Master of Science in Public Health

Common risk factors of irritable bowel syndrome in the Population of Rawalpindi

By

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Common risk factors for irritable bowel syndrome in the population of Rawalpindi

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I understand that plagiarism is the use or presentation of any work by others, whether published or not, and can include the work of other candidates. I also understand that any quotation from the published or unpublished works of other persons, including other candidates, must be clearly identified as such by being placed inside quotation marks and a full reference to their source must be provided in proper form.

This dissertation is the result of an independent investigation. Where my work is indebted to others, I have made acknowledgments.

I declare that this work has not been accepted in substance for any other degree, nor is it currently being submitted in candidature for any other degree.

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ABSTRACT

Background: One of the most prevalent gastrointestinal illnesses is irritable bowel syndrome (IBS). This disorder's pathophysiology is still unknown. However, a lot of etiological theories point to a bacterial origin. Additionally, numerous researches have shown that psychological and social elements play an important role. The purpose of this study was to determine the frequency and common risk factors for IBS among population of Rawalpindi

Objectives: This study was conducted to assess the frequency and risk factors of irritable bowel syndrome in the population of Rawalpindi It also explored the association of Irritable bowel syndrome with socio-demographic variables and potential risk factors.

Methodology: A cross-sectional study was carried out in the Outpatient Department (OPD) of different consultant gastroenterologist/clinicians in Rawalpindi. A total of 341 IBS patients were consecutively selected for the purpose of the study. Data about IBS patients were collected through an adapted questionnaire. Chi-square of Independence was applied to check the association of IBS with socio-demographic and risk factors.

Results: Among the 341 respondents, males 172 (50.4%) and females 169 (49.6%) were involved in this study. The frequency of IBS was 39.3% with higher proportion among females. There was significant association between irritable bowel syndrome (IBS) and common risk factors (p value <0.05) like BMI, Smoking, Chronic health problem, Stress, Coffee consumption, Tea, consumption of Spicy food.

Conclusion: According to the study, 39% of the population under investigation had IBS. The greatest risk factors for IBS were weight of respondent, smoking, stress, health problem, intake of coffee tea and spicy foods. Teaching them stress management strategies

and providing them awareness regarding diet is highly recommended. It is advised to consider all these factors when providing counseling to the patient and relevant services in the expectation of alleviating their IBS symptoms, reducing the incidence rate of IBS, and further improving their QOL.

ACKNOWLEDMENTS

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LIST OF ABBREVATION

IBS   Irritable bowel syndrome

ICD   International Classification of Diseases,

IE   infectious enteritis, OR (odds ratio

PI-IBS   post-infectious irritable bowel syndrome

RR   relative risk

SPSS   Statistical Package for Social Science

Chapter 1: INTRODUCTION

1.1 Definition and background

Irritable bowel syndrome (IBS) is one of the most common functional bowel disorders, Functional gastrointestinal (GI) disorders refer to a set of symptoms reported by the patient, but despite conducting conventional clinical investigations, including biochemical and microbiology tests at both macro- and micro pathological levels, no organic or morphological disease can be detected to explain these symptoms (Per M. Hellström, Peter Benno 2019).

Irritable bowel syndrome (IBS) stands as the most prevalent example of gut-brain interaction disorders, impacting approximately 5% to 10% of adults globally. To diagnose IBS, both abdominal pain and changes in stool frequency and form must be present, as they are defining characteristics of this condition (Sayuk, G. S. et al 2021).

Historically, diagnosing IBS has relied on identifying symptoms that correspond to various syndromes, including IBS with diarrhea, IBS with constipation, functional diarrhea, functional constipation, chronic functional abdominal pain, or bloating. A combination of peripheral and central mechanisms triggers gastrointestinal motor and sensory dysfunctions, ultimately giving rise to the diverse range of symptoms seen in IBS (Camilleri, M. 2021).

Although, the Rome IV criteria, which were published in May 2016, represent the updated diagnostic criteria for IBS and other functional gastrointestinal disorders (FGIDs) but for research purposes ROME III criteria is mostly used. These criteria supersede the previous Rome III diagnostic criteria, which were published a decade earlier for clinical purposes (Whitehead, W. E., Palsson, O. S., & Simrén, M. 2017).

1.2. Clinical Symptoms

Irritable bowel syndrome (IBS) is a prevalent and chronic disorder that involves the interaction between the gut and the brain, previously known as functional gastrointestinal (GI) disorders. In clinical practice, IBS is characterized by recurrent abdominal pain and disrupted bowel movements. To diagnose IBS for clinical or research purposes, the Rome IV criteria have been established through a consensus among a multinational group of experts in gut-brain interaction disorders. According to these criteria, patients with IBS should experience abdominal pain at least once weekly on average, along with changes in stool frequency, changes in stool form, and/or relief or worsening of abdominal pain related to defecation (Lacy, et al., 2021).

Frequently, individuals with IBS encounter symptoms that coincide with food intake, prompting the use of dietary interventions to alleviate these symptoms. Moreover, patients with IBS exhibit variations in the expression of endocrine cells in the gastrointestinal (GI) tract, leading to differences in circulating hormone levels. It is worth noting that dietary modifications can significantly influence the production of gut hormones, as their secretion is predominantly influenced by the ingestion of food and the nutrient content of the consumed food (Tap, J. & Störsrud, S.2021)

The presence of "red flags," also known as alarm symptoms, such as fever, weight loss, rectal bleeding, significant changes in blood chemistry, palpable abdominal masses, recent onset of symptoms in individuals over 50 years of age, symptoms occurring at night, and a positive family history of celiac disease, colorectal cancer, or inflammatory bowel disease, should prompt investigation and thorough evaluation (Bellini, M., et al, 2014)

1.3. IBS Subtypes

Patients suffering from IBS are categorized into subtypes based on their predominant bowel habit, which includes IBS with diarrhea (IBS-D), IBS with constipation (IBS-C), and mixed IBS (IBS-M), which is a combination of the previous two. Typically, IBS-D and IBS-C show similar prevalence rates. The common signs and symptoms of IBS encompass abdominal pain, bloating, straining during defecation, the sensation of incomplete evacuation, presence of mucus with stools, urgency, symptoms that worsen after meals (postprandial symptoms), as well as feelings of depression and anxiety (Hadjivasilis, A, et al 2019).

Subtype	Characteristics
Diarrhea-predominant	>25% loose stools, <25% hard stools
Constipation-predominant	>25% hard stools, <25% loose stools
Mixed-type	>25% loose stools, >25% hard stools

In clinical practice and for epidemiological research, the Rome IV classification system for IBS subtypes relies on the patient's self-perception of their predominant abnormal stool consistency, as indicated by the Bristol Stool Form Scale. Unlike the Rome III criteria, which considered the proportion of all bowel movements that were loose/watery or hard/lumpy to classify IBS subtypes (IBS-D, IBS-C, IBS-M, IBS-U), subsequent studies demonstrated that subtyping based solely on the proportion of abnormal bowel movements with loose/watery or hard/lumpy consistency was more reliable (Grad, S., & Dumitrascu, D. L. 2020).

