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Comparison of the Role of Gut Microbiota and their Emerging Insights among Geriatric South Indian Population: A Randomized Control Trial

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Abstract

Background: The aging process is marked by a gradual deterioration of the organism's biological functions. Millions of microorganisms in the human intestine form a diverse microbial ecology. The gut microbiota has been described as an essential organ that connects to other organs in multiple directions. The gut microbiota axis functions to regulate host-microbe via interacting with the humoral, immunological, endocrine, and neurological as well as metabolic processes.

The aim of the work: The aim of our study was to compare the role of gut microbiota and their emerging insights among two group of geriatric South Indian population.

Methodology: The study examined the effects of probiotic consumption on older adults over 60. It was randomized and placebo-controlled. They were divided into the **Study (Probiotics)** group or **Placebo** group. Participants took their designated probiotic twice daily for three months during the intervention period. During the intervention phase, participants were requested to maintain their regular eating patterns and health-related behaviors. A total of 100 candidates went through the screening process among which 50 subjects were enrolled in the study. The probiotic group included 25 participants and 25 participants were included in Placebo group. At the fourth, eighth, and twelve weeks, participants were reviewed and enquired if their bowel habits had improved over the previous four weeks in order to gauge the impact of probiotics on intestinal health.

Results: The probiotics group showed a notable improvement over the course of the intervention period in bowel habits, including the frequency and quantity of bowel movements, the sense of incomplete evacuation, the odor of the feces, the number of gas passages, the bowel sounds, and the distention of the abdomen. The percentage of effectiveness was 98%, the p value was 0.0001 in Probiotic group and 2% in Placebo group.

Conclusion: Our research demonstrated that probiotic supplements can help improve gut health in healthy older adults.

Keywords: Gut; Microbiota, Probiotics; Gut Health; Geriatrics; Randomized Trial.

INTRODUCTION

The aging process is marked by a gradual deterioration of the organism's biological functions. Millions of microorganisms in the human intestine form a diverse microbial ecology. It has been stated that the gut microbiota is an essential organ that connects to other organs in multiple directions. The gut microbiota axis functions to regulate host-microbe via interacting with the humoral, immuno-logical, endocrine, and neurological as well as metabolic processes. The majority of benign human gut microorganisms have mutualistic relationships with their hosts and are typically linked to the host's defenses against pathogenic invasion [1].

Numerous studies conducted worldwide have focused on the critical role that intestinal microbiota plays in human health and illness. Numerous types of bacteria, viruses, archaea, and unicellular eukaryotes can be found in the human body. There are bacteria on every surface of the human body, however, a significant number of bacteria reside in the stomach and gastrointestinal system. The microbiota in the human stomach is a complicated ecosystem made up of over one thousand different types of bacteria [1,2].

In comparison to the overall genome, the human gut micro-biome contains about 150 times as many genes. It is widely accepted that there are more than 100 trillion germs in the human body, all of which are essential to many biological functions, including health and illness [3]. Both intestinal and extraintestinal functions are impacted by them, making them the primary modulators of body homeostasis that affect hematopoiesis, metabolism, barrier homeostasis, and inflammation. The microbial community influences various organ-related illnesses in addition to gut health; however, the precise mechanism of connection between the gut and the organs is still unclear [4]. The interaction between the microbes and the host is a crucial element in both health and illness. Numerous host variables, such as age, diet, lifestyle, and environment, have a significant impact on the variety of gut microbiota. However, it is now believed that one of the primary factors (modifiers) influencing the gut microbiota is food [5].

The human microbiome has the potential to improve nutritional absorption, regulate hunger, and use energy from various dietary sources. Additionally, microbes are essential to the metabolism of xenobiotics. even gut microorganisms change the chemical structures of medications, pollutants, and even insecticides during the metabolism of xenobiotics [6]. The gut microbiota regulates energy balance, immunity, weight gain or loss, and disorders linked to obesity [7]. Similarly, gut microbiota and their metabolites are implicated in a range of conditions, including cirrhosis, alcoholic liver disease (ALD), cardiovascular diseases (CVDs), hepatocellular carcinoma, inflammatory bowel disorders (IBDs), and non-alcoholic fatty liver diseases (NAFLDs) [8,9].

