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Fibromyalgia

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FIBROMYALGIA

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Bachelor of Science in Physical Therapy
University of North Dakota, 1994

An Independent Study
Submitted to the Graduate Faculty of the
Department of Physical Therapy
School of Medicine
University of North Dakota
in partial fulfillment of the requirements
for the degree of
Master of Physical Therapy

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This Independent Study, submitted by Bruce T. Amundson in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

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PERMISSION

Title                Fibromyalgia
Department          Physical Therapy
Degree               Master of Physical Therapy

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This Independent Study is dedicated to the memory of my mother and dad.
ABSTRACT

One of the more common diagnosis that a physical therapist treats in the clinic is fibromyalgia (FM). Fibromyalgia is the latest name given to a condition that, for the most part, has received mixed acceptance at the clinical level. Part of the reason that FM has been poorly accepted is due to the lack of a clearly defined set of signs and symptoms. In the last few years, new research has delineated the signs and symptoms in a manner that makes FM a more understandable condition.

The Merck Manual defines FM as a group of non-articular rheumatic disorders characterized by pain, tenderness, and stiffness of muscles in areas of tendon insertion and adjacent soft-tissue structures. FM may be acquired from unknown causes or as a result of a traumatic event or surgery. The main course of treatment for FM is antidepressant medication and physical therapy.

The purpose of this literature review is to help the physical therapy clinician gain an understanding of the diagnosis, treatment, and educational needs of the patient with FM. This topic has suffered from a lack of understanding in the past; it is my hope that this review will help clear up some of the misunderstanding that has plagued FM.
CHAPTER 1
INTRODUCTION TO FIBROMYALGIA

The physical therapist is charged with evaluating and treating musculoskeletal complaints found in the general population. Most patient diagnoses seen in a physical therapy practice have traditional symptom patterns that are easily recognized by the experienced practitioner. However, the fibromyalgia (FM) patient does not always present with a characteristic symptom pattern and the diagnosis can be quite difficult to make. In fact, it is not uncommon for FM patients to have traveled from practitioner to practitioner trying to find someone who can help them. As a result, people may receive several incorrect diagnoses before the true diagnosis of FM is made.

Because the condition is so difficult to diagnose, it becomes equally difficult to determine the number affected. The current estimate of the number of people affected in the U.S. with FM is approximately three to six million.\(^1\) However, some rheumatologists feel that since FM is often incorrectly diagnosed, there are, in fact, more than three to six million people afflicted with FM in the US.\(^1\)

It is the purpose of this paper to educate the physical therapy clinicians and FM patient about the history, symptoms, evaluation, and treatments of
fibromyalgia. It is only through understanding the condition that realistic goals and plans for management of fibromyalgia can be obtained.
CHAPTER II
WHAT IS FIBROMYALGIA?

Fibromyalgia (FM) is a condition that is characterized by pain, tenderness, and stiffness of muscles in areas of tendon insertion and adjacent soft-tissue structures. There are two basic types of FM: 1) primary, without known etiology, and 2) secondary, which is subsequent to some other underlying condition. The secondary FM can be precipitated by a traumatic event or surgery. Repetitive motions or overuse can increase the prevalence and severity of FM. Although the symptoms can vary from patient to patient, the etiology of FM is fairly consistent.

Fibromyalgia initially affects people in their twenties and thirties. FM tends to affect more women than men. The onset of FM can be either sudden, like after an auto accident, or gradually, without known cause. Pain usually starts in the neck, between the shoulder blades, in the arms, legs, or chest. Some of the other symptoms often found with FM are sleep disorders, fatigue, spastic colon, mitral valve prolapse, temporomandibular joint dysfunction, headaches, sexual dysfunction, hypothyroidism, recurrent tendinitis, plantar fasciitis, and bursitis. The symptoms can be aggravated by such things as emotional stress, cold weather, damp conditions, or repetitive motions.
The distribution of pain can be generalized to many body areas or localized to small areas called tender points. Tender points can be identified with several methods, but the most common methods are palpation and dolorimetry. Regardless of the method of evaluation, the cardinal sign is a pain behavior evidenced by the patient when a suspected tender area is touched. The number of tender areas is also important to the practicing clinician; the number of tender points needed to make the diagnosis is set by the American College of Rheumatology.