1.4.Risk Factor

As developing countries adopt more of a Western diet and lifestyle, there is a possibility of observing a rise in the prevalence of IBS. This trend could be influenced not only by dietary changes but also by increasing awareness of the condition (Black, C. J., & Ford, A. C. 2020). IBS is more prevalent among younger individuals and is less frequently diagnosed after the **age** of 50. Beyond the age of 50, if you experience symptoms, it is more probable that an organic cause might be triggering them rather than IBS. In such cases, it is crucial to rule out serious conditions like colon cancer through appropriate medical evaluation. **Females** have a higher likelihood of being diagnosed with IBS compared to males. Furthermore, there appears to be a correlation with estrogen therapy, as IBS is more frequently observed following estrogen therapy, both before and after menopause (Alexander C. Ford, M.D 2017). IBS patients have been proven to have significantly lower quality of life. IBS impairs quality of life to the same extent as serious chronic conditions such hepatic cirrhosis, congestive heart failure, renal insufficiency, and diabetes, according to studies done on the condition (Yu-Bin Guo et al., 2014)

Visceral hypersensitivity is regarded as one of the primary factors responsible for generating symptoms in patients with IBS. Increased sensitivity to stimuli is a common observation among individuals with IB S, leading to heightened sensations in response to various triggers. The connection between IBS and psychological factors, particularly anxiety and stress, has been well-established and recognized for a considerable period of time.

Tobacco smoking has been implicated in various gastrointestinal tract disorders. It is known to have a protective and beneficial effect on ulcerative colitis but acts as a significant risk factor for other conditions, such as Crohn's disease, peptic ulcer disease, Gastroesophageal reflux disease (GERD), and gastric carcinoma. However, the impact of smoking on irritable bowel syndrome (IBS) has not been definitively established. Some studies have suggested

that smoking might play a protective role in IBS, but available data defining this relationship is limited and inconclusive. Further research is needed to fully understand the potential association between smoking and IBS.

1.5. Prevalence of IBS

The prevalence of functional GI disorders can vary significantly based on geographical location, cultural factors, healthcare access, and other variables. Globally, functional GI disorders affect almost 40% of the population worldwide (Arishi, A. M. & Elmakki, et al 2021). The estimated prevalence of irritable bowel syndrome (IBS) being 10% to 25% in different regions worldwide was a commonly reported range. IBS is indeed considered one of the most common functional gastrointestinal disorders, affecting a significant portion of the global population (Seger, S. & Nasharuddin, N. N. B, et al 2020). The prevalence of Irritable Bowel Syndrome (IBS) in Karachi, Pakistan, according to a study conducted by college students, was 34%. However, it's important to note that this study's findings are specific to Karachi and may not accurately represent the prevalence of IBS across the entire country of Pakistan (Bachani, P., Kumar, L., Kumar, N., Fatima 2021).

1.6. ROME Criteria

Rome III & IV criterias gives insight into irritable bowel syndrome (IBS) as a functional bowel disorder in which recurrent abdominal pain is associated with defecation or a change in bowel habits. Disordered bowel habits are typically present (i.e., constipation, diarrhea or a mix of constipation and diarrhea), as are symptoms of abdominal bloating/distension. Symptom onset should occur at least 6 months prior to diagnosis and symptoms should be present during the last 3 months (Lacy, B. E., & Patel, N. K. (2017)

The Rome III criteria are a widely used classification system for Irritable Bowel Syndrome (IBS) that categorizes the condition into four subtypes based on the predominant bowel habit. These subtypes are: IBS with Predominant Constipation (IBS-C): Characterized by constipation, with symptoms such as infrequent and hard stools, straining during bowel movements, and a feeling of incomplete evacuation. IBS with Predominant Diarrhea (IBS-D): Characterized by diarrhea, with symptoms such as frequent loose or watery stools and an urgent need to have bowel movements. IBS with Mixed Bowel Habits (IBS-M): Characterized by a combination of both constipation and diarrhea, with alternating or mixed patterns of bowel movements. Unclassified IBS (IBS-U): Used when the individual's symptoms do not clearly fit into any of the above subtypes, or when the symptom pattern changes over time, making it challenging to determine the predominant bowel habit (Hellström, P. M., & Benno, P. 2019).

Despite this fact, scant information is available on frequency and common risk factors of irritable bowel syndrome. Thus, it was important to estimate the prevalence and risk factors The present study was conducted to determine this main issue.

1.7. OBJECTIVES:

1. To find out the frequency of irritable bowel syndrome in the population of Rawalpindi attending Gastroenterology OPD.

2. To determine risk factors of irritable bowel syndrome in the population of Rawalpindi attending Gastroenterology OPD.

1.8. Rationale:

Research on Irritable Bowel Syndrome (IBS) is crucial due to its widespread prevalence and impact on individuals' quality of life. Understanding the underlying causes, risk factors, and potential treatments can lead to improved management strategies for affected patients. By studying the genetic, environmental, and immunological factors contributing to IBS, researchers can develop more targeted therapies, enhance diagnostic methods, and provide personalized treatment plans. Additionally, investigating the psychological and social aspects of IBS can help develop comprehensive approaches that address not only the physical symptoms but also the emotional well-being of patients. Overall, research on IBS holds the potential to alleviate suffering, reduce healthcare costs, and enhance the overall well-being of individuals affected by this condition.

1.9. OPERATIONAL DEFINITIONS:

History of Infection or Gastrointestinal Illness: Participants will be asked if they have experienced any significant gastrointestinal infections or illnesses in the past 12 months. Medical records or self-reported diagnoses will be used to confirm these events.

Family History of IBS: Participants will be asked whether any first-degree relatives (parents or siblings) have been diagnosed with IBS. Medical records or physician confirmation may be used to verify the family history.

Dietary Habits: Dietary habits will be measured using a validated food frequency questionnaire (e.g., Block Food Frequency Questionnaire). Participants will report their consumption frequency of specific food items over a defined period (e.g., past month).

Irritable Bowel Syndrome: Diagnosed cases of IBS based on the Rome III, which includes recurrent abdominal pain on average at least 1 day per week in the last 3 months, associated with two or more of the following: defecation-related symptoms, changes in stool frequency, and changes in stool form.

Gender: Gender of participants, categorized as male, female, or non-binary, based on self-identification.

Chapter II: LITERATURE REVIEW

In 1849, Cumming1 made an observation about irritable bowel syndrome, noting that individuals afflicted by it experienced alternating constipation and laxity in bowel movements. He acknowledged the paradox of these divergent symptoms occurring within the same person, stating that he couldn't provide a definitive explanation for the coexistence of such distinct aspects of the condition. As time progressed, the enigmatic gastrointestinal manifestations of irritable bowel syndrome have been labeled using different expressions, such as mucous colitis, spastic colitis, nervous colon, and irritable colon (Horwitz, B. J., & Fisher, R. S. (2001).

2.1. Epidemiology of IBS worldwide

Depending on the specific set of diagnostic criteria employed, irritable bowel syndrome (IBS) affects approximately 11% of the global population. Among those who experience IBS symptoms, roughly 30% seek medical consultation for their condition. Interestingly, the abdominal symptoms between individuals who consult doctors for IBS and those who don't are not markedly different. However, those who do seek medical help tend to exhibit higher levels of anxiety and a reduced quality of life. On a global scale, there is a higher prevalence of IBS among females. Notably, the occurrence of diagnosed IBS is about 25% lower in individuals aged 50 and older. Importantly, there is no discernible connection between socioeconomic status and the incidence of IBS (Canavan, C., West, J., & Card, T. (2014)

Evaluating epidemiology of IBS, out of the 390 citations that were assessed, 81 of them presented findings regarding the prevalence of irritable bowel syndrome (IBS) across 80 distinct study populations involving a total of 260,960 participants. The combined prevalence across all these studies was determined to be 11.2% (with a 95% confidence interval ranging

from 9.8% to 12.8%). It's important to note that the prevalence of IBS exhibited variations based on both the country under consideration (ranging from 1.1% to 45.0%) and the specific criteria utilized to define the condition. The most elevated prevalence figures were observed when using at least three Manning criteria (14%, with a 95% CI of 10.0% to 17.0%). When employing the Rome, I, Rome II and Rome III criteria, the corresponding prevalence rates were 8.8% (95% CI, 6.8%–11.2%) and 9.4% (95% CI, 7.8%–11.1%), respectively. Upon comparison, it was found that the prevalence of IBS was higher in women as opposed to men (with an odds ratio of 1.67 and a 95% CI of 1.53–1.82). Additionally, individuals above the age of 50 exhibited a lower prevalence compared to those under 50 (with an odds ratio of 0.75 and a 95% CI of 0.62–0.92). While socioeconomic status did not seem to have an impact, it's worth noting that only four studies provided data on this particular aspect (Lovell, R. M., & Ford, A. C. (2012).

