Tailored Digital Healthy Lifestyle of Irritable Bowel Syndrome: Effect on Pain and Related Symptoms

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Abstract:

Background: Irritable Bowel Syndrome (IBS) is a common chronic gastrointestinal illness that severely lowers a patient's quality of life. New research shows that lifestyle treatments can be beneficial, especially when they are tailored to each person's needs and provided online. **Aim:** To assess how a tailored digital healthy lifestyle affects pain and related symptoms in IBS patients. **Design**: A pretest-posttest research design. **Subjects and Method:** a purposive 60 patients diagnosed with IBS who admitted at the Tropical Medicine and Gastroenterology outpatient clinic, El Rajhi Liver Hospital, Assiut University. **Tools**: Using two tools: (I) a patient health needs assessment questionnaire to gather demographic characteristics and medical data and (II) the IBS Severity Scoring System (IBS-SSS). **Results:** (IBS) was more prevalent among young adult females with most participants having moderate illness duration (1–3 years), relatively high education levels, and urban residence. Post-intervention findings revealed significant improvement in IBS-related pain and symptom severity as measured by the IBS-SSS. The older age, urban residence, and the presence of comorbidities significantly predicted higher IBS symptom severity, whereas higher educational attainment was associated with lower symptom scores. **Conclusion:** The tailored digital healthy lifestyle intervention was effective in reducing pain and related symptoms among IBS patients. **Recommendation**: Healthcare providers should be encouraged to integrate such digital tools into routine care to empower patients and enhance symptom control.

Keywords: Digital Health, Healthy Lifestyle, Irritable Bowel Syndrome, Pain.

Introduction:

Many people suffer from irritable bowel syndrome, or IBS. Abdominal pain, bloating, and irregular bowel habits that range from diarrhea to constipation are its hallmarks. Up to 8.8% of people globally may be impacted, and in every country, the prevalence is 1.4:1, meaning that women are affected more frequently than males. Patients may experience discomfort and problems with diarrhea or constipation two thirds of the time, with pain being more prevalent and occurring half the time **(Lacy, Pimentel, & Brenner, 2021).**

Irritable bowel syndrome has always been difficult to diagnose, as seen by the variety of names it has been given, such as mucous colitis and spastic colon. However, efforts to develop precise diagnostic criteria for IBS using a questionnaire did not begin until the 1970s. "Recurrent abdominal pain, on average, at least 1 day/week in the last 3 months, associated with two or more of the following criteria," is what the Rome IV diagnostic criteria for IBS require connected to bowel movements; linked to a shift in the frequency of bowel movements; linked to a shift in the shape or appearance of bowel movements **(Lembo et al., 2022).**

Irritable bowel syndrome can present with four bowel patterns, which are still included in the Rome IV classification. The following are these patterns: IBS-D (diarrhea predominant), IBS-C (constipation predominant), and IBS-M (mixed diarrhea and constipation) IBS-U (unclassified; symptoms cannot be placed into one of the three categories mentioned above). Subtypes of IBS are frequently dynamic. Interestingly, 29% of patients switch between diarrhea-predominant IBS and constipation-predominant IBS within a year, and 75% of patients shift subtypes **(Keefer et al., 2022).**

The most often given medication for individuals with IBS is an antispasmodic for pain management. However, successful bowel pattern regularization and management of the illusive symptom of bloating must be part of the therapeutic approach used to treat IBS. Many patients experience discomfort from bloating; however, its definition is ambiguous and its function as a symptom differs throughout civilizations and ethnic groups **(Chang, Lembo, & Sultan, 2022).**

In order to encourage and sustain a healthy lifestyle for people, "tailored digital healthy lifestyle" would entail the use of specialized and

customized digital tools, technologies, and solutions. This idea combines digital resources to provide individualized counseling, support, and interventions based on each person's particular health requirements, preferences, and objectives **(Chatterjee, Prinz, Gerdes, & Martinez, 2021).**

According to a recent study, leading a healthy lifestyle may lower the chance of developing irritable bowel syndrome, or IBS. According to a study published Tuesday in the journal Gut, persons who engaged in physical activity, slept well, ate a healthy diet, consumed alcohol in moderation, or abstained from smoking had a 42% lower chance of having the gastrointestinal condition **(Taylor, 2024).**

Significance of the study:

The most common functional gastrointestinal illness observed in the general population globally is IBS. Due to its chronic nature and symptoms, which can range from mild to severe, it has a significant detrimental impact on the patient's quality of life; for this reason, it is crucial that these people have lives that are healthy. Customized digital solutions meet each person's specific needs and preferences by enabling focused interventions, individualized health plans, and personalized health evaluations. Patients should be taught how to manage and control their symptoms as well as that the disease is benign in nature. Digital platforms provide possibilities for ongoing health education, equipping people with the information and tools they need to make wise lifestyle and health decisions. Therefore, the purpose of this study is to give patients personalized digital healthy lifestyle information that will help them stay as healthy as possible and alleviate pain and associated symptoms **(Singh, Tuck, Gibson, & Chey, 2022).**

Aim of the study: The current study aimed to assess how a tailored digital healthy lifestyle affects pain and related symptoms in irritable bowel syndrome patients.