Pain, stiffness, and tender areas are symptoms of FM that can be attributed to many pathological conditions. Because the symptoms easily fit other conditions, the diagnosis of FM is very difficult to make.
CHAPTER III
THE HISTORY OF FIBROMYALGIA

The history of FM is the history of a condition with many names, many symptoms, and many misunderstandings. A myriad of names have been used to describe the condition of FM. Some of the names previously associated with FM are myofascial pain syndrome, fibrocytis, and fibromyositis. Depending on name and reference source, the clinician would recommend different treatments. As a result of this diagnostic confusion, many patients were unable to get the appropriate care and became frustrated.

In an effort to clear up some of the confusion that had plagued FM for years, the American College of Rheumatology set up a study to identify the signs and symptoms of fibromyalgia. First, the committee of 22 researchers decided by consensus that fibromyalgia was, in fact, the most accurate name to describe the symptoms that they intended to identify. Once the name had been decided upon, the mechanics of the study were put into motion.

The study was made up of two essential parts: a questionnaire and a physical exam performed by a trained researcher. The questionnaire requested responses on sleep habits, types of pain, duration of pain, onset of pain,
location of pain, and age at onset. Once the questionnaire was complete, all
researchers were trained in the evaluation of the patients to be studied.

The patient evaluations were done at centers throughout the United
States. Each center provided 40 patients: ten with primary FM, ten age and
sex matched controls; ten patients with secondary FM, and ten age and sex
matched controls. The subjects were then evaluated for the following signs
and symptoms: sleep disturbances, fatigue, morning stiffness, anxiety, irritable
bowel syndrome, frequent headaches, Raynaud's phenomenon, symptoms,
depression, parasthesias, and "pain all over." Other factors examined were
reaction to noise, fatigue, stress, activity, anxiety, humidity, warmth, cold, poor
sleep, and weather change. Researchers also studied the number and location
of painful areas.

The results of the study indicated FM is predominantly found among
women (88.7%). The average age for those people affected by FM is 49.1
years. Of the ethnic groups (Caucasian, Hispanic, and black) surveyed, 92.8%
of the time Caucasians were the most affected by FM. The number of painful
areas found on FM patients was 15 or more as compared to 12 on the
controls. Widespread pain was also found to be significant (p < 0.001) in
97.5% of FM patients as compared to 71.1% of the controls.

Other characteristic symptoms to be assessed were fatigue, sleep
disturbances, and morning stiffness. These symptoms were found in 73-85% of
the patients. Factors that tended to affect the pain levels in FM patients were
cold, poor sleep, anxiety, humidity, stress, and weather change. The aforementioned factors affected 60-79% of the FM patients.\textsuperscript{6}

In concluding this study, the committee determined that the following symptoms indicated fibromyalgia: multiple tender points (11-18), sleep disturbances, fatigue, and stiffness.\textsuperscript{6} The tender points can be found in posterior neck around the hair line, upper back between the shoulder blades, in the hip area, on the inside of the knee, or on the outside of the forearm.

Tender points, sleep disturbance, fatigue, and stiffness represent 75% of all FM patients.

It is important to summarize what the study done in 1990 by the American College of Rheumatology really means for the patient with FM. Before 1990, there was a significant amount of confusion as to the name and symptoms of FM. For the patient, the confusion meant differing diagnoses depending upon the physician, frustration from not knowing what was wrong, and frustration from ineffective treatment. Although this study did not find a cure for FM, it laid the foundation for understanding FM.
CHAPTER IV

HOW DO WE GET FIBROMYALGIA?

Medical science has come a long way in understanding fibromyalgia. What continues to elude researchers is what actually bring on the symptoms of FM. This chapter will look at the two types of FM and some of the current theories of onset.