A total of 4143 citations were initially identified, out of which 184 studies were deemed relevant. Among these, 57 studies met the eligibility criteria, representing 92 distinct adult populations and encompassing a total of 423,362 participants. In the 53 studies utilizing the Rome III criteria, spanning 38 countries and comprising 395,385 participants, the combined prevalence of irritable bowel syndrome (IBS) was determined to be 9.2% (with a 95% confidence interval of 7.6–10.8). Notably, there was a high degree of heterogeneity (I2=99.7%) among these studies. When analyzing the subtype distribution, irritable bowel syndrome with mixed bowel habit (IBS-M) was the most common under the Rome III criteria, reported by 33.8% (95% CI 27.8–40.0) of individuals meeting IBS criteria. In contrast, irritable bowel syndrome with diarrhea (IBS-D) emerged as the most common subtype under the Rome IV criteria, reported by 31.5% (95% CI 23.2–40.5) of IBS-diagnosed individuals. Furthermore, a higher prevalence of IBS was noted in women compared to men, with figures of 12.0% (95% CI 9.3–15.0) and 8.6% (95% CI 6.3–11.2) respectively, resulting

in an odds ratio of 1.46 (95% CI 1.33–1.59). The prevalence of IBS exhibited significant variation across different countries, and this discrepancy persisted even when uniform diagnostic criteria and methodologies were applied across studies (Barberio, et al., 2020).

2.2. Regional Epidemiology of IBS

In various Asian regions, the prevalence of irritable bowel syndrome (IBS) tends to be higher among younger age groups. When applying the Rome II criteria, the prevalence of IBS was notably higher in individuals under the age of 50 compared to those who were 50 years and older in specific locations. For instance, in Singapore, the prevalence was 9.7% versus 5.8%, and in Taiwan, it was 38% versus 18%. In Hong Kong, individuals with IBS had an average age that was 5 years younger than those without IBS (40 years versus 45 years). In both Korea and Japan, the highest prevalence of IBS was observed among subjects below the age of 30. However, in South China, the difference in IBS prevalence between subjects below and above 50 years of age was only slight. This suggests that the age-related variation in IBS prevalence is not consistent across all regions in Asia (Gwee, et al,.2009).

Conversely, in Pakistan, irritable bowel syndrome (IBS) exhibited a different pattern. It was found to be more prevalent among individuals with lower levels of education, and it was also more commonly observed in laborers compared to individuals in clerical and professional occupations. This indicates that socio-economic factors might influence the prevalence of IBS in distinct ways in different regions. Likewise, a study conducted in the USA revealed a similar trend. Functional bowel disorders, which likely include IBS, were found to occur more frequently among individuals in the lower household income group. This highlights the potential impact of socio-economic status on the occurrence of these disorders, suggesting that financial and occupational factors could contribute to their prevalence (Ghoshal, et al, 2009).

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2.2.1. Prevalence of IBS in India

Recently, the Indian Society of Gastroenterology conducted a comprehensive study involving approximately 3,000 individuals diagnosed with irritable bowel syndrome (IBS) and around 4,500 community participants from 18 different centers. Notably, this study distinguished itself by opting for a diagnosis of IBS solely based on the symptoms exhibited by the participants, rather than relying on established criteria like the Rome criteria or Manning criteria. The findings from this unique approach revealed an estimated prevalence of IBS at 4.2%. In a separate study centered on an urban community in the western part of India, specifically Mumbai, Shah et al. conducted research involving 2,549 subjects. Through the utilization of the Manning criteria, this study reported a relatively higher prevalence of IBS, calculated to be approximately 7.5%. These contrasting results from different diagnostic criteria underscore the complexities involved in assessing the prevalence of IBS and highlight the potential impact of varying diagnostic methods on reported prevalence rates. (Makharia, et al., 2011)

A study was conducted in India to evaluate the prevalence of depression and anxiety in irritable bowel syndrome. The study reported that in individuals diagnosed with irritable bowel syndrome (IBS), the prevalence of depression was found to be 37.1%, while the prevalence of anxiety disorder was 31.4%. In contrast, within the control group, the prevalence of depression was 8.6%, and the prevalence of anxiety disorder was 5.7%. These statistics underscore a significantly higher occurrence of both depression and anxiety disorder among individuals with IBS when compared to the control group (Kabra, N., & Nadkarni, A. 2013)

2.2.2. Prevalence of IBS in China

A study was conducted in china to evaluate the prevalence of IBS in college and university students, out of the total of 2,126 students for whom complete data was available, the prevalence of irritable bowel syndrome (IBS) was determined to be 7.85% based on the Rome III criteria. This prevalence was associated with a female-to-male ratio of 1.78:1, signifying a higher occurrence among female students. Among the various subtypes of IBS, the majority of students exhibited the IBS-constipation subtype, accounting for 36.5% of cases. Following this, the IBS-diarrhea subtype was observed in 31.1% of students, while the IBS-mixed subtype was found in 23.9% of cases (Dong et al., 2010).

Another Chinese meta-analysis study shows that The combined occurrence of irritable bowel syndrome (IBS) in China was recorded at 6.5%. The prevalence of IBS was notably higher among individuals aged between 30 and 59 years. Within the Chinese population, several factors were identified as associated with a greater likelihood of experiencing IBS. These factors encompassed being female, possessing a history of intestinal infection, displaying symptoms of anxiety and depression, reporting a food allergy, and engaging in alcohol consumption (Zhang, et al,.2014).

A cross sectional study was conducted to know the prevalence of IBS in China, Japan and South Korea which shows that the collective prevalence of irritable bowel syndrome (IBS), accompanied by a 95% confidence interval of 12.6% (ranging from 11.6% to 13.7%), was determined. Notably, substantial disparities in prevalence were observed when examining Japan, China, and South Korea. Specifically, the rates were found to be 14.9% (with a confidence interval of 13.4-16.5) in Japan, 5.5% (with a confidence interval of 4.3-7.1) in China and 15.6% (with a confidence interval of 13.3-18.3) in South Korea. This variance in prevalence among these countries was deemed statistically significant (P < 0.001) (Takeoka et al., 2013)

2.2.3. Prevalence of IBS in Middle East

A study in Saudi Arabia about risk factors and prevalence showed that in the context of the study, the observed prevalence of irritable bowel syndrome (IBS) was 18.2%. Among individuals diagnosed with IBS, the subtype referred to as IBS-M was the most prevalent, accounting for 42.3% of cases. Several factors emerged as significantly linked to IBS. These encompassed habits such as smoking, the presence of gastroesophageal reflux disease (GERD), food allergy, anxiety, psychological stress, a family history of IBS, regular usage of non-steroidal anti-inflammatory drugs (NSAIDs), a history of infection prior to the onset of symptoms, and residing in the southern region of Saudi Arabia. These associations were found to be statistically significant (P < 0.05*) (Alqahtani, N. H., & Mahfouz, 2022).

