aged 60 years or above, accounting for 13.9% of the total population and is expected to rise to 20.8% by 2050.[1] The Indian elderly population above 60 years is projected to constitute 20% of the population by 2050.[2] Studies have shown that a high prevalence of malnutrition among older Indian adults is due to inadequate dietary intake, low meal frequency, poor oral health and, socioeconomic disparities.[3] Population with a past of poor dietary habits and lifestyle choices tend to become malnourished in their old ages.[4] It is a complex interplay of physical inactivity, altered lifestyle, social isolation that further increases the risk of malnutrition among the elderly population.[5] A recent study of 2023 conducted in Assam reported that only 36.7% of elderly participants met the recommended dietary diversity score. This clearly points towards suboptimal dietary patterns.[6]

Consumption of outside food, a lifestyle factor commonly seen in Indian young adults, is also a contributing to malnutrition. Outside meals contains less vegetables and fewer whole grains which leads inadequate coverage of daily recommended nutrition.[7] In a cohort study, it was found that consuming more than five away-from-home meals/week increased odds of metabolic syndrome by

1.8× (95% CI: 1.4–2.3) compared to <1 meal/week.[8] Another research had shown that more than five outside meals/week had 3.2× higher chances of malnutrition (MNA score ≤17) compared to eating home-cooked meals (OR=3.2, 95% CI: 2.1–4.9, *p*<0.001). They showed 72% of vitamin D insufficiency (<20 ng/mL) in compared to 41% in home-cooked group (*p*=0.003) along with 2.1× higher risk of iron-deficiency anemia (Hb <12 g/dL; *p*=0.02).[9]

Dietary habits have a direct effect causing dysbiosis.[10] It is one of the modifiable factors which influences the gut microbiota composition. With ageing loss of appetite and inability to chew properly are common events. This compounded by a weak intestine leads to inadequate digestion and absorption of nutrients.[11] Habitual diets have a greater influence on the gut microbiota than acute dietary strategies, hence a proper diet history is important.[12] Sleeping patterns get altered in the elderly with increasing age. The duration of sleep decreases which eventually leads to sleep disorders.[13] Studies show that sleep deprivation (SD) has a significant negative impact upon the gut functioning. Alteration in the intestinal barrier, increase in pro inflammatory cells/chemicals, decreased immunity and colonization resistance contributes to gut dysbiosis.[14] In the gut, smoking modifies several functions such as alterations in tight junctions in the small intestine leading to increased permeability (gut leakiness) and disruption of gut barrier function.[15] Alcohol consumption can lead to overgrowth of bacteria and study shows its consequence in the overgrowth of both anaerobic and aerobic bacteria in the jejunum.[16] Chronic alcohol exposure completely changes the gut microbiota.[17]

There are multiple factors at play when it comes to point out the nutritional status of this age group. Due to the higher distribution of this age group in the population it is crucial to study the factors can be highlighted for a successful intervention. This study aimed to identify the risk factors of past history of lifestyle and dietary habits that may show higher impact on the nutritional status in elderly population.

Materials and Methods: A cross-sectional study was conducted among 150 elderly individuals (aged 60–75 years) with a history of different occupations and consumption of outside meals 3-4 times per week for at least 15 years during their working period. The study was conducted with the in-patients of Ayursundra Superspeciality Hospital, Guwahati, Assam. They were admitted in the hospital with gastrointestinal issues of malabsorption and maldigestion. Patients who were able to take food orally were included in the study. Screening tool was in the form of questionnaire referring the Subjective Global Assessment (SGA)[18] with categorical scoring was used to identify the current nutritional status. Dietary habits and lifestyle history was also taken in the same assessment tool.

Scoring: The Subjective Global Assessment (SGA) was divided into three parts namely Part A: patient related medical history, Part B: Physical examination and Part C: Others.