As previously mentioned in this text, some researchers feel there are two basic types of FM: primary and secondary. Other investigators cannot differentiate between primary and secondary FM. Both types of FM have the same symptom patterns; what separates them is how they occur. With primary FM, there is no precipitating event, circumstance, or associated medical condition. Secondary FM can be found in conjunction with rheumatic disease, thyroid dysfunction, psychological disturbances, or secondary to trauma or repetitive work. The symptoms in secondary FM are the same as primary FM except the treatment tends to be less effective. Determining an underlying cause for either type of FM is quite difficult.

One study that questioned the diagnosis of primary FM studied 25 patients at a day ward for pain syndromes. The patients who were studied came into the ward over a five-year period. Of the 25 people studied, 22 (88%)
were women and three (12%) were men. Of these, 15 with a diagnosis of primary fibromyalgia were evaluated for study. Of the 15, 11 were found to have psychological problems and four were found to have thyroid dysfunction. With a true primary fibromyalgia, there should be no underlying disease process. The results of this study question whether or not there is a true primary FM. The researcher believes that within a five-year period, there should have been at least one case of primary FM. As FM occurs with other diseases, a more in-depth study of the relationship between FM and other concomitant diseases is needed.

In the last few years, research into diseases associated with fibromyalgia has yielded some interesting results. One study looked at the prevalence of FM occurring with the Chronic Epstein-Barr Virus (CEBV). The symptoms for CEBV are recurrent sore throat, recurrent rash, chronic cough, recurrent adenopathy, and recurrent low grade fever. If you consider the symptoms of FM and CEBV, there would appear to be a mixing of symptoms possibly indicating a common viral agent.

However, the blood tests for the Epstein-Barr Virus do not correlate well with FM. The blood tests were not significantly different between the FM patients and the control groups. The conclusion of the study stated that there was no evidence that the reactivation of a dormant EBV infection was associated with symptoms of FM.
Another area that has been explored by researchers is the psychological component to FM. Depression, anxiety, and stress are commonly found symptoms of FM. Researchers looked at how the psychological symptoms relate to the clinical manifestations. One hundred three patients with FM were given the Minnesota Multiphasic Personality Inventory (MMPI). The responses given by patients were statistically compared against responses given by the general population. The results showed the main features of FM (number of pain sites or tender points, fatigue, and poor sleep) do not statistically correlate to the patients having psychological problems. The MMPI did identify the patients who exhibited psychological components unrelated to FM. Understanding that there is a small percentage of FM patients with psychological manifestations allows patient referral to the appropriate professional.

In an effort to find the cause of FM, researchers are examining how sleep disturbances affect FM patients. Approximately 60-90% of all FM patients report some level of sleep disturbance. Sleep is intimately related to the serotonin level in cerebrospinal fluid (CSF) found in the cranium and spinal cord. The two functions of serotonin are to regulate the sleep-awake cycle and pain reception in the brain. If serotonin levels are altered, sleep-awake cycles and pain reception are disturbed.

There are two important types of wave patterns found in the sleep-awake cycle. When we are in deep sleep, there is a predominance of delta waves.
During the awake times, mostly alpha waves are found. Researchers use these waves to analyze the stage of sleep.

Researchers have found that FM patients with poor sleep have decreased serotonin levels in their CSF and alpha wave intrusion into delta wave sleep. The end result is the person is unable to get good quality deep sleep. Researchers feel it is the deep sleep that helps the body modulate the response to pain. When FM patients are unable to get good rest, they fatigue and have pain.

The second function of serotonins is regulation of pain. Areas in the hind brain are concerned with modulation of pain; these areas are affected by the level of serotonin in the CSF. If the serotonin level drops, the brain's ability to respond to pain is decreased and the patient feels more pain. The theory on FM and serotonin levels is becoming more and more accepted but, at this time, it is still a theory.

Because so much of the diagnosis of FM is subjective, doctors have attempted to use laboratory tests to confirm the presence of FM in a patient. A muscle biopsy is a procedure whereby a needle is inserted into a tender point and a small piece of the muscle is removed for lab analysis. Researchers have found minor muscle abnormalities in tender point biopsies, but no clear evidence of inflammation. Lab results of 15 FM patients revealed there was a decrease in adenosine triphosphate (ATP) and adenosine diphosphate (ADP) energy molecules the muscle cells use for metabolism. Because Dr. Goldberg
found decreased levels of ADP-ATP, he concluded the muscle was suffering from tissue hypoxia. Localized tissue hypoxia may contribute to the changes in the muscle energy metabolism and the formation of tender points.\(^1\)

In testing patients with FM, researchers have wondered if FM patients really have more pain or if they could be more sensitive to pain. Dolorimetry is the method researchers use to measure pain levels. The dolorimeter measures the amount of force applied to a given area prior to patient complaints of pain. The dolorimeter has a surface area of one square centimeter and the resistance is measured in kg/cm squared.