Research hypothesis:

Pain and related symptoms may be significantly improved among IBS patients post implementation of the tailored digital healthy lifestyle.

Subjects and method:

Research design;

Pretest-posttest research design was conducted.

Setting:

The study was carried out at Tropical Medicine and Gastroenterology outpatient clinic at El Rajhi Liver Hospital, Assiut University Hospital.

Subjects:

Participants in this study were 60 IBS patients of both sexes, aged 18 to 65, who were selected by a purposive sampling.

Excluded criteria:

Past medical history of diabetes mellitus, renal, hepatic, or any other underlying illness.

Sample size: It was calculated using (G power software) as 60 cases. Calculated size of the sample for testing differences between two independent means two tailed. Used "power 95 %", "effect size 0.8", and "error 0.05"

Tools: two tools were utilized:

Tool I: Patient's health needs assessment questionnaire:

This tool consisted of two parts:

Part (I): Patient demographic characteristics: It included age, gender, education level and residence.

Part (II): Medical data as: It asked about family history (first-degree relatives) with an IBS diagnosis, Time since diagnosis, history of laparotomy or abdominal surgery, gastro-esophageal retardation illness, epigastric pain syndrome, BMI, hypertension, diabetes, autoimmune diseases, anemia, asthma, heart disease. Constipation-predominant (IBS-C), diarrhea (IBS-D), mixed (IBS-M), and unclassified (IBS-U) are the subtypes of IBS.

Tool II: IBS Severity Scoring System (IBS-SSS):

It was developed by **(Francis, Morris, & Whorwell, 1997)** to assess patient's pain and related symptoms. It is the first easy way to track how the IBS condition and its therapy are going. This scale primarily assesses the severity of IBS symptoms over a 10-day period, including distension, frequency and consistency of stools, stomach pain, and overall difficulty with daily life. The IBS-SSS does the calculations. Each of the five questions has a visual analogue scale score ranging from 0 to 100.

The five components are:

1. **Severity of abdominal pain**; Patients rate the worst pain experienced over the past 10 days.
2. **Frequency of abdominal pain;** patients report how often they experienced abdominal pain during the same period.
3. **Severity of abdominal distension (bloating);** this assesses the perceived severity of bloating or fullness.
4. **Dissatisfaction with bowel habits**; evaluates how dissatisfied the patient is with the consistency and frequency of their stools.
5. **Interference with quality of life (QOL)**; assesses how much the IBS symptoms have impacted the patient's daily life and functioning.

Scoring system:

- 0–75: Normal / in remission (healthy individuals)
- 75–175: Mild IBS
- 175–300: Moderate IBS
- >300: Severe IBS

Tailored Digital Healthy Lifestyle: The researchers prepared specific booklet for IBS patients regarding healthy lifestyle in simplified Arabic using colored image instructions based on a review of related literatures. The following were included in the Tailored Digital Healthy Lifestyle; included stress management, eating a high-quality, and balanced food, staying active, sleeping 7 to 9 hours every night, and stop smoking. Using in-person interviews followed by apps and online platforms (Whatsapp, Telegram, etc.), these interventions were carried out in accordance with the patient's needs.

Stop smoking: Nicotine significantly exacerbates several IBS symptoms by increasing the formation of stomach acid and decreasing the generation of sodium bicarbonate.

High level of activity: It has been demonstrated that regular exercise reduces IBS symptoms. Compared to sedentary people, physically active people have more frequent bowel movements and faster colon transit. According to a randomized clinical trial, patients who engaged in moderate-to-intense physical activity three times a week for 12 weeks saw a significant decrease in their symptoms of IBS.

-**Sleeping 7 to 9 hours per night:** Compared to healthy persons, patients with irritable bowel syndrome (IBS) are more likely to experience sleep disturbances.

-Diet:

-Increase intake of fiber: Fiber softens and facilitates the passage of stool, which may help with IBS constipation.

-Steer clear of gluten: The majority of cereal, grains, pasta, and processed foods contain gluten.