A. PATIENT RELATED MEDICAL HISTORY: 1. Weight change (Overall change in the past 6 months) [1- No weight change or gain; 2- Minor weight loss (1-2kgs); 3- Weight loss (>5kgs); 4- Weight loss (>7kgs); 5- Weight loss (>10kgs)]. 2. Dietary intake (Duration) [1- No change; 2- Overall decrease in intake; 3- Full liquid diet; 4- Hypocaloric diet; 5- Starvation]. 3. GI Symptoms (Duration) [1- No symptoms; 2- Nausea; 3- Vomiting with moderate GI symptoms; 4- Diarrhea/Constipation; 5- Severe anorexia]. 4. Functional capacity (Nutrition related functional impairment)[1- None/improved; 2- Difficulty with normal activity; 3-Light activity; 4- Difficulty with ambulation; 5- Bed/Chair ridden with No/Little activity]. 5. Comorbidity- associated diseases and its relationship to nutritional requirements. [1- Healthy; 2- Mild comorbidity; 3- Moderate comorbidity; 4- Severe comorbidity; 5- Very severe multiple comorbidity].

B. PHYSICAL EXAMINATION: 1. Decreased fat stores or loss of subcutaneous fat (1- Normal/No change; 2- Mild; 3- Moderate; 4- Severe; 5- Very severe). 2. Signs of muscle wasting (1- Normal/No change; 2- Mild; 3- Moderate; 4- Severe; 5- Very severe)

C. OTHERS (Biochemical/Clinical indication): 1- Decreased albumin; 2- Significant changes in lab results for >1month; 3- Recommended Enteral/Parenteral nutrition; 4- On Enteral nutrition for >15 days; 5- On Enteral nutrition for > 1month
Total score: The sum of the 8 components (Well Nourished: score between 7 to 14, moderately malnourished: score between 15 to 28, Severely Malnourished: score between 29 - 35) were calculated and categorized into the nutritional status.
The statistical analyses were done in PSPP 1.6.2. Model fit was confirmed via Hosmer-Lemeshow test (p=0.72), and multicollinearity was excluded (all VIF < 2.0). Binary variables were coded as: 1=irregular sleep, 0=regular; 1=smoker, 0=non-smoker. Multivariable logistic regression adjusted for all significant univariate predictors (diet, meal timing, smoking, and sleep pattern). Power analysis indicated 85% power to detect OR≥2.0 at α=0.05. SGA score ≥15 (moderate/severe) define the malnutrition status.

Result

The analysis of 150 elderly individuals showed a high prevalence, 76.7% (n=115) of malnutrition. 62.7%, n=94) were moderately malnourished, 14.0%, (n=21) were severely malnourished, while only 23.3% (n=35) were well-nourished. Several significant predictors of malnutrition were identified during the analysis. Irregular sleep patterns appeared to be the strongest risk factor (χ^2=12.45, p=0.002), with malnourished subjects having 3.2-fold higher odds (OR=3.2, 95% CI: 1.7–6.0), which remained significant after adjustment (aOR=2.8, 95% CI: 1.5–5.4). This association remained to be strong in multivariate analysis (adjusted OR=2.8, p=0.001), implying that sleep quality behaves as an independent contributor to nutritional status. Irregularity in meal pattern also appeared to be another critical predictor (χ^2=10.32, p=0.006), with irregular eaters facing 2.5 times increased chances (95% CI: 1.4–4.3) of malnutrition. These shows a similar result after adjustment for confounders (aOR=2.3, p=0.008), showing the importance of consistent dietary routines. Smoking history also showed a significant association (χ^2=8.76, p=0.012), with smokers having 2.1 times higher chances (95% CI: 1.2–3.8) of malnutrition, which held after multivariate adjustment (aOR=1.9, p=0.032). While vegetarian diet initially appeared linked to malnutrition (χ^2=6.24, p=0.044; OR=1.8), this association lost significance in adjusted models (aOR=1.5, p=0.142), implying confounding by other lifestyle factors (e.g., smoking or sleep). Alcohol intake showed no significant correlation (p=0.126), possibly due to uniform exposure in the cohort (56% drinkers).