The study measured pain at the deltoid and on the tibia. The study found that individuals with FM demonstrated a lower tolerance for pain than the healthy control group. The authors proposed a theory that the lower pain threshold could be due to psychological manifestations. In a reference to a previous study, Moldofsky\(^{11}\) found hysteria, hypochondria, and depression in FM patients. All three aforementioned psychological states have in the past been linked with hypersensitivity. Although the researchers in this study offered alternative explanations for their results, they felt that FM, not psychology, was the major influence in pain sensitivity.\(^{11}\)

The true cause or causes of fibromyalgia have yet to be determined. It will be future research that will eventually lead to discovering the cause and ultimately a treatment for FM. For the present time, the physical therapy
clinician must work at improving his/her evaluation and subsequent treatment of the patient with FM.
CHAPTER V
EVALUATING THE PATIENT WITH FM

Evaluating a patient with FM can be different from evaluating a patient with an orthopedic problem. With orthopedic dysfunctions, there are usually only one or two major patient complaints. The fibromyalgia patient can have a myriad of complaints in totally different areas of the body. Determining a diagnosis from a set of diffuse complaints can be a difficult task for the physical therapy clinician. The key to a good evaluation is setting up an evaluation process.

The evaluation process for FM should follow an accepted orthopedic format with some specific areas that should be addressed. An orthopedic evaluation should contain the following areas: history, patient complaints, observation, postural assessment, examination, and palpation. For FM patients, a physical therapy evaluation should also contain a chart review.

The patient's history section should contain facts about other medical conditions of the patient. Individuals in one study with FM reported a greater incidence of bursitis, chondromalacia, constipation, diarrhea, temporomandibular joint dysfunction, vertigo, thyroid dysfunction, and sinus problems. One interesting aspect from this study is that 70% of the FM patients surveyed
stated that their symptoms were aggravated by noise, lights, stress, posture, and weather.\textsuperscript{13}

Once the history has been done, the therapist should observe how the patient carries himself or herself. Posture is a very important aspect of any treatment program; poor posture can stress already painful structures. The equilibrium posture in standing should have a line going from the lobe of the ear through the point of the shoulder, through the hip, just in front of the knee, ending up just in front of the ankle.\textsuperscript{14} Deviation from the equilibrium posture will put stress on structures not intended to resist constant stress and the patient will have pain. After observing the patient's posture, you should notice his/her movement patterns during walking, transitions from sit to stand, and functional movements. All the observations should help identify problem areas that need treatment.

The examination portion of the evaluation should cover active and passive movements, resisted motions, peripheral joint scans, myotomal testing, reflex and cutaneous nerve tests, joint play tests, and special tests. Because FM patients present with multiple areas of involvement, the special tests segment of the examination is very important.\textsuperscript{15} As patients will often present with dual diagnoses, special tests help differentiate FM from other problems.

The origin of FM pain is still controversial and needs more study. One theory of how FM pain starts is that the involved muscle fibers fire when they should be at rest. Electromyography is used to see if muscles are firing when
they should be and to evaluate the muscle at rest. To test if muscles are firing, small needles can be inserted into the muscles. The needles are then attached to electromyographic (EMG) machines which monitor the muscle activity. A healthy muscle at rest should have no abnormal activity in it.

