SUMMARY

Gastrointestinal Irritability (GII) is one of the world's most common chronic complaints for which there is no established treatment consensus. While the aetiology of the disorder remains unclear, certain food substances have been implicated in triggering the symptoms. To study the effectiveness and acceptability of dietary intervention, questionnaires were sent to 1029 patients with GII who had attended the Allergy Unit at Royal Prince Alfred Hospital (RPAH) between the years of 1983 and 1997. Part of this questionnaire asked for a graded description of the severity and frequency of gastro-intestinal (GIT) symptoms and other associated symptoms, before and after dietary modification. The respondents were classified into two groups: those who self-modified their diet and those who modified their diet based on the results of the elimination diet and challenge procedure. A comparison of these two groups indicated that those who reported their GIT symptoms as more severe, were more likely to commence the elimination diet and challenge protocol than those who did not. However, the long-term (mean 6 years) avoidance of food substances was similar in both groups. The most avoided substances were the preservatives followed by dairy products and monosodium glutamate (MSG). For both groups, the benefit of dietary manipulation was evident by the lower severity and frequency of symptoms reported when the relevant foods were avoided. Symptomatic recurrences were occasionally experienced as a result of inadvertent ingestion, but in most cases they were due to deliberate ingestion of the offending foods.

INTRODUCTION

Gastrointestinal irritability (GII) is one of the world's most common chronic complaints. Approximately 15-20% of the Western population suffers from irritable bowel syndrome (IBS), one of the most common forms of GII, which accounts for approximately 50% of referrals to gastrointestinal clinics [1,2]. The prevalence of IBS is higher in females than males (2.5:1 respectively). It is also noted that IBS is just as common in the third world as developed countries [1]. The disorder has a familial tendency and is thought to have multi-factorial origins [1].

The pathogenesis of many GII complaints is inadequately defined. IBS is an idiopathic disorder associated with changes in function throughout the gut and is characterised by abnormal gastrointestinal motility patterns, or sensations, of the colon, rectum or small bowel [3,4]. The many origins implicated in the aetiology of GII/IBS include alterations in function following infection, stress and psychopathology, whilst suggested symptom triggers consist of dietary fibre and fat intake, food intolerances and food allergies [5].

Although the relationship between stress and IBS remains unclear, it has been recognised by some studies that stressful events and gut dysfunction occurs concurrently [4]. Further, evidence has shown that the immune system plays a role in regulating stress induced responses in humans. This has generated conjecture that the immune system may influence psychosomatic disease [8].

Traditionally, psychopathology has been incriminated as the major cause of IBS. Bentley et. al (1983) reported that 86% of their study group suffered psychiatric disorders in addition to their IBS [7]. However, current opinion no longer supports psychopathology as the major factor in GII aetiology and most people with IBS have normal psychopathology [1]. As only one quarter of people with symptoms of IBS present to a doctor [1], it has been suggested that the psychological make-up of each individual plays a role in determining the health seeking behaviour of those with IBS.

Recent research has linked IBS with abnormalities of visceral sensitivity, contrary to the traditional theory that it is purely a motor disorder. As psychopathology moderates the motor and visceral responses of the gut, it is thought that it remains an influencing factor in IBS aetiology [1].

In addition to the abdominal symptoms, patients with IBS, often present with non-colonic symptoms such as headache, fatigue/lethargy, backache, nausea, non-cardiac chest pains and gynaecological problems are often present in patients with IBS [1,4].

Treatment for non-infectious diseases of the gastrointestinal system such as IBS and inflammatory bowel disease (IBD) remain largely unsatisfactory and have concentrated on the use of drug therapy, bulking agents and stress management [9]. Therapies remain essentially empirical, targeted toward symptomatic relief [4]. For patients with diarrhoea as the predominant symptom, an antidiarrhoeal agent is indicated. When symptoms of pain, wind or bloating are predominant, the use of an antispasmodic drug is prescribed [4]. Tricyclic antidepressant drugs are also commonly used for pain relief. The dosage recommendations of antidepressants are lower for IBS treatment than for depression [1,4]. Stress management is also indicated by some practitioners for GII therapy. For some patients, the use of hypnotherapy and psychotherapy has proven beneficial [1,10].

The fact that symptoms of GII often occur post-prandially suggests that food reactions may be occurring. Evidence suggests that post-prandially, in those who suffer IBS related diarrhoea, less time is taken for food to enter the colon than in those who suffer IBS related constipation [6,17]. Investigation of dietary manipulation for the treatment of GII has frequently involved the reduction of fatty foods or the increase of dietary fibre. This is because fibre has the ability to increase the stool weight and to reduce transit time through the gut. For some patients, particularly those suffering diarrhoea, the increase in dietary fibre has served only to intensify the severity of symptoms [1,9].

It has been reported anecdotally and by means of double-blind challenges, that individual foods can cause symptoms in a proportion of people with GII. A population study of food

intolerance determined that its prevalence is difficult to establish. Questionnaire response showed that 20.4% of the UK population perceived themselves to be food intolerant. However, when strict dietary and challenge procedures were applied only 1.4% of subjects were found to suffer from food intolerance [14].

True food allergy is an IgE mediated "immediate hypersensitivity reaction, usually involving a single food protein, and predominantly seen in infants and young children with a history of atopic eczema" [11]. By contrast, food intolerances can occur at any age, and are caused by the adverse pharmacological effects of certain chemicals present in many common foods. These may be naturally occurring substances (e.g. salicylates, amines, glutamate) or additives in processed foods (e.g. preservatives, colourings, MSG). Reactions are idiosyncratic, dose-dependent, and the particular symptoms provoked vary amongst individuals [12]. The relationship between occurrence of symptoms and ingestion of individual foods is often not obvious to the patient. The only reliable means of diagnosis is by systematic elimination of the relevant foods from the daily diet, followed by a series of challenges designed to provoke symptoms. These are best conducted double-blind with purified food substances and placebos [13].

It is the experience of the Allergy Unit that patients with GII report significant clinical improvement on an elimination diet, and once the offending substances have been recognised by provocation, patients can maintain long-term control of symptoms by adherence to an appropriately modified diet.

Other studies have shown that, following an elimination diet and challenge procedure with food or chemical substances, a relationship exists between foods and IBS in 39-67% of reported cases [2]. Additional research has shown that 48.1% of respondents reported symptomatic improvement after three weeks of following an elimination diet [9]. Jones et al. (1982) determined that a high proportion of GII sufferers have specific food intolerance when subjected to double-blind challenge [15]. Lewis (1995) states that "studies have shown that as many as 70% of patients with abdominal pain and diarrhoea may be successfully managed by diet; double blind challenges have provided objective

evidence of food intolerance" [16]. Schmidt and Floch (1992) state that "there appears to be a subset of IBS patients who have a strong history of atopy and immunologically linked food allergy. Furthermore, many of these patients experienced improvement of their IBS on an elimination diet" [3].

By contrast, Farah et al. (1985) found that 6% of subjects had proven specific food intolerance when assessed by double-blind placebo control food challenges. Further, they argue that a greater number of subjects have symptoms attributable to psychogenic causes [17]. Bentley et al. (1983) could also only confirm food intolerance in a small proportion of IBS sufferers' [7].

As there is still some question about the role of dietary modification in the management of GII, this study documented the severity and frequency of symptoms, before and after an elimination diet, in a group of people presenting to the Allergy Unit, during the last 15 years. At present, the literature detailing the relationship between GII and food intolerance has been inconclusive. This retrospective study aimed to describe the population suffering from GII who presented at RPAH and identify the profile of food intolerance in the diagnosis and management of GII. Particular emphasis was placed on symptom frequency and severity, extent of continuing dietary restriction and the relationship between specific intolerances and particular symptoms or symptom clusters.

METHODS

STUDY POPULATION

All patients with GII, who had attended the Allergy Unit at RPAH between 1983 and 1997, were invited to participate in this study. However, some subjects were under 18 at the time of consultation. As the age of consent is 18 years, questionnaires were only sent to people who were 18 or over at the time the study began in October, 1997. Names, dates of birth and addresses were obtained from the Allergy Unit patient records.

QUESTIONNAIRE

A questionnaire (Appendix 1) was sent to each of the 1029 subjects meeting the stated criteria. The subjects were asked to record their names on the questionnaire so that data from their clinical records could be matched with the questionnaire. Return of the questionnaire was taken as implied consent and therefore written consent was not sought.

General information about beginning the elimination diet, how long it took to gain improvement, and what length of time it took to do the challenge procedure, was sought from the respondents.

Symptom Survey

To assess the effectiveness of the elimination diet and provocation procedure, individuals were asked to record their current symptoms, if any, and to compare them with those present at diagnosis and during the elimination diet. Information was sought about the following symptoms:

nausea/ vomiting	hives/ swellings
indigestion/ reflux	eczema
wind/ bloating	headache/ migraine
stomach pains/ cramps	fatigue
diarrhoea/ constipation	nose/ sinus problems
mouth ulcers	bladder/ vaginal irritation

Subjects could add any other symptoms they experienced. When present either before, during or after the elimination diet, the frequency and severity of the symptoms were graded according to the following definitions:

Severity

Mild: aware of the symptom, but it was easily tolerated without medication.

Moderate: sufficient to cause interference with daily life or require medication.

Severe: incapacitating, with inability to work or carry on with normal activities.

Frequency

Rarely: less than once a month.

Monthly: occurring up to three to four times per month.

Weekly: present at least once per week.

Daily: present every day.

Current Diet Survey

Information was sought about each subject's current dietary restrictions, if any. They were asked to indicate how often they currently either knowingly or accidentally experienced food reactions. Frequency of food reactions were graded according to the following definitions:

Never

Occasionally: Less than once a month

Fairly Often: One to three times per month

Frequently: Once a week or more

For those who did not proceed with the elimination diet and challenge, questions were asked about dietary modification based on information obtained from the clinic consultation. Those who did modify their diet were called the *self-modified diet group.* The analyses of the current diet was then broken into those who modified their diet according to Allergy Unit elimination and challenge procedure, the *challenge-modified diet group*, and those who self-modified.

Medication Survey

Each subject was asked to record their current usage of medications in order to control or alleviate symptoms. They were asked to record the name of the medication and how frequently, (daily, weekly or monthly), it was required.

Smells and Fumes Survey

Previous experience at the Royal Prince Alfred Hospital has indicated that many patients with food intolerance become more sensitive to smells and fumes when they restrict their diet. In order to document this, subjects were asked to record whether they felt smells, foods or environmental chemicals triggered their symptoms. The following examples were listed: perfumes, fresh paint, cigarette smoke, petrol fumes, car exhaust, flower scents, cleaning agents, insecticide sprays and new carpet. Information was sought on the severity of the symptom, along with questions about the sensitivity, before, during and after the elimination diet and challenge procedure.

CLINICAL DATA COLLECTION

For each individual who returned a questionnaire, their answers along with the clinical data from the medical records were simultaneously entered into the database. Results of both open and double-blind challenges (doses listed in appendix 2) to the following substances/foods were recorded: dairy, wheat, colouring, preservatives (sulphites, benzoates, sorbates), antioxidants, nitrates, propionates, salicylates, amines and MSG. If symptoms were provoked after taking a challenge this was recorded as a positive reaction to that challenge.

DATA RECORDING AND ANALYSIS

The responses to the questionnaire and the clinical data were entered into the Allergy Unit research database (Microsoft Access, 1997). Descriptive statistics were obtained from the data. Since the questionnaire response was low and no control group was used, significance levels were not determined in this retrospective, observational study.

The Ethics Review Committee of the Central Sydney Area Health Service (RPAH Zone) and the Ethics Committee of the University of Newcastle approved this study.

RESULTS

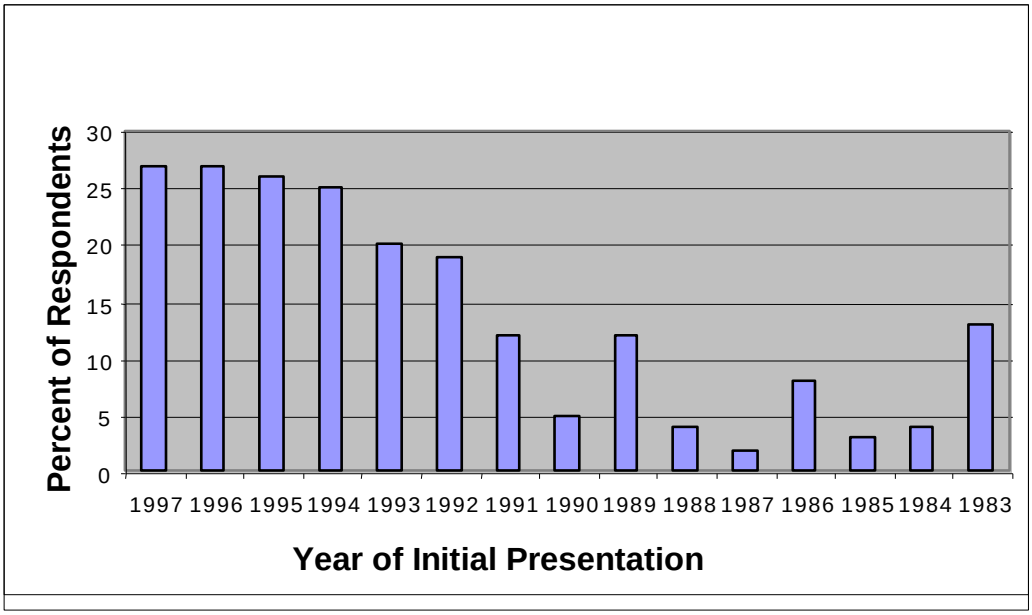
The majority of patients presenting to the Allergy Unit are from surrounding areas (Appendix 4). The average age for the whole group was 40 years (Range 5.8-81.7), however the majority of subjects (49%) were females aged between 25 and 52 (Appendix 3).

Of the 1029 questionnaires, 211 were returned. Of those returned, 149 (12.5%) were completely or partially answered, 60 were marked "not at this address" and a further 2 were returned by family members as the subject had passed away since the initial consultation. Of the 1029 subjects, 741 (73%) were female and 280 (27%) were male, thus a gender ratio of 2.6:1 respectively was calculated.

Respondent Characteristics

It can be seen from figure 1 that most of the questionnaires were returned by people attending the clinic in the last six years (average time). The 149 who attempted to answer the questionnaire comprised 121 (81%) females and 28 (19%) males, (4:1 respectively). The average age was 41 years (range 12-81 years). As the group was chosen for GII problems all respondents presented with gastrointestinal symptoms. In addition to these, 41% presented with coexisting central nervous system (CNS) symptoms (particularly fatigue and headache), 15% with respiratory symptoms, 10% with skin symptoms and 5% with other symptoms. Other symptoms included muscle/ joint pain, bladder irritation, black outs, sweats and vaginal irritation (Appendix 5).

Figure 1: Questionnaire response rates by year of presentation (n=1029).



Elimination Diet Response Characteristics

Analysis showed that 106 of the 149 subjects who answered the questionnaire (73%) began the elimination diet. Of 106 respondents 74% experienced improvement on the elimination diet. After three weeks on the elimination diet 70% of 71 respondents had improved. The remaining 30% took several more weeks to improve.

After beginning the elimination diet, 32 of 70 respondents (46%) reported a temporary exacerbation of symptoms or "withdrawal effect". On average, withdrawal symptoms occurred 7 days (range 1-40, SD=9,n=25) after beginning the elimination diet and persisted for 5 days (range 1-12, SD=3, n=26). In this group an average of 33 days (range 1-210, SD=37, n=58) was required for symptoms to settle on the elimination diet.

In those subjects who did not persist with the elimination diet because they felt their symptoms were not improving, the diet was abandoned after only 16 days (range 2-52, SD=3, n=32). Of the 56 respondents who did not experience symptomatic improvement, 34 (61%) resumed a normal diet.

Challenge Data Characteristics

In 88 respondents who reported beginning the elimination diet, 80% started the challenges. From 72 respondents, 52% challenged with both open and double-blind challenges. Nineteen percent did double-blind capsules only, while 29% reported doing open food challenges alone. The prescribed challenge regime was completed by 67% of 62 respondents and the testing procedure lasted on average 15 weeks (Range 1-72, SD=14).

The data on the chemical and food responses to the elimination diet was analysed from information filed in the subjects' clinical notes. An average of 5.6 (range 1-11) positive reactions per person was calculated for 54 subjects (Appendix 6). The most prevalent symptoms provoked by challenge were grouped to include all the GIT reactions, headache and fatigue (Table 1).

The salicylates, amines and preservatives (sorbates, benzoates and sulphites), were found to induce most of the GIT symptoms with similar trends seen for headaches (Table 1). Table 2 shows the separate GIT response to the individual challenges. Tables 1 and 2 demonstrate that a single compound can produce a variety of symptoms, even in the same individual.

TABLE 1 – PERCENTAGE OF QUESTIONNAIRE SUBJECTS WHO SUFFER GIT, HEADACHE AND FATIGUE AFTER CHALLENGING.

Challenge	**Subjects Challenged**	**GIT Symptoms**		**Headache**		**Fatigue**	
Double-Blind Challenges		n	%	n	%	n	%
Sorb/Benz/MBS	35	21	60	5	14	2	6
Colours	36	18	50	3	8	3	8
Amines	49	24	49	4	8	1	2
Salicylates	50	27	54	5	10	3	6
Glutamate	46	22	48	5	11	2	4
Nitrate	40	18	45	2	5	2	5
Propionate	42	18	43	5	12	3	7
BHA/BHT	42	13	31	1	2	2	5
Gluten	38	9	24	0	0	0	0
Lactose	41	7	14	2	5	0	0
Open Challenges							
Wheat	40	18	45	4	10	4	10
Milk	40	15	38	3	8	5	13
Placebos							
Starch	44	3	7	0	0	1	2
Sucrose	36	1	3	0	0	0	0

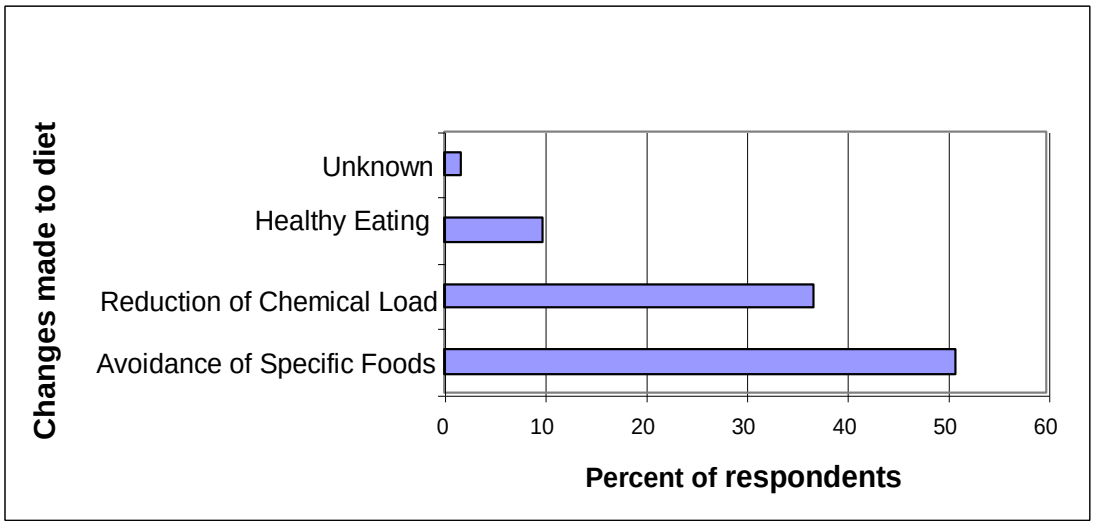
TABLE 2 - BREAKDOWN OF MAJOR GIT SYMPTOMS PROVOKED BY CHALLENGES IN THE QUESTIONNAIRE SUBGROUP.

Challenge	**Subjects Challenged**	**Diarrhoea**		**Pain/Cramp & Colic**		**Wind/ Gas & Bloating**		**Nausea**	
Double-Blind Challenges		n	%	n	%	n	%	n	%
Sorb/Benz/MBS	35	8	23	6	17	11	31	4	11
Colours	36	8	22	7	19	6	17	0	0
Amines	49	9	18	13	27	10	20	3	6
Salicylates	50	12	24	8	16	10	20	5	10
Glutamate	46	12	26	12	26	5	11	3	7
Nitrate	40	8	20	12	30	6	15	1	3
Propionate	42	7	17	10	24	5	12	0	0
BHA/BHT	42	6	14	5	12	3	7	2	5
Gluten	38	6	16	2	5	2	5	1	3
Lactose	41	5	12	2	5	2	5	2	5
Open Challenges									
Wheat	40	12	30	9	23	11	28	3	8
Milk	40	5	13	9	23	9	23	3	8
Placebos									
Starch	44	2	5	1	2	0	0	0	0
Sucrose	36	0	0	1	3	1	3	0	0

Challenge-Modifiers versus Self-Modifiers Responses

Of the 45 respondents who reported not beginning the elimination diet, 36% found the diet too difficult, whilst 25% sought advice elsewhere (Appendix 7). Even if subjects reported not beginning the elimination diet, 46 of 64 respondents (72%) stated that they made dietary modifications based on the information obtained at the Allergy Unit. Figure 2 shows the dietary modifications made by this group who did not formally proceed with the elimination diet protocol. This demonstrates that approximately 50% of the respondents avoided specific foods that they felt were causing their symptoms, approximately 33% of respondents reduced their total chemical load and the rest started healthy eating practices. Dietary changes could not be determined for 2% of respondents.

FIGURE 2: PERCENT OF NON-STARTING RESPONDENTS WHO ALTERED THEIR DIET FROM ADVICE GIVEN AT THE ALLERGY CLINIC (N=45).



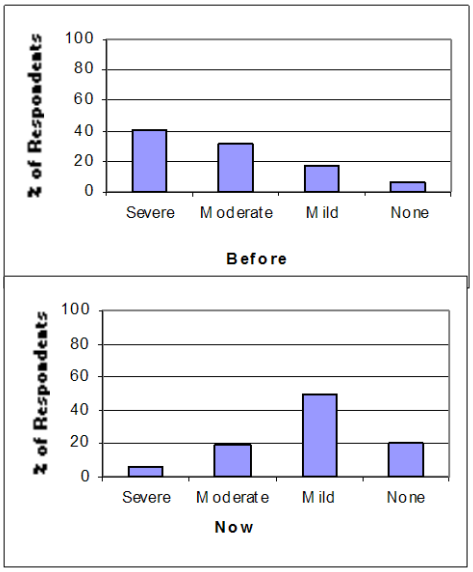
The severity and frequency of GIT and CNS symptoms, is summarised in figure 3, for both the self-modified and the challenge-modified groups at initial presentation and at the time the questionnaire was sent. The trend seen in all of the following graphs is that improvement in different symptom complexes does occur with dietary manipulation, be it by challenge or self-modification. Figure 3 highlights, for the challenge-modified group, a greater severity response than for the self-modified group for GIT symptoms only. The severity and frequency of the remaining symptoms are shown in Appendix 8.

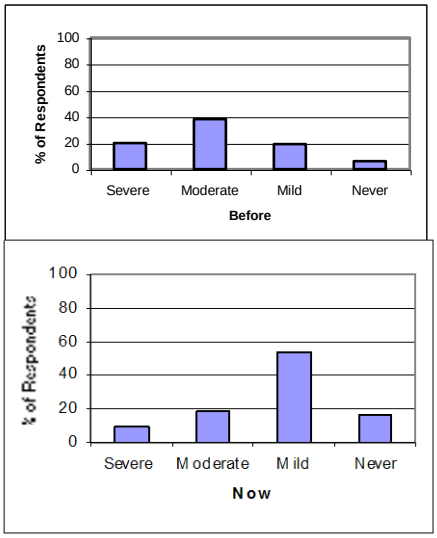
FIGURE 3: SEVERITY AND FREQUENCY OF SYMPTOMS BEFORE AND AFTER DIETARY MODIFICATION

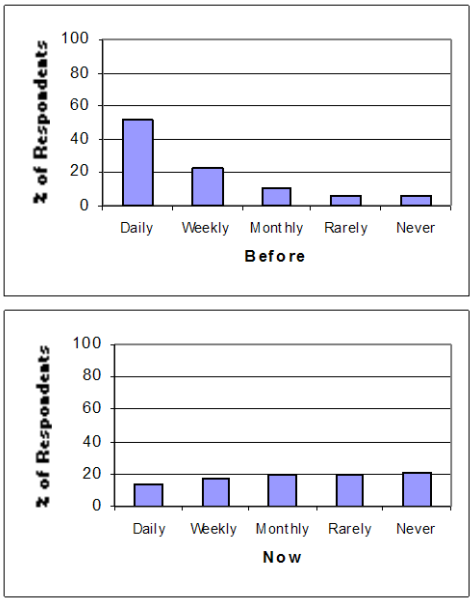
GIT SYMPTOMS – SUMMARY

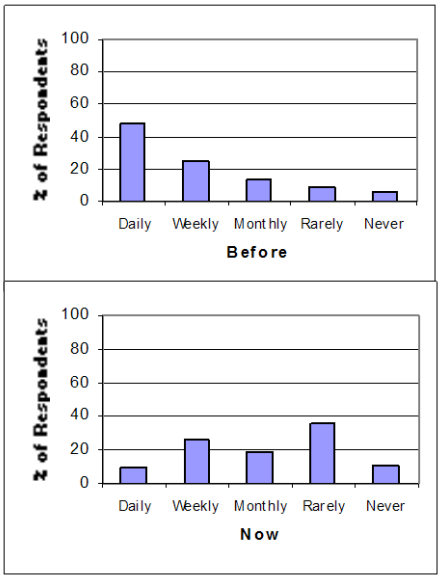
CHALLENGE-MODIFIED GROUP ***SELF-MODIFIED GROUP***

SEVERITY







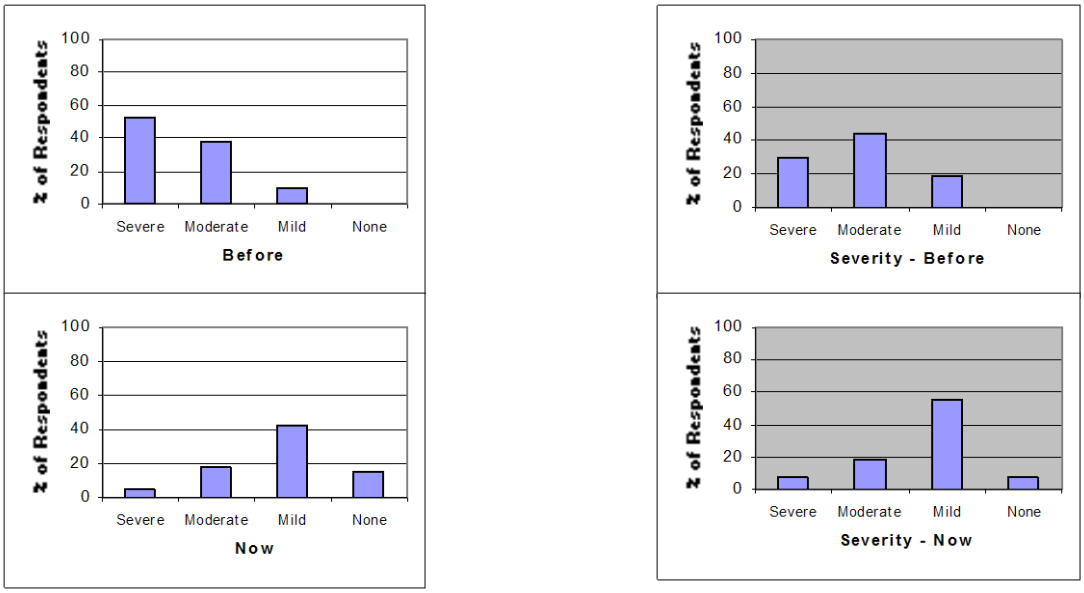


FREQUENCY

FIGURE 3: SEVERITY AND FREQUENCY OF DIARRHOEA/CONSTIPATION SYMPTOMS BEFORE AND AFTER DIETARY MODIFICATION

CHALLENGE-MODIFIED GROUP (n=73) ***SELF-MODIFIED GROUP (n=27)***

SEVERITY



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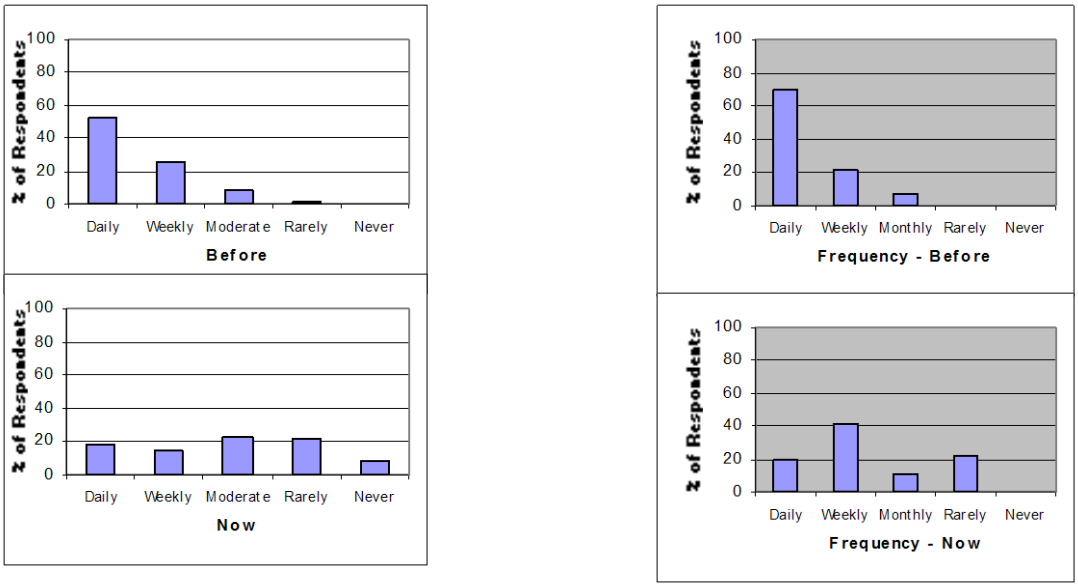
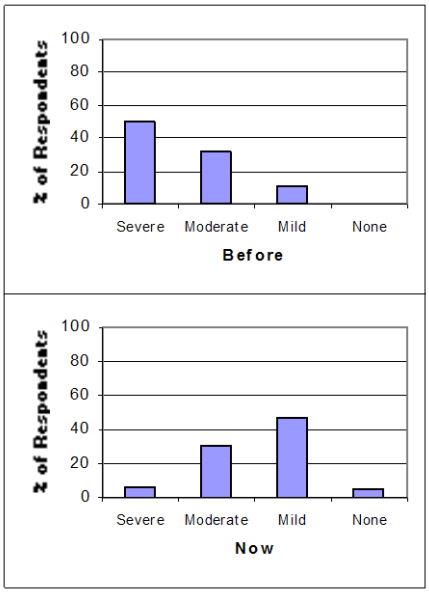


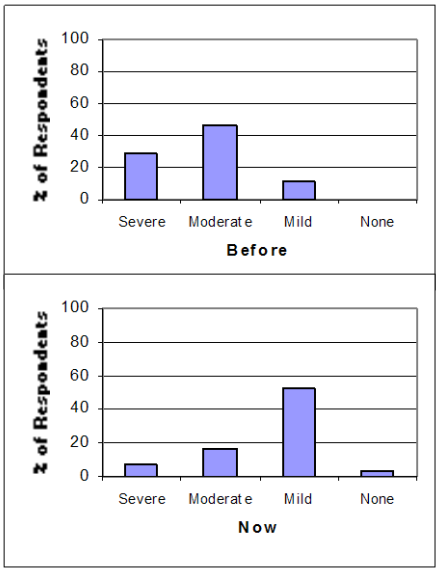
FIGURE 3: SEVERITY AND FREQUENCY OF WIND/ GAS/ BLOATING SYMPTOMS BEFORE AND AFTER

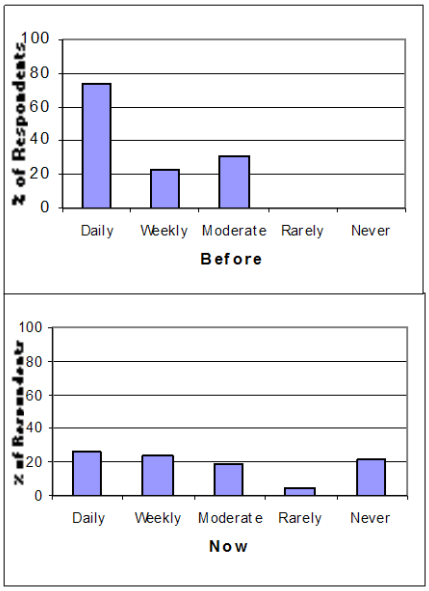
FIGURE 3: SEVERITY AND FREQUENCY OF WIND/ GAS/ BLOATING SYMPTOMS BEFORE AND AFTER DIETARY MODIFICATION

CHALLENGE-MODIFIED GROUP (n= 62) ***SELF-MODIFIED GROUP (n=28)***

SEVERITY







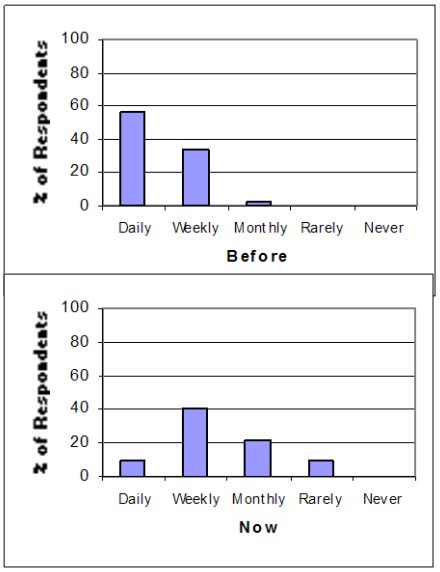


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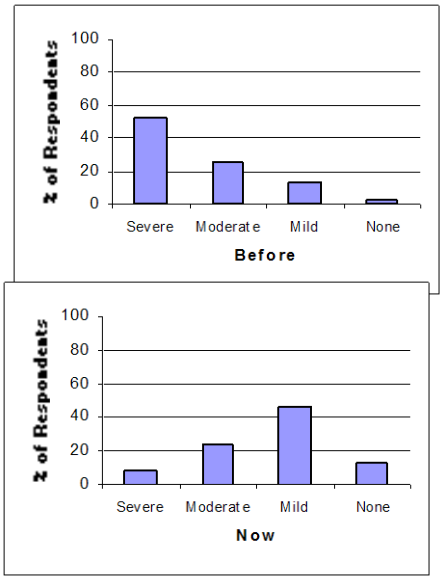
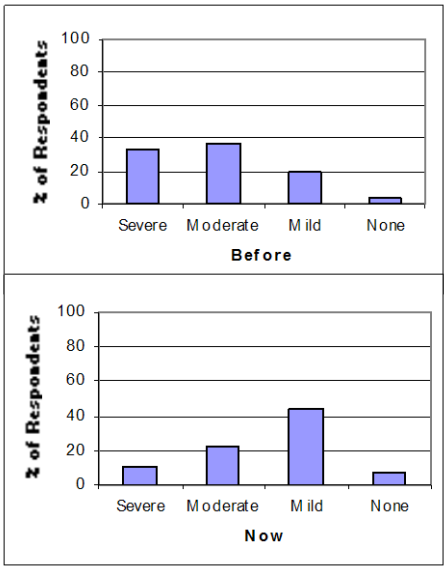
FIGURE 3: SEVERITY AND FREQUENCY OF STOMACH PAINS/CRAMPS SYMPTOMS BEFORE AND AFTER DIETARY MODIFICATION

CHALLENGE-MODIFIED GROUP (n=62) ***SELF-MODIFIED GROUP (n=27)***

SEVERITY





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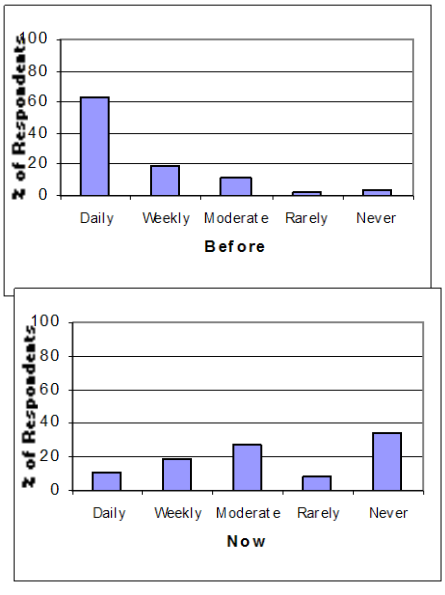


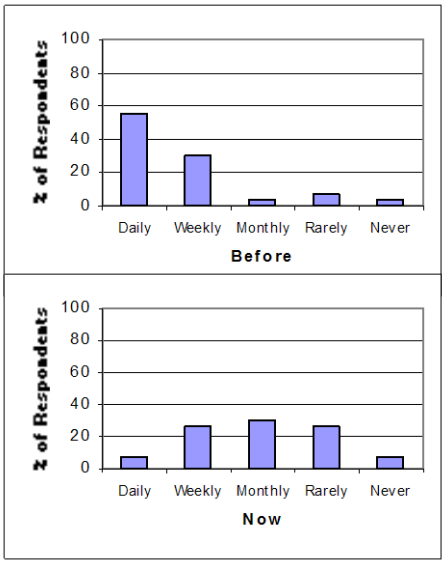
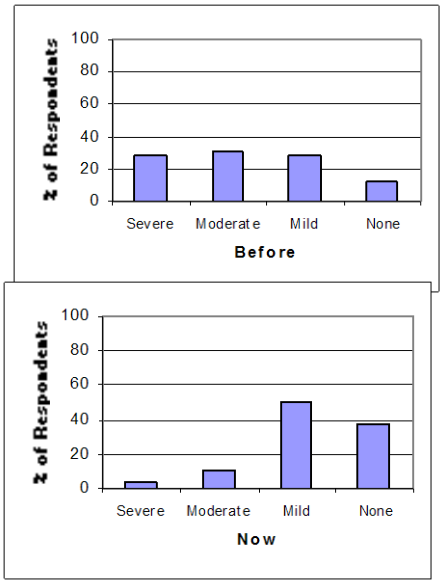
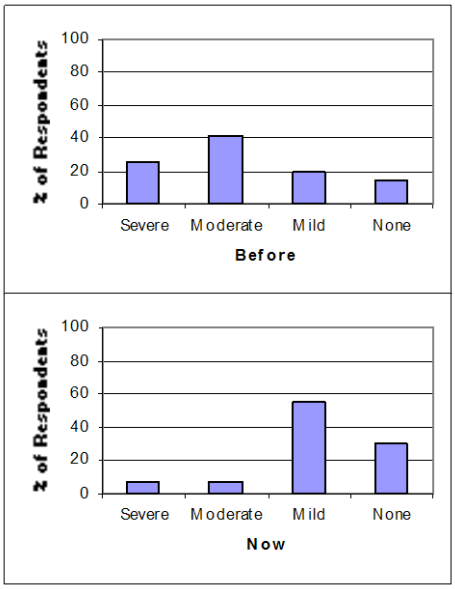


FIGURE 3: SEVERITY AND FREQUENCY OF NAUSEA/ VOMITING SYMPTOMS BEFORE AND AFTER DIETARY MODIFICATION

CHALLENGE-MODIFIED GROUP (n=52) ***SELF-MODIFIED GROUP (n=27)***

SEVERITY





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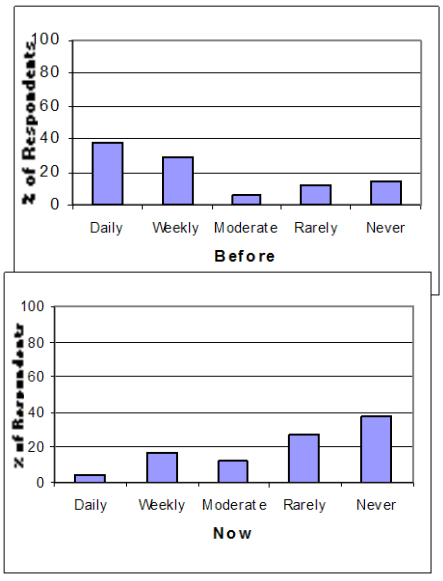


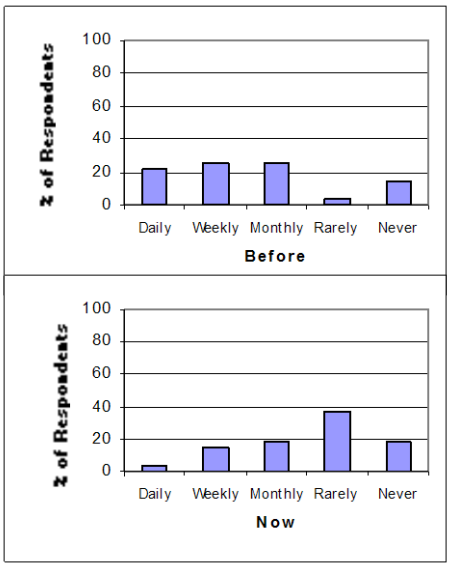
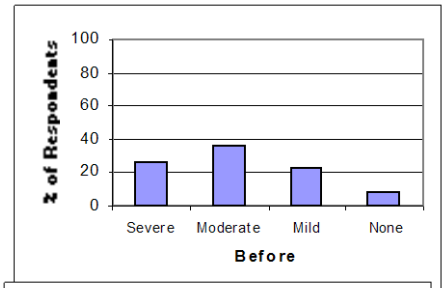
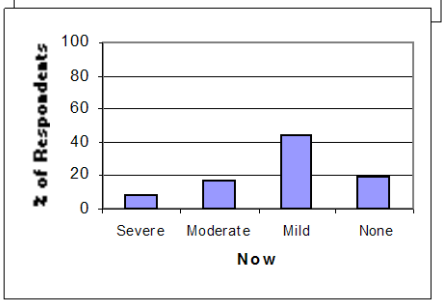


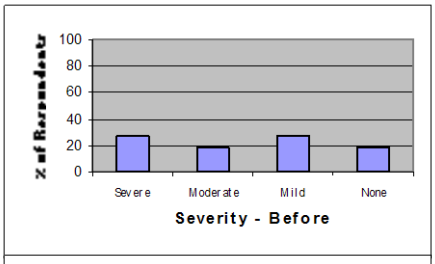
FIGURE 3: SEVERITY AND FREQUENCY OF HEADACHE/MIGRAINE SYMPTOMS BEFORE AND AFTER DIETARY MODIFICATION

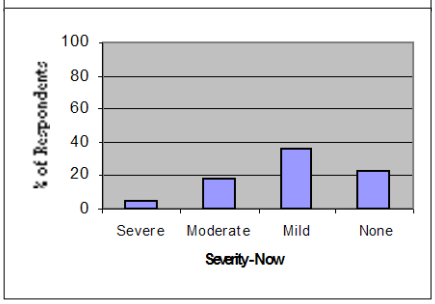
CHALLENGE-MODIFIED GROUP (n=48) ***SELF-MODIFIED GROUP (n=22)***

SEVERITY









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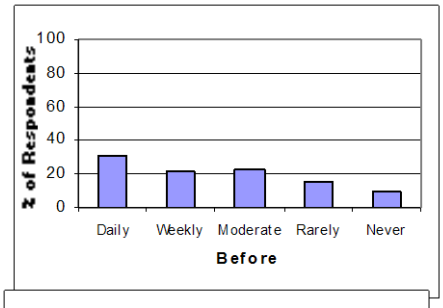
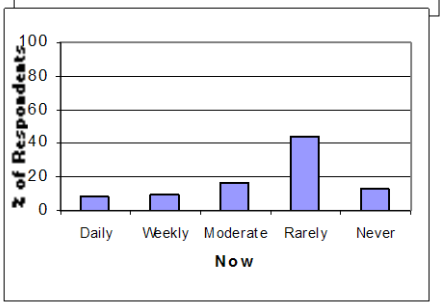
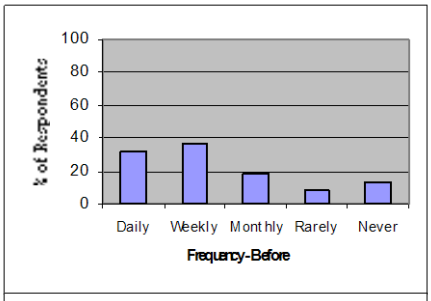






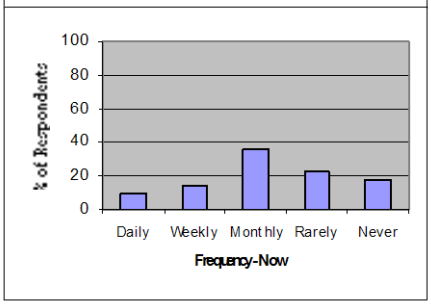
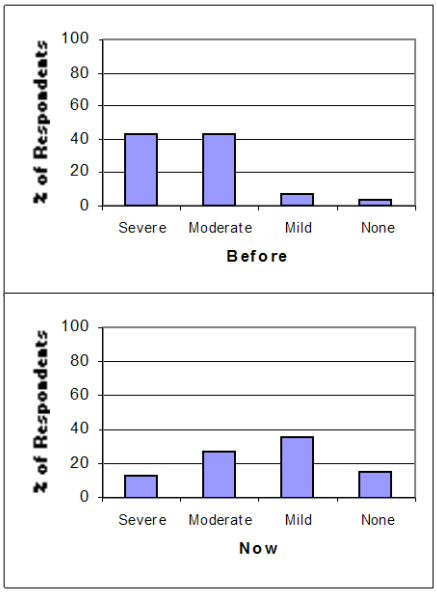
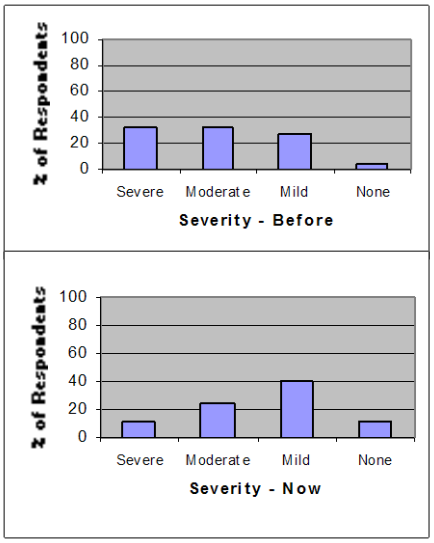


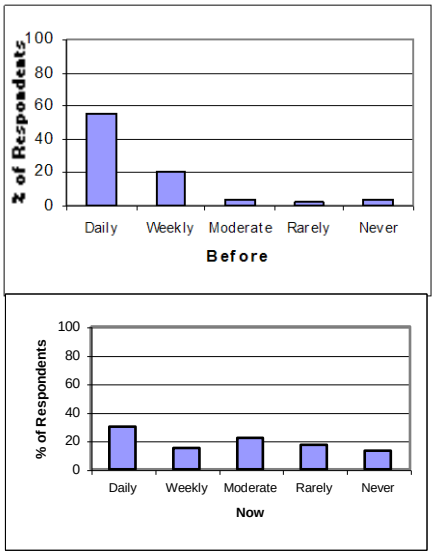
FIGURE 3: SEVERITY AND FREQUENCY OF FATIGUE SYMPTOMS BEFORE AND AFTER DIETARY MODIFICATION

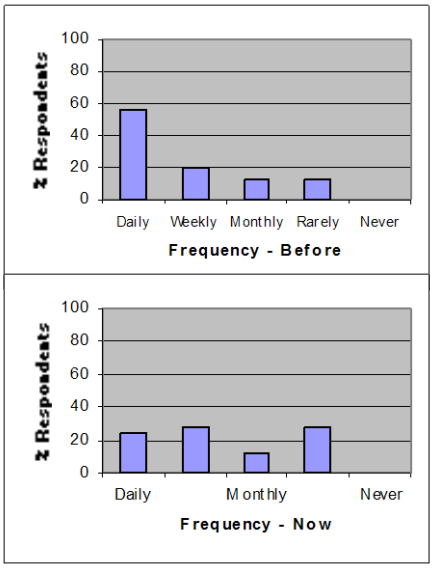
CHALLENGE-MODIFIED GROUP (n=54) ***SELF-MODIFIED GROUP (n=25)***

SEVERITY









FREQUENCY

After seeking advice from the Allergy Clinic, 116 of 137 respondents (85%) reported, after a mean of six years, that they were still modifying their diet. Comparison of food/ chemical restrictions between self-modified and challenge-modified diet groups revealed that self-modified respondents restrict their diet to a greater extent than the challenged-modified diet respondents. Restriction of additives was most common for both groups (Appendix 9). The most noted difference between the two groups regarding order of food/ chemical restriction, was that self-modifiers restrict dairy products most commonly after additives, whereas the challenge-modified group restrict MSG most commonly after preservatives (Appendix 10).

Medication Response

Of 126 respondents, 53 (42%) report that they currently take medications to control their symptoms. Analysis of the major pharmaceutical categories taken by respondents, demonstrates that anti-spasmodics, antacids (which include hydrogen antagonists such as Losec) and anti-diarrhoeals were the most frequently used (Table 3).

TABLE 3: MAJOR PHARMACEUTICAL CATEGORIES TAKEN BY RESPONDENTS TO CONTROL SYMPTOMS (N=48)

Pharmaceutical Category	**Daily**	**Weekly**	**Monthly**	**% Respondents**
Anti-Spasmodic	17	8	13	79
Antacids	29	2		65
Anti-Diarrhoeal	15	6	10	65
Laxatives	15	2		35
Pain Relievers		8	6	29
Anti-Depressant	10	2		25

Intolerance to Smells and Fumes

From 129 respondents, 84 (65%) believe that smells, fumes or environmental chemicals can trigger symptoms. Numerous smell triggers which provoked symptoms were identified (Appendix 13), but frequently the symptoms were not recorded.

When on the elimination diet, 50% (n=71) of subjects reported that they were more smell sensitive, however, when food chemical groups were reintroduced into the diet, their sensitivity returned to pre elimination diet levels (n=77), (Appendix 14).

Current Diet Response

Forty-six percent of 117 respondents reported occasionally experiencing reactions following inadvertent ingestion of specific food/chemicals. Conversely, 89 of 104 respondents (86%) reported experiencing food reactions 'occasionally', 'fairly often' or 'frequently' after knowingly ingesting foods to which they are sensitive (Appendix 11).

Participants were invited to comment on how they feel now, compared with when they first visited the clinic. From 135 respondents, only 4% of respondents expressed feeling worse, when compared to their initial clinic consultation. A further 29% of respondents reported feeling the same or a little better since first attending the clinic. A total of 67% report that they feel completely well or much better now, compared with their initial visit (Appendix 12).

DISCUSSION

Methodological Constraints

Follow up of continuing adverse reactions to food in people with gastrointestinal irritability was examined in this retrospective, descriptive study. The entire group of people sent questionnaires in this study, who presented to the Allergy Unit with GII, matched the literature IBS population for female: male ratio [1]. However, the 12.5% response rate from this group, did not enable the finding of statistical significance.

The poor response rate may be attributed to several factors, particularly time limitations. Ideally, an improvement in response rate may have been achieved through telephone follow-up or a reminder letter. If time had allowed, a second mail out with a reminder letter and phone call would have been implemented. As a consequence of the small response rate, results cannot be generalised to the broader population of IBS sufferers, therefore, a further prospective study is required.

GII patients are referred to the Allergy Unit after their general practitioner or gastro-enterologist has diagnosed them with suspected food intolerance. Consequently, referral bias has been introduced to the study due to the specificity of the group. A selection bias may have occurred in this study, as subjects who were dissatisfied with the Allergy Unit practice may not have returned their questionnaire. Further, patient notes are completed and reviewed by different members of staff and therefore, interpretation was sometimes difficult. In addition, patients whose challenge reactions were confounded[*], do not always contact the Allergy Unit with information regarding progress and therefore re-challenges are not recorded. Open challenges are biased as they are not placebo controlled and often there is a tendency towards responding to the first challenge [18]. The clinic database is designed for quantitative data analysis and therefore comments were unable to be included and analysed.

[*] Confounders are variations from the elimination diet procedure during the challenge phase. Therefore, the reaction may be attributed to the confounder, not the challenge.

Findings

Seventy percent of those who began the elimination diet experienced symptomatic improvement after only three weeks. On average, those who abandoned the diet did so after 16 days, as they felt their symptoms were not improving. Nanda et al. (1995) suggests that at least three weeks is required for symptomatic improvement, which supports the results from this study. As approximately half of those beginning an elimination diet experienced a flare up of symptoms after at least one week, which lasted for five days (range 1-12days), it could be surmised that a proportion of those who abandoned the diet (average 16 days) had experienced a withdrawal effect.

Nanda et. al (1995) state that an elimination diet should not continue for longer than three weeks if symptoms have not improved. Interestingly, in this study a further 27% of respondents improved beyond this suggested period. Therefore it seems reasonable to extend the trial period of the elimination diet. The Allergy Unit encourages patients to continue the elimination diet for 6-8 weeks to allow improvement.

Eighty percent of those who began the elimination diet, went on to the challenge phase. The mean number of challenge reactions was 5.6 per individual. This indicates that numerous substances may be involved in provoking similar reactions**.** Previous research conducted at RPAH also found that subjects had an average of 6 reactions to challenges and that a diverse range of symptoms could be precipitated [19]. Young et al. (1994) found in their population study of food intolerance, that GIT symptoms, were provoked by a wide range of food substances [14]. This illustrates some of the difficulties that may be encountered when the elimination diet and challenge procedure is undertaken and interpreted without professional direction. The most common symptoms provoked by challenges were of the GIT and CNS clusters. These results are similar to those reported by Francis and Whorwell (1997). They consider that the non-colonic symptoms, such as headache and fatigue, are an important part of the IBS symptom complex and should be considered when diagnosing GII [1].

Diarrhoea was the most common symptom provoked by the double-blind challenges. Of the challenges taken, salicylates, amines and preservatives were largely responsible for the assortment of GIT symptoms provoked. Open challenges (wheat and milk) also induced a high percentage of GIT symptoms. These findings may be due to a number of factors, including that wheat and milk were the initial challenges and were not blinded. Yang et. al (1997) cite that symptoms can be provoked at the beginning of a challenge procedure [18]. Flatulence (wind/gas/bloating) and diarrhoea and were found to be the most common symptoms provoked by wheat challenge. Abdominal pain (pain/cramp/colic) and flatulence were frequently reported to the milk challenge. As these challenges were not double-blind, other factors may have been involved in perceived food intolerance. The literature suggests that a higher proportion of the population perceives themselves to be food intolerant than actually are, when tested with double-blind placebo controlled challenges [14].

Forty-two percent of respondents currently take medications to control their symptoms. The most common medications were antispasmodics, antacids, antidiarrhoeals, laxatives, pain relievers and antidepressants. This shows that traditional treatment methods are still necessary in GII and that treatment remains empirical, targeted at symptomatic relief [4].

Smells, fumes and other environmental substances, were reported to provoke symptoms. The attributed symptoms could not be determined as this question was poorly answered.

Sensitivity to smells and fumes was reported to increase, by approximately 50% of respondents, when on the elimination diet. However, when food chemical groups were reintroduced to the diet at the completion of testing, sensitivity returned to pre-diet levels. Elimination of foods from the diet appears to decrease the dose threshold for reactivity to food chemicals, that is, a decrease in “tolerance” or an increase in “sensitivity”. Similarly, our results indicate that this may also be the case for smells and fumes. Clinical experience at RPAH has indicated that patients become more susceptible to smells and fumes when on the elimination diet, with sensitivity receding with dietary liberalisation [20].

Although the study was targeted at the previous 15 years, the majority of questionnaires were returned from patients who visited the Allergy clinic in the previous 6 years. Of the 27% who did not formally follow the elimination diet and challenges, the majority (88%) still felt that foods were triggering symptoms and went on to self-modify their diet based on information received at the Allergy Unit (Appendix 16). The remainder, on the whole, felt that the diet was too difficult or sought advice elsewhere, perhaps for an easier treatment option.

Gertner and Powell-Tuck (1994) found that "only a small proportion of patients with IBS are willing to go through rigorous protocols and most patients with mild symptoms will refuse to do so." A comparison of the frequency and severity of symptoms in the challenge modified versus self-modified diet groups in this study supports this finding. A higher proportion of the challenge-modified diet group report more severe GIT symptoms. This indicates that perception of severity and impact on daily living, are major factors in determining the patient's motivation to undergo strict dietary manipulation. The differences reported by the two groups, for headache and fatigue severity, were not as marked as the gastrointestinal symptoms. This suggests that the severity of gut symptoms motivates people who suffer from GII to start the elimination diet.

Analysis of the current diet of these two groups demonstrated that both groups restricted additives more commonly than other food and chemicals. In the challenge modifiers, MSG followed by dairy were the next restricted food/chemical classes. This is contrary to challenge results, which showed that salicylates and amines provoked the highest percent of symptoms, followed closely by the preservatives. That people target milk and preservatives maybe the result of the "wide belief that milk causes allergies" [21] or the result of popular media attention to the "MSG symptom complex" [18]. As most commercial products contain salicylate and amine, it could be surmised that if the commercial food intake is decreased to avoid preservatives, the chemical load of salicylate and amine will automatically be reduced. This point is demonstrated in Appendix 15 where the food choices available for each preservative challenge are extremely limited. Interestingly, the self-modifiers recounted similar results, however,

more people restricted dairy before MSG. Further, a higher proportion of the self-modifiers restricted these food/ chemical classes than the challenge modified diet group (perceived > actual food intolerance) [14].

Nearly half of the respondents still reported occasional, accidental food reactions. This was due to inadvertent consumption of food/chemicals to which they were sensitive. Approximately two-thirds of respondents reported knowingly experiencing food reactions fairly often or frequently. This may be the result of the difficulties of continuing dietary restriction. Interestingly, about one in ten respondents reported never having accidental or expected food reactions. Perhaps these subjects had particularly severe food reactions and can now control their symptoms, by maintaining strict diet control.

Eighty-two percent of respondents reported an improvement in their symptoms since their initial clinic consultation. The majority of these completed the elimination procedure, however some sought advice elsewhere, began medications, reduced their stress load, and found that their symptoms improved with time.

CONCLUSIONS

It seems that the more severe the symptoms experienced, the more likely people are to do the elimination diet. However, emphasis may need to be given to the possibility of a withdrawal effect so that immediate wellness is not expected, and encouragement is given to stay on the elimination diet for up to six weeks. In this group of respondents, the elimination diet was successful in targeting the substances leading to symptoms. In both the challenge-modified and self-modified groups, the benefit of dietary manipulation, was supported by the lower severity and frequency of symptoms reported, when the relevant foods were avoided. Most respondents (85%) were avoiding these foods on a long-term basis, and symptomatic recurrences were due occasionally to inadvertent, but mostly to deliberate ingestion of the offending foods.

IMPLICATIONS FOR FUTURE RESEARCH

Further research should investigate whether those who present with predominant symptom clusters such as CNS (headache and fatigue), show the same trend for greater severity of these symptoms in the challenge-modified diet group than the self-modified diet group. The hypothesis to be tested would be that the challenge-modified group perceive themselves to suffer from these symptoms to a greater extent and therefore proceed with the elimination diet and challenge regime more readily than the self-modified diet group.

For this study, prospective research is necessary to gain statistical significance and extrinsic validity in order to generalise the results of this study to the broader population of GII sufferers.

Further research looking at peoples perception of the chemical class “additive” would be beneficial. If people report that they avoid “additives,” does this mean that they:

- Avoid one additive
- Avoid some additives
- Avoid all additives
- Buy products labelled -NO PRESERVATIVES/ NO ADDITIVES/ NO ARTIFICIAL COLOURINGS OR FLAVOURINGS, but do not read food labels and ingredients lists on products not labelled in this way.
- Sometimes do any of the above
- Always do any of the above.

This would help to define the extent of food additive restriction more clearly.

REFERENCE LIST

[1] Francis, C.Y. & Whorwell, P.J. (1997) “The Irritable Bowel Syndrome,” in Postgraduate Medical Journal, Vol.73, pp. 1-7.

[2] Stefanini, G.F., Saggioro, A., Alvisi, V., Angelini, G., Capurso, L., Di Lorenzo, G., Dobrilla, G., Dodera, M., Galimberti, M., Gasbarrini, G., Manghisi, O., Marsigli, L., Mazzacca, G., Rigo, L., Sacerdoti, G., Scolozzi, Surrenti, C.,Grazioli, I. and Melzi, G. (1995) “Oral Cromolyn Sodium in Comparison with Elimination Diet in the Irritable Bowel Syndrome, Diarrheic Type” in Scandinavian Journal of Gastroenterology 1995; Vol 30, p535-541.

[3] Schmidt, M. and Floch, M. (1992) "Food Hypersensitivity and the Irritable Bowel Syndrome," in The American Journal of Gastroenterology, Vol.87, No.1, pp. 18-19.

[4] Lynn, R.B. & Friedman, L.S. (1993) “ Irritable Bowel Syndrome,” in The New England Journal of Medicine, Vol.329, No.26, pp.1940-45.

[5] Gertner, D. and Powell-Tuck, J. (1994) "Irritable Bowel Syndrome and Food Intolerance," in The Practitioner, Vol. 238, pp. 499-504.

[6] Kellow, J. & Langeluddecke, P. (1989) “Advances in the Understanding and Management of the Irritanle Bowel Syndrome,” in The Medical Journal of Australia, Vol.151, July 17, 1989.

[7] Bentley, S.J., Pearson, D.J. and Rix, K.J. (1983) “Food Hypersensitivity in Irritable Bowel Syndrome” in The Lancet, August 1983, pp. 295-297.

[8] Collins, S.M. (1992) “Is the Irritable Gut an Inflamed Gut?” in Scandinavian Journal of Gastroenterology 1992; 27 Supple 192:102-105.

[9] Nanda, R., James, R., Smith, H., Dudley, C.R.K. and Jewell, D.P. (1989) "Food Intolerance and the Irritable Bowel Syndrome," in Gut Vol 30, pp.1099-1104.

[10] Lunardi, C., Bambara, L.M., Biasi, D., Cortina, P., Peroli, P., Nicolis, F., Favari, F. & Pacor, M.L. (1991) "Double-blind Cross-Over Trial of Oral Sodium Cromoglycate in Patients with Irritable Bowel Syndrome due to Food Intolerance," in Clinical and Experimental Allergy, Vol.21, pp.569-572.

[11] Zwetchkenbaum, J.F. & Burakoff, R. (1988) "Food Allergy and the Irritable Bowel Syndrome," in The American Journal of Gastroenterology, Vol.83, No.9, pp.901-4.

[12] Loblay, R.H. and Swain, A.R. (1986) "Food Intolerance," in eds. Walhqvist and Truswell, Recent Advances in Clinical Nutrition Vol.2, pp. 169-177 Libbey: London.

[13] Swain, A., Loblay, R. and Soutter, V. (1991) The Simplified Elimination Diet, Dpt of Clinical Immunology, RPAH: Camperdown.

[14] Young, E., Stoneham, M.D., Petruckevitch, A., Baryon, J. & Rona, R. (1994) "A Population Study of Food Intolerance," in The Lancet, Vol.343, May 7, pp.1127-30.

[15] Jones, V., McLaughlan, P., Shorthouse, M., Workman, E. and Hunter, J. (1982) "Food Intolerance: A Major Factor in the Pathogenesis of Irritable Bowel Syndrome," in The Lancet, November 1982, pp. 1115-1117.

[16] Lewis, P.J. (1995) "Management of Irritable Bowel Syndrome: Food intolerance may play a part" in British Medical Journal 1995; Vol 310, pp. 310.

[17] Farah, D.A, Calder, I., Benson, L. and Mackenzie, J.F. (1985) "Specific Food Intolerance: Its Place as a Cause of Gastrointestinal Symptoms" in Gut 1985; Vol 26, pp. 164-168.

[18] Yang, W., Drouin, M, Herbert, M., Mao, Y. & Karsh, J. (1997) "The Monosodium Glutamate Symptom Complex: Assessment in a Double-blind, Placebo-controlled, Randomised Study," in Journal of Allergy Clinical Immunology 1997, Vol.99, pp.757-62.

[19] Loblay, R.H. & Swain, A.R. (1992) "The Role of Food Intolerance in Chronic Fatigue Syndrome" in The Clinical and Scientific Basis of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome , Hyde , B.M. & Goldstein, M.D. (Eds); pp. 521-537.

[20] Loblay, H.R. (1993) "Allergic to the 20th Century" in Australian Family Physician 1993; Vol 22. Pp 1986-1996.

[21] Dairy Good (1995) Food Facts: Dairy Food Myths and Fallacies. Why so many myths about milk and milk products? Australian Dairy Corporation: Melbourne