-Adhere to a particular diet known as the low FODMAP diet, which calls for limiting or avoiding foods high in difficult-to-digest carbohydrates.

Stress management: The colon will spasm if the patients are anxious, stressed, or dissatisfied IBS symptoms may be triggered by these spasms, which can cause pain and stomach cramps

Methods: The study was conducted through the following 3 phases:

Preparatory phase:

1-Administrative approval: Following an explanation of the study's purpose, the Tropical Medicine and Gastroenterology department as well as the outpatient

clinic at El Rajhi Liver Hospital, Assiut University Hospital, granted official approval and administration authorization to collect the necessary data.

2-Tools development:

- After an in-depth national and international literatures (nursing and medical textbooks, journals, and online resources), tools were created **(D'Silva, Hua, Modayil, Seidel, & Marshall, 2024; Olson et al., 2024; Alsharef et al., 2024)**.

3-Validity and Reliability:

-Professors with expertise in the domains of medicine and nursing assessed the instruments' content validity and reliability; no changes were needed.

-Validity and Reliability of the IBS Severity Scoring System (IBS-SSS); for determining the intensity of symptoms in patients with IBS, the IBS Severity Scoring System (IBS-SSS) is a validated and reliable tool that is frequently used in clinical and research settings. Cronbach's alpha scores of 0.75 to 0.83 have been reported, indicating that the tool has good internal consistency and that the items evaluating the overall severity of symptoms are reliable.

4-Ethical Considerations:

-Research proposal was approved from ethical committee of the Faculty of Nursing, Assiut university with number (IRB: 1120240868).

-There was no risk for study subjects during application of the research.

-The study followed ethical principles in clinical research.

-Confidentiality and anonymity was assured.

-Participants had the right to refuse to participate and /or withdraw from the study without any rational at any time.

-Participants were coded for data entry so that their names could not be identified.

-Formal consent from patient to participate in the study was obtained after explanation of the study purpose.

5-Pilot study: 10% (6) of the sample's patients in the chosen environment participated in a pilot study to assess the tools' applicability, feasibility, and clarity based on expert opinions. Any necessary adjustments were made. The final study sample was not including the pilot study sample.

Implementation phase:

-In this phase, each patient who met the inclusion criteria was interviewed individually to clarify the nature and purpose of the study, and consent forms were collected from those who agreed to participate.

-The researchers gave the patient an

introduction and described the goal of the study at the start of the interview.

-The researchers begin filling out the patient's assessment sheet at the first visit in order to evaluate the patient's medical history and demographics using Tool I. Tool II (pre-test) is used to evaluate the patient's pain and associated symptoms. It took fifteen to twenty minutes.

-The patients' private phone number and WhatsApp are obtained by the researcher in order to send them instructions that they must follow.

-The researchers gave patients an explanation and demonstration of the customized digital healthy lifestyle. It took place in each patient's room separately.

-The key components of the Tailored Digital Healthy Lifestyle are stress management, eating a high-quality, balanced food, sleeping 7 to 9 hours per night, and abstaining from smoking.

-Videos, colored posters, brochures, and a PowerPoint presentation on the researcher's laptop that included all the components of a customized digital healthy living for the patients under study were the teaching methods used. This session lasted between thirty and sixty minutes.

-These educational sessions involved the patients and their families.

-A hard copy of a healthy lifestyle with colored pictures was supplied to the patients at the conclusion of the first visit.

Evaluation phase:

-The patients were told to follow instructions for three months.

-Weekly telephone follow-up was conducted by the researchers to make sure the participants were maintaining their healthy lifestyle.

-Patients were asked to return for a follow-up at the end of the third month after starting a healthy lifestyle. The IBS Severity Scoring System (Tool II) was used to assess the patients' discomfort and associated symptoms post the tailored digital healthy lifestyle; this process took roughly fifteen to twenty minutes.

Statistical analysis:

The gathered data was organized, categorized, and examined using the statistical software for social sciences (SPSS) version 22. Descriptive statistics were utilized to report the mean and standard deviations of the data for both qualitative and quantitative variables. The statistical tests used were the paired t-test, chi-square test, and correlation r-test. A statistically significant difference was not considered when the p-value was larger than 0.05, and high

significance was assumed when it was less than 0.05.