An Iranian study evaluating dietary pattern and prevalence of IBS, the study identified four primary dietary patterns: (i) 'fast food', (ii) 'traditional', (iii) 'lacto-vegetarian', and (iv) 'western' dietary patterns. After accounting for potential influencing factors, it was observed that individuals falling within the highest quartile of the 'fast food' dietary pattern exhibited a tendency towards a higher risk of irritable bowel syndrome (IBS) compared to those in the

lowest quartile. Conversely, an inverse correlation was noted between the 'lacto-vegetarian' dietary pattern and the risk of IBS. This finding persisted even after adjusting for potential confounding variables, with individuals in the top quartile of the 'lacto-vegetarian' dietary pattern being 24% less likely to experience IBS. No statistically significant associations were observed between the 'traditional' and 'western' dietary patterns and the risk of IBS, either before or after accounting for covariates (Khayyatzadeh, et al., 2016).

A study about IBS, risk factors and prevalence in adult Lebanese population showed that in accordance with the Rome III criteria, the study population exhibited a prevalence of irritable bowel syndrome (IBS) at 20.1%. The initial analysis revealed that certain factors were significantly linked to a higher prevalence of IBS in a bivariate context. These factors encompassed being under the age of 30, identifying as female, having a history of water pipe smoking, and having consumed alcohol at any point. However, variables such as educational attainment, cigarette smoking, and engagement in physical exercise did not demonstrate a significant association with the occurrence of IBS (Costanian, et al., 2015)

2.2.4. Prevalence of IBS in Bangladesh

A Study conducted in Bangladesh reported that the overall prevalence of IBS was 39.3%, but the majority (77.3%) had no basic awareness of IBS. In this study, anxiety and depression had a significant relationship with IBS and IBS had a significant ($P < 0.001$) relationship with food intolerance and insomnia BS is common in university students of Bangladesh and is associated with anxiety, depression, and particular dietary patterns. IBS is common in university students of Bangladesh and is associated with anxiety, depression, and particular dietary patterns. (Anita Das et al., 2022)

2.3. Situation in Pakistan

A study conducted in Pakistan showed that the overall prevalence of IBS was 33.2%. Notably, there was a higher occurrence of IBS among females in comparison to males, with rates of 57.7% and 42.2%, respectively (p-value = 0.009). Additionally, our findings revealed that the age group most affected by IBS was individuals between 20 and 29 years, with a prevalence of 45.5% (Bachani et al., 2021).

A study in Agha Khan University Karachi about IBS showed that The predominant symptom was abdominal pain 87.8 % (36/41) which was aggravated post-prandially 72.2% (29/41), relieved following defecation in 87 % (35/41) with a sense of incomplete evacuation 85.3% (35/41) and distention after defecation in 80.4 % (33/41). Anxiety and depression was present in 80% (33/41) as an extra intestinal symptom 80% (33 out of 41) of the participants (Jafri, et al., 2003).

A study done at shifa international hospital Islamabad showed that a cohort of 292 patients, with a mean age of 40.44 ± 13.69 years, was enrolled in the study. Among these participants, there were 156 (53.4%) males and 136 (46.6%) females. Virtually all male and female patients experienced symptoms of abdominal pain and bloating. However, constipation was prevalent in 79.4% of females and 71.6% of males. Meanwhile, diarrhea was reported by 46.5% of females and 42.7% of males. Both constipation and diarrhea were observed in 27.3% of females and 15.6% of males. A substantial proportion of patients had coexisting medical conditions, with a significant number of them also reporting sleep disturbances. Additionally, many experienced symptom exacerbations related to stress and had sensitivities to certain foods (Khokar, et al., 2013).

A study conducted in Peshawar about prevalence of irritable bowel syndrome and major risk factors in medical students shows that the occurrence of Irritable Bowel Syndrome (IBS) was observed to be 13.4% among males and 17.5% among females. Noteworthy associations

were identified wherein IBS exhibited a positive correlation with factors such as stress and sleep disturbances. Conversely, negative associations were established between IBS and factors like regular exercise, smoking, living standards, household income, and the consumption of spicy food (Iftikhar, et al., 2018).

2.5. Impact of IBS on quality of Life (QOL)

The quality of life among individuals with IBS is remarkably diminished, especially within the subset of patients seeking medical attention. In this group, the impact on quality of life is comparable to conditions associated with significant mortality, such as ischemic heart disease, heart failure, and diabetes mellitus. While the severity of pain emerges as a crucial determinant affecting the quality of life in IBS, disturbances in bowel patterns and psychological challenges are also anticipated to play substantial roles (Lea, et al., 2001).

Both younger and older individuals with IBS commonly exhibit a lower overall health status compared to the general population. Those affected by IBS tend to experience a diminished health-related quality of life (HRQoL) in comparison to individuals dealing with specific conditions like gastroesophageal reflux disease, diabetes, and end-stage renal disease. To evaluate the impact of treatment interventions on IBS patients' quality of life, several disease-specific assessment tools are currently accessible and extensively employed in clinical trials (Mönnikes, H. 2011).

IBS has a complicated and poorly known pathogenesis Genetics, food, changes in the gut flora, gastrointestinal infections, and psychological variables have all been proposed as potential risk factors that may have an impact on the bidirectional brain-gut axis. However, the only instance in which a definite cause has been found is post-infectious IBS (Christopher et al., 2020)

People who smoke cigarettes or drink large amounts of alcohol are more likely to develop disorders with their digestive system. But it is difficult to prove that heavy drinking or smoking is the primary cause of these gastrointestinal diseases (Shuai Yuan et al., 2023)

Patients frequently report dietary triggers for their IBS symptoms and a Western diet high In sugar and fat has been associated with IBS. Some patients with IBS report symptomatic benefit from reducing the amounts of fermentable oligosaccharides, disaccharides, monosaccharaides in their diet, although estimates of response rates show considerable variation of between 50% and 86%. Alternatively, non-coeliac gluten intolerance might play a part in some patients, although estimates of prevalence in the general population non-coeliac disease are excluded, vary widely (Christopher et al., 2020)

A study about impact of gastrointestinal diseases on Health related Quality of life of patients in Pakistan was conducted in Pakistan. This study encompassed a participant pool of 199 patients, revealing an average Gastrointestinal Quality of Life Index (GIQLI score) of 87.8 ± 17.8. The findings illuminated that heightened severity of core symptoms corresponds to a reduced quality of life (QoL). Furthermore, in a gender-based comparison, females exhibited lower overall GIQLI scores and recorded lower scores in several domains, with a statistical significance (p-value: 0.02) favoring males. Among obese patients, the mean GIQLI score, spanning the gastrointestinal, psychological, and social dimensions, was notably lower. Conversely, an elevated age was linked with a higher disease-specific GIQLI score.