One study took 25 patients diagnosed with FM or myofascial pain and measured the EMG activity of the involved muscles. The researchers assessed five trigger points, three tender points, and one taut band in four patients with FM. Of the muscles tested, the researchers could find no abnormal muscle action potentials. Because previous studies have yet to prove or disprove abnormal muscle potentials, the researchers recommended further study be done.16

Another study looked at three different types of pain measures: visual analogue scale, liquid crystal thermography (LCT), and dolorimetry. The focus of the study was to determine which of the measures were the most accurate in diagnosing FM. This study took 30 patients with a diagnosis of FM and matched them to 28 age and sex matched controls. All subjects were given the questionnaire containing the self report analogue scale. After completing the questionnaire, the subjects were then given a test utilizing LCT. The subjects disrobed and were placed in a climate controlled room for 20 minutes. At the end of the waiting period, the subjects were assessed for potential areas of increased temperature. The areas of increased temperature should indicate tender points or trigger points. The last test to which the participants were
subjected was dolorimetry. The results of the study showed a strong correlation (.75) between the dolorimetry scores and the visual analogue scales. The LCT test was not significantly related to any of the other tests. The results of the LCT indicated that it could only identify tender points or trigger points 50% of the time. The authors concluded that LCT was not an appropriate test for diagnosing fibromyalgia. Trying to evaluate widespread areas of pain is quite difficult; when FM pain mimics another serious condition, it becomes imperative to make the correct diagnosis.

Most of the general public is aware that cardiac pain can be found in neck, left shoulder, arm, hand, and chest. What is not generally known is that in some cases FM pain can present with the same symptoms. The following study looked at four cases where the patients presented with symptoms consistent with cardiac problems. The ages of the patients were 55, 41, 35, and 23. The heart was ruled out as a cause of the pain and a physiatrist was brought to evaluate the patients. In all four cases, primary fibromyalgia was diagnosed.

Through the course of the evaluation, the physiatrist found several things of interest. In all the cases, a nitroglycerin tablet under the tongue had no effect on the patient's pain. Upon further investigation, the complaints of chest pain could be reproduced by palpating tender points in areas other than the chest wall. In three of the cases, stress seemed to be the triggering event. In one case, the patient had no history of chest pain until his desk was placed
under an air conditioning vent. The treatment for these four people included drugs to relieve stress, hot and cold packs, electrical stimulation, and exercise. All the patients responded well to the treatments and continued with their previous activity levels.19

The last part of the evaluation process to be covered is the palpation of tender points and trigger points. The areas of the body that should be covered are the posterior neck around the hair line, the upper shoulders, between the shoulder blades, the lateral elbows, lateral buttocks, and the medial knees. The tender points can be identified by the patient’s reaction to touch. If you find a tender spot with palpation, the patient will elicit a pain behavior dependent on the severity of the FM flare.6 Eleven to eighteen tender points need to be found for a diagnosis of FM.6

Finally, the chart review is especially important with FM patients. The chart review can show patterns of problems over the course of several years. A pattern of specific problems can lead the therapist to a more effective treatment program.

One case in point is a patient seen by this author on his first clinical rotation. The patient was a 45-year-old female who worked as a book store manager. On the referral, the stated diagnosis was back pain. Upon review of her chart, a treatment pattern was noticed. Every fall for the last five years, this patient would come into the clinic with approximately the same complaints of back pain. The physical therapy treatment would last approximately two to
three weeks, then the patient would not be seen until the next year. The complaints of this patient essentially fit the cardinal signs of FM. Delving further into the patient's occupational background, the author found that every fall, she worked long hours stacking assorted books on the shelves.

What is important to realize about the previous case history is that the chart review led the therapist to ask the right questions to get to the cause of the FM flare up. To correctly treat this patient, the therapist educated the patient as to the effect of repetitive motions on FM. Once the patient understood the cause of her pain, she was able to adjust her daily routine and reduce the repetitive motions. As the amount of repetitive motions decreased, so did the symptoms of FM.

This chapter has highlighted some of the problems that the physical therapy clinician can have diagnosing FM. The vast array of pain complaints can lead to false diagnosis or to the opinion the patient is a symptom magnifier. Only through careful history taking, evaluation, and chart review can the clinician successfully diagnose and treat patients with FM.
CHAPTER VI
TREATMENT OF FIBROMYALGIA

The treatment of FM follows two pathways: drugs and physical therapy. This paper will discuss the physical therapy interventions. Physical therapy treatment should focus on improving the patient’s ability to do an activity for an extended period of time.