Results

Table (1): Shows that the studied patients consisted predominantly of females (60%) and individuals aged 18–30 years (36.7%), indicating a higher prevalence of IBS among young adult women. Most participants had at least a secondary level of education (46.7%), with 36.6% attaining university or higher education, suggesting relatively good health literacy. Additionally, a majority of the participants resided in urban areas (58.3%), which may reflect greater access to healthcare resources and digital platforms used in the intervention

Figure (1): Reveals that the majority of participants (47%) reported having irritable bowel syndrome (IBS) for 1–3 years**.**

Table (2): Reports that the majority of participants (63.3%) had no family history of IBS. About 31.7% had a history of abdominal surgery, 55% experienced epigastric pain syndrome, and 48.3% reported gastroesophageal reflux disease (GERD). Regarding body mass index, 40% were overweight; Hypertension (30%), diabetes mellitus (23.3%), and anemia (35%) were the most common chronic conditions.

Figure (2): Shows that the most common IBS subtype was **mixed type (IBS-M)**, reported by **33.3%** of the sample, indicating the presence of alternating symptoms of constipation and diarrhea.

Figure (3): Indicates a statistically significant improvement in IBS severity levels following the intervention ($p = 0.001$). Before the intervention, 66.6% of participants experienced severe IBS, which dropped drastically to 8.3% post-intervention. Meanwhile, the proportion of those with mild IBS rose from 6.7% to 40%, and moderate IBS increased from 26.7% to 41%, reflecting a positive shift from severe to less intense symptom categories. Notably, 10% of participants reported no IBS symptoms after the intervention, compared to none beforehand.

Table (3): Identifies significant predictors of total IBS symptom severity score. It indicated that older age (46–65 years), urban residence, and comorbid conditions were associated with higher IBS severity, while a higher education level was associated with lower symptom severity. Gender and occupation were not statistically significant predictors in this model.

Table 1: Demographic Characteristics of the Study Patients (N = 60).

Variables	Categories	N	%
Age	18–30 years	22	36.7%
	31–45 years	20	33.3%
	46–65 years	18	30.0%
Gender	Male	24	40.0%
	Female	36	60.0%
Educational level	Illiterate	10	16.7%
	Secondary education	28	46.7%
	University or higher	22	36.6%
Residence	Urban	35	58.3%
	Rural	25	41.7%

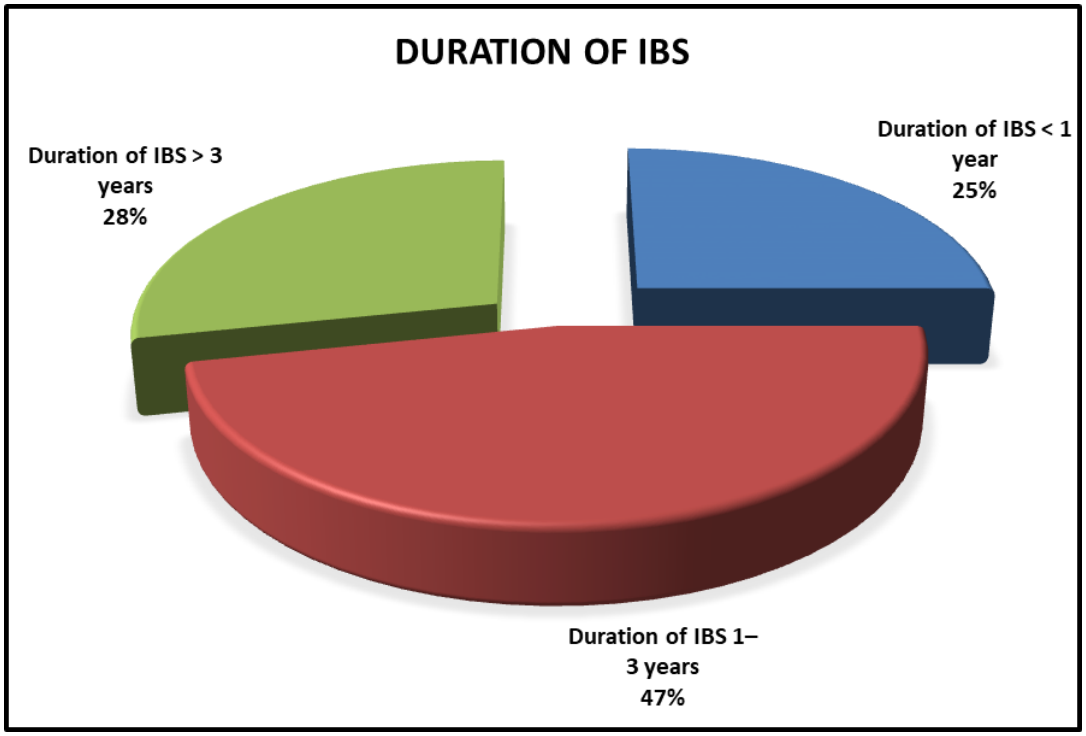

Figure 1: The duration of IBS among the studied patients (N = 60).

