

Nutritional Management of Fibromyalgia

A Literature Review

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Abstract

Background: Fibromyalgia syndrome(FMS) is characterized by widespread musculoskeletal pain and tenderness at specified sites, fatigue, subjective swelling, and unrefreshing sleep. This syndrome primarily afflicts women in their middle ages, although it may be seen at any age(6). Fibromyalgia is classified as a syndrome rather than a disease because there is not an identifiable agent even though the symptoms persist. Because of the difficulty in diagnosing the syndrome it is often confused and misdiagnosed as chronic fatigue syndrome, myofascial pain syndrome, or rheumatoid arthritis.

Objective: The objective of this project is to write a literature review surrounding the current issues and nutritional management related to FMS . Although the etiology of the syndrome is not known, there is reason to suspect that inadequate nutrition is a contributing factor. This review will address the possible etiologies, symptoms, and treatments of this perplexing condition.

Data Source: The Logan College of Chiropractic library was the main source for gathering literature for this review. The online card catalog provided many books regarding FMS, five of which I decided to use as reference material. An online search was performed using Pub-Med, which provided several research articles relevant to this paper. I also used Google as a search engine and found eight web sites that were useful in providing additional sources. Lastly, I chose several books from my home library to aid in this review.

Conclusion: FMS is a debilitating syndrome that affects millions of individuals in the United States. There are multiple factors that may contribute to the development of the condition. It has been associated with more than 46 infectious, metabolic, neurologic and neoplastic diseases.(3) Because of its mysterious nature it is often misdiagnosed in the health field. However, it is likely that nutritional deficiencies may play a role in the progression of the syndrome. With proper nutritional management and conservative care the symptoms of FMS may be reduced or diminished.

Introduction:

Fibromyalgia syndrome(FMS) is not uncommon and affects as many as 12,000,000 Americans according to the National Foundation for Fibromyalgia(14). Many of these individuals remain undiagnosed due to the difficulty in recognizing the condition. Rheumatic diseases were first described in the Hippocratic writings and understanding of these disorders has evolved over the centuries(4). Over time, the notion of rheumatism has differentiated into a number of disorders.

To better understand the controversy and perplexing diagnosis of this condition it is necessary to give a brief history of the term “fibromyalgia.” FMS was first described by William Balfour, a surgeon at the University of Edinburgh, in 1816, but for many years the medical profession called it many different names(1,2). The definition of FMS was provided by the American College of Rheumatologists(ACR) in 1990. The definition was as follows(1):

1. A history of widespread pain for at least 3 months. Pain is considered widespread when all of the following are present: pain in the left side of the body, the right side of the body, below the waist and above the waist. In addition there should be axial pain (cervical spine or anterior chest or thoracic spine or low back).
2. Pain (with the patient reporting “pain” and not just “tenderness”) in 11 of 18 tender point sites on digital pressure involving 4K of pressure. The sites are all bilateral and are situated:
 - At the suboccipital muscle insertions (close to where rectus capitis posterior minor inserts)
 - At the anterior aspects of the inter-transverse spaces between C5 and C7

- At the midpoint of the upper border of upper trapezius muscle
- At the origins of the supraspinatus muscle above the scapula spines
- At the second costochondral junctions, on the upper surface, just lateral to the junctions
- 2 centimeters distal to the lateral epicondyles of the elbows
- In the upper out quadrants of the buttocks in the anterior fold of gluteus medius
- Posterior to the prominence of the greater trochanter
- On the medial aspect of the knees, on the fatty pad, proximal to the joint line

This definition seemed to add confusion to the diagnosis of FMS for obvious reasons. The definition provided by the ACR only focused on the aspect of pain. It was also very specific with the locations and the amount of pressure that must be applied to elicit the pain. Also, it did not give explanation for those individuals who might have less than 11 points of pain.

The official definition of FMS came about as a result of the Copenhagen Declaration, which established FMS as an officially recognized syndrome on January 1, 1993, for the World Health Organization(WHO). The Copenhagen Declaration defines FMS as a painful, but not articular, condition predominantly involving muscles, and as the most common cause of chronic, widespread musculoskeletal pain(13). The WHO considered the ACR definition as “suitable for research purposes” and added the following symptoms to the syndrome: ...the presence of unexplained widespread pain or aching, persistent fatigue, generalized morning stiffness, non-refreshing sleep, and multiple tender points. In addition, the Copenhagen Declaration states that FMS is “part

of wider syndrome encompassing headaches, irritable bladder, dysmenorrhea, cold sensitivity, Raynoud's phenomenon, restless legs, atypical patterns of numbness and tingling, exercise intolerance and complaints of weakness(2). The Copenhagen Declaration gave a wider scope to the definition of FMS. It is easy to see that the signs and symptoms that were added in the Copenhagen Declaration may overlap and are consistent with other types of conditions including:

