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Improvement in Gastrointestinal Quality of Life Index (GIQLI) following meditation: An open-trial pilot study in India

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ABSTRACT

Background: Medical science is increasingly recognizing the role of gut health in achieving optimal wellbeing. A healthy gut improves digestion. Additionally, it has a positive impact on multiple physiological networks such as immune system, central nervous system and hepato-endocrine system, thus contributing to the overall quality of life. Functional gastrointestinal disorders: also known as disorders of gut-brain interaction, such as irritable bowel syndrome are increasing worldwide. Conditions like stress, anxiety and mental disorders are correlated with these disorders. Mind-body interventions have been shown to ameliorate stress, anxiety and related conditions that may aggravate functional gastrointestinal disorders.

Objective: The present study aims to investigate the benefits of a novel meditation technique called the Vaishvanara Agni meditation (VAM) on the gastrointestinal quality of life.

Materials and methods: 54 subjects participated in the study and practiced VAM for 50 days. During the Vaishvanara Agni meditation (VAM), attention is directed to the navel region and the digestive system. The effect of the meditation was evaluated using the gastrointestinal quality of life (GI-QoL) questionnaire, which was administered to subjects at three different time points i.e. day 0, day 24 and day 50. **Results:** GI-QoL was significantly improved with the practice of VAM. Additionally, significant improvements were noticed in all sub domains especially core symptoms, physical strength and the psychological domain.

Conclusion: Meditation practices that focus on improving digestion can be an effective tool for improving gut health.

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1. Introduction

Gut health is a complex phenomenon, consisting of micro and macro integrity of various gastrointestinal organs from oesophagus to the rectum, allowing us to eat and digest without discomfort [1]. Changes in the human gut micro-biota are associated with both health and disease. Imbalance in gut micro-flora not only affects digestion, but also has an impact immunity and chronic illness like cancer and type 2 diabetes [2,3]. Diseases and disorders related to gastro intestinal system have increased in the past decade due to major lifestyle changes. Various studies conducted in the past

document a high prevalence of depression, stress, anxiety and altered central nervous system processing among people who suffer from gastrointestinal disorders [4–6]. Digestive disorders affect nearly 60 to 70 million people worldwide [7]. The prevalence was found to be higher in women than in men [6]. In 2016, over 36 million Indians were found to be affected by gastrointestinal (GI) and liver related non communicable disorders [8].

Functional gastrointestinal disorders (FGIDs) (or gut-brain interaction disorders), like irritable bowel syndrome and ulcerative colitis are prevalent worldwide. These diseases exhibit a wide variety of symptoms, and have no biochemical or structural basis [9]. A bi-directional communication exists between central nervous system and enteric nervous system through gut brain axis. It is hypothesized that most GI disorders occur as a result of alteration in this axis. Due to the alteration, stress hormones like

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corticosterone and adrenocorticotrophin are released causing mental disorders and mood swings [9]. According to a study from US, Canada and UK in the year 2015, roughly, more than one third of the population is diagnosed with one or more FGIDs according to ROMEs IV criteria [10].

Meditation improves the quality of life and reduces the burden of disease among individuals suffering from non communicable diseases and lifestyle related disorders such as diabetes, cardiovascular diseases, blood pressure and polycystic ovary syndrome [11–14]. Studies indicate that controlled rhythmic breathing techniques such as *Sudarshan Kriya* promote a healthier lifestyle by improving immunity, antioxidant status, hormonal status, and brain functioning [15]. Research studies in the past indicate that yoga and meditation techniques have positive effects on neurophysiological systems, and serve as an alternative treatment for various psychosomatic disorders [3]. A recent study highlighted the benefits of mindfulness-based meditation in reducing depression and improving quality of life parameters associated with gastroesophageal reflux disease [4]. Relaxation training such as meditation is useful in providing symptomatic relief in many non-communicable gastrointestinal diseases like Irritable Bowel Syndrome (IBS) [17].