Table 2: Medical data of the Studied IBS Patients (N = 60).

Medical data	N	%
Family history of IBS (first-degree relative)	22	36.7%
History of abdominal surgery/laparotomy	19	31.7%
Epigastric pain syndrome	33	55.0%
Gastroesophageal reflux disease (GERD)	29	48.3%
Body Mass Index (BMI)		
– Underweight (<18.5)	4	6.7%
– Normal (18.5–24.9)	19	31.6%
– Overweight (25–29.9)	24	40.0%
– Obese (≥30)	13	21.7%
Co- morbids diseases:		
Hypertension	18	30.0%
Diabetes Mellitus	14	23.3%
Autoimmune diseases (e.g., SLE, RA)	6	10.0%
Anemia (clinically diagnosed)	21	35.0%
Bronchial Asthma	9	15.0%
Heart Disease	7	11.7%

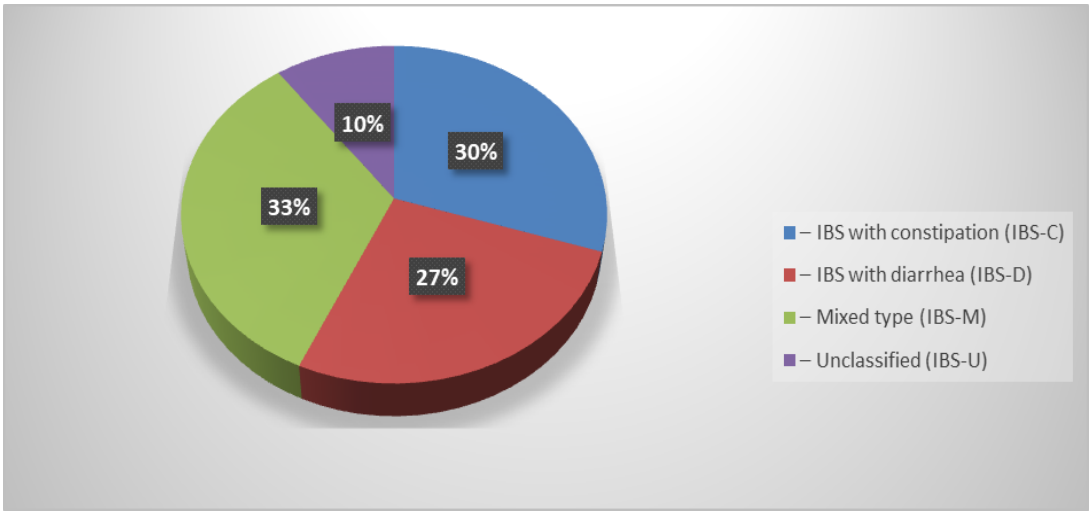

Figure 2: Sub types IBS among the studied Patients (N = 60).

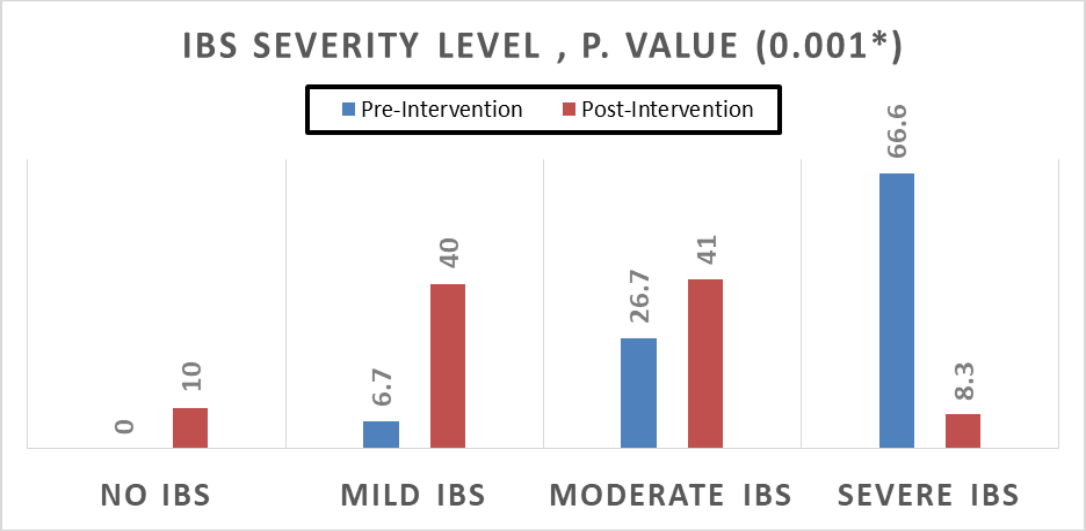

Figure 3: Distribution of the total scores of IBS Symptom Severities among the studied patients pre and post the Tailored Digital Healthy Lifestyle intervention (N = 60).