THE AIM OF THE WORK

The aim of our study was to compare the role of gut microbiota and their emerging insights among two group of geriatric South Indian population.

Methodology

The study was a randomized, placebo-controlled trial aiming to investigate how probiotics use affects people over 60. The eligible participants were randomized to one of the **study (probiotic) or placebo groups** in a 1:1 ratio according to a computer-generated random sequence. It was carried out at Kumarasamy Hospital, Erode from January 2024 to March 2024 with a 3-month intervention period. During the study enrolment, it was advised that the eligible individuals abstain from taking probiotics and other dietary supplements. Participants ingested their designated probiotic (*Streptococcus faecalis:* 30 million, *Clostridium butyricum*: 2 million, *Bacillus mesentericus*: 1 million, Lactic acid bacillus (*Lactobacillus sporogenes*): 50 million spores) twice daily for three months (the intervention period). During the intervention phase, participants were requested to maintain their regular eating patterns and health-related behaviours. They were instructed to document their use of treatment, as well as any odd occurrences like taking medicine and dealing with negative side effects on a regular basis.

Participants who had taken antibiotics, anti-inflammatory drugs, or gastrointestinal treatments within the previous three months, as well as those who regularly took probiotics during that time, were **not included** in the study. After receiving approval from the Institutional Ethics Committee, the study was carried out. At weeks four, eight, and twelve, participants answered questions concerning improvements in their bowel habits on a general health questionnaire. The questionnaire assesses ten bowel habits: general bowel health, frequency and amount of defecation, feeling of incomplete evacuation, stool odour, abdominal cramping, bowel sounds, number of gas passages, abdominal distention, and frequency of diarrhea. In addition, it detects if these habits had been improved over the previous four weeks. Participants answered on a 5-point scale, with 1 denoting "not at all" and 5 denoting "very much." Higher scores suggest that each parameter has improved.

The sample size was calculated using the following formula. **n= (Z^2 P(1-P))/d^2;** Where n = Sample size; Z = Z statistic for a level of confidence=1.96; P = Expected prevalence of proportion (If the expected prevalence is 34%, then P = 0.34), and d = Precision (If the precision is 5%, then d=0.12). The required sample size as per the above-mentioned calculation was 50 subjects and the two groups were compared using unpaired 't' test, with p value < 0.05 was considered to be statistically significant.

RESULTS

A total of 100 candidates went through the screening process among which 50 subjects were enrolled in the study. The probiotic group included 25 participants and 25 participants were included in Placebo group. **Table 1** summarizes the baseline demographic and clinical parameters. At the fourth, eighth, and twelve weeks, respectively, participants were reviewed and enquired if their bowel habits had improved over the previous four weeks in order to gauge the impact of probiotics on intestinal health. Throughout the intervention period, the probiotics group showed a significant improvement in bowel habits, including the frequency and quantity of bowel movements, the sense of incomplete evacuation, the odor of the feces, the number of gas passages, the bowel sounds, and the distention of the abdomen. The percentage of effectiveness was 98% and the p value was < 0.0001, which was found to be statistically significant . however, the percentage of effectiveness was 2% in Placebo group (Figure 1).

Table [1]: Participants' baseline general characteristics

Variable		Probiotics (n = 25)	Placebo (n = 25)
Age (Years)		60.02 (4.22)	61.13 (3.11)
Sex	Male	14 (56.0%)	13 (52.0%)
	Female	11 (44.0%)	12 (48.0%)
BMI (kg/m^2)		24.71 (01.82)	23.16 (2.41)
Physical activity	Yes	2 (8.0%)	1 (4.0%)
	No	23 (92.0%)	24 (96.0%)
Health status	Poor	4 (16.0%)	3 (12.0%)
	Very poor	18 (72.0%)	19 (76.0%)
	Excellent	3(12.0%)	3 (12.0%)
	Good	0 (0.0%)	0 (0.0%)
	Fair	0 (0.0%)	0 (0.0%)
Energy intake (kcal/d)		1567.22 (364.69)	1523.18 (419.91)

Data are presented as mean (SD) or n (%).