2.6. Conceptual framework
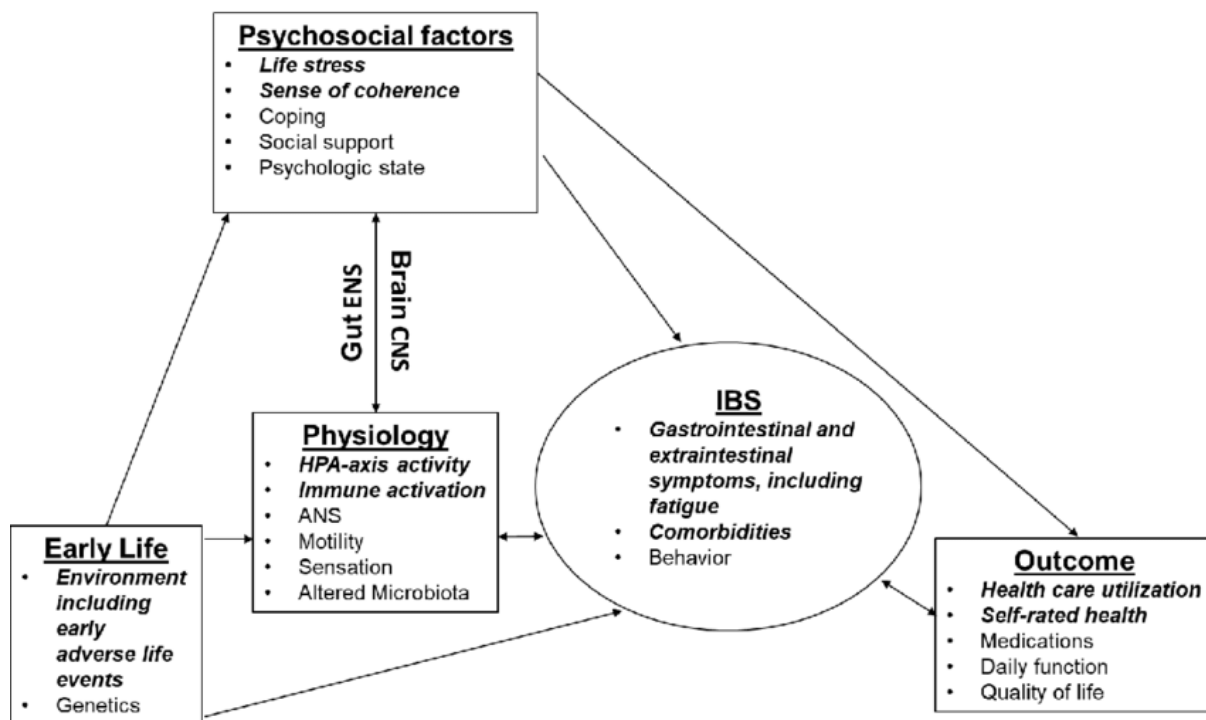
Figure 1: Conceptual framework of irritable bowel syndrome

Chapter III: METHODOLOGY

3.1 Study design

A descriptive cross-sectional study was carried out to with focus on major risk factors and prevalence of irritable bowel syndrome in the population of Rawalpindi

3.2 Study Duration

The study duration for the current research was six months.

3.3 Study setting

The study was conducted in Outpatient Department (OPD) of different consultant gastroenterologist/clinicians in tertiary care hospitals of Rawapindi.

3.4 Sampling Technique

Data was collected using non-probability consecutive sampling techniques.

3.5 Sample Selection

3.5.1 Inclusion criteria

1. Recurrent diarrhea of 3 episodes in last 3 months

2. Patient with the history of diarrhea who: meet Rome 3 criteria

3. All patients age 15-50 years

4. Both Genders

3.5.2 Exclusion criteria

1. Adolescents who are academically handicapped (learning or physical disability)

2. Adolescents who are unwilling to participate in the study.

3.6 Sample Size Calculation

Sample size was calculated using proportion formula for sample size calculation in Open Epi menu, Version 3.01 software. Calculated sample size was 341 with 33.2% of prevalence 95% confidence interval (C.I) and 5% margin of error.

3.7 Data Collection Tools

Data was collected using an interview-based questionnaire. A Performa was developed to collect data regarding socio demographic characters of the respondents, Section B Consist of health related problems and Section C have questions regarding dietary factors. Questionnaire is attached in Annexure-I.

3.8 Sampling Strategy

Data was collected from Outpatient Department (OPD) of different consultant gastroenterologist/clinicians in Rawalpindi. Using non-probability consecutive sampling

3.9. Outcome Variables

The major construct of the questionnaire was to assess frequency and risk factors of IBS. The outcome variable was patient with history of diarrhea.

3.9.1. Independent Variables

The Performa included socio-demographic variables such as gender, age, socioeconomic status, place of residence etc.

3.10 Pilot testing

Pilot testing was performed before starting the formal data collection procedure by including 10% of the actual sample size. Performa was tested for any future changes; no major changes were done after pilot testing. Data from pilot testing was not included in final analysis. Reliability statistics in terms of Cronbach alpha was found to be 0.7.

3.11 Data Analysis

Data were analyzed using the statistical package for social science (SPSS) version 26. Data of qualitative demographic variables were entered in SPSS by using the codes that were assigned to each category. While data of quantitative variables were entered in numerical form.

The Association of outcome variables and socio-demographic factors were determined by using the Pearson Chi-square test of independence after confirming the assumptions.

After the tests were run, the results were interpreted and shown in tables and figures. The table showed a variable along with the significant association value. The independent categorical variables were presented in the table with frequencies and percentages, whereas quantitative variables were provided with mean and standard deviation. A p-value ≤ 0.05 was considered to be significant.
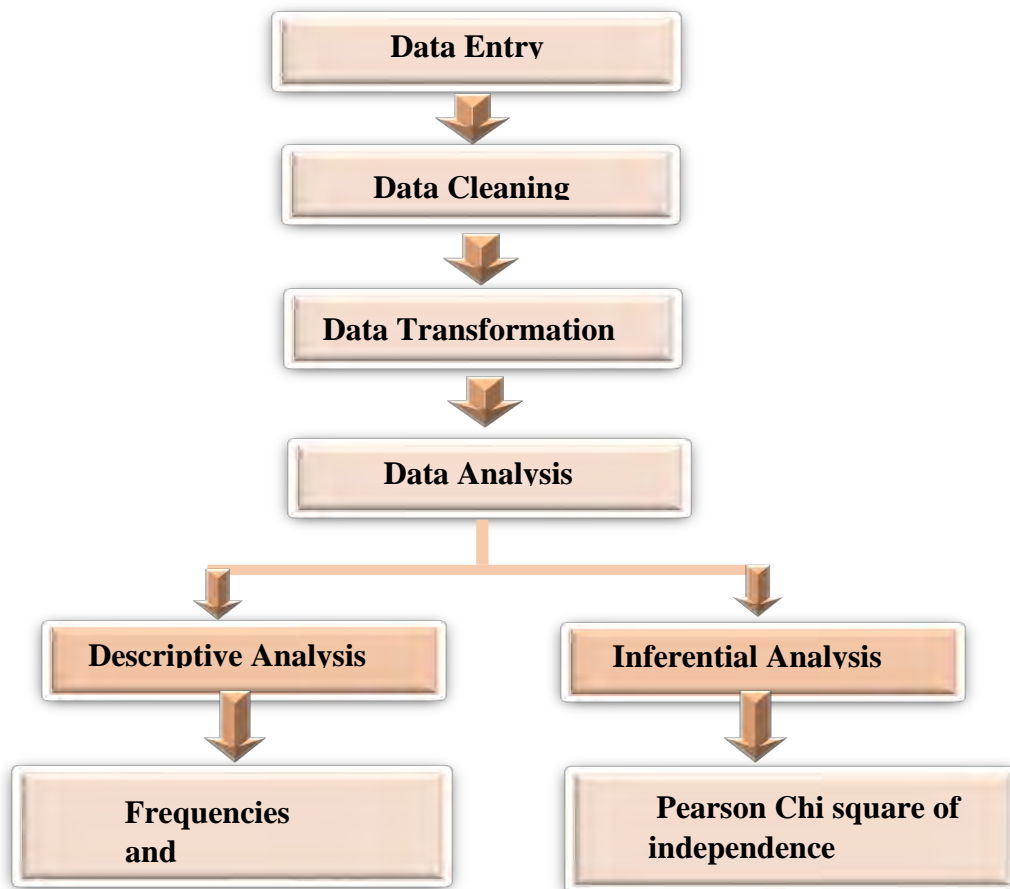
Figure 2: Data analysis plan

3.12 Ethical Considerations

Before starting formal data collection, approval from the Institutional Review Board (IRB) of Al-Shifa School of Public Health Rawalpindi, Pakistan has been taken (Annexure-). Permission letter from the Head of Department of Al-Shifa School of Public Health was obtained. Individuals were explained the purpose of the research and oral consent was taken from each participant (Annexure-3). Participants were assured of the confidentiality of their data. Data collected from the respondents was kept anonymous and was not shared with anyone

Chapter IV: RESULTS

4.1. DESCRIPTIVE STATISTICS

A total of 341 participants were part of this research study. Details regarding the demographic variables are mentioned below. Data obtained from the irritable bowel syndrome Questionnaire have been presented which describes the Sociodemographic characteristics of the study sample, health related problems whereas, the last part is related to Dietary and lifestyle characteristic.