Though research studies in the past have highlighted significance of holistic techniques in improving or treating GI disorders, there exist serious gap in literature to assess the effect of mind-body interventions like meditation on Gastrointestinal quality of life. Though one study does compare the effect of 10 weeks of yoga therapy with medical care on abdominal pain and quality of life in children, specific meditation practices to improve gut quality are not studied [18]. The present study investigates the improvement in gut health and gastrointestinal quality of life with the regular practice of a novel meditation called the Vaishvanara Agni meditation (VAM) which directs attention on the navel region and the digestive system.

2. Materials and methods

2.1. Study design

This was an open-trial single-arm, pre-post pilot study conducted to analyze the impact of a novel meditation called Vaishvanara Agni meditation (VAM) on the gastrointestinal quality of life in normal adult population. The participants were guided into the practice of the VAM technique using a recorded audio twice a day. They could attend the sessions in person or online. Gastrointestinal Quality of Life Index (GIQLI) was used to assess the GI QoL at three-time points: before the meditation practice started (Day0), 24 days after regular meditation practice (Day24), and 50 days after regular practice (Day50). All the participants were contacted via email and phone for day 24 and day 50 assessments.

2.2. Population

The study enrollment was conducted via word of mouth and social media. Before the first session of VAM, the study details were explained to the participants and informed consent was obtained. Inclusion criteria for the study was as follows: between 19 and 45 years of age, commitment for 50 days as a regular participant, and willingness to adopt the VAM meditation as a lifestyle intervention. Participants who had severe and chronic digestive issues were excluded. The Institutional Review Board of the Sri Institute for Advanced Research ethics committee in India approved this study. 80 people participated in this pilot study. However, only 54 participants completed the assessments at all three time points, and were considered for data analysis.

2.3. Intervention

Vaishvanara Agni meditation (VAM) is a 20 min guided meditation and brings attention to the navel centre and the gut region to activate the digestive fire. The term Vaishvanara Agni is derived from Sanskrit, where “Agni” means fire and “*Vaishvanara Agni*” is a term specific for digestive fire.

VAM is a type of open monitoring meditation [19,20]. Open monitoring meditation requires a broad scope of attention while focusing on a particular object. The practice is based on a non judgmental awareness or monitoring on the ongoing experience at the physical level. Though the practice requires initial focus to reduce distractions, it involves a higher order meta-awareness of the present moment.

During the process of VAM, attention is first directed to the navel region and the digestive system. The process of initial attention on navel centre gradually shifts to a meta awareness.

VAM was designed by renowned yoga expert and humanitarian, Sri Sri Ravi Shankar.¹ VAM is available free of charge to the community and can be made available by the authors, on request.

2.4. Measure

Gastrointestinal Quality of Life Index [21]: Gastrointestinal Quality of Life Index (GIQLI) is a validated and reliable tool to assess health-related quality of life. It is a 36 item scale divided into five domains: core symptoms (10 items), physical (6 items), psychological (6 items), social (2 items) and disease specific (8 items).

Core symptoms include questions that pertain to unpleasant symptoms of GI disorders like pain and abdominal bloating. Physical domain focuses on determining the physical strength and capacity to perform on an individual level despite the discomfort and the symptoms. Psychological domain contains questions that assess mental well-being of an individual. Social domain focuses on understanding the impact on social life of an individual whereas disease specific domain concentrates on medical symptoms and categorizing them into a particular disorder/disease.

Each item is based on a 0–4 Likert scale with 0 being least desirable to 4 being the most desirable option. The summative scores represent Gastrointestinal Quality of Life Index. GIQLI ranges from 0 to 144 with higher scores indicating a better quality of life.