Table 3: Multiple Regression Analysis for Predictors of IBS Symptom Severity (N = 60).

Predictor Variable	Coefficient (β)	Standard Error (SE)	t-value	p-value
Intercept (β_0)	21.45	9.10	2.36	0.022
Age (in years)	0.25	0.11	2.27	**0.027**
Gender (Male = 1, Female = 0)	3.92	2.45	1.60	0.114
Education Level (High = 1)	-4.87	2.10	-2.32	**0.023**
Residence (Urban= 1, Rural= 0)	5.63	2.68	2.10	**0.039**
Comorbidities (Yes = 1)	6.78	2.85	2.38	**0.020**
Occupation (Employed = 1)	-2.85	2.32	-1.23	0.222

$R^2 = 0.42$, Adjusted $R^2 = 0.38$, $F(6, 53) = 6.31$, $p < 0.001$

Discussion:

For those with irritable bowel syndrome (IBS), a customized digital healthy lifestyle intervention has demonstrated encouraging results in the management of pain and associated symptoms **(Gentile et al., 2022)**. These digital interventions usually include symptom-tracking tools, stress-reduction strategies, and dietary suggestions that are tailored to the needs and preferences of the individual. Through the use of digital platforms, patients can receive ongoing assistance and successfully implement self-management techniques. Patients who actively engage in these programs see notable gains, particularly if they continue to participate for an extended length of time **(Jactel et al., 2023).** In this situation, nurses play a crucial role because they can help patients understand the advantages of digital technologies, help them navigate the platforms, and offer continuous support and encouragement to improve program adherence and promote better long-term management of IBS. Additionally, nurses can evaluate patient progress, provide tailored care plans, and promote the incorporation of these digital resources into more comprehensive treatment regimens **(Hadi et al., 2024).**

In terms of demographic characteristics, the current study showed that most irritable bowel syndrome (IBS) patients were female and primarily between the ages of 18 and 30, which is consistent with previous research that suggests IBS is more common in young adult females. This finding is consistent with other research by **Canavan, West, & Card, (2024) and Chey, Keefer, Whelan, & Gibson, (2023)**, which found that IBS is more prevalent in women and typically appears in the early stages of adulthood. Hormonal differences, stress sensitivity, and variations in how men and women seeking health care could all be contributing factors to the gender gap that has been seen.

A significant percentage of participants had completed secondary school or were enrolled in a university or higher education program, indicating that the sample's health literacy was generally strong. Higher educated patients are more likely to seek medical attention for IBS symptoms and use self-management techniques, such as digital therapies, according to a study by **El-Salhy, Hausken, & Hatlebakk, (2020)**. It does, however, somewhat contradict studies by **Zhou, Price, & Verne,**

(2020), which found that IBS symptoms are similarly common across educational levels, however those with less education can go undiagnosed since they have less access to healthcare.

The majority of participants were residents of urban areas, which may indicate that they had easier access to digital tools and healthcare services that were necessary for the intervention. **Almalki, Alzahrani, Albassam, & Alotaibi, (2021)** reported higher IBS diagnosis rates in urban settings, presumably as a result of increased health awareness and service accessibility. This urban preponderance is consistent with their findings. The results of **Choung, Locke, & Talley, (2021)**; however, showed no discernible difference in the prevalence of IBS between urban and rural locations, indicating that underreporting in rural areas can affect the perception of disparity.

Regarding medical data, the results showed that many IBS patients had a family history of the disorder, have had abdominal surgery in the past, and often have upper gastrointestinal problems such GERD and epigastric pain syndrome. A complex clinical picture that would necessitate multidisciplinary therapy is suggested by the fact that the majority of patients were overweight and that co-morbid conditions such diabetes, hypertension, and anemia were prevalent.

According to the current study, a significant percentage of patients had a family history of IBS, which supports the findings of **Yeh et al. (2021)**, who found that having a first-degree relative with IBS raises the risk of getting the illness. This confirms that shared environmental variables and genetic predisposition have a part in the etiology of IBS. Furthermore, **Jadallah, Khatatbeh, Sarsak, Sweidan, & Alzubi, (2022)** noted that the significant prevalence of comorbidities in the population under study, including bronchial asthma, diabetes mellitus, hypertension, and anemia, is in line with previous studies that have demonstrated that individuals with IBS frequently have other chronic illnesses. These results are consistent with **Zhang, Jin, & Wang, (2024)**; who found that IBS is often linked to systemic health problems, potentially via similar neuroendocrine and inflammatory pathways.

