

The Psychobiotic Potential: Fermented Food Intake and Mental Resilience

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Abstract: ***Background:** Fermented foods are an important component of traditional Indian diets and have received increasing research attention because of their possible relationship with the microbiota–gut–brain axis. However, evidence concerning naturally consumed fermented foods and psychological resilience remains limited. **Objective:** To examine the association between fermented-food consumption frequency and mental resilience among adults aged 18–45 years. **Methods:** A descriptive-correlational survey was conducted using 159 consented responses. After applying predefined exclusion criteria, including recent antibiotic use, regular probiotic supplementation, diagnosed digestive disorders, and diagnosed psychiatric disorders, 96 participants were retained. Data were collected using fermented-food consumption questions, the 10-item Connor–Davidson Resilience Scale (CD-RISC-10), the Perceived Stress Scale (PSS-10), and a self-developed emotional well-being measure. Spearman’s rank-order correlation was used because the primary fermented-food frequency index was non-normally distributed. **Results:** The screened sample was predominantly aged 36–45 years (62.5%) and rural residents (55.3%). Dosa (58.3%), idli (55.3%), and appam (53.9%) were the most frequently consumed fermented foods. CD-RISC-10 scores had a mean of 20.37 (SD = 9.19). Fermented-food consumption frequency showed a significant positive association with resilience ($p = .357$, $p < .001$, $N = 96$). However, average servings per day were not significantly associated with resilience ($p = -.123$, $p = .265$), perceived stress, or emotional well-being. **Conclusion:** Greater frequency of fermented-food consumption was associated with higher mental resilience in this screened sample. The finding represents an association rather than evidence of causality. Differences between dietary exposure measures highlight the need for more precise dietary assessment in future research.*

Keywords: fermented foods; mental resilience; gut–brain axis; nutritional psychiatry; emotional well-being; India

1. Introduction

Dietary behaviour is increasingly studied in relation to psychological functioning through nutritional psychiatry and the microbiota–gut–brain axis. Fermentation can modify the nutritional and microbial characteristics of foods, providing a plausible basis for investigating their relationship with psychological outcomes. However, fermented foods differ considerably in their ingredients, microorganisms, fermentation processes, and biological effects.

India provides an important cultural context for this research because foods such as dosa, idli, appam, curd, buttermilk, and fermented rice preparations are commonly consumed. Cultural familiarity, however, does not itself establish psychological benefits. Mental resilience, defined in terms of adaptation and coping with adversity, provides a relevant psychological outcome for examining this relationship.

The present study therefore examined whether fermented-food consumption frequency was significantly associated with mental resilience among adults aged 18–45 years.

2. Methods

2.1 Design and Participants

A non-experimental, descriptive-correlational design was employed. The original dataset included 159 consented responses. Following predefined exclusion criteria, 96 participants were retained for the primary analysis, representing 60.4% of the original sample.

2.2 Measures

Fermented-food consumption was assessed through questions concerning food type, frequency, and quantity. A fermented-food frequency index was used as the primary exposure variable, while average servings per day was examined as a supplementary measure.

Mental resilience was measured using the CD-RISC-10. Internal consistency in the present sample was high (Cronbach’s $\alpha = .937$). Emotional well-being was assessed using a self-developed 10-item composite with good internal consistency ($\alpha = .849$). The PSS-10 demonstrated low internal consistency ($\alpha = .368$); therefore, its findings were interpreted cautiously and were not used as confirmatory evidence.

2.3 Statistical Analysis

Descriptive statistics and Cronbach’s alpha were calculated. Distributional assumptions were examined using the Shapiro–Wilk test. Because the fermented-food frequency index was non-normally distributed, Spearman’s rank-order correlation was used for the primary analysis. Supplementary correlations examined average servings per day in relation to resilience, perceived stress, and emotional well-being.

3. Results

Of the 96 participants, 62.5% were aged 36–45 years, 26.0% were aged 26–35 years, and 11.5% were aged 18–25 years. Female participants represented 61.3% and male participants 38.7% of valid responses. Rural residents constituted 55.3% of the sample.

Dosa was the most frequently reported fermented food (58.3%), followed by idli (55.3%) and appam (53.9%). The most common reported average consumption was one serving per day (53.6%). The mean CD-RISC-10 score was 20.37 (SD = 9.19), while the mean emotional well-being score was 33.81 (SD = 7.24).

The primary analysis demonstrated a statistically significant positive association between fermented-food frequency and resilience:

Variables	N	Spearman's ρ	p
Fermented-food frequency $\times$ CD-RISC-10	96	0.357	< .001

Participants reporting greater fermented-food consumption frequency tended to report higher resilience scores. However, average servings per day were not significantly associated with resilience ($\rho = -.123$, $p = .265$), perceived stress ($\rho = -.105$, $p = .341$), or emotional well-being ($\rho = -.039$, $p = .724$).

4. Discussion

The principal finding was a moderate positive association between fermented-food consumption frequency and mental resilience ($\rho = .357$, $p < .001$). This finding is compatible with theoretical literature concerning possible relationships between fermented foods, microbial activity, immune signalling, and gut–brain communication. However, the present study did not measure gut microbiota, inflammatory markers, neuroactive metabolites, or other biological mediators. Therefore, no specific biological mechanism can be inferred from the findings.

An important observation was that average servings per day were not significantly related to resilience. This suggests that frequency and quantity may capture different aspects of dietary exposure. Future studies should therefore use validated food-frequency questionnaires or repeated dietary records that assess both food type and quantity.

The high internal consistency of the CD-RISC-10 supports its use as the principal psychological outcome in this dataset. In contrast, the self-developed emotional well-being measure requires further validation. The low PSS-10 reliability ($\alpha = .368$) is an important methodological concern and warrants verification of item coding, reverse scoring, response anchors, and data entry before the measure is used for confirmatory analysis.

5. Strengths and Limitations

The study examined naturally consumed fermented foods and used a non-parametric statistical procedure appropriate to the distribution of the primary exposure. It also clearly distinguishes the observed association from proposed gut–brain mechanisms.

However, the cross-sectional design prevents causal inference. The screened sample was relatively small and disproportionately represented adults aged 36–45 years and rural residents, limiting generalisability. Dietary intake was

self-reported and may be affected by recall or measurement error. Potential confounders such as socioeconomic status, overall diet, physical activity, sleep, occupational stress, and social support were not incorporated into the primary analysis.

6. Conclusion

Among 96 screened adults aged 18–45 years, greater fermented-food consumption frequency was significantly associated with higher mental resilience. Traditional foods including dosa, idli, and appam were prominent in the dietary pattern. Nevertheless, the cross-sectional design and the absence of a significant association when average servings per day were considered require cautious interpretation. The findings provide a basis for further research using validated dietary measures, longitudinal designs, controlled interventions, and, where feasible, biological measures of gut–brain pathways.

Declarations

Ethics approval: [Insert exact ethics approval information.]

Informed consent: Participants provided consent as recorded in the study dataset.

Funding: [Insert actual funding statement.]

Conflict of interest: [Insert actual declaration.]

Data availability: Data should be shared only in accordance with participant consent, institutional requirements, and applicable privacy protections.

Author contributions: [Insert according to the target journal requirements.]

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