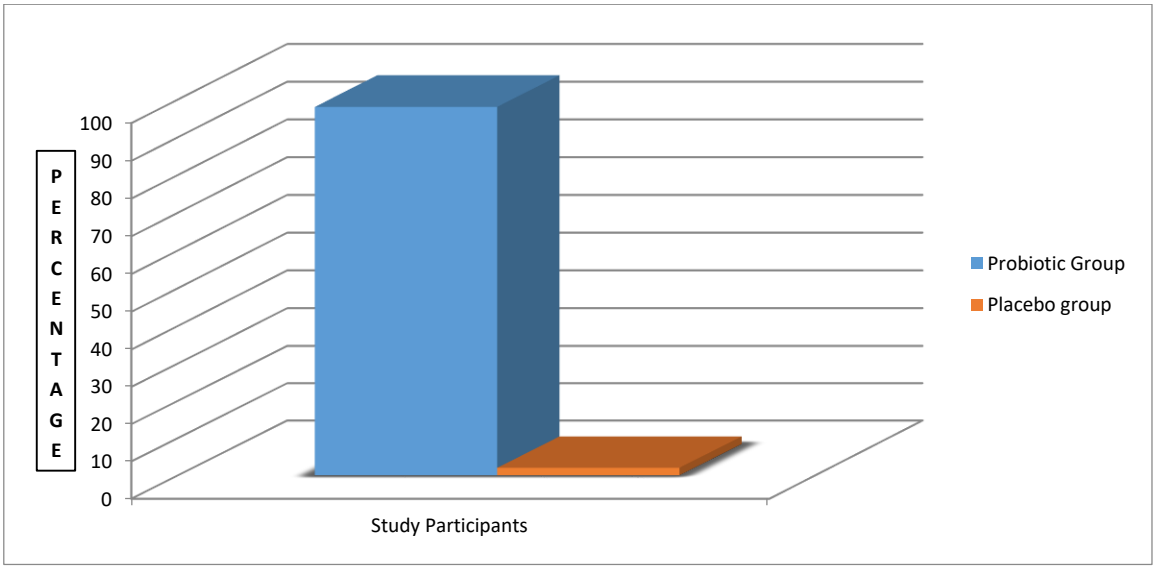

Figure (1): Percentage of effectiveness among the study population

DISCUSSION

Our study examined the impact of probiotics on intestinal health in older persons using a randomized, placebo-controlled design. By altering the composition of gut microbes and enhancing mental and cognitive health, our study showed that probiotics have systemic effects on the gut–brain axis in healthy older adults. The bulk of current research focuses on people with major depressive disorder, Alzheimer's disease, and moderate cognitive impairment, despite mounting evidence that probiotics regulate the gut-brain axis and have important effects on several cerebral functions. Little is known about nutritional interventions that can prevent or delay age-associated loss in brain function in the general older population, despite the fact that psychological discomfort and neurodegenerative illnesses offer significant threats to well-being in old age [10–14].

The average rate of intervention compliance in the current trial was 100%, indicating strong participant compliance. Because the current study focused on older persons without diseases rather than those who reacted well to therapy, including those with neurological problems, our findings are more useful as a comprehensive health care strategy in the older population.

Even though diet is considered to be a crucial factor in both disease prevention and health maintenance. Previous research found that diet also plays a key role in affecting the host's metabolism and sculpting the composition of gut microbes which correlates with our study findings. The microbial population can proliferate, develop, and survive with the assistance of the gut environment [15]. In addition to being a crucial and important source of energy, carbohydrates are delivered to the host through the fermentation stage by the gut microbiota [16]. Human health depends on the host and gut flora being in a balanced state; many diseases, as diabetes, obesity, hypertension, and inflammatory bowel disease, are linked to a disturbance of this balance [17].

The substantial metabolic activities of the varied human microbiome are essential for the host's metabolism as well as the healthy function of the liver and gut mucosal enzymes. The gut microbiome shapes the diet's biochemical makeup, which in turn affects human health. Studies have been prompted by the significance of gut microbiota for human immunity to look at the roles that certain microorganisms play in metabolic pathways, particularly in the metabolism of dietary components [18]. When there are significant dietary changes, the human gut microbiota responds well [19].