Additionally, the current findings showed that overweight and obesity were prevalent among IBS patients, which is consistent with earlier research suggesting that a higher BMI may aggravate the severity of the disease and contribute to

gastrointestinal symptoms. According to **Noemi, Bob, & Bókkon, (2024)**, obesity is thought to affect gut function through systemic inflammation, mechanical pressure, and hormonal abnormalities. The correlation between IBS and GERD is also consistent with **Gentile et al. (2022)**, who noted that these two conditions frequently coexist, perhaps as a result of similar visceral hypersensitivity and altered motility patterns.

On the other hand, a significant portion of patients in this study had a history of abdominal surgery, which has been connected in studies by **Meade & Garvey (2022)** to an increased chance of developing IBS. But since **Rzeszutek et al. (2024)** did not detect a significant correlation, it is possible that surgical history is a fortuitous finding rather than a causative factor, possibly reflecting gastrointestinal problems that preceded surgery. This disparity suggests that additional longitudinal research is required to elucidate the temporal link between the development of IBS and surgery.

The prevalence of autoimmune conditions including rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE) among IBS patients is another area of difference. Although a quantifiable percentage of cases with autoimmune comorbidities were found in the current study, additional research by **Melchior et al. (2022)** has found either no association or contradicting evidence for this connection. The difficulty of drawing a firm link between autoimmune diseases and IBS is highlighted by these discrepancies, which could be caused by variations in sample size, diagnostic standards, or population characteristics.

The present study revealed that the most common IBS subtype was mixed type (IBS-M), this indicating the presence of alternating symptoms of constipation and diarrhea.

According to **Melchior et al. (2022)**, mixed-type IBS is the most frequently identified kind in clinical practice, particularly in patients seeking medical attention, because the alternating symptoms of constipation and diarrhea frequently result in increased discomfort and functional impairment. In the same direction, **Makkawy et al. (2023)** noted that IBS-M is common in Middle Eastern cultures, potentially as a result of food patterns and psychological stressors that worsen alternating bowel behaviors.

However, this finding contradicts research that found diarrhea-

predominant IBS (IBS-D) to be the most prevalent subtype. For example, IBS-D was most common in Western populations, according to **Alsharef et al. (2024)**, and a large multinational survey by **Selim et al. (2022)** revealed comparable results. The distribution of IBS subtypes across communities may be influenced by these changes, which could be ascribed to variations in dietary practices, cultural considerations, and diagnostic standards employed in different research.

Regarding the Sub types IBS among the studied Patients, the majority of the research population had a relatively recent but established history of irritable bowel syndrome (IBS), as evidenced by the fact that over half of the individuals reported having the ailment for one to three years. Given this length of time, it is likely that these individuals had advanced past the first diagnosis stage and were considering long-term management techniques, such as measures related to digital lifestyle.

When combined, the results show that patients with IBS (1-3 years) offer a crucial window for successful intervention, especially when it comes to digital lifestyle programs that encourage stress management, dietary modification, and symptom monitoring. This emphasizes how crucial customized digital solutions are to helping people who have just received a diagnosis and enhancing symptom results.

Gralnek, Hays, Kilbourne, & Kahn, (2019), who found that a considerable percentage of IBS patients seek medical attention and intervention during the first two to three years after symptom onset due to worsening symptom severity and quality-of-life disruptions, corroborate this finding. According to **Black Ford, & Thomas, (2020)**, people who have just received an IBS diagnosis are more inclined to participate in instructional and self-management programs, particularly online ones, as they look for ways to manage their symptoms.

The current results, on the other hand, are in contrast to those of **Lovell and Ford (2022)**, who observed that many patients experience IBS symptoms for prolonged periods of time, frequently five years or longer, without receiving a formal diagnosis. This is mostly because of stigma, the normalization of symptoms, or the incorrect attribution of GI problems to stress or food. Furthermore; **Spiller ., Aziz, & Brandt, (2023)** contended that IBS frequently has a variable,

relapsing-remitting course, making it challenging for some patients to identify the onset of symptoms or seek prompt care, resulting in longer periods of time without treatment.

Regarding the total scores of IBS Symptom Severities among the studied patients, the current study showed a statistically significant improvement in IBS severity levels after the digital healthy living intervention ($p = 0.001$), based on the total scores of IBS Symptom Severities among the patients under study. A significant portion of patients had severe IBS symptoms before the intervention; however this percentage drastically decreased after it. With the intervention effectively lowering the intensity and frequency of IBS symptoms, these results point to a notable improvement in symptom burden.