4.1.2. DEMOGRAPHICS OF THE PARTICIPANTS

A total of 341 cases of IBS from hospitals of Rawalpindi were included during the study period. Among them 172 (50.4%) were male and 169 (49.6%) were female. About income status of participants, almost (67.7%) had not enough monthly income or even exceeds their needs. Regarding weight of the respondents 73 (21.4%) were underweight, 64(18.8%) were lie in normal category, 63 (18.5%) of overweight and 141 (41.3%) of the respondents were obese. Majority of participant lie in obese category.

Table 1: Demographic characteristics

Sociodemographic variables	Categories	Frequency(n)	Percent (%)
Place of residence	Living with family	358	92.7
	Migrant worker	20	5.2
Gender	Male	172	50.4
	Female	169	49.6
Economic Status	Enough & Exceed	67	19.6
	Enough only	231	67.7
	Not enough	43	12.6
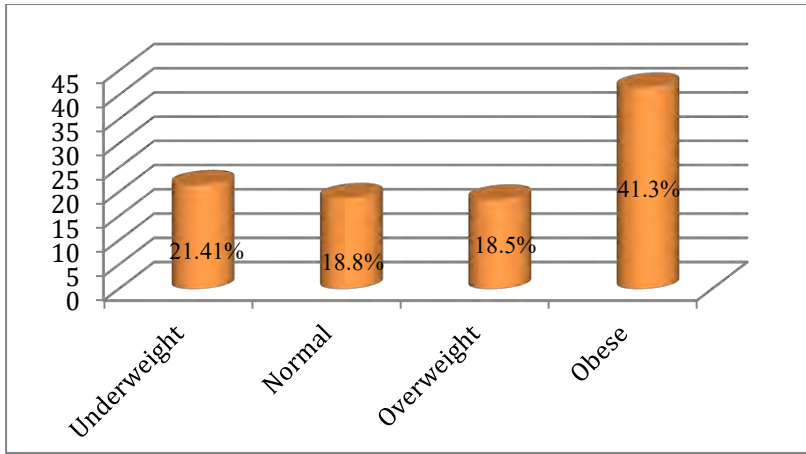
Fig 1: BMI of respondents

Regarding weight of the respondents 73 (21.4%) were underweight, 64 (18.8%) were lie in normal category, 63 (18.5%) of overweight and 141 (41.3%) of the respondents were obese Majority of participant reported obese in this study.

4.1.3. Health Related Problems

Leading causes and risk factors of IBS include health related problems like chronic health problem permanent medicine use family history of IBS smoking etc. All these factors were investigated in this study and results are tabulated as under:

Almost 85 (24.9%) had family history of IBS 256 (75.1%) respondents have not family history of IBS. 57 (16.7%) have chronic health problems 131 (61.6%) suffering from stress in last 6 months.

Table 2: Descriptive results of Health related issues

Question/Risk factors	Categories	Frequency(n)	Percent (%)
Family History of IBS	Yes	85	24.9
	No	256	75.1
Chronic health problem	Yes	57	16.7

23

	No	284	38.4
Stress in last 6 months	Yes	131	61.6
	No	210	58.5
Permanent Medicine use	Yes	51	15.0
	No	290	85.0
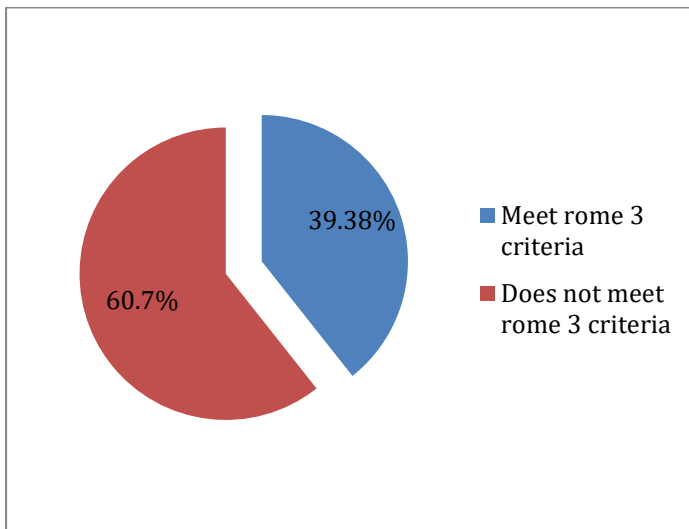
Fig 2: Patient with the history of diarrhea

In this study it was found that 39% were the patients who have IBS and meet Rome 3 criteria

And 60.7% are those who do not have irritable bowel syndrome.

Table 3: Descriptive results of Dietary factors

Question/Risk factor	Categories	Frequency(n)	Percent (%)
Physical Activity of participant	Yes	25	7.3
	No	316	92.7
Sleeping hours of participant	< 8 hours/day	88	25.8
	> 8 hours/day	253	74.2

Regular Breakfast	Yes	215	63.0
	No	126	37.0
Drinking fluids with meals	Yes	232	68.0
	No	109	32.0
Vegetable in diet	twice/week or less	81	23.8
	thrice/week or more	260	76.2
Fruits consumption	twice/week or less	120	35.2
	thrice/week or more	221	64.8
Fast food consumption	twice/week or less	216	63.3
	thrice/week or more	125	36.7
Coffee consumption	twice/week or less	287	84.2
	thrice/week or more	54	15.8
Tea consumption	twice/week or less	94	27.6
	thrice/week or more	247	72.4
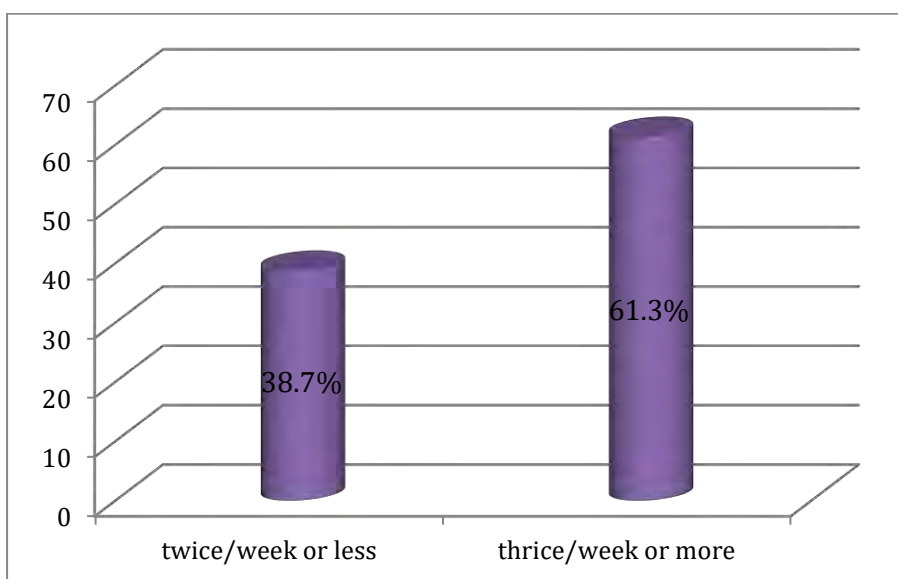
Fig 3: High fat diet consumption

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Among 341 respondents, respondents used high fat diet twice a week or thrice

132 (38.7%), use high fat diet twice a week or less and (61.3%) use thrice a week or more.