- tension headaches
- irritable bowel syndrome
- chronic back pain
- irritable bladder
- chronic pelvic pain
- myofascial pain syndrome
- trigger point syndromes
- chronic fatigue syndrome
- rheumatoid arthritis
- tender point syndrome

As previously discussed, there is an extensive range of pain syndromes and conditions that are similar and may be related to FMS. The Fibromyalgia Network also listed commonly associated symptoms including: fatigue, sleep disorder, jaw pain, cognitive or memory impairment, post-exertional malaise and muscle pain, morning stiffness, menstrual cramping, numbness and tingling, dizziness, and skin or chemical irritations(15). Other factors that are not likely the cause of FMS, but may be aggravating factors include(16):

Social and Environmental Factors

- Home and job stress
- Pending Litigation
- Cold intolerance
- Unemployment

Neuroendocrine Factors

- Low energy, easily fatigued
- Reduced stamina
- Neuroautonomic imbalance
- Nonrestorative sleep

Biomechanical Factors

- Hyperlaxity
- Overuse, overload
- Physical deconditioning
- "Tight body"

Psychological Factors

- Affective spectrum disorders
- Anxiety disorders
- Depression
- Helplessness behaviors

Depending on the sources elicited there may be a vast range of commonly associated features. It is important to keep in mind that the core features that must be present in an individual with FMS are widespread pain in all four quadrants of the body and tender points at 11+ sites out of 18(8,10).

Despite intensive research, the pathogenesis remains unclear. Clinical heterogeneity is pronounced, and multiple factors are likely to relate to its development and chronicity. There is no concrete evidence of overt inflammation or structural abnormality and the problem appears functional rather than pathological(20). There are many triggering events that may precipitate its onset, including:

- Inadequate thyroid hormone regulation of cell function resulting from thyroid hormone deficiency and/or partial cellular resistance to thyroid hormone(12).
- Reduced circulation of muscle cells and damage to the cells energy producing mechanism. Abnormalities discovered in some FMS patients include tissue hypoxia and deteriorated muscle fibers at the sites of tenderness(19).
- Hypothalamic-pituitary-adrenal stress and reduced ATP production. Biopsies conducted on FMS patients indicate mitochondrial damage in the muscle, a metabolic abnormality(14).

- Abnormal levels of platelet and brain serotonin, as well as cerebrospinal fluid substance P. Also, impaired levels of growth hormone and somatomedin C were found in individuals with FMS(14,16,19).
- Chronic or acute fungal, parasitic, or viral infections.
- Sleep disorders such as sleep apnea and restless leg syndrome.
- A wide variety of nutritional imbalances and inadequacies

Discussion:

In order to develop a proper treatment plan for the FMS individual it is important to first perform a proper screening to determine the progression of the syndrome. It is also important to determine the impact it has on the activities of daily living. An assessment method was developed by John C. Lowe D.C. The five step assessment method is as follows(9):

1. **Pain distribution** is quantified by the percentage of the patient's body in pain according to a pain drawing the patient completes each visit.
2. **Symptom Intensity** (0-10 Visual Analog Scale). One VAS for each of the 13 associated symptoms is marked by the patient. A 14th VAS is for the patient's estimate of pain intensity. The average of the 14 scores is posted on a graph.
3. **Tender Point Sensitivity** (the pressure/pain threshold) at each of the 18 tender points is measured with an algometer (calibrated force gauge). The average for the points is calculated.
4. Functional capacity is assessed through the **Fibromyalgia Impact Questionnaire**.
5. Depression is quantified with the **Zung's Self-Rating Depression Scale**, which grades the presence and degree of depression.

This assessment method is an easy way to obtain a generalized idea of the severity of FMS. Once the assessment is complete it is possible to categorize the type and extent of the FMS. A classification of FMS is often helpful in the diagnosis and treatment of FMS. The following chart lists the 5 most common types of fibromyalgia(19):

Types of Fibromyalgia

Definition

Primary	Characteristic feature of FMS without recognizable cause.
Secondary	Characteristic feature secondary to known cause or underlying disease, or so closely associated with the disease conditions as to appear as manifestations of the associated disease.
Localized/Regional	Localized myofascial pain associated with trigger points usually secondary to muscle strain (occupational, repetitive) similar to local, regional, or specific myofascial pain syndrome; does not satisfy the accepted criteria for FMS.
Elderly	Similar to primary and/or secondary FMS; special attention directed toward diagnosis of polymyalgia rheumatica, degenerative neurologic disease, osteoporosis, Parkinson's disease, organic brain syndrome, post-viral syndrome.
Juvenile	Similar to primary with the exception the individual is an adolescent.

After the proper consultation and diagnosis is achieved a care plan can be established. The treatment of FMS varies greatly among health specialists, but the nutritional aspect is something to be considered seriously. The value of nutrition to the human body is often underestimated. Chronic nutritional deficiencies are routinely seen in Western societies. These deficiencies occur largely because of food processing, increased sugar and white flour intake, and possibly also depletion of nutrients in the soil because of modern farming practices. As an example, the average American diet contains approximately 150 pounds of processed sugar and white flour—both of which have been largely stripped of vitamins and minerals, but are full of calories(17). Because of these problems, high calorie malnutrition is common in the United States and other

Western Societies. These deficiencies have the ability to enhance the disease process and lead to impaired immune function. Nutrition is a critical factor in the healing and prevention of FMS.

It is essential for the individual with FMS to develop healthy eating habits. Although supplements are a vital part of FMS management, the supplements alone cannot provide the nutrients needed to combat this condition. There are some basic principles that need to be followed in order to optimize the nutrition for FMS individuals. It is imperative to eat at least three meals a day to maintain energy for daily needs. Some individuals with FMS benefit most by eating six smaller meals each day(5). The diet should emphasize foods that are low in fat, low in refined sugars, high in natural fruit and vegetables, and relatively higher in protein. Avoid caffeine, nicotine, and alcohol as these all interfere with the body's ability to manufacture energy and proteins and carry out efficient biochemical reactions(1). An adequate water intake is important and purified water should be the preferred source.

Chemical and food sensitivities are often secondary to the diagnosis of FMS. The Fibromyalgia Network conducted a survey questionnaire of 6240 individuals with FMS. Approximately 26% of those individuals reported chemical and food sensitivities as additional diagnoses(8). Chemical and food sensitivities vary in many ways, with some affecting the respiratory tract and others affecting the patient's behavioral pattern. Many of the symptoms of FMS, such as headaches, mood swings, and weight fluctuations, may often be worsened by foods and chemical sensitivities. It is a good idea for patient's with FMS to keep a food diary. This will aid in figuring out the suspected foods that might be causing the adverse reactions.

The most common food allergies and sensitivities occur with corn, wheat, fish, milk, nuts, and eggs. Also high on the list are alcohol, berries, cane sugar, chocolate, coconut, coffee, mustard, citrus, peanut butter, peas, pork, potatoes, soy products, tomatoes, and yeast(2). Those who are very sensitive need to omit all forms of the offending food, whereas the less sensitive individuals may tolerate small amounts. Restricted foods may also be hidden in the diet in unfamiliar forms. To help in identification and avoidance of offending foods, allergy specific lists describing foods to avoid, key words for ingredient identification, and acceptable substitutes are useful. When certain foods are omitted, substitutes for the nutrient sources must be made. For example, when milk is omitted from the diet, a substitute for calcium, vitamin D, protein, and riboflavin must be made. In general, it is best for the patient to restrict his/her diet to fresh, natural food grown without chemicals.

Supplementation is important to all of us, but it is especially beneficial to the FMS sufferers. Supplementation consists of the intake of vitamins, minerals and natural herbs. Because the American diet is often lacking in many of these supplements it is important to consume these to avoid deficiencies. It is important to remember that natural foods are the best source for vitamins and minerals because they provide easier digestion and a higher level of bioavailability.

Minerals are the most important of all the body's nutrients. Mineral elements have many essential roles, both as dissolved ions in body fluids and as constituents of essential compounds. The balance of mineral ions in body fluids regulates the activity of many enzymes, maintains acid-base balance and osmotic pressure, facilitates membrane

transfer of essential compounds, and maintains nerve and muscular irritability(7). The body may only need small amounts of some minerals, but it is essential to have them on a daily basis. A shortage of even one mineral may disrupt the balance of the entire human body.

More and more people are suffering from mineral deficiency. The problem begins with the American diet and the movement to eat easily prepared foods that are often of very low nutritional content. Also, due to over-farming and the depletion of soil nutrients, even natural foods are showing lower levels of major nutrients. Growing evidence supports the fact that stress and anxiety over extended periods of time can result in mineral imbalances. When there is a deficiency of minerals, the result is a nutritional imbalance that can lead to a disruption of sleep patterns, concentration, and the ability to interact normally(18). The following are some of the minerals that may be extremely beneficial to the FMS patient.

The role of magnesium in the treatment of fibromyalgia was first reported by Dr. G.E. Abraham's group in 1992(11). Dr. Abraham's earlier gynecological work had demonstrated that dysmenorrhea and PMS were strongly correlated to deficient magnesium levels. In a later controlled study, Abraham, confirmed his preliminary finding and demonstrated that significant reductions in pain/tenderness could be achieved with high doses of magnesium and malic acid (600mg/day and 2400 mg/day respectively). Magnesium deficiency has been linked with symptoms of depression, agitation, and disorientation. Another problem that may result from a magnesium deficiency is that it increases susceptibility to aluminum toxicity, which may play a role in fibromyalgia as well(21). Most importantly, magnesium is crucial for glycolysis, so a

deficiency in magnesium could cause tissue hypoxia. A deficiency is associated with muscle cramps upon exertion and upon wakening. Calcium in proper balance with magnesium, allows normal muscle function. Lastly, magnesium is involved in every major energy production and transport function in the body. Therefore, supplementation has beneficial impacts on fatigue and pain.

Potassium is a major cation of intracellular fluid, with only small amounts in extracellular fluid. Potassium functions in regulating pH and osmolarity and cell membrane transfer. Potassium ion is necessary for carbohydrate and protein metabolism. Potassium is also vital in stimulating nerve impulses that cause muscle contraction. The symptoms of potassium deficiency include muscle twitches, weakness and soreness, fatigue, nervousness, and rapid heartbeat.

Calcium is the most abundant mineral in the body. It makes up about 39% of the total body minerals(5). Ninety-nine percent of calcium is in the bones and teeth. The remaining 1% is in the blood and extracellular fluids, where it regulates many important metabolic functions. The proper balance of calcium, sodium, potassium, and magnesium ions maintains muscle tone and controls nerve irritability. An individual with a calcium deficiency may experience tetany or sustained muscle contractions. Calcium and phosphorus work closely together. Phosphorus is essential for FMS individuals because it helps to produce energy as it aids in the oxidation of carbohydrates.

There are also a few macronutrients that are essential at much smaller amounts. Zinc is a constituent of many enzymes and insulin. It is also important in nucleic acid metabolism. Zinc aids in the absorption of many vitamins in the body and is a vital component of enzymes in the brain. Selenium is a very powerful antioxidant and is

needed for immune function. It is important in the protection against free radicals.

Individuals with FMS are often found to be deficient in selenium and this can alter their immune capabilities. Iron deficiency affects millions of individuals worldwide. Iron is not easily absorbed by the body and requires moderate level of hydrochloric acid for its absorption. Iron is important in oxygen transfer and is known as the anti-anemia mineral because of its assistance in the oxygenation of cells and combining with protein to form hemoglobin.

Vitamins are organic compounds essential for specific metabolic reactions that cannot be synthesized by human tissue cells from simple metabolites(7). A significant number of individuals with FMS have been found to be deficient in various vitamins.

Vitamins are essential to the body and must be replaced daily. Vitamins are important for the body to utilize other nutrients and contribute to the breakdown of fats, carbohydrates and proteins(5).

Vitamin A occupies important roles in vision, growth, and bone development. Vitamin A is necessary for growth and development of skeletal soft tissues through its effect on protein synthesis and bone cell differentiation. It is important to remember that vitamin A can be toxic at extreme amounts and beta carotene should be the preferred source. Preformed vitamin A occur only in foods of animal origin, but the carotene form is found in dark green, leafy, and yellow-orange vegetables. Vitamin A also occurs in therapeutic levels in cod and halibut oils.

Vitamin C is a water soluble vitamin and is essential to the body. It has multiple functions as either a coenzyme or cofactor. It is a powerful anti-oxidant and it helps prevent infection by increasing the activity of white blood cells. It has a vital role in the

formation of collagen, a protein substance on which the integrity of cellular structure in all fibrous tissue depends. Vitamin C is essential for healing and the synthesis of neurotransmitters in the brain and, when combined with bioflavonoids, also assists with adrenal and immune functions(5). Vitamin C can be destroyed by oxidation in the presence of heat and alkalinity. Therefore, the best sources are fresh fruits and vegetables that do not need to be cooked.

Vitamin E is very effective as an anti-oxidant. It helps prevent oxidation of unsaturated fatty acids and vitamin A in the intestinal tract and body tissues. Vitamin E has been shown to protect red blood cells from hemolysis and it performs roles in epithelial tissue maintenance and prostaglandin synthesis(7). Although it has not been substantiated yet, it may also have a calming and relaxing effect that is beneficial to the FMS sufferer. Vitamin E is stable to heat and acid, but may be destroyed by alkalinity, oxygen, salts, and ultraviolet radiation. Good sources of the vitamin include wheat germ, vegetable oils, green leafy vegetables, milk, fat, egg yolk, and nuts.

Members of the vitamin B complex have an essential role in the metabolic processes of all living cells. They function as coenzymes and are vital in the production of energy during glycolysis. FMS individuals may have an increased need for B vitamins due to increased stress. Because of the close interrelationships among the B vitamins, an inadequate intake of one may impair utilization of others.

Many FMS sufferers have demonstrated a marked impairment of vitamin B1 (thiamin) status. Thiamin has essential roles in energy transformation, as well as membrane and nerve conduction. It is also important for growth, normal appetite, and digestion. Thiamin is a water soluble vitamin and is needed in small amounts each day.

Good sources of thiamin are pork liver, organ meats, legumes, whole-grain and enriched cereals and breads, wheat germ and potatoes.

Vitamin B2 (riboflavin) is necessary for antibody formation, red blood cell formation, cell respiration, fat and carbohydrate metabolism(5). Riboflavin plays enzymatic roles in tissue respiration and acts as a transporter of hydrogen ions. Some good sources for riboflavin include: milk and dairy foods, organ meats, green leafy vegetables, enriched cereals, and eggs.

Vitamin B3 (Niacin) is essential in the oxidation-reduction reactions involved in the release of energy from carbohydrates, fats, and proteins. Niacin is also involved in glycolysis, fat synthesis, and tissue respiration. Good sources of niacin include fish, liver, meat poultry, many grains, eggs, peanuts, milk, legumes and enriched grains.

Vitamin B6 (pyridoxine), as a coenzyme, aids in the synthesis and breakdown of amino acids and in the synthesis of unsaturated fatty acids from essential fatty acids. It is also essential for the conversion of tryptophan to niacin. Vitamin B6 is especially helpful to the FMS sufferer who is experiencing excessive stress. Sources of B6 include pork, glandular meats, cereal bran and germ, milk, egg yolk, oatmeal, and legumes.

The last of the B complex vitamins that will be discussed is vitamin B12 (cobalamin). Cobalamin is essential for normal function in metabolism of all cells, especially for those of the gastrointestinal tract, bone marrow, and nervous tissue. Because the body store of the vitamin is substantial the likelihood of deficiency is very unlikely. Dietary sources of cobalamin include liver, kidney, milk and dairy foods, meat, and eggs.

There are also some other supplements and natural herbs that deserve mentioning due to their potential benefits to the FMS sufferer. Malic Acid is a food supplement found in citrus fruit and apples. Malic acid and magnesium are depleted during strenuous exercise and may lead to muscular soreness and fatigue. Because both substances have an oxygen-sparing effect, a deficiency of either one can possibly induce the hypoxia common in muscles of FMS patients.

Coenzyme Q10 is a very powerful antioxidant and aids in the oxygenation of cells and tissues. It is estimated to be 20 times stronger than vitamin E, and is considered to boost biochemical ability and activate cellular energy while improving circulation(5).

Melatonin can be extremely beneficial to the FMS individual who suffers from inadequate sleep patterns. Melatonin is a hormone that assists in attaining deep levels of sleep. As we get older our ability to produce melatonin drops significantly, therefore supplementation may aid the FMS patient in obtaining a restful nights sleep.

The last supplement that will be mentioned is boswellia serrata. Boswellia serrata is a traditional treatment for joint pain and inflammation. In ancient times it was known as frankincense. It was found to have slow-acting long term anti-inflammatory effects. Although FMS is primarily known as inflammatory in nature, boswellia serrata can be effective in alleviating some of the “aches and pains”.

The management of FMS can be as difficult as the diagnoses of the syndrome. The treatment plan is difficult due to the many contributing factors to the condition. It has been proven that proper nutrition plays a vital role in coping with the many symptoms that might be presented.

Conclusion:

FMS is difficult to manage and is frustrating for both the patient and the caregiver. The difficulty lies in the fact that a single identifiable factor is not known and the condition may mimic other disease processes. FMS is likely a multitude of several different contributions, when combined, can have a very detrimental impact on the FMS sufferer. It is important to recognize each factor that might be affecting the individual and treat it accordingly. The nutrition management approach has proven extremely beneficial, not only at alleviating symptoms, but by improving the overall health of the patient. Nutrition counseling is a conservative approach, which should be utilized with specificity. Through proper management, small additive changes can culminate in an optimal personal wellness.

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