This significant improvement is in line with earlier studies. According to **Jactel et al. (2023)**, for instance, IBS patients' quality of life and symptom intensity were considerably enhanced by tailored food and lifestyle therapies, especially those that included digital assistance. In a similar vein, **Gentile et al. (2022)** discovered that digital cognitive behavioral therapy (CBT) applications successfully decreased psychological distress and symptom severity in people with moderate to severe IBS. Additionally, **Dear, Titov, Perry, & Johnston, (2024)** showed that self-help programs offered online under guidance reduced IBS symptoms and functional impairment, especially when patients used the platform consistently. These results highlight the importance of digital technologies in promoting long-term symptom management and behavioral change.

However, some research, like that done by **Traynard (2024)**, has indicated that although non-pharmacologic treatments can be helpful, the extent of symptom relief varies greatly, and not all individuals react to digital or lifestyle-based therapy in the same way. Furthermore, if comorbid psychological problems are not addressed, individuals with long-standing or treatment-resistant IBS may see delayed or more limited improvement, according to **Gentile et al. (2022)**.

The current study's results revealed important factors of the sample's overall IBS symptom severity score. The results of the research showed that greater IBS severity scores were substantially correlated with older age, living in an urban area, and having comorbid diseases, all of which may increase the burden of symptoms. Higher educational

attainment, on the other hand, was linked to less severe IBS, suggesting that improved health literacy could help with symptom management. However, neither gender nor occupation was found to be a statistically significant predictor, indicating that these demographic characteristics might not have an independent impact on the severity of IBS symptoms in this group.

These results are consistent with the **Thomas, Thomas, & Butler, (2022)** study, which found that comorbid diseases and advancing age are linked to higher symptom burden and worse quality of life in IBS patients. In a similar vein, **Staudacher, Black, Teasdale, Mikocka-Willis, & Keefer, (2023)** highlighted that patients with higher education levels typically report better symptom control, perhaps as a result of their increased knowledge of treatment alternatives, dietary triggers, and self-management techniques.

Lee, Kim, & Choi, (2023), who discovered that urban living, may be connected to higher stress levels, environmental factors, and dietary habits that could worsen gastrointestinal symptoms, support the observed association between urban residence and increased IBS severity. However, **Berentsen et al. (2025)** contended that urban dwellers might actually have easier access to care, which could lessen symptoms a discrepancy that might be context- or population-specific.

The homogeneity of the current sample or the impact of other mediating variables not included in the model may be the reason for the interesting lack of significance for gender and occupation in this model, which contrasts with research like **Adeyemo, Olasehinde, & Adeyemi, (2020)**, which found female gender and sedentary occupation as potential contributors to increased IBS risk and severity.

Conclusion:

46.7% of participants had at least a secondary education, and 36.6% had a university degree or higher, indicating a comparatively high level of education. Most of the participants (58.3%) lived in cities. A number of concomitant diseases were common among patients, including hypertension (30%), diabetes mellitus (23.3%), anemia (35%), epigastric pain syndrome (55%), and gastroesophageal reflux disease (GERD) (48.3%). The majority of participants (43.4%) had been diagnosed with IBS for one to three years.

Mixed type (IBS-M) was the most prevalent IBS subtype among participants. The severity of IBS significantly improved ($p = 0.001$),

with a considerable decrease in severe cases and a rise in mild and moderate cases. With a sharp decline in cases of severe IBS and some participants reporting no symptoms after the intervention, the severity of symptoms significantly changed. Comorbid disorders, living in an urban area, and being older were all significant predictors of increased IBS severity.

Recommendations:

For Patients:

-Patients should get education on lifestyle changes that can effectively control their IBS symptoms, such as dietary changes, stress management techniques, and physical activity.

-Patients with mild or early symptoms should be encouraged to seek prompt medical advice to prevent progression to severe IBS.

-Patients with chronic conditions (such as hypertension, GERD, or anemia) should actively manage these comorbidities, as they are linked to greater IBS severity.

For Nurses:

-Especially for patients with lower educational attainment, nurses should offer specialized information regarding IBS subtypes, symptom causes, and self-care techniques.

-Using a comprehensive approach, nurses should include evaluations for stresses and concomitant illnesses that could exacerbate IBS.

For Future Research:

-Research can look into how telemedicine, online learning, and smartphone apps can help control IBS, especially in urban populations.

-More study is required to determine how coping strategies, anxiety, and emotional stress affect the intensity of IBS symptoms and how well they respond to treatment.

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