

Psychological Recovery in Fibromyalgia Patients through Pain Visualization

NISHIMURA Mio

Digital Hollywood University ,Graduate School

Fibromyalgia is characterized by chronic, widespread pain, the complexity and individuality of which often complicate treatment. In this study, Riessman's narrative analysis was employed to explore the pain experiences and associated psychological changes in three patients with fibromyalgia. By utilizing onomatopoeia and graphics to visualize pain, common themes were identified from the narratives, which were then analyzed in relation to the patients' psychological backgrounds. The findings suggest that while pain tends to increase and become more complex over time, the rate of progression and methods of recovery vary significantly between individuals, underscoring the need for personalized treatment approaches. Additionally, the study highlights that the visualization and verbalization of pain, along with its externalization, may enhance self-efficacy and contribute to more effective pain management in fibromyalgia patients.

1. Introduction

Fibromyalgia has a prevalence rate of approximately 1.7% in Japan, making it a relatively common condition, even when compared to rheumatoid arthritis, which has a prevalence of about 0.6-1.0%^{[1][2]}. However, due to the lack of specific abnormalities detectable in blood tests or imaging, the diagnosis of fibromyalgia is often delayed in Japan. This chronic condition is characterized by widespread pain throughout the body, severe stiffness, intense fatigue, sleep disorders, depression, and memory impairment, with symptoms persisting for over three months. Additionally, the intensity and location of pain in fibromyalgia can fluctuate daily, and patients often experience multiple types of pain simultaneously. This variability can distort sensory and cognitive functions, leading to persistent pain that causes hypersensitivity and sensory dullness, making it extremely difficult for patients to comprehend and articulate their pain to others.

This study examines the progression of pain in fibromyalgia and investigates how patients' psychological responses to their pain affect their sense of self-efficacy and self-acceptance, using three case studies as examples. We also analyze how these patients verbalize and manage their pain, comparing the results with previous studies.

Previous research has provided insights into the expression of pain and the enhancement of self-efficacy. Takahashi et al. explored the ways in which patients with chronic pain use onomatopoeia to express their pain in a large-scale survey of 170,000 people in Japan, and showed that onomatopoeia is an effective means of communicating the nuances of pain to others^[3]. Lorig et al. found that self-management programs for chronic diseases contribute to improving patients' sense of self-efficacy and self-affirmation, particularly through the verbalization of symptoms, which increases the sense of control over the disease^[4]. Melzack emphasized the highly subjective and individual nature of pain, exploring the impact of visualizing pain on patients' psychological organization, and showed that visualized pain can serve as a tool for self-understanding and contribute to pain management.^[5] Pennebaker demonstrated that verbalizing emotions can foster empathy and alleviate feelings of isolation, further highlighting the impact of verbalization on emotional organization and

psychological health^[6]. These studies suggest that the emotional resonance created through the verbalization and visualization of pain may provide psychological support for patients.

The aim of this study is to clarify how the verbalization and visualization of pain contribute to enhancing self-efficacy and self-affirmation in patients with fibromyalgia. While previous research has shown that these methods can influence psychological organization and pain management, many aspects remain unclear, particularly in the context of fibromyalgia.

2. Objectives

This study aims to evaluate how the process of verbalizing and visualizing pain by patients with fibromyalgia helps them understand the complexity and diversity of their pain and how this contributes to their psychological recovery. Additionally, the study examines the impact of patients sharing their pain with others on their self-efficacy and overall mental health.

3. Methods

3.1 Online Lecture on Pain

On July 6, 2023, an educational lecture on the fundamentals of pain was delivered via YouTube to an audience of chronic pain patients. This 45-minute session provided a comprehensive overview of the different types and mechanisms of pain, covering topics such as the functions of nerves and synapses, the role of sensory receptors, as well as distinctions between neuropathic pain, nociceptive pain, and alterations in pain modulation^[8].