Majority of the respondents were more frequently use high fat diet in their daily routine.
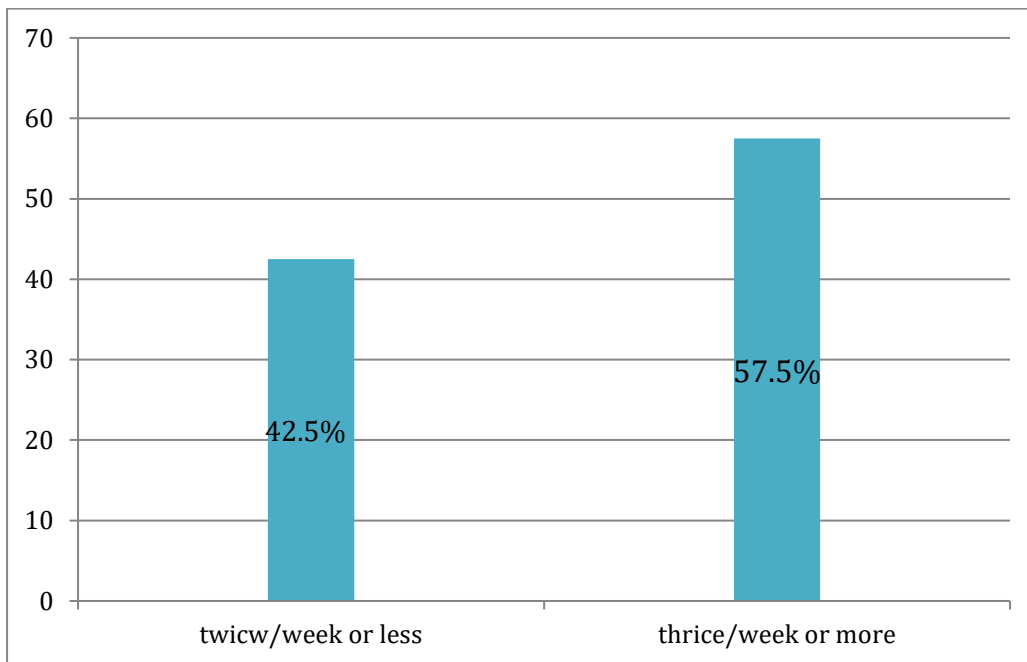
Fig 4: Spicy food consumption

Among 341 respondents, 145 (42.5%) consume spicy foods twice or less a week and 196

(57.5%) consume spicy foods thrice a week or more. Majority of respondents take spicy foods.

4.2. Inferential Analysis (Chi-square)

Chi-square of independence was applied to examine the association. Results for each variable

are shown in the following table:

Table 4: Association with Irritable Bowel Syndrome

Socio-demographic factors	Patient with history of diarrhea	
	Meet Rome III criteria	Doesn't meet Rome III criteria
BMI of respondent		
Underweight	1 (1.4%)	72 (98.6%)
Normal	2 (3.1%)	62 (96.9%)
Overweight	9 (14.3%)	54 (85.7%)
Obese	122 (86.5%)	19 (13.5%)
p-value	**.001**	
Family History of IBS		
Yes	29(34.1%)	56(65.9%)
No	105(41.0%)	151(59.0%)
p-value	.259	
Physical Activity of participant		
Yes	14(56.0%)	11(44.0%)
No	120(38.0%)	196(62.0%)
p-value	.076	
Sleeping hours of participant		
< 8 hours/day	30 (34.1)	58(65.9%)
> 8 hours/day	10 (41.1%)	149(58.9%)
p-value	.246	
Smoking		
Smoker	73(67.6%)	35(32.4%)
Non-Smoker	61(26.2%)	172(73.8%)
p-value	**.003**	
Regular Breakfast		
Yes	82(38.1%)	133(61.9%)
No	52(41.3%)	74(58.7%)
p-value	.568	
Drinking fluids with meals		
Yes	91(39.2%)	141(60.8%)

No	43(39.4%)	66(60.6%)
p-value	.968	
	Chronic health problem	
Yes	14(24.6%)	43(75.4%)
No	120(42.3%)	164(57.7%)
p-value	**.015**	
	Stress in last 6 months	
Yes	82(62.6%)	4937.4%)
No	52(24.8%)	158(75.2%)
p-value	**.001**	
	Permanent Medicine use	
Yes	15(29.4%)	36(70.6%)
No	119(41.0%)	171(59.0%)
p-value	.117	
	Vegetable in diet	
twice/week or less	34(42.0%)	47(58.0%)
thrice/week or more	100(38.5%)	160(61.5%)
p-value	.572	
	Fruits consumption	
twice/week or less	47(39.2%)	73(60.8%)
thrice/week or more	8739.4%)	134(60.6%)
p-value	.971	
	Fast food consumption	
twice/week or less	82(38.0%)	134(62.0%)
thrice/week or more	52(41.6%)	73(58.4%)
p-value	.508	
	Coffee consumption	
twice/week or less	92(32.1%)	195(67.9%)
thrice/week or more	42(77.8%)	12(22.2%)
p-value	**.000**	
	Tea consumption	
twice/week or less	21(22.3%)	73(77.7%)
thrice/week or more	113(45.7%)	134(54.3%)
p-value	**.000**	

	Spicy food consumption		
twice/week or less	23(15.9%)	122(84.1%)	
thrice/week or more	111(56.6%)	85(43.4%)	
p-value	**.000**		
	High fat diet consumption		
twice/week or less	46(34.8%)	8665.2%)	
thrice/week or more	88(42.1%)	121(57.9%)	

p-value	.181	

Interpretation:

In this study, Body Mass Index (BMI) was found to be significantly associated with irritable bowel syndrome (p= .000). A strong association was observed between smoking and irritable bowel syndrome (p=0.001). The present study revealed a significant correlation of chronic health problem and irritable bowel syndrome (p=0.015). Moreover, this study found direct relation between stress in last 6 months and history of diarrhea (p=0.001). Strong association was noted between Coffee consumption and irritable bowel syndrome. This study showed a significant association between spicy food consumption and irritable bowel syndrome (p=0.000)

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Chapter 5: DISCUSSION

This cross sectional study assessed the frequency and common risk factors for irritable bowel syndrome in the population of Rawalpindi. Data were collected through an adapted survey questionnaire. One outcome variable (History of diarrhea) was tested independently for their association with socio demographic and other variables.

In this study, Body Mass Index (BMI) was found to be significantly associated with irritable bowel syndrome (p= 0.001). This may be attributed to the fact that overweight people have more chances of having IBS. Similar results were reported by previous researches. A study conducted in 2014 reported that Both IBS and obesity have considerable impact on the healthcare system and society. (Blakely et al., 2014)

Students are more likely to be less careful with their diets than adults, so eating habits and dietary balance can have a significant impact on the onset and severity of IBS-related symptoms. Items discussed including eating breakfast, drinking plenty of fluids, and favoring fresh foods like fruits, vegetables.