2.5. Data analysis

Data was collected on Day0, Day24 and Day50 and matched for individuals using their email address and mobile numbers. Three sets were formed Day0–Day24, Day0–Day50, and Day24–Day50. The paired-sample t-test was used to compare the scores at three different time points and significance was calculated. P value < 0.05 was considered statistically significant. The test was performed using the Microsoft Excel Data analysis tool. Cronbach’s alpha was calculated to find out the internal consistency of the domain-specific questions. Cohen’s d value was used to measure the effect size of the intervention at different time points of the study. The cumulative score of all questions/items was expressed as the mean \pm SD in different domains.

3. Results

80 subjects were enrolled in the study. Out of 80, 54 participants completed the assessments at all three time points, and were

¹ <https://www.srisriravishankar.org/>.

Table 1
Participants demographic details (N = 54) n(%).

Characteristics	Type	Participants
Gender n (%)	Male	26(48.2)
	Female	28 (51.8)

considered for data analysis. The remaining 26 participants did practice the intervention daily, however they missed assessments on either the 24th or the 50th day and thus, were not considered for data analysis. Table 1 depicts the demography of the study population. Reliability for internal items were calculated using Cronbach alpha. The overall score for 36 items were found to be 0.884 (pre), 0.902 (post) and 0.918 (day 40).

Table 2 depicts the GIQLI index for the study population. The overall mean scores increased from 84 to 94 after the intervention and kept increasing with the practice of VAM as assessed on Day 50. According to Kulkarni et al. and Joneja et al. overall score of 84 is indicative of severe gastrointestinal problems and hence poor quality of life. The score improved significantly with the practice of the intervention [22,23]. Individual sub-domains scores also show significant improvement as seen in Table 2. Core symptoms such as pain, bloating, belching and fatigue noticeably reduce through the practice of VAM. Further reduction in such symptoms is noticed on day 50. The subdomain of physical strength and mental wellness for a subject showed improvement soon after the practice of VAM, however long term practice of VAM created changes in social and disease specific areas.

Table 3 depicts a gender wise comparative analysis for the intervention. Males showed significant benefit in all the domains. However, female scores are significant only in overall quality of life and core symptoms subdomains. For the other domains, even though the scores increase with time, they fail to show significance as seen in Table 3.

Table 4 demonstrates the effect size of the intervention via Cohen's d value. The effect size between day0 and day 24 was 0.48, thus implying a medium effect of the intervention. This effect size can also be interpreted as 69% of the population receiving a significant improvement in the GI quality of life by 24th day of practice [24]. The d value of 0.689 between day 0 and day 50 implies a large effect size. It can also be interpreted as 76% of the population receiving a significant improvement in the GI quality of life by the 50th day of practice [24].

The effect sizes of various sub-domains indicate a large effect of the intervention on core symptoms of GI disorders in comparison to other domains. Effect sizes of more than 0.75 on 24th day, and 0.95 on the 50th day indicate that the difference is grossly perceptible, and therefore the intervention has a large effect on core-symptom of the population. Medium sized effect of the intervention was also noticed on physical aspect by the day 50.

4. Discussion

The present study evaluates the improvement in gastrointestinal quality of life following a meditation practice. To our

Table 2
Mean value, SD and significance of GIQLI scores pre, day 24 and day 50 of intervention for the total population.

Scale	Overall GIQLI Score	Core Symptoms	Psychological aspect	Physical aspect	Social aspect	Disease specific
Pre (Mean And Sd)	84.9 ± 18.3	19.6 ± 6.1	13.7 ± 3.7	12.2 ± 6.0	2.4 ± 1.5	21.3 ± 4.2
Day 24 (Mean And Sd)	93.9 ± 18.5	24.2 ± 6.1	14.7 ± 3.2	14.1 ± 5.9	2.3 ± 1.6	22.3 ± 4.8
Day 50 (Mean And Sd)	97.9 ± 19.4	25.5 ± 6.2	15.1 ± 3.3	16.1 ± 5.4	1.9 ± 1.5	22.8 ± 5.3
p value (Pre-Day 24)	0.00**	0.00**	0.02*	0.01*	0.60	0.13
p value (Pre-day 50)	0.00**	0.00**	0.00**	0.00**	0.02*	0.04*

**p value <0.001. *p value <0.05.

knowledge this is the first study to establish a relationship between meditation and GI quality of life. A study on human intestinal flora of subjects practicing vegan meditation based lifestyle showed an overall improvement in body's immunity, metabolic activity and endocrine system facilitating a better state of health overall. Meditation may improve psychological, cardiovascular and digestive ailments whereas a vegan diet can prevent metabolic diseases like cholesterol, obesity and diabetes [25].