Evidence from people who alternate between plant-based and meat-based diets, add more than 30 g of certain dietary fibers to their diets daily, or follow either a low-fiber-high-fat or high-fiber-low-fat diet for ten days confirms the existence of these rapid, food-induced patterns [20]. Thus, a balanced gut microbial community is necessary for the coexistence of the microbiome and the host in a mutually beneficial interaction [21-25].

The fact that we only found the benefits of a three-month probiotic intervention in older persons from a small sample is our **study's limitation**. Hence study in a large-scale population is required to establish the benefit of probiotics.

Conclusion: Numerous facets of our everyday lives could be enhanced by understanding the specific roles that the gut microbiota plays in our growth and development as well as how it operates in both health and disease. In summary, our research demonstrated that probiotic supplements can help improve gut health in healthy older adults whose gut microbial composition has changed.

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REFERENCES

1. AboNahas HH, Darwish AM, Abd EL-kareem HF, AboNahas YH, Mansour SA, Korra YH, et al. Trust your gut: the human gut microbiome in health and disease. In: Sayyed, R.Z., Khan, M. (eds) Microbiome-Gut-Brain Axis. Springer, Singapore. 2022: pp53-96, doi:10.1007/978-981-16-1626-6_3.
2. Lagier JC, Edouard S, Pagnier I, Mediannikov O, Drancourt M, Raoult D. Current and past strategies for bacterial culture in clinical microbiology. Clin Microbiol Rev. 2015 Jan;28(1):208-36, doi: 10.1128/CMR.00110-14.
3. Wang B, Yao M, Lv L, Ling Z, Li L. The human microbiota in health and disease. Engineering. 2017 Feb 1;3(1):71-82, doi: 10.1016/J.ENG.2017.01.008.
4. Ahlawat S, Asha, Sharma KK. Gut-organ axis: a microbial outreach and networking. Lett Appl Microbiol. 2021 Jun;72(6):636-668, doi: 10.1111/lam.13333.
5. Simões CD, Maganinho M, Sousa AS. FODMAPs, inflammatory bowel disease and gut microbiota: updated overview on the current evidence. Eur J Nutr. 2022 Apr; 61 (3): 1187-1198. doi: 10.1007/s00394-021-02755-1.
6. Nakov R, Velikova T. Chemical Metabolism of Xenobiotics by Gut Microbiota. Curr Drug Metab. 2020;21(4):260-269. doi: 10.2174/1389200221666200303113830.
7. Piccioni A, Cicchinelli S, Valletta F, De Luca G, Longhitano Y, Candelli M, et al. Gut Microbiota and Autoimmune Diseases: A Charming Real World Together with Probiotics. Curr Med Chem. 2022; 29 (18): 3147-3159. doi: 10.2174/0929867328666210922161913.
8. Philips CA, Augustine P, Ganesan K, Ranade S, Chopra V, Patil K, et al. The role of gut microbiota in clinical complications, disease severity, and treatment response in severe alcoholic hepatitis. Indian J Gastroenterol. 2022;41(1):37-51. doi: 10.1007/s12664-021-01157-9.
9. Jansen VL, Gerdes VE, Middeldorp S, van Mens TE. Gut microbiota and their metabolites in cardiovascular disease. Best Pract Res Clin Endocrinol Metab. 2021 May;35(3):101492. doi: 10.1016/j.beem.2021.101492.
10. Akbari E, Asemi Z, Daneshvar Kakhaki R, Bahmani F, Kouchaki E, Tamtaji OR, Hamidi GA, Salami M. Effect of Probiotic Supplementation on Cognitive Function and Metabolic Status in Alzheimer's Disease: A Randomized, Double-Blind and Controlled Trial. Front Aging Neurosci. 2016 Nov 10;8:256. doi: 10.3389/fnagi.2016.00256.