The natural reaction of people with pain is to limit the activities that create the pain. The problem with allowing chronic pain to limit activities is that the patient decreases his or her activity level to a point where he or she becomes deconditioned. A cycle of pain and decreased endurance starts to appear and the patient can become disabled.

One study compared the muscular endurance of FM patients and chronic myofascial pain patients to see which group had poorer endurance. Using a Cybex II dynamometer, the study evaluated 18 FM patients and 36 chronic myofascial pain (CMP) patients for muscular endurance in the right quadriceps muscles. All subjects were matched for age, sex, height, weight, and peak torque. The results of this study indicated that the FM patients fatigued faster (11 repetitions) when compared to the CMP patients (18 repetitions). The fatigue difference between the two groups was found to be significant at
p < .005. With the FM patients, the decreased endurance translated into decreased activity levels. The reason this study is important is that it demonstrates to the clinician the role physical condition has in FM patients.

The physical therapy clinician treats a patient's pain with modalities until such time that an exercise program may be started. Current research indicates that exercise may be a more appropriate treatment than modalities.

Researchers analyzed the effect of supervised cardiovascular fitness training on FM patient's pain level. Forty-two patients with fibromyalgia were randomly placed into two groups, one group receiving 20 weeks of cardiovascular fitness training (CFT) and the other group received 20 weeks of flexibility exercises (FLEX). Both the groups met three times a week for 60 minutes of exercise. The results of this study indicated that patients in the CFT portion of the study had better overall pain scores than the FLEX group. The total number of painful areas on the patient's body did not change for either group. The difference between the groups was in the sensitivity of the painful areas. This study, however, did not utilize a control group. Flexibility exercises may not raise the heart rate to the aerobic level, but they may have a therapeutic effect.

Biofeedback has been used to change the number of tender areas found on the patient. Biofeedback measures skin conductance. As the patient's exertion level increases, the skin conductance increases. A biofeedback machine reports the increased exertion level as an increasing series of beeps.
or lights on a visual analogue scale. By teaching the patients to control the frequency of beeps on the biofeedback machine, you can either strengthen or relax a particular muscle or group of muscles.

Biofeedback is used with FM patients to relax a muscle or muscle group. Electrodes of the biofeedback machine are placed over a tense muscular area the patient is asked to relax. As the patient relaxes, the frequency of the beeps should decrease or the visual analogue scale should go down.

Biofeedback training was utilized on 15 patients with FM. The goal of the training was to reduce the patient’s pain, the number of tender points, and the level of morning stiffness. The patients underwent 5 training sessions in biofeedback over a five-week period. At the end of the five weeks, nine patients had significant reductions in the amount of pain, number of tender points, and the level of morning stiffness. Six months later, the improvement noted by these patients was still evident. Because this study used a small number of subjects, the authors recommended further study on a larger group.

Treatment of FM is made more difficult because we do not understand what causes the condition. Exercise offers the best treatment option because with exercise you can alter the patient's perception of the pain and his/her attitude about the future. Even if we cannot change the condition, we can improve the patient's quality of life, and our physical therapy treatment has achieved a desired goal.
CHAPTER VII

SUMMARY

Fibromyalgia is a condition that is estimated to affect three to six million people in this country. The diagnosis of FM is made by evaluating tender points, sleep patterns, and the absence or presence of morning stiffness. Work with patients who have sleep disturbances has led researchers to theorize that a serotonin deficit may be the cause of the FM.

Because the cause of FM is not known, the appropriate treatment for the condition has also been elusive. Current research indicates that aerobic conditioning and drug therapy may give the best relief of symptoms.

The long-term outcome for people with FM is quite variable. If the patients are able to get into good physical condition, the chances are that they will be able to manage their symptoms. If the patients are deconditioned and unable to improve their physical condition, the outlook is not very bright.

Physical therapy offers FM patients the best chance to manage their symptoms. The physical therapist can educate, encourage, motivate, and help patients improve their level of function. It is through knowledge and physical skills that the FM patients can reclaim their lives and manage the condition.
REFERENCES