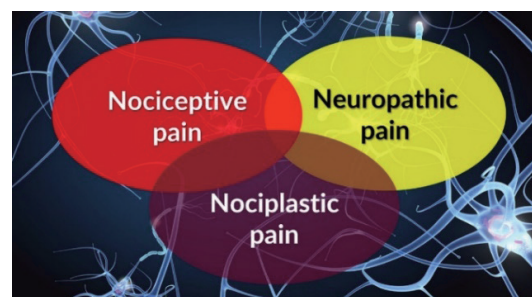


Figure 1: Classification of Pain by Pathology

(a) Neuropathic Pain

This type of pain results from nerve damage due to various causes, including spinal cord injury, stroke, vasculitis, diabetes, infections, or chemotherapy. Common conditions associated with neuropathic pain include sciatica, postherpetic neuralgia, phantom limb pain, and cervical spondylosis.

(b) Nociceptive Pain

This pain is triggered by tissue damage and is mediated by receptors responding to thermal, mechanical, or chemical stimuli. It typically manifests as part of the inflammatory response, characterized by swelling, redness, heat, and pain. Common examples include fractures, rheumatoid arthritis, and appendicitis.

(c) Nociplastic Pain

Nociplastic pain occurs due to altered pain perception or functional changes in the nervous system, even in the absence of actual nerve damage or tissue injury. This category includes conditions such as fibromyalgia, complex regional pain syndrome (CRPS), unexplained lower back pain, and irritable bowel syndrome.

3.2 Verbal and Visual Expression of Pain

Following the lecture, participants were provided with "pain cards" designed to aid in the visual representation of their pain. They were encouraged to begin creating their cards, with the understanding that each participant would present their work in a free-form presentation approximately three weeks later. The pain cards were developed using the Japanese version of the McGill Pain Questionnaire^{[7][8]} as a foundation, incorporating onomatopoeia and visual graphics. There were 22 distinct types of pain cards available.

Onomatopoeia, particularly effective in Japanese for conveying sensory experiences and conditions intuitively, played a central role in the design of these cards. For instance, the word “zuki-zuki” conveys the rhythmic, throbbing nature of certain types of pain, while “hirihiri” suggests a sharp, burning sensation. The design of these cards was deeply influenced by the author's personal experiences as a fibromyalgia patient, with a focus on capturing the polysemy and figurative aspects of pain.

By using colors to visually emphasize the characteristics and sensations of each type of pain, observers can intuitively understand what kind of pain it is just by looking at the color. Utilizing color theory makes the visualization of pain even more effective. Figures 2 through 5 show the types of pain and a color used for each type of pain.

- The pain types are color-coded as follows
- Yellow: Neuropathic pain (Figure 2)
- Gray: Dull Pain (Figure 3)
- Red: Nociceptive pain (Figure 4)
- Navy: Psychogenic Pain (Figure 5)