A strong association was observed between smoking and irritable bowel syndrome (p=0.001) which is directly related to irritable bowel syndrome. Similar results were reported by previous researches (Fujiwara et al. 2018). According to previous study it has been noted that Cigarette smoking was found to be a common factor in any form of overlap among GERD, FD, and IBS. Furthermore, the link between smoking was higher among smokers who smoked frequently (Fujiwara et al. 2018)

However, another study conducted in India also reported an association between cigarettes smoking and IBS (Basandra et al., 2014)

The present study revealed a significant correlation of stress and irritable bowel syndrome (p=0.000) This finding is consistent with previous identical researches Physical and psychological stress are thought to be key contributors to IBS pathogenesis. Moreover, it is noted that that the alterations in the central nervous system (CNS) as a result of Colic is caused by psychological and physical tensions and resulting in the appearance of IBS symptoms (Elhosseiny et al., 2019)

Moreover, this study found direct relation between the people who consume spicy foods and irritable bowel syndrome (p=0.000)

Previous results showed that eating spicy meals linked to an increased prevalence of IBS in Iranian people. Even after controlling for relevant factors such as eating habits, this link remained significant. (Esmaillzadeh et al., 2013) [13]. A study reported that spicy and salty foods increase the risk of developing IBS

In this study, coffee consumption has significant association with irritable bowel syndrome (p=0.000). Previous study showed that coffee and caffeine consumption related with an increased risk of IBS. Caffeine was also associated with an increased risk of IBS among women Furthermore; there is a link between coffee use and the severity of IBS symptoms (Koochakpoor et al., 2021).

5.1. Strength:

- The current study is somehow successful in assessing the prevalence and common risk factors of irritable bowel syndrome among residence of Rawalpindi city.

- The present study was conducted in individuals coming to tertiary care hospitals with GI symptoms from variety of socioeconomic groups were included for assessment of risk factors.

- Present study has also identified the major determinants of irritable bowel syndrome among individuals presenting to tertiary care hospitals.

- The current study included a diverse sample comprising individuals from different socioeconomic groups, educational background and ethnic groups.

5.2. Limitations

Despite the sincere efforts of the researcher, few limitations were still present in the current study.

- It was a cross-sectional study and hence no causal relationship can be established in study.

- It was a time bond research study.

- The data used in this study was collected by self-administered questionnaires which is subjective and accordingly can introduce some bias.

5.3. Recommendations

- An effective doctor-patient relationship and a shared understanding are essential to the therapy of IBS because they can improve symptoms and quality of life, decrease medical visits, and increase adherence to treatment.

- Patients with IBS would appreciate improved understanding, support, and information from clinicians on the nature of the disorder, diagnosis, and symptom management options.

- In order to rule out inflammatory bowel disease, all patients who report with IBS symptoms for the first time in primary care should undergo a complete blood count, C reactive protein or erythrocyte sedimentation rate, coeliac serology, and, in patients under 45 years of age with diarrhea, a faecal calprotectin test. Where applicable, local and national recommendations for colorectal and ovarian cancer screening should be followed

- In the absence of alarm symptoms or indicators, clinicians should positively diagnose IBS based on symptoms and abnormalities on routine blood and stool testing.

- Referral to gastroenterology in secondary care is recommended when there is uncertainty about the diagnosis, when patients have severe symptoms that are resistant to first-line therapies, or when a patient specifically asks a specialist's opinion.

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ANNEXURE-I

Academic Dishonesty questionnaire

	SOCIODEMOGRAPHIC PROFILE			
1	Name		2	GENDER: a) Male b) Female
3	Income a) Enough & exceed b) Enough only c) Not enough		4	Parents a) Living together b) divorced c) dead
5	Living conditions a) with family b) private house		6	BMI a) Underweight b) Normal c) Overweight d) Obese
	Health problems			
7	Family history of IBS a) Yes b) No		8	Regular exercise a) Yes b) No
9	Sleeping hours a) <8h/day b) ≥ 8h/day		10	Smoking a) Yes b) No
11	Having breakfast a) Yes b) No		12	Drink fluid with meal a) Yes b) No
13	Chronic health problem a) Yes b) No			
14	Emotional stress in previous 6 months a) Yes b) No)		15	Medication use a) Yes b) No
	Dietary Factors			

16	Vegetables a) Twice/week or less b) thrice/week or more	17	Fruits a) Twice /week or less b) thrice/week or more
18	Fast food a) Twice /week or less b) thrice/week or more	19	Coffee a) Twice /week or less b) thrice/week or more
20	Tea a) Twice /week or less b) thrice/week or more	21	Spicy food a) Twice /week or less b) thrice/week or more
22	High-fat diet a) Twice /week or less b) thrice/week or more	23	Patient with the history of diarrhea who a) Meet Rome III criteria b) Meet Rome III criteria

ANNEXREX IRB

AL-SHIFA SCHOOL OF PUBLIC HEALTH
PAKISTAN INSTITUTE OF OPHTHALMOLOGY
AL-SHIFA TRUST, RAWALPINDI

MSPH-IRB/15-20
27ᵗʰ Mar, 2023

TO WHOM IT MAY CONCERN

This is to certify that **Muhammad Tariq** D/O **Muhammad Saif Ullah** is a student of Master of Science in Public Health (MSPH) final semester at Al-Shifa School of Public Health, PIO, Al-Shifa Trust Rawalpindi. He/she has to conduct a research project as part of curriculum & compulsory requirement for the award of degree by the Quaid-i-Azam University, Islamabad. His/her research topic, which has already been approved by the Institutional Review Board (IRB), is **"Common risk factors for Irritable Bowel syndrome in the population of Rawalpindi"**.

Please provide his/her necessary help and support in completion of the research project. Thank you.

Sincerely,

Dr. Ayesha Babar Kawish
Head
Al-Shifa School of Public Health, PIO
Al-Shifa Trust, Rawalpindi

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ANNEXURE-III

<u>Informed Consent Form</u>

Title of study:

"*Common risk factors of irritable bowel syndrome in the population of Rawalpindi*"

Procedure: Data will be collected from patients using a questionnaire. If a patient is not able to respond, his/her colleagues will be asked to fill the questionnaire.

Time required: It is anticipated that it will take approximately 5-7 minutes to complete the questionnaires.

Voluntary participation: Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

Confidentiality: Data will be completely anonymous and reported in aggregate form. Your name will not be collected at any time. After data collection, the questionnaires will be password-protected. Once submitted the researcher will not be able to withdraw responses due to anonymity and de-identified data.

Risks: There will be no serious risk associated with study.

Benefits: There are no direct benefits associated with participation in this study. However, it will assess the academic dishonesty and its effect on self-esteem in schools of twin cities

Payment: You will receive no payment for participating in the study.

Right to withdraw from the study: You have the right to withdraw from the study at any time without any consequences.

Contact information: If you have questions about the study, please contact:

Muhammad Tariq

sheikhuu88@gmail.com

Contact # 03017805002

Consent

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Name of Participant_____

Signature of Participant _____

Date _____ (DD/MM/YY)

Statement by the researcher/person taking consent:

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that. I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the

individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this Informed Consent Form (ICF) has been provided to the participant.

Name of Researcher/person taking the consent_____

Signature of Researcher /person taking the consent_____

Date _____ (DD/MM/YY)

ANNEXURE-IV

RESEARCH TIMELINE

Activities	March 2023	April 2023	May 2023	June 2023	July 2023	Aug 2023
Literature search	██	██	██	██		
Synopsis/ IRB	██	██				
Pilot testing			██			
Data collection			██	██		
Data analysis				██	██	
Thesis write up		██	██	██	██	
Thesis defence						██

ANNEXURE-V

BUDGET

Budget item	Transport	Stationery and internet	Printing	Publishing
Pilot testing	12000 Rs/-	4000Rs/-	700Rs/-	-
Data collection	15,000Rs/-	7,000Rs/-	-	-
Thesis write-up	6,000Rs/-	5,00Rs/-	5,000Rs/-	8,000Rs/-
Total expenditure	16,000Rs/-	17,000Rs/-	13,000Rs/-	8,000Rs/-
Grand total	63,000Rs/-			