Table 1. Statistical Analysis Summary: Malnutrition Risk Factors in Elderly (N=150)

Variable	Category	Count (%)	χ^2 (p-value)	Unadjusted OR [95% CI]	Adjusted OR [95% CI] (p-value)
Diet	Vegetarian	52 (34.7%)	6.24 (0.044*)	1.8 [1.1-3.0]	1.5 [0.8-2.7] (0.142)
	Non-vegetarian	98 (65.3%)	Reference	Reference	Reference
Meal Timing	Irregular	50 (33.3%)	10.32 (0.006**)	2.5 [1.4-4.3]	2.3 [1.2-4.3] (0.008**)
	Regular	100 (66.7%)	Reference	Reference	Reference
Smoking	Smokers	101 (67.3%)	8.76 (0.012*)	2.1 [1.2-3.8]	1.9 [1.1-3.5] (0.032*)
	Non-smokers	49	Reference	Reference	Reference

Variable	Category	Count (%)	χ^2 (p-value)	Unadjusted OR [95% CI]	Adjusted OR [95% CI] (p-value)
		(32.7%)			
Sleep Pattern	Irregular	102 (68.0%)	12.45 (0.002**)	3.2 [1.7-6.0]	2.8 [1.5-5.4] (0.001**)
	Regular	48 (32.0%)	Reference	Reference	Reference
Alcohol	Drinkers	84 (56.0%)	4.15 (0.126)	1.3 [0.8-2.2]	1.2 [0.7-2.1] (0.186)
	Non-drinkers	66 (44.0%)	Reference	Reference	Reference

- *p < 0.05, **p < 0.01
- Adjusted ORs from multivariate logistic regression controlling for diet, meal timing, smoking, and sleep pattern
- Reference categories: Non-vegetarian diet, regular meal timing, non-smokers, regular sleep, non-drinkers
- OR = Odds Ratio; CI = Confidence Interval

Discussion:

The study revealed that the subjects with gastrointestinal issues had strong association with poor sleep, irregular meal timing and smoking which may had result in their malnutrition. Poor sleep showed the most significant impact. Those with irregular sleep pattern had three times higher chances of malnutrition compared to those with regular sleep. This suggests that appetite, nutrient absorption or overall health of older adults may get affected when sleep gets disrupted. Irregular meal pattern is also seemed to be a major factor influencing nutritional status. Irregularity in eating pattern can lead to 2.5 times greater risk to malnutrition as inconsistent eating habits disrupts nutrient intake as well as metabolic balance. It appeared that smoking habits can double the risk of malnutrition, possibly due to depletion in nutrient or reduced appetite. It was observed that the early association between malnutrition and vegetarian diet (OR=1.8) may reflect a poorer coverage of micronutrients in commercial vegetarian diets, as reported in Indian urban populations. However, this association was confounded by lifestyle factors (smoking), indicating poor dietary habits alone do not account for risk of malnutrition. Vegetarian diet may seem to appear linked with malnutrition; the association disappeared when factors like sleep and smoking were accounted for. This implies that malnutrition in vegetarians may get affected from a broader lifestyle issues along with the diet. No significant association with alcohol intake was shown because of lack of variability in the amount drunk to demonstrate a dose-response relation.

These findings highlights the malnutrition in the elderly is not only related to diet but also significantly influenced by modifiable lifestyle factors. Priority should be given to improve the sleep quality, regularity in meal patterns and supporting smoking cessation to reduce the risk of malnutrition effectively.

There are some limitations with study. The cross-sectional nature of the design limits causal interpretations, bias might be introduced due to the retrospective recall of past dietary habits and the data collection was done from a single centre and the findings may not be enough for generalization. Further research with larger population and in-depth study is required to investigate the correlation thoroughly which may introduce to some integrated interventions ta rgeting these modifiable habits to sustain the nutritional status in aging population.

Conclusion

A long-term habit of consuming outside foods at the young age can lead to gastrointestinal issues and ultimately results in malnutrition in the later stage of life. Addition to this, upon reaching older age, irregularity in sleep pattern and dietary habits can contribute towards malnutrition. Smoking has also been seen as a contributory factor. Irregularities in the aforementioned habits at a younger age may also lead to malnutrition at a later stage in life. For future study, a larger sample size, broader age range along with inclusion of co-morbidities and history of medication intake may give a deeper insight in the outcome of the study.

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Conflict of interest:

The authors have declared no conflict of interest.

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