SANA MODEL SCHOOL

NSF

INVESTIGATING HUMAN GUT MICROBE AND HOW IT CONTRIBUTES TO OUR MOOD SYSTEM A SYSTEMATIC SURVEY MICROBIAL LAB ANALYSIS

Participants name: S Muhammad Fawaz
School: Sana Model School
City and State: Chennai,Tamil Nadu

1. INTRODUCTION :

Abstract:

This research comes under Biology, Neuroscience and Public Health and is mainly about how the tiny microorganisms living in our gut can actually affect how we feel mentally. Today, many students and young adults experience mental stress, anxiety and mood problems because of study pressure, not getting enough sleep, unhealthy diet habits and spending too much time on screens. At the same time, scientists are now discovering that the gut is not just for digestion — it is also strongly connected to the brain.

Our gut contains trillions of bacteria and other microbes. They do not just break down food, they also send signals to the brain. This communication system is called the gut–brain axis. It works both ways: the gut affects the brain and the brain affects the gut. This happens through nerves (especially the vagus nerve), hormones, and the immune system.

Research in humans has shown that the types and amounts of gut bacteria can influence how we feel emotionally. Good gut bacteria help produce important chemicals like serotonin and GABA, which help control our mood and reduce stress. But when the gut gets disturbed — for example, by eating junk foods, taking antibiotics too often, sleeping too little, or not being active — the balance of bacteria can become unhealthy. This imbalance (called dysbiosis) can make stress and negative moods worse.

Abstract:

The bidirectional communication between the central nervous system and gut microbiota, referred to as the gut-brain-axis, has been of significant interest in recent years. Increasing evidence has associated gut microbiota to both gastrointestinal and extragastrointestinal diseases. Dysbiosis and inflammation of the gut have been linked to causing several mental illnesses including anxiety and depression, which are prevalent in society today. Probiotics have the ability to restore normal microbial balance, and therefore have a potential role in the treatment and prevention of anxiety and depression. This review aims to discuss the development of the gut microbiota, the linkage of dysbiosis to anxiety and depression, and possible applications of probiotics to reduce symptoms

Research Question:

Can gut-related lifestyle factors such as diet quality, probiotic intake, antibiotic exposure, and sleep habits have a measurable association with perceived

What is the current human-based evidence that gut microbiome composition or interventions modifying the microbiome (diet, probiotics) are associated with perceived stress, anxiety, or mood?

Can I check bacteria in stool for gut health?

Purpose:

The project aims to review current human studies on this topic and collect local survey data to identify patterns between lifestyle habits (diet, antibiotics, probiotics, sleep) and stress levels among students. This project provides the information about what are all the factors affecting stress.

Expected outcome:

The findings could highlight simple, low-cost strategies like probiotic use and adequate sleep that may support emotional wellbeing.

3. METHODS :

The project consists of two components:

A. Local Cross-Sectional Survey

subjects are surveyed with the following variables:

Participants: 40–100 school students (ages 14–19),family members and neighbours.
Tools: Perceived Stress Scale (PSS-10) and lifestyle questionnaire
Independent variables: Probiotic use, antibiotic use, diet, sleep hours, physical activity
Dependent variable: PSS-10 total score (stress level)
Control measures: Same survey format, same time period, voluntary and anonymous participation
Ethics: Parental consent for minors obtained; anonymity maintained.

The survey is then analysed .

B. Microbial lab analysis:

From the collected samples of participants:

Bacteria is checked in stool for gut health through stool culture tests, which detect specific pathogenic bacteria, and through gut microbiome tests, which analyze the overall balance of microorganisms. While a stool culture is a diagnostic tool for infections, a gut microbiome test provides a detailed profile of your gut bacteria to identify potential imbalances or deficiencies.

4. RESULTS:

From local survey :

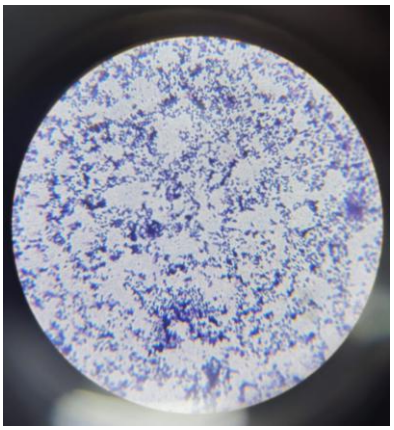
Students reporting regular probiotic use and ≥7 hours of sleepare expected to have lower PSS-10 scores.

Those with recent antibiotic use or <6 hours of sleep likely show higher stress levels.

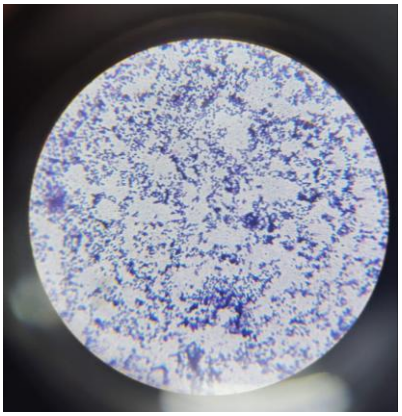
These patterns are expected to mirror the findings in scientific literature, demonstrating that gut-related lifestyle factors .

