

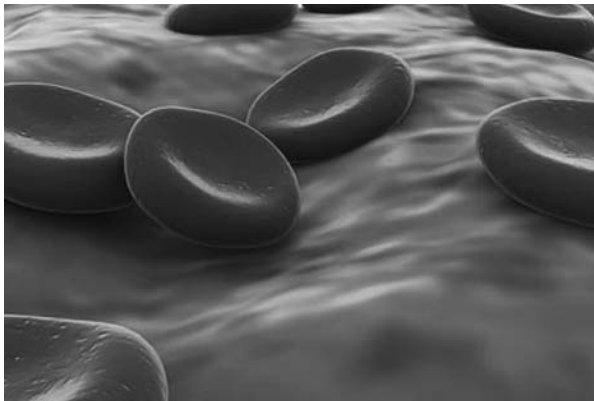
# FIBROMYALGIA RESEARCH REVIEW

JOANNA RAWLING



## AN INCREASED PREVALENCE OF FIBROMYALGIA IN IRON DEFICIENCY ANAEMIA PATIENTS.

Iron deficiency anaemia (IDA) is the most common type of anaemia, and occurs when dietary intake or adsorption of iron is insufficient. As a result, haemoglobin, (a protein-based carrier of iron and oxygen found in red blood cells), cannot be formed. Iron deficiency anaemia usually develops slowly, therefore may go unrecognised for long periods of time. Whilst the most common symptoms include pallor, tiredness and lack of energy, IDA may have serious consequences, including a decreased ability to work, exercise or even cognitive dysfunction. Other disorders characterised by a deficiency of iron include the thalassaemias. Thalassaemia is an inherited blood disease in which there is an abnormality in the protein haemoglobin. Consequently, the patient's red blood cells (see photo) cannot function normally to carry oxygen and iron around the body, leading to anaemia. Thalassaemia varies in severity, and is either classed as thalassaemia minor, which is characterised by mild symptoms, or thalassaemia major, which is the most severe form, with treatment consisting of repeated blood transfusions or bone marrow transplantation.



So what do these iron deficiency disorders have to do with fibromyalgia syndrome (FMS)?! A recent article by a team of researchers from Turkey highlights some common symptoms shared by both fibromyalgia and iron deficiency anaemia/thalassaemia sufferers, including fatigue and cognitive dysfunction. The Turkish researchers therefore decided it was important to establish whether there is any connection between the iron deficiency syndromes and FMS. They studied 205 iron deficiency anaemia (IDA) patients, 40 patients with thalassaemia minor (TM), and 196 FMS patients, along with a control group of 100 healthy individuals. Each patient was interviewed to determine their health history, and blood samples were taken. Blood samples were subjected to various analyses, including red blood cell count and measurement of the concentration of ferritin and haemoglobin (the two forms in which iron is stored and transported in the body). Strikingly, the researchers discovered that the prevalence of fibromyalgia among thalassaemia and

iron deficiency patients was significantly higher (18-20%) than among healthy individuals (6%). They compared the history of iron deficiency anaemia patients with or without FMS, and found that a higher percentage of IDA sufferers with FMS were married females than IDA sufferers who did not have fibromyalgia, consistent with the known prevalence of FMS among women in the general population.

Since the sample size of patients in the current study was relatively small, further studies should be carried out to confirm that FMS is associated with iron deficiency. However it is interesting to speculate about the significance of the possible association between iron deficiency and fibromyalgia. Iron deficiency is known to lead to fatigue and sleep disturbances, which are common complaints among FMS patients. Moreover, iron is present in enzymes (biological catalysts), which are essential for catalysing the biochemical reactions that produce serotonin in the body. Serotonin is a "feel-good" hormone found in the brain and spinal cord, and is known to regulate deep sleep and pain perception. Since serotonin levels are decreased in FMS sufferers, it is possible that there is a link between iron deficiency, low serotonin levels and resulting sleep irregularities, at least in a subgroup of FMS patients who also suffer from anaemia. In addition, iron deficiency is also associated with important changes in muscle metabolism and energy use, making exercise difficult. It is likely that iron deficiency further contributes to sore and tired muscles following exercise in anaemic FMS patients. Finally, the researchers suggest a follow-up study in order to assess the effect of iron supplementation on FMS symptoms.

Pamuk GE, Pamuk ON, Set T, Harmandar O and N Yesil. 2008. "An increased prevalence of fibromyalgia in iron deficiency anaemia and thalassaemia minor and associated factors." *Clinical Rheumatology* [Epub ahead of print].

Department of Internal Medicine, Trakya University Medical Faculty, Edirne, Turkey.

## DO MAGNESIUM AND ZINC PLAY AN IMPORTANT ROLE IN FIBROMYALGIA SYMPTOMS?

Previous scientific studies have suggested that there is a reduction in blood flow and cellular energy (ATP) to the muscles of fibromyalgia syndrome (FMS) patients. ATP (adenosine triphosphate) is made within cellular structures called mitochondria, and acts to provide energy for essential biochemical reactions in our body, including muscle movement. Magnesium is a trace element, (required at minute quantities for normal growth and development), and is found in green, leafy vegetables. Magnesium is important for the production of ATP energy and for muscle function. Since FMS is associated with an impairment in ATP production in the mitochondria, it has been suggested that a deficiency of magnesium may play an important role in FMS. Therefore researchers from Turkey aimed to determine the levels of magnesium and other trace elements, (selenium and zinc),

in the blood of fibromyalgia patients, and to investigate whether trace element levels are related to symptom severity.