In the study conducted by Eypasch et al. [21] when GIQLI was administered to a group 168 normal healthy individuals, their mean GIQLI score was 125. In our study the mean score for participants at baseline was 84.9 which is much lower compared to baseline scores for healthy individuals as per the study by E.Eypasch et al. So far, no large scale study has been conducted on Indian population that measures the GIQLI scores for healthy individuals. Hence, based on study by Eypasch we assume that the study participants in our study had some gastrointestinal disturbances, which was improved with the practice of meditation as evident from the scores on Day 24 and Day 50.

Results of our study indicate an overall improvement in the quality of life with regular practice of Vaishvanara Agni meditation. Participants in our study have very low scores on GIQLI at baseline (pre-intervention). Although our study lacked collection of medical history and clinical diagnosis of the study population the scores suggested that participants suffered from gastrointestinal problems. Regular practice of VAM not only improved the physical strength and digestion of the individual, but also contributed to their mental, emotional and social health.

4.1. Impact of VAM on core symptoms

Subjects experienced the greatest improvement on the core symptoms, which are abdominal pain, abdominal noise, bloating, belching and fatigue. Subjects reported that they experienced less discomfort after the use of VAM meditation. A possible explanation for these results could be quoted from ancient traditional texts of Ayurveda. The digestive fire in the body increases with an increase in acidic conditions of the body. Balancing and maintaining digestive fire in the body is important for maintaining harmony of micro flora and healthy digestive functions. Imbalance in digestive fire and hence micro flora leads to pathological conditions like constipation, ulcers and diarrhea [26].

4.2. Impact of VAM on physical aspect

Results also show improvement in physical aspect scores, i.e. improvement in physical strength, appearance and endurance. The enhancement in physical performance and activity could be due to an improved gut microbiota among individuals. Studies indicate that including probiotic diet improves physical performance in athletes. Probiotic supplementation increases endurance in adults. Endurance levels, blood glucose levels and longer time to exhaustion were noticed among those who consumed probiotic supplements [27]. Another possible explanation is an

Table 3
Mean value and significance of GIQLI scores pre, day 24 and day 50 of intervention.

	Scale	Overall GIQLI Score	Core Symptoms	Psychological aspect	Physical aspect	Social aspect	Disease specific
Male	Pre (Mean And Sd)	91.2 ± 16.9	21.4 ± 5.4	14.9 ± 2.9	14.5 ± 5.6	2.3 ± 1.2	25.5 ± 4.5
	Day 24 (Mean And Sd)	102.5 ± 12.5	26.4 ± 4.8	15.5 ± 2.6	16.9 ± 3.9	1.6 ± 1.3	24.5 ± 3.9
	Day 50 (Mean And Sd)	103.7 ± 17.7	27.1 ± 6.3	15.6 ± 3.1	17.2 ± 4.3	1.7 ± 1.5	27.5 ± 5.7
	p value (Pre-Day 24)	0.00**	0.00**	0.01*	0.00**	0.04*	0.02*
	p value (Pre-day 50)	0.00**	0.00**	0.04*	0.00**	0.03*	0.06
Female	Pre (Mean And Sd)	80.62 ± 18.2	18.28 ± 6.3	12.31 ± 3.5	10.6 ± 5.8	2.4 ± 1.7	23.6 ± 5.3
	Day 24 (Mean And Sd)	88.06 ± 19.8	22.59 ± 6.5	13.3 ± 3.08	12.1 ± 6.2	2.7 ± 1.6	23.6 ± 5.5
	Day 50 (Mean And Sd)	93.93 ± 19.7	24.3 ± 6.0	13.8 ± 3.07	15.3 ± 5.9	2 ± 1.5	25.0 ± 6.1
	p value (Pre-Day 24)	0.04*	0.00**	0.44	0.40	0.20	0.97
	p value (Pre-day 50)	0.00**	0.00**	0.02*	0.00**	0.29	0.32