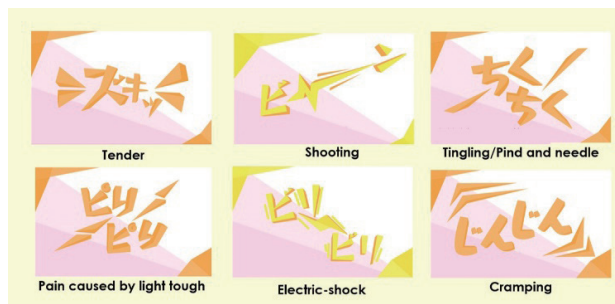


Figure 2: Pain cards in yellow for Neuropathic pain

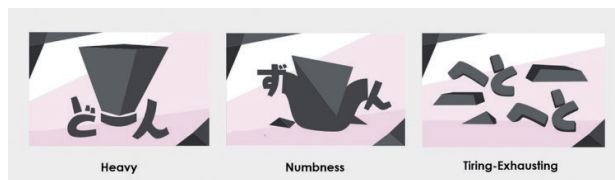


Figure 3: Pain cards in gray for Dull pain



Figure 4: Pain cards in red for Nociceptive pain

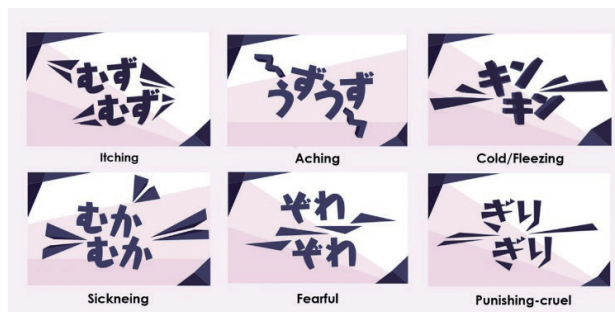


Figure 5: Pain cards in navy for Psychogenic pain

3.3 Patient-Led Pain Analysis Presentation Event

Between July 27 and August 10, 2023, we conducted a closed online event titled the “Pain Analysis Presentation Event” on three separate days. This event featured 20 participants (16 women, 4 men), of whom 8 presented their personal pain experiences. The presenters included 5 patients with fibromyalgia, 1 patient with sciatica, 1 patient with anterior cutaneous nerve entrapment syndrome, and 1 patient with post-marathon muscle pain. The primary objective of the event was to empower participants to gain a deeper understanding of their pain by expressing it visually through onomatopoeia and graphics and then articulating these expressions to others. Prior to the presentations, participants were assured that “the content you will present today is derived from your own analysis and interpretation of your pain, and there is no possibility of error, so please proceed confidently with your presentation.” This assurance was intended to create a psychologically safe environment, encouraging participants to present with confidence.

This study focuses on analyzing the pain experiences and related psychological changes of three fibromyalgia patients from the event, employing two analytical approaches: visual analysis and thematic analysis based on Riessman's narrative analysis method.

(a) Visual Analysis

This method interprets the nature and intensity of pain as depicted in the visual representations created by the patients. It enables an understanding of how pain evolves, becoming more complex and severe over time, as captured through the patients' visualizations.

(b) Thematic Analysis

This method involves extracting common themes from the patients' narratives and interpreting them within their broader context. Thematic analysis provides insights into how visualizing pain impacts the psychological state of patients.

Initially, we gathered detailed narratives from each patient, focusing on the progression and changes in their pain, their methods of self-expression, and coping strategies as presented during the event. These narratives were then organized and evaluated using visual analysis to assess how the pain was visually represented. Following this, thematic analysis was used to extract recurring themes, which were subsequently categorized into key elements such as psychological changes, pain visualization, and social isolation. These themes were then interpreted in relation to the patients' psychological contexts.

4. Results

Case 1: 43-year-old woman with a 27-year history of fibromyalgia, expressing pain progression using onomatopoeia and graphics

This patient's medical history reflects a severe and progressive chronic pain journey. Diagnosed at 15 with Complex Regional Pain Syndrome (CRPS) and Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS), she initially experienced deep, weather-sensitive pain in her knees, hips, and right shoulder. Over time, this evolved into sharp, electric shock-like sensations, along with burning and stabbing pain from even light touches.

By 23, her condition had escalated to fibromyalgia, resulting in relentless 24-hour pain across her body, likened to the sensation of bones being broken with an axe. This pain was exacerbated by external factors like wind, clothing, and even her own voice vibrations, leading to complete physical dependency. Now, at 43, after 27 years of struggle, she is bedridden, classified as PS 9, and requires full assistance for all daily activities.

Visual Analysis

The visualization of this patient's pain provides a clear depiction of how her condition has become more complex and intense over time. Initially, the primary symptom was represented by a throbbing pain, but as her condition progressed, sharper and more persistent pains, described as "jirigiri" and "gan-gan," were added to the mix. This evolution illustrates the transition of her pain from a manageable physical discomfort to an overwhelming sensation that dominates her entire body. