

The Effect of Nutritional Therapy for Yeast Infection (Candidiasis) in Cases of Chronic Fatigue Syndrome

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Abstract

The objective of this study was to evaluate the effectiveness of nutritional therapy for yeast infection in cases of medically-diagnosed Chronic Fatigue Syndrome/ME.

Forty participants, each with medically-diagnosed CFS/ME, received individual nutritional advice for treating yeast infection (candidiasis) over the course of one year, following an anti-candida protocol which had been used successfully in nutritional practice for twelve years. Data were generated by questionnaires from which answers enabled an assessment of nutritional status to be formulated as well as allowing scores to be calculated for CFS/ME and candidiasis. Confounding variables included stress, glucose tolerance, use of steroid treatments/ HRT/ contraceptive pill and age. The drop-out rate was high with only eighteen subjects completing the year, the main reported reason being lack of motivation to adhere to the anti-candida diet which was part of the protocol.

Data analysis indicated a relatively strong positive correlation between candida and CFS/ME at the start of the study. The average fall in CFS/ME symptom scores throughout the year was 30.5%, with one participant achieving a 100% reduction in symptoms. 83% of participants experienced some reduction in CFS/ME symptoms scores. Higher than average stress scores and use of steroids/HRT/contraceptive pill all negatively impacted CFS/ME scores despite following an anti-candida protocol. Subjects aged 36 or over experienced a greater degree of improvement than younger subjects, a situation which requires further investigation.

The observed study findings support the premise that nutritional therapy: specifically

in the form of an anti-candida protocol, can be an effective treatment for some CFS/ME sufferers.

Introduction

On 16th July 1998, at a scientific briefing to the press at the Royal College of Physicians, the then Chief Medical Officer Sir Kenneth Calman said, 'I recognise chronic fatigue syndrome is a real entity. It is distressing, debilitating, and affects a very large number of people. It poses a significant challenge to the medical profession'.¹ At the briefing, he announced the establishment of a Working Group on Chronic Fatigue Syndrome, sometimes referred to as Myalgic Encephalomyelitis. A report was eventually published in January 2002, in which the condition was referred to throughout as CFS/ME.² It suggested a population prevalence of at least 0.2%-0.4%, the commonest age of onset being early twenties to mid-forties, and in children the commonest age of onset being 13-15, although with some cases as young as five years old. CFS/ME was found to be twice as common in women as in men and to affect all social classes to a similar extent, as well as affecting all ethnic groups.³

The report stated that research has demonstrated immune, endocrine, musculoskeletal and neurological abnormalities. "Several overarching possibilities, not mutually exclusive, have been proposed to explain the occurrence of CFS/ME, including:

- CFS/ME is an umbrella term for several different illnesses:
- One (or more) 'core' disorder(s) exist.
- Several different causative factors trigger a common disease process.
- The aetiology and/or pathophysiology are multifactorial.

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- Certain factors are necessary but not sufficient to cause CFS/ME.
- Certain factors can influence individual manifestations or duration.
- Some features are downstream (secondary) consequences of the primary disease process.⁴

The report further stated that patients with CFS/ME experience an individual array of symptoms from the overall range seen in the illness. 'Some, such as physical and/or cognitive fatigue, are seen in almost all patients, though their extent can vary. Others are very common, such as pain, disturbed sleep, and gastrointestinal disturbance... Some patients seem to have a dominant locus of symptoms (e.g. flu-like malaise, neuromuscular symptoms, cognitive impairment or gastrointestinal disturbance).⁵

The report included a recommendation that, although research criteria stipulates that a diagnosis can only be made after the presence for six months of a cluster of symptoms, six months should be viewed as an endpoint for the diagnostic process, as patients need help to manage the illness much before then.⁶

The positive nature of much of this 2002 Working Group Report does much to dispel the controversy which has existed over many years regarding the nature of CFS/ME. In 1955, two doctors at the Royal Free Hospital in London decided that an outbreak of the condition among nearly 300 hospital staff and a few patients was caused by mass hysteria.⁷ This opinion was reinforced by a report on CFS requested by the then Chief Medical Officer and published in 1996 by the British Royal Colleges of Physicians, Psychiatrists and General Practitioners.⁸ The 1996 Working Group's statement of their scope of work was to review the current state of knowledge, adding their own clinical experience to that of the literature. However, a lead editorial in the British medical journal 'Lancet' pointed out that the Royal Colleges' Working Group was heavily weighted with psychiatric experts

and appeared to make no effort to collect other viewpoints.⁹ In contrast, the 2002 Working Group Report reached the conclusion that there should be no doubt that CFS/ME is a chronic illness which should be recognised as such by health and social care professionals, a view endorsed by the Department of Health in the Government's response to this Report.¹⁰ Although to this extent the new Report was positive, nevertheless the Working Group arrived at the negative conclusion 'that there is no cure for CFS/ME'.¹¹ They did however identify three specific strategies as potentially beneficial in modifying the illness: graded exercise, cognitive behavioural therapy and pacing, although members of the Working Group expressed widely differing opinions on the potential benefits and disadvantages of these approaches.¹²

In addition, the Working Group found that 'complementary approaches are popular with patients' and among the complementary practitioners most commonly consulted were nutritionists. In fact, the Working Group's recommendations for care included referral to multidisciplinary teams or other services (e.g. nutritional advice and support).¹³

The Government's response to this report indicated that the Department of Health endorsed the need for more research on a wide range of aspects of CFS/ME.¹⁴ The researchers consider that such aspects might include the possible connection between CFS/ME and various biochemical disorders, e.g., allergy, hypoglycaemia and gut dysbiosis including yeast infection (candidiasis). Yeast infection is caused by a fungal form of the common intestinal yeast, *Candida albicans*, which can affect a wide range of body tissues and functions for which frequently no obvious explanation can be found.¹⁵ It is known to release toxins into the bloodstream, giving rise to a variety of symptoms which include physical and mental fatigue, muscle ache, bowel problems and other symptoms not unlike those of CFS/ME.¹⁶⁻¹⁸

There is a growing body of experiential evidence among nutritional therapists that many people with diagnosed CFS/ME are found to respond to appropriate nutritional therapy which addresses a variety of biochemical disorders, even sometimes to the point of 100% recovery with full and active lifestyles, a finding which is at odds with the 2002 Working Group conclusion that 'there is no cure for CFS/ME'. Very often, as part of their nutritional therapy, these recovered clients will have been advised to follow a specific nutritional protocol devised to control a suspected intestinal overgrowth of yeast.

Although 'yeast infection' in its overt forms has been known as far back as Hippocrates who described oral thrush in debilitated patients, it was not until 1977 that there was any suspicion that 'this organism is perhaps capable of causing disorders much more severe than conventionally attributed to it', when Truss (1977) reported his observations of treating generalised candidiasis over the previous sixteen years.^{19,20} His report was published in 'The Journal of Orthomolecular Psychiatry' in 1978, and by 1984 he had published three more clinical papers – 'Restoration of Immunologic Competence to *Candida albicans*', 'The Role of *Candida albicans* in Human Illness', and 'Metabolic Abnormalities in Patients with Chronic Candidiasis: The Acetaldehyde Hypothesis'.²¹⁻²³ Trowbridge (1986) said that yeast infection was 'affecting approximately one-third of the populations of all Western industrialised countries'.²⁴ Odds (1988) said that 'the rate of increase of the infections caused by yeasts in the genus *Candida* shows no sign of abating: clinical and scientific interest in candida remains very high'.²⁵

Yet scepticism in the medical profession was engendered by the American Academy of Allergy and Immunology when it questioned the existence of the *Candida* syndrome, saying that it was speculative and unproven.²⁶ A sample medical text

book states that 'in temperate climates the only common fungal diseases in previously healthy people are superficial mycoses, especially ringworm and vaginal or oral thrush', thereby discounting the possibility of systemic health problems caused by yeast infection.²⁷

Despite these opinions, many people with diagnosed CFS/ME have discovered that it is possible to regain health if ways are found of bringing under control an overgrowth of *Candida albicans*, as is frequently evidenced in clinical practice by nutritional therapists.

Candida albicans is one of many micro-organisms which colonise the internal and external bodily surfaces of human beings soon after birth. Health depends on a delicate balance between two main groups of micro-organisms, the bifidobacteria and bacteroides. The beneficial bifidobacteria help to maintain an acidic pH in the large intestine, which deters an overgrowth of invading pathogens and protects the mucosal walls of the gut. It appears that under certain circumstances the stability of the gut flora can be severely disrupted, leading to overgrowth by opportunistic organisms, some of which may be pathogenic.²⁸ Others simply decrease functional efficiency of the gastro-intestinal tract.²⁹ *Candida albicans* is a yeast, a single-celled organism which reproduces by budding. It is a dimorphic organism which can change its anatomy and physiology from a yeast to a fungal form as it proliferates. Bland (1984) explained that "the yeast-like state is a non-invasive, sugar-fermenting organism, whereas the fungal state produces rhizoids (mycelia), or very long root-like structures, which can penetrate the mucosa, and it is invasive. Penetration of the gastrointestinal mucosa can break down the boundary between the intestinal tract and the rest of the circulation and allow introduction into the bloodstream of many substances which may be antigenic."³⁰ Both incompletely-digested dietary proteins and *Candida* organ-

isms are reported to enter the bloodstream in this way, with specific consequences.³¹

In addition it is known that *Candida albicans* releases toxins (a minimum of 79 known chemical substances) which have been shown to affect the brain.^{32,33} Acetaldehyde, a breakdown product of alcohol produced by yeast from sugar, reacts with the neurotransmitter dopamine to cause mental and emotional disturbances and the commonly-experienced 'spaced-out' feeling. It also affects the immune system (aldehydes cause suppression of T-cell function) and other major body systems, causing proliferation of aches and pains in joints and muscles, muscle weakness, numbness, tingling and itching.³⁴⁻³⁶ Lack of energy and fatigue are common. All these symptoms are frequently exacerbated by abnormal levels of organic acids produced by yeasts which can be detected in urine.³⁷

At least eight species of *Candida* have been implicated as human pathogens.³⁸ Since each strain is thought to contain up to 35 antigens and any one person may harbour more than one strain, the sensitization potential is enormous, quite apart from the infectious potential through tissue invasion.^{39,40} The sensitization potential of *Candida albicans* is supported by studies showing that histamine release is stimulated by *Candida* antigens.⁴¹⁻⁴³

Not least to be disturbed by yeast overgrowth is hormone function, and varied symptoms of menstrual dysfunction are common due to the fact that *Candida* has receptor sites in its cell membranes which accept hormones, but also due to the fact that *Candida albicans* itself exactly fits receptor sites waiting for hormones, thereby blocking efficient hormone function.^{44,45}

Causes of yeast overgrowth include antibiotics, corticosteroid drugs, hormone treatments, sugar and stimulants in the diet, and stress. Antibiotics cause major qualitative and quantitative changes in the intestinal flora, encouraging the yeast population to increase.⁴⁶ Steroid drugs not

only depress the immune system but provide excellent nourishment for fungi.⁴⁷⁻⁵⁰ Sugar is a known promoter of fungal growth and the present per capita consumption in the United States is 120 pounds per year, a figure which is almost certainly closely echoed in Britain.^{51,52} Stress, like stimulants in the diet, leads to the production of adrenaline which in turn triggers the release of the body's sugar stores into the bloodstream, thereby encouraging *Candida* just as much as direct sugar consumption.⁵³ Trowbridge (1986) blamed 'the excessive use of antibiotics, steroids and birth control pills coupled with a milieu of universal pollution'. Also, 'pregnancy by its hormonal alterations of a woman's body, tends to stimulate the resurgence of yeast overgrowth in her tissues', so that 'newborns are eligible to acquire *Candida albicans* as they come down the mother's birth canal'.⁵⁴

Determining the involvement of yeast in health problems is not necessarily helped by laboratory tests because their interpretation is not always straightforward and can even sometimes be misleading. Golan (1995), Shaw (1998) and Trowbridge (1986) each discuss in some detail the unreliability of laboratory tests based on blood or stool analysis or endoscopy examination, and Hunnisett (1990) states that a breath test to identify patients who ferment dietary carbohydrate to ethanol in their gut might demonstrate the presence of glucose-fermenting organisms in the stomach or small intestine but will not detect carbohydrate fermentation in the colon; in addition, any detected fermentation might be due to alcohol-producing microflora other than yeasts.⁵⁵⁻⁵⁸ An organic acids urine test is probably more reliable because it will detect elevated organic acids which would only be elevated in the presence of yeasts.⁵⁹ However, it is an expensive option when an assessment of symptoms and history can usually provide information which is in fact as valuable as laboratory tests.⁶⁰

A simple and accessible method for

determining the possibility and/or severity of candidiasis is to use a questionnaire such as the one devised by Crook (1984) which indicates symptom pattern and history.⁶¹ It is of course possible for symptoms to be the result of causes other than yeast infection, but a high score relating to a wide variety of symptoms indicates a strong possibility increasing to probability as the total score increases. The surest way of confirming the possibility is then to embark on an anti-candida protocol and await results, which can be clearly seen by comparing a newly-completed questionnaire with the original after a three-month interval. Since it is not dangerous to proceed with a trial yeast treatment protocol, in the final analysis this is actually the most reliable diagnostic test of any.⁶² It was such a protocol that participants in this study were advised to follow.

With regard to pharmaceutical treatment for yeast overgrowth, there does not yet appear to be a prescribable medication which is both completely effective and completely safe, several necessitating regular monitoring of liver function. Odds (1988) states that of the many thousands of drugs which have been synthesized or discovered, only a few are sufficiently non-toxic to justify more extensive testing and, of these, a very tiny number indeed survive the rigorous requirements for safety and efficacy that justify their introduction into clinical practice.⁶³ In addition, researchers report that polyene antibiotics like nystatin may actually stimulate yeasts to increase the number of their colonies.⁶⁴ Non-systemic medications intended to destroy yeast overgrowth in the intestines might well invade the bloodstream via a leaky gut leading to toxicity, symptoms of which include nausea, muscle aches and brain fog. Conversely, non-systemic medications will not be able to destroy yeast which has possibly colonised outside the gut. A safe, systemic approach is needed and a nutritional anti-candida protocol had been used in

nutritional practice for twelve years prior to this study. The purpose of this study is to evaluate the extent to which this protocol (described under Methods) would enable improvement in symptoms to be experienced over one year by subjects suffering from medically-diagnosed CFS/ME and in this way to assess the possibility of a correlation between CFS/ME and yeast infection.

Methods

Study Design

The study is based on a population sample of 40 men and women aged 18 and over, suffering from medically-diagnosed CFS/ME. Exclusion factors for participants included those with a medical diagnosis of diabetes, multiple sclerosis, cancer, AIDS or other life-threatening illness and pregnant or breast-feeding women. Each participant received appropriate advice from qualified nutritional therapists at a UK-based nutritional therapy practice, under the direction of one of the authors who had graduated in 1990 from the Institute for Optimum Nutrition in London and is a registered member of the British Association for Nutritional Therapy. Each participant was allocated an identification number, and asked to complete a questionnaire (Appendix A, see note) from which records were made of their gender, age, height and weight together with information about major and minor health problems, health history and current medication prescribed by their doctor. The questionnaire included a self-assessment score for CFS/ME, comprising lifestyle factors and common symptoms. It also included a self-assessment yeast score. Additional information requested included a stress profile, level of dietary compliance, use of steroids/HRT/contraceptive pill, and a glucose tolerance profile.

From the list of symptoms reported, an analysis of nutritional status could be made, and the level of individual nutritional

intervention determined to provide an optimum daily requirement of nutrients. A comprehensive report was prepared and supplied to each candidate, providing advice on necessary changes to their diet and also a personal supplement program which included recommendations for antifungal and probiotic supplements. In addition, an audiotape was supplied giving information about candidiasis and its management. The candidates had a choice of either attending for a personal consultation, if able, or alternatively receiving a detailed explanatory covering letter with their report. The candidates also had an ongoing facility to telephone their nutritionist for help or advice as or when needed. Similar questionnaires were completed after 4 months, 8 months and 1 year, so that initial, interim and final self-assessment scores for CFS/ME, yeast and other factors could be compared. At each re-assessment, a full report was provided to the client and there was again the opportunity for either a face-to-face consultation or an explanatory covering letter, plus ongoing telephone support as required.

Treatment Protocol

Each participant was advised to follow the four-point plan which is outlined below:

1. An anti-candida diet (i.e., avoiding yeast, sugar, refined grains, stimulants and fermented products). Yeasts are able to ferment dietary glucose and sugar promotes fungal growth, so all forms of sugar—sucrose, lactose, maltose, fructose and added glucose—have to be strictly avoided, as do refined carbohydrates which add to the glucose load.^{65,66} Many practitioners, including Trowbridge (1986) and Lorenzani (1986) agree that all fruit must be avoided until candida overgrowths are fully under control.^{67,68} Foods containing yeast have to be avoided because of the high degree of apparent cross-sensitization between candida and other yeasts.⁶⁹ Each candidate was supplied with detailed diet guidelines list-

ing foods to avoid and foods to enjoy. (Appendix B, see note)

2. An individually-prescribed program of vitamins and minerals to improve the body's nutritional status and thereby strengthen immunity. (See specimen list of optimum daily requirements, Appendix C, and specimen supplement program formulated to meet those requirements Appendix D, see note) The individual program of supplements for each client was based on an analysis of symptoms as reported in a detailed questionnaire, in line with the methods of symptoms analysis taught by the Institute for Optimum Nutrition in London. Deficiency symptom analysis is arguably the most underestimated method of assessing nutritional needs, but its advantage is that health is being measured directly.⁷⁰ Biochemical individuality means that identical supplement programs would not be effective for each person but, when an individual program is formulated, good improvements in nutritional status (and therefore in health) can be expected. Through the proper use of optimum nutrition, host resistance can be improved to the point at which normal healthy bodily processes can fight off infections of all kinds, including yeast infection.⁷¹

Research has shown that the following vitamins and minerals may play a particular part in enhancing resistance to yeast infection: vitamin C, folic acid, pyridoxal-5-phosphate, riboflavin, vitamin A, zinc, magnesium and selenium.⁷²⁻⁷⁵ In addition, supplementation with essential fatty acids may be beneficial and pantothenic acid may reduce the adverse effects of aldehydes by increasing the activity of aldehyde hydrogenase, the enzyme involved in their metabolism.^{76,77}

At each review consultation, clients were asked to list the supplements they had actually been taking to ensure that they corresponded with the supplement program which had been formulated for them.

3. Natural antifungals, of which there

are several. One of the most useful natural antifungals for inhibiting an overgrowth of yeast organisms is caprylic acid, a long-chain fatty acid which occurs naturally in coconut oil and human breast milk and does not adversely affect beneficial organisms.⁷⁸⁻⁸¹ In addition, caprylates decrease stickiness of blood platelets, aid digestion by increasing motility of the stomach and its secretions, reduce cholesterol in blood and liver and increase the uptake of calcium.⁸²⁻⁸⁵

Certain essential oils from herbs such as oregano have a short-chain fatty acid structure which is better able to be absorbed through fatty cell wall membranes than long-chain caprylic acid. Oregano therefore has greater systemic antimicrobial activity, being able to reach candida which has colonised in tissues of the body beyond the gastrointestinal tract.⁸⁶ Once caprylic acid has helped to bring intestinal yeast under control, plant oils such as oregano are useful for attacking outlying candida overgrowths on the skin and nails, and in such areas as sinuses, ears, eyes and joints.

Each candidate in this study was advised to take caprylic acid as their initial antifungal, and some were later transferred to a different type of antifungal as seemed appropriate for their remaining symptoms.

4. Probiotic supplements to rebalance intestinal microbes with beneficial flora, in particular *Lactobacillus acidophilus* (the major colonizer of the small intestine) and *bifidobacterium bifidum* (the major colonizer of the large intestine). The *Lactobacillus* bacteria produce the enzyme lactase to break down lactose and create lactic acid from carbohydrates. *L. acidophilus* has been shown to inhibit *E. coli*, salmonella and shigella micro-organisms and it has also been shown to inhibit the formation of mycelia in *Candida* organisms.⁸⁷⁻⁸⁹ *Bifidobacteria bifidum* produce acetic acid and lactic acid and compete with pathogens for nutrients and attachment sites. They detoxify the intestinal tract and manufacture B vitamins and they act as an extension of the

body's defence mechanism by controlling and destroying pathogenic bacteria, viruses and yeasts.⁹⁰ Each candidate in this study was advised to take a supplement providing both *L. acidophilus* and *B. bifidum* in encapsulated freeze-dried powder form. In view of the role of lactose in encouraging *Candida*, a product was chosen which has a milk-free base.

These four points form the anti-candida strategy which was recommended to each participant in the study. They were also warned clearly of one aspect of the anti-candida battle which they would almost certainly encounter—a syndrome known as a Herxheimer reaction.⁹¹ As yeast is destroyed, the breakdown products and toxins released can cause extremely unpleasant symptoms—general malaise, nausea, aching limbs, depression, or an apparent flare-up of previous symptoms in areas where candida had colonized. German dermatologist Herxheimer first described this response when *Candida albicans* was being destroyed by the use of antifungal substances.⁹² Referred to colloquially as 'die-off', it should be recognized as an encouraging sign that *Candida* is being destroyed.^{93,94} However, the symptoms can be far from pleasant and, in some cases, are sufficient to persuade the sufferer to abandon the anti-candida protocol. It is therefore preferable to approach the regime slowly but surely by spending at least one month on just the first two parts of the four-point plan (anti-candida diet and immune-boosting vitamins and minerals) and not introducing points 3 and 4 (antifungals and probiotics) until initial Herxheimer reaction has subsided. Antifungals are then increased gradually, as die-off symptoms allow, so that the client is encouraged to take control of his/her own intake of antifungals. To help minimize die-off reaction, liver detoxification processes can be supported by drinking roasted dandelion coffee (to stimulate the production of bile for carrying toxins out of the liver) and taking the herbal supple-

ment milk thistle (containing silymarin); these recommendations were made to each participant in the study.

Statistical Analysis

The data were analyzed from a number of perspectives. Whilst the primary focus of the study was to evaluate the effects of a nutritional anti-candida protocol in helping to reduce symptoms of CFS/ME, the collected data also provided the opportunity to examine the base relationship between yeast infection and CFS/ME. Assuming a normal distribution of CFS/ME and candida scores, a correlation coefficient (r) was calculated, using data from the sample start population (40 participants), where the sample correlation coefficient r is assumed to give an unbiased estimate of the total population coefficient (p). A 95% confidence interval around the correlation coefficient r was additionally calculated. The sample start population was used for this relationship analysis rather than the end population (18 participants) in order to maintain confidence levels in what is already a relatively small population sample.

The effectiveness of an anti-candida protocol in treating CFS/ME was analyzed using a hypothesis test, where the null hypothesis assumed that there would be no effect on CFS/ME symptoms by adhering to an anti-candida protocol. Assuming a t -distribution and using start and end data from the end sample population (18 participants), a paired, two-tailed t -test (two-tailed to acknowledge the possibility that some participants might experience a worsening of symptoms) was used to estimate a p value for the study. Start and finish CFS/ME and candida symptom scores plus simple average percentage reductions in symptom scores were also calculated.

The additional data collected on stress levels, use of steroid treatments/HRT/contraceptive pill, age, dietary compliance and glucose tolerance were also analyzed with regard to acknowledging the presence of

confounding variables. Due to the fact that both steroid use and stress are believed to hinder the effectiveness of an anti-candida protocol, particular focus was placed on the symptom scores and percentage reductions of these population subsets (although it is recognized that the statistical validity of such observations declines as the sample population size is reduced).

Results

The Relationship Between CFS/ME Start and End Symptom Scores

When data from the completing 18 participants are analysed according to the relationship between the start and end CFS/ME scores, a moderately strong correlation is found ($r = 0.64$) (Figure 1, p. 199). The graph demonstrates an encouraging level of improvement in most cases over the course of the study.

The Relationship Between CFS/ME and Candida

Data analysis on the population sample of 40 participants indicated a moderately strong positive correlation ($r=0.57$) between CFS/ME and candida at the start of the study (Figure 2, p. 199).

As a 95% confidence interval gives a value for r of between 0.31 and 0.74, it is reasonable to assume that reducing candidiasis may lessen the severity of CFS/ME symptoms in the majority of sufferers. (A calculated correlation coefficient on the 18 participants remaining at the end of the study led to a higher r value of 0.73 but, due to the reduced population sample size, the more conservative 'start' coefficient of $r=0.57$ has been used in this analysis.)

The Effectiveness of an Anti-Candida Protocol on CFS/ME

Table 1, (p. 199) shows the start, end and percentage reduction symptom scores for CFS/ME and candida for the 18 completing participants; Figure 3, (p. 200) represents the same information in diagrammatic form.

Figure 1. Start CFS/ME vs. End CFS/ME Scores $r=0.64$

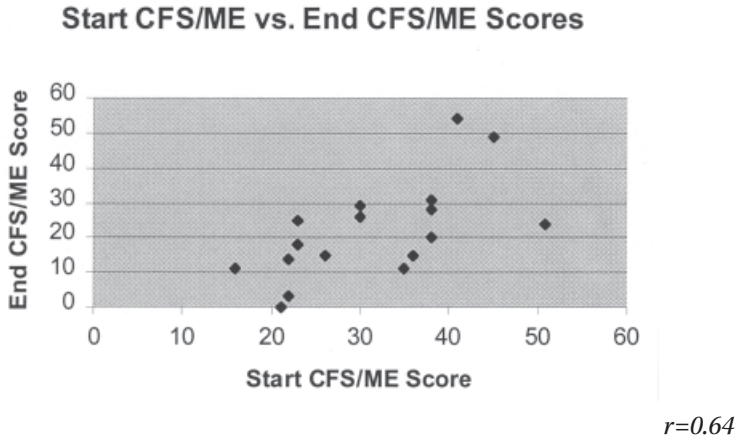


Figure 2. CFS/ME vs. Candida – Start of study $r=0.57$

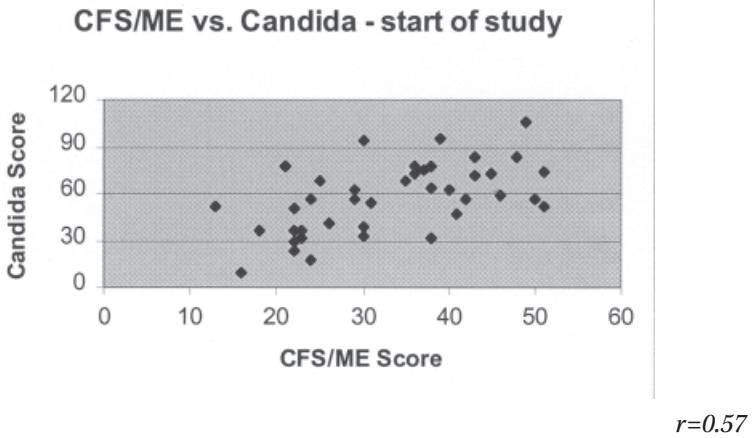


Table 1. CFS/ME and Candida scores of 18 completing participants.

CFS/ME Scores			Candida Scores		
Average start	Average end	% decrease	Average start	Average end	% decrease
30.9	21.5	30.5	51.4	26.1	49.2

One participant achieved a 100% reduction in CFS/ME symptoms, and another an 86% reduction in CFS/ME symptoms. At least 83% of participants experienced at least some improvement in symptoms. The average percentage fall in CFS/ME symptom scores throughout the course of the study was 30.5%, and the average reduction in yeast symptom scores was 49.2%.

Using a null hypothesis that an anti-candida protocol would have no effect on symptoms of CFS/ME, a paired, two tailed t-test on pre- and post-study CFS/ME scores on the 18 completing participants gave a statistically significant ($p=0.024$) result at the 97.5 percentile level, thus giving support to the alternative hypothesis that an anti-candida protocol is an effective treatment for CFS/ME.

The Impact of Stress on CFS/ME

The participants' stress levels were found to have a significant impact on symptoms of CFS/ME over the course of the study. Participants who experienced a higher than average stress score at the start of the study or at the end of the study, or at both the start and end of the study (where 'higher than average' start stress score constitutes a score of

over 12, and 'higher than average' end stress score constitutes a score of over 9) all demonstrated a reduced fall in their CFS/ME symptom scores (23.5%, 26.8%, 20.4% respectively vs. 30.5%) compared with the average (Table 2, p.201, Figure 4, p. 202)

A high stress factor (i.e. higher than average start/end/start and end stress scores) also resulted in the sample population's absolute end CFS/ME scores remaining higher than average, particularly those who experienced higher than average stress levels at both the start and end of the study (CFS/ME scores of 28.8 vs. 21.5).

The Impact of HRT/Contraceptive Pill/Steroids on CFS/ME

Of the 18 completing participants, one third was taking either HRT or the contraceptive pill or some other form of steroid treatment. These participants experienced a higher than average CFS/ME score at the start of the study (38.7 vs. 30.9); this pattern was also demonstrated when data from the initial population of 40 were analyzed. By the end of the study, data from the population of 18 (Table 2, p. 201 Figure 5, p. 202) showed that CFS/ME symptoms had improved in this population subset, but by a lower than

Figure 3. Reduction in average CFS/ME and candida symptom scores over the course of the study.

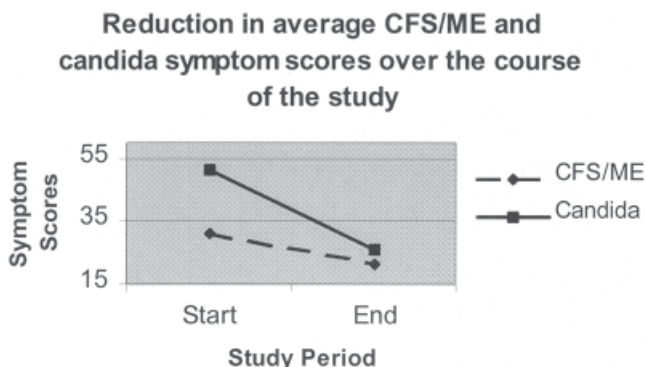


Table 2. Data for sample population of 18 completing participants.

Proportion of Sample Population	CFS/ME Scores			Candida Scores		
	Average start	Average end	% decrease	Average start	Average end	% decrease
All	30.9	21.5	30.5	51.4	26.1	49.2
Those using steroids/HRT/contraceptive pill (6 participants)	38.7	28.8	25.4	64.5	34.2	47.0
Those with higher than average start stress scores (8 participants)	31.9	24.4	23.5	58.4	29.9	48.8
Those with higher than average end stress scores (9 participants)	34.9	25.6	26.8	54.7	33.1	39.4
Those with higher than average start and end stress scores (5 participants)	36.2	28.8	20.4	51.8	35.4	31.7
Those over the average age of 36 (9 participants)	31.7	15.8	50.2	55.0	23.9	56.6
Those with a duration of CFS/ME of 6yrs+ (8 participants)	30.75	18.1	41.1	53.4	27.0	49.4

average amount (25.4% vs. 30.5%), with their absolute CFS/ME scores also remaining higher than average (28.8 vs. 21.5).

These observations infer that use of HRT/contraceptive pill/steroids negatively impacts the effectiveness of an anti-candida protocol in treating CFS/ME. However, an improvement in CFS/ME symptoms was still seen in each of these cases, indicating that the use of nutritional therapy still re-

mains effective, but to a lesser extent than in participants who were not using HRT/contraceptive pill/steroids.

The Impact of Duration of Illness on CFS/ME

It has been encouraging to observe that the participants who have had a longer than average duration of CFS/ME (where a longer than average duration refers to over 6 years in this population sam-

Figure 4. The effect of stress on CFS/ME scores at the start and end of the study

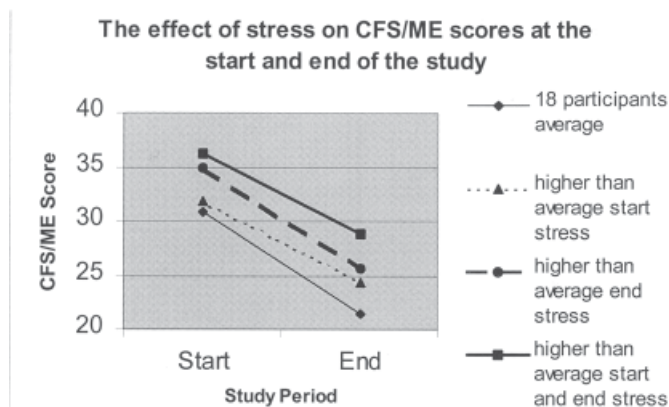
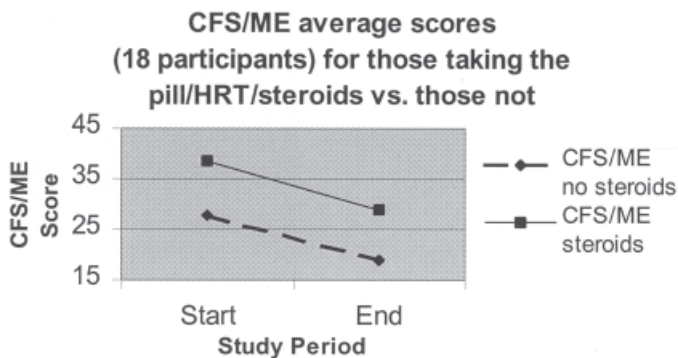


Figure 5. CFS/ME average scores (18 completing participants) for those taking HRT/contraceptive pill/steroids vs. those not taking them



ple) were not at a disadvantage in terms of the effectiveness of the anti-candida protocol in reducing symptoms of CFS/ME (Table 2). In fact, those participants in this sample who had a longer than average duration actually experienced a greater drop in CFS/ME symptoms over the study time period (41.1% vs. 30.5%). Longer duration

of illness was therefore found not to impair the effectiveness of the anti-candida protocol in relieving symptoms of CFS/ME.

The Impact of Age on CFS/ME

Of the study participants, half of the group had an age of 36 years or more. The results indicate that although there ap-

peared to be no relationship between age and CFS/ME start symptom scores, by the end of the study participants over the age of 36 had achieved a greater reduction in symptoms (50.2% vs. 30.5%), with a lower absolute end symptom score than average (15.8 vs. 21.5). (Table 2, Figure 6, below)

Discussion

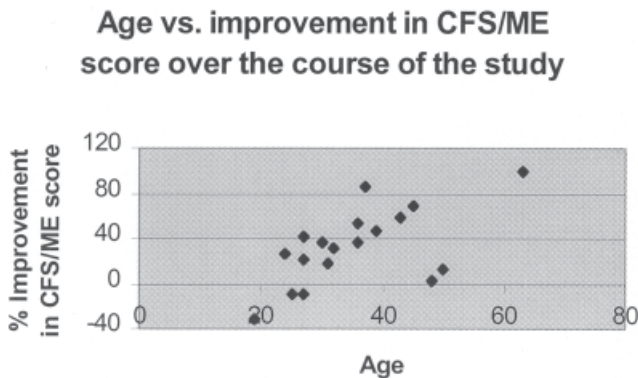
Study Design and Results

The issue of testing nutritional strategies on sample populations is problematic due to the difficulty of isolating contributing factors in order to establish cause and effect and to eliminate bias. During this study, it was deemed unethical to form a control group of CFS/ME sufferers who would be asked not to undergo any form of treatment for their CFS/ME over the course of the year. With hindsight, a control group consisting of CFS/ME sufferers who were being treated by conventional medicine might have been of interest for purposes of comparison with the effects of the anti-candida protocol. (It is worth noting that the majority of participants were not taking medication for their CFS/ME symptoms. Of those who did take medication, anti-depressants were the

drugs which had most commonly been prescribed by their medical advisors.). However, given that the Working Group in 2002 concluded that there is ‘no cure’ for CFS/ME, the assumption was made for the purposes of this study that, without treatment, CFS/ME symptom scores for most participants could be expected to remain unchanged over the course of one year.

Despite the lack of a control, the findings are extremely encouraging; the sample population experienced on average a 30.5% reduction in symptoms, 83% of the sample benefited from some reduction in symptoms, and a t-test concluded that these results are significant at a level of 97.5%. Only three participants experienced a worsening of symptoms, and in each case there was at least one explanatory factor which is believed to adversely affect candida—use of nicotine, higher than average stress levels or use of HRT/contraceptive pill/steroids. Due to the probable multi-factorial causes of CFS/ME, these participants might simply have had too many causal factors present to enable a reduction in symptoms of CFS/ME over the course of one year, as a result of which their scores for both candida and CFS/ME remained higher than most.

Figure 6. Age vs. Improvement in CFS/ME scores over the course of the study.



Dropout Rate

The presence of bias in this study is also acknowledged in relation to the low sample population size (18 completing participants) and large dropout rate over the course of the study (55%). As a result of this dropout rate, the correlation statistics are based on the larger sample start population (40 participants) whilst the t-tests were paired and based on only those 18 participants who started and finished the study. The dropout rates might be attributed to one or more of the following factors:

a) Lack of motivation for strict adherence to the anti-candida diet over a lengthy time period, as reported by several of the non-completing participants.

b) A temporary worsening of symptoms due to Herxheimer reaction before experiencing encouraging signs of improvement, a situation about which participants had been forewarned and for which they were encouraged to request specific advice to help alleviate those symptoms; some participants were possibly not prepared to go through this temporary phase.

c) Disappointment that more improvement was not being experienced within the one-year time-scale of the study. It is the researchers' experience that a one-year time period is generally a minimum period in which to see a marked improvement in symptoms of CFS/ME, and that further progress is usually made after this time (i.e. beyond the end of the study). This medium-to-long term approach to the treatment of the illness may have dissuaded some participants who perhaps were looking for a "quick fix" approach to their illness.

d) Difficulty in keeping to the anti-candida diet due to hypoglycemic cravings. Data analysis of the participants who left the study early shows that they had an initial score for poor glucose tolerance which was on average 12% higher than those who went on to complete the study. This suggests that it was harder for those partici-

pants to control their cravings for certain foods, and therefore also harder to adhere to a protocol which required 100% compliance to the anti-candida diet.

e) Cost of taking part in the study. However, before agreeing to take part, participants were made aware of the financial cost to them of consultations and food supplements. It is therefore unlikely that finances played a role in the high dropout rate for the majority of participants.

In summarizing possible reasons for the high drop-out rate, it is interesting to note that, of the 22 subjects who failed to complete, some had already shown an encouraging reduction in their scores for both CFS/ME and candida. For these people, lack of progress was obviously therefore not their reason for failing to complete the study.

Confounding Variables

Due to the fact that CFS/ME is thought to be a multi-factorial condition, it is probable that in some participants the anti-candida protocol, in addition to reducing candida symptoms, also dealt with some other possible contributing factors to chronic fatigue, e.g. allergies, hypoglycaemia, low magnesium status, poor immune status or low general nutritional status.

The study has shown that stress, HRT, the contraceptive pill, steroid medications and age have all been found to influence a reduction in CFS/ME.

Although this study demonstrates an observed correlation between candida and CFS/ME, this does not imply causation, and infers nothing about the role of other variables in CFS/ME. However, the impact of these variables should not detract from the fact that 83% of completing participants felt that their symptoms had improved, indicating that at least one factor in each of their individual nutritional anti-candida programs had produced these encouraging results.

Whilst the findings regarding the im-

fact of stress levels and HRT/contraceptive pill /steroids are important (that they encourage candida overgrowth and also make it harder to achieve a reduction in symptoms of CFS/ME), further research is required specifically in this area, ideally using a larger study group. The observation that certain lifestyle choices (e.g. contraceptive pill, HRT) and perceived stress levels can negate some of the benefits of nutritional therapy supports the notion that a more holistic treatment plan might be helpful for some CFS/ME sufferers. In addition, a surprising outcome from this study was the higher level of improvement in symptoms of CFS/ME in participants aged 36 and over compared with those aged under 36, and this is again an area where further investigation is warranted.

Conclusion

This study shows promising results in the future treatment of CFS/ME, using an anti-candida protocol either alone or as an integral part of a treatment plan which, as suggested by the Working Group in 2002, might include graded exercise, cognitive behavioural therapy or pacing. Whilst this is neither a large scale study, nor a double-blind randomized control trial, there are observed statistically-significant findings and encouraging percentage reductions in CFS/ME symptoms in 83% of the study participants using this anti-candida protocol. A correlation between CFS/ME and candida has been observed, and the effectiveness of reducing CFS/ME symptoms by following an anti-candida protocol has been shown in this sample population at a 97.5% significance level, with an average reduction in symptoms of 30.5%.

It is important to recognize that recorded improvements are improvements which are perceived by the subjects so, whilst it is acknowledged that this study is lacking in objective data, its findings may certainly be considered significant to those who are suffering from CFS/ME. Further

study of the impact of the confounding variables (e.g., stress, HRT/contraceptive pill/steroids, age) on symptoms of CFS/ME may also be warranted in light of the findings of this research.

The evidence presented here should give hope to sufferers of CFS/ME in that, for some, the power to reduce their symptoms may lie in their own hands.

Note: Appendices related to this paper (questionnaire, diet sheet and specimen recommended supplements program) are available on request from erica@nutritionhelp.com or from Erica White, Nutritionhelp Ltd., 2 Electric Avenue, Westcliff-on-Sea, Essex, SS0 9NQ, UK

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