11. Rudzki L, Ostrowska L, Pawlak D, Małus A, Pawlak K, Waszkiewicz N, Szulc A. Probiotic Lactobacillus Plantarum 299v decreases kynurenine concentration and improves cognitive functions in patients with major depression: A double-blind, randomized, placebo controlled study. Psychoneuroendocrinology. 2019 Feb;100:213-222. doi: 10.1016/j.psyneuen.2018.10.010.
12. Kazemi A, Noorbala AA, Azam K, Eskandari MH, Djafarian K. Effect of probiotic and prebiotic vs placebo on psychological outcomes in patients with major depressive disorder: A randomized clinical trial. Clin Nutr. 2019 Apr;38 (2):522-528. doi: 10.1016/j.clnu.2018.04.010.
13. Broekhuizen K, Pothof A, de Craen AJ, Mooijaart SP. Characteristics of randomized controlled trials designed for elderly: a systematic review. PLoS One. 2015 May 15;10(5):e0126709. doi: 10.1371/journal.pone.0126709.
14. Clegg A, Relton C, Young J, Witham M. Improving recruitment of older people to clinical trials: use of the cohort multiple randomized controlled trial design. Age Ageing. 2015 Jul;44(4):547-50. doi: 10.1093/ageing/afv044.
15. Browne HP, Forster SC, Anonye BO, Kumar N, Neville BA, Stares MD, Goulding D, Lawley TD. Culturing of 'unculturable' human microbiota reveals novel taxa and extensive sporulation. Nature. 2016 May 26;533(7604):543-546. doi: 10.1038/nature17645.
16. Conlon MA, Bird AR. The impact of diet and lifestyle on gut microbiota and human health. Nutrients. 2014 Dec 24;7(1):17-44. doi: 10.3390/nu7010017.
17. von Martels JZH, Sadaghian Sadabad M, Bourgonje AR, Blokzijl T, Dijkstra G, Faber KN, Harmsen HJM. The role of gut microbiota in health and disease: In vitro modeling of host-microbe interactions at the aerobe-anaerobe interphase of the human gut. Anaerobe. 2017 Apr;44:3-12. doi: 10.1016/j.anaerobe.2017.01.001.
18. Cardona D, Roman P. New Perspectives in Health: Gut Microbiota. Int J Environ Res Public Health. 2022 May 10;19(10):5828. doi: 10.3390/ijerph19105828.
19. Rowland I, Gibson G, Heinken A, Scott K, Swann J, Thiele I, Tuohy K. Gut microbiota functions: metabolism of nutrients and other food components. Eur J Nutr. 2018 Feb;57(1):1-24. doi: 10.1007/s00394-017-1445-8.
20. David LA, Maurice CF, Carmody RN, Gootenberg DB, Button JE, Wolfe BE, Ling AV, Devlin AS, Varma Y, Fischbach MA, Biddinger SB, Dutton RJ, Turnbaugh PJ. Diet rapidly and reproducibly alters the human gut microbiome. Nature. 2014 Jan 23;505(7484):559-63. doi: 10.1038/nature12820.
21. Ding RX, Goh WR, Wu RN, Yue XQ, Luo X, Khine WWT, Wu JR, Lee YK. Revisit gut microbiota and its impact on human health and disease. J Food Drug Anal. 2019 Jul;27(3):623-631. doi: 10.1016/j.jfda.2018.12.012.
22. Wang X, Peng J, Cai P, Xia Y, Yi C, Shang A, Akanyibah FA, Mao F. The emerging role of the gut microbiota and its application in inflammatory bowel disease. Biomed Pharmacother. 2024 Oct; 179: 117302. doi: 10.1016/j.biopha.2024.117302.
23. Luqman A, Hassan A, Ullah M, Naseem S, Ullah M, Zhang L, et al. Role of the intestinal microbiome and its therapeutic intervention in cardiovascular disorder. Front Immunol. 2024 Jan 26;15:1321395. doi: 10.3389/fimmu.2024.1321395.
24. Lloyd-Price J, Abu-Ali G, Huttenhower C. The healthy human microbiome. Genome Med. 2016 Apr 27; 8(1):51. doi: 10.1186/s13073-016-0307-y.
25. Sender R, Fuchs S, Milo R. Revised Estimates for the Number of Human and Bacteria Cells in the Body. PLoS Biol. 2016 Aug 19;14 (8): e1002533. doi: 10.1371/journal.pbio.1002533.

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