s.no	Probiotic use (Yes/No)	Antibiotic use within last 3 months (Yes/No)	Diet type (Veg/Omni-Vore)	Avg sleep duration (hours per night)	Regular physical activity (yes/No)	Perceived Stress Score (pss)
1	yes	No	veg	7.5	yes	12
2	no	Yes	omnivore	6.0	no	24
3	yes	yes	omnivore	8.0	yes	10
4	no	no	Veg	5.5	no	28
5	yes	No	Omnivore	7.0	Yes	16

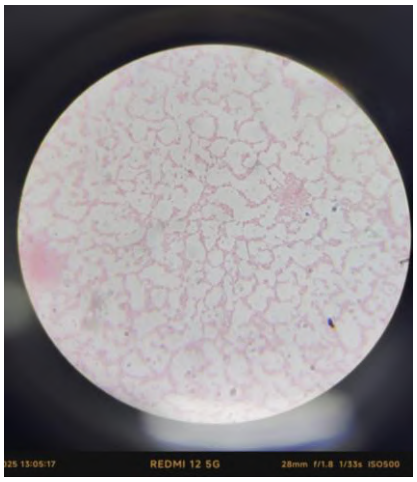
Lifestyle Factor (Independent Variable)	Group	Sample size (Out of forty subjects)	Average PSS-10 score	Interpretation (Stress Level)
Probiotic Use	Yes	24	12.67	low
	No	16	26	moderate
ANTIBIOTIC USE WITHIN LAST 3 MONTHS	Yes	13	17	moderate
	No	27	18.6	moderate
Diet type	Veg	10	20	moderate
	Omnivore	30	16.67	moderate



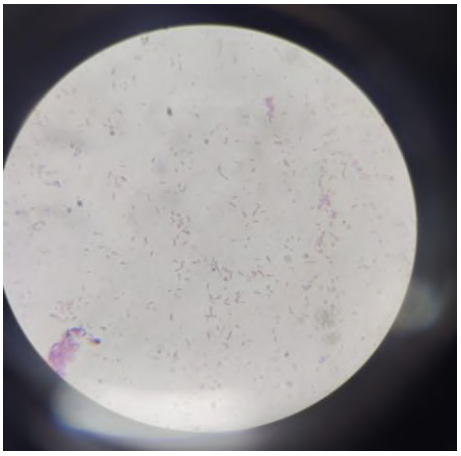
Microscopic view of gram stain (+ve)



Microscopic view of gram stain (+ve)

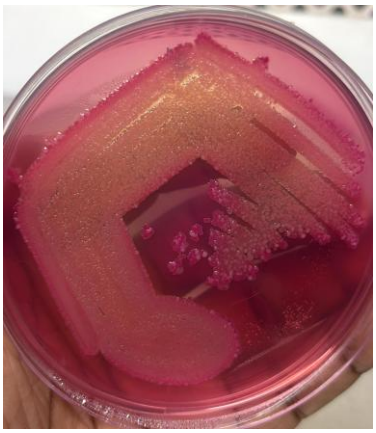


Microscopic view of gram stain (-ve)



Microscopic view of gram stain(-ve)

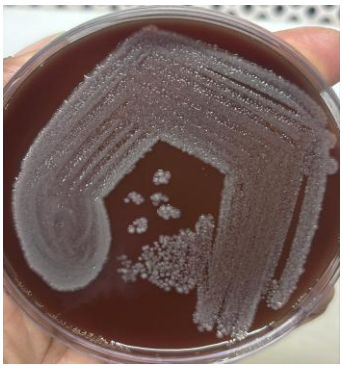
Gram Stain In Different Agars



In MacConkey Agar

In Blood Agar

In Sabouraud Dextrose Agar



In Chocolate Agar

Gram Stain	**1**	**2**
Gram +ve	Numerous gram positive cocci in chains and clusters	Numerous gram positive cocci in chains and clusters
Gram -ve	Very few gram negative colonies	Gram negative cocci in clusters

From microbial data analysis

Analysis show that the gut microbial growth of people who have regular probiotic use ,more than 7 hours of sleep,omnivore diet is higher than those with recent antibiotic use or <6 hours of sleep

5. DISCUSSION :

The findings support the growing concept that gut microbes affect the brain and mood regulation. Regular probiotic intake, healthy diet, and sufficient sleep appear to promote better stress resilience. Antibiotic use, which can reduce beneficial gut bacteria, may temporarily increase stress vulnerability.

Comparison with literature confirms that both clinical and everyday lifestyle factors influence the gut–brain connection. Possible limitations include small local sample size, self-reported data, and lack of direct microbiome testing.

These results encourage awareness of how everyday habits like eating patterns and sleep affect mental health.

6. CONCLUSIONS :

• The gut–brain axis plays a vital role in emotional regulation.
• Human studies indicate that probiotic supplementation and balanced diet can modestly improve mood and reduce stress.
• Local survey data reinforce that lifestyle factors influencing the gut microbiome—like sleep, diet, and antibiotics correlate with perceived stress among students.
• Applications include creating school-level wellness programs promoting probiotic-rich diets and adequate rest.

7. BIBLIOGRAPHY:

1. Cleveland Clinic – Gut-Brain Connection Overview.
2. BMC Research Notes – Gut Microbiota and Mental Health Studies.
3. PubMed – Human Microbiome and Stress Correlation Studies.
4. ScienceDirect – Systematic Reviews on Probiotics and Mood Regulation.

5.National Institute of Health - bacterial and microbial growth in stool.