The researchers recruited 32 FMS patients as well as 32 normal healthy volunteers, and analysed the concentration of selenium, magnesium and zinc in their blood. Magnesium levels were found to be significantly lower in FMS patients when compared with the normal healthy volunteers. Given the role of magnesium in cellular energy production and muscle function, it is possible that a deficiency of magnesium in FMS patients could account for fatigue and muscle pain. Indeed, several symptoms of magnesium deficiency are similar to those experienced by FMS sufferers, including fatigue, muscle weakness, irritable bowel and tingling sensations.

Although selenium deficiency has previously been shown to be associated with muscle pain, selenium levels were found to be similar in both FMS and healthy patients in this study. However, as for magnesium, zinc levels were found to be significantly lower in FMS patients. Zinc is known to be important for antioxidant reactions in the body, as it acts as a "free radical scavenger". Free radicals are the by-products of chemical reactions in our body that can cause cellular damage and have been implicated in cancer development. Antioxidants like zinc act to reduce the oxidative damage to our body caused by free radicals. Interestingly, low zinc levels have also been found in chronic fatigue syndrome patients, who seem to benefit from zinc supplementation. Since many symptoms of chronic fatigue syndrome and fibromyalgia are similar, it is possible that fibromyalgia sufferers could also benefit from zinc and magnesium supplementation, both of which are thought to aid in the treatment of chronic fatigue.

Although the Turkish investigators reported lower levels of trace elements in FMS patients, they were unable to correlate low zinc and magnesium levels with pain severity. In other words, patients with the greatest level of pain did not necessarily have the lowest zinc and magnesium levels. However, zinc levels did correlate with the number of fibromyalgia tender points. Finally, the observations that FMS sufferers may be low on essential nutrients further emphasises the important role that diet may play in FMS. Further studies are required to test whether fibromyalgia symptoms would improve following changes in the patient's diet or dietary supplements to improve zinc and magnesium levels.

Sendur OF, Tastaban E, Turan Y and C Ulman. 2008. "The relationship between serum trace element levels and clinical parameters in patients with fibromyalgia." *Rheumatology International* [Epub ahead of print].

Department of Physical Medicine and Rehabilitation, Adnan Menderes University Medicine School Hospital, Aydin, Turkey.

## THE EFFECT OF A GASTRIC BYPASS OPERATION ON FIBROMYALGIA.

Researchers from the United States recently made a chance discovery that fibromyalgia symptoms seemed to improve following a gastric bypass operation, and decided to investigate their observations in more detail. Previous studies have found that around 24% of fibromyalgia syndrome (FMS) patients in the USA are obese. Since it has been shown that a 5% loss of body weight results in a mild improvement of FMS symptoms, it has been proposed that weight loss could

serve as a method to improve the symptoms of fibromyalgia.

A gastric bypass operation (termed a "laparoscopic Roux-en-Y gastric bypass"), promotes weight loss by reducing the size of the stomach, thereby drastically limiting the amount of food that a patient can consume on a daily basis. The American research team aimed to determine the effect of weight loss on the clinical course of fibromyalgia following a gastric bypass operation in 10 fibromyalgia patients. Patients were interviewed by telephone before and after the operation, and asked to rate their degree of pain on a scale of 1-10 (with 10 being the worst), state their number of tender points (as recorded in the last visit to a rheumatologist), and give details of any medication they were taking for the treatment of fibromyalgia. The body mass index (BMI) of patients was also recorded over a 2-year period. The body mass index represents the mass of a person (in kilograms), divided by the square of their height (in metres), and is used as an indicator as to whether a person is over- or underweight. For example, an adult who weighs 65 kg and is 1.7 m tall has a BMI of  $65/1.72 = 22.5$ , which is considered within the normal range (20-25). A BMI of 25-30 is overweight, whereas a BMI of above 30 indicates clinical obesity. Unsurprisingly, the BMI of the obese patients decreased following the gastric bypass operation (from an average of 49.4 to 29.7). However this significant weight loss was also associated with a decrease in pain score (from 9.0 to 3.0), and in the number of tender points (from 18.0 to 3.5), among the fibromyalgia patients. Furthermore, eight out of the ten FMS patients switched to milder pain-relieving medication following the operation.

Unfortunately, the number of patients involved in this study was very small (10), and the methods used to analyse the effects on FMS symptoms (telephone interviews) do not constitute a rigorous scientific study. However, this research does pose some interesting points. Gastric bypass surgery has been associated with an improvement in muscle condition, and physical exercise becomes easier, which may account for the improved symptoms experienced by the FMS sufferers. Gastric bypass surgery has also been shown to cause remission of type 2 diabetes (a disorder of carbohydrate metabolism). Given the proposed link between sugar metabolism and fibromyalgia/chronic myofascial pain, it is possible that improved sugar metabolism/reduced carbohydrate intake following the operation also led to an improvement in FMS symptoms. It would be interesting to test if similar beneficial results could be achieved in overweight/obese FMS patients through a diet and exercise program, without the need for a serious, potentially life-threatening operation.

Saber AA, Boros MJ, Mancl T, Elgamal MH, Song S and T Wisadattanapong. 2008. "The effect of laparoscopic Roux-en-Y gastric bypass on fibromyalgia." *Obesity Surgery* [Epub ahead of print].