**p value <0.001. *p value <0.05.

improved digestion of the nutrients due to healthy intestinal flora which could lead to higher energy and endurance. VAM could possibly improve the digestion in the body, and hence the physical strength.

4.3. Impact of VAM on psychological aspect

Meditation has long been shown to activate parasympathetic nervous system, hence, relaxing the body [28]. Our results show slight improvements in the psychological aspect of individuals thus reducing mood swings, sadness, stress, frustration and nervousness. According to ancient Ayurveda, imbalance in the digestive fire increases ‘Pitta’ in the body which results in anger, frustration and violent activities [26]. Improvement in mind-body complex leads to an improvement in social behavior.

4.4. Impact of VAM on social aspect

Daily interactions and social activities are influenced by gut microbiota. The potential of gut microbiota to influence human behavior and biology is well understood by the scientific world. Imbalance in gut flora affects various neurotransmitters like Ach, NA, DA, GABA, 5-HT, etc that impact social behaviour [29]. These neurotransmitters modify the HPA axis, thereby affecting one’s mood and interest in daily activities. Our results indicate a significant improvement in social behavior of an individual after 50 days of VAM practice.

4.5. Impact of VAM on disease specific items

Results indicate a slight improvement in the clinical conditions of individuals, however the effect is not very high. Various causes can underlie clinical conditions such as infection, metabolic change, physiological disturbance etc. It is not easy to treat these conditions without addressing each underlying factor. Though a slight amount of relief would be provided with meditation, their condition may not be completely eradicated. Moreover, the subjects taken for the

Table 4
Cohen’s d value.

Domain	D0-D24	D0-D50
GI QLI Index	0.489	0.689
core symptom	0.753	0.958
Psychological aspect	0.294	0.391
Physical aspect	0.317	0.688
Social aspect	0.083	0.341
Disease specific	0.205	0.298

study were healthy and did not show any major signs of GI disorders.

In the past decade gut health has gained a lot of importance and increasingly become a topic of research to understand its impact on various functions of the body. Gut health is known to impact almost all aspects of life. This study is a first of its kind, to our knowledge and explores the role of a customized meditation on the improvement in gastrointestinal quality of life. Further studies are needed to explore the impact on gut-brain axis and gut microbiome.

5. Conclusion

Evidence from our study indicates that meditation practices which focus on improving digestion can be an effective tool for improving gut health. They are a low cost, high yield method to improve gut health. Good gut health and bacteria in the gut-microbiome helps to maintain different aspects of human health. It has a large role to play in improving our overall quality of life. Mind body interventions like VAM can enhance the GI QoL, hence positively impacting the overall health and wellbeing.

6. Limitations and future work

This study was conducted as a pilot with a small group of healthy adults. Replication in a large group, with a control arm is required to further confirm the results. For the purpose of the pilot study, the enrollment was conducted via word of mouth and social media. Participants willing to experience the meditation and continue the practice for 50 days were enrolled. This might introduce a selection bias. Medical history of the participants were not collected to identify any existing underlying health issues, which was another limitation of the study. It would also be necessary to study a population with gut related disorders to observe the efficacy of the meditation for those who suffer from gut related chronic conditions. Further microarray and genetic analysis of gut microbiota can provide insight into the mechanism of action of meditation on the gut microbiome.

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Conflict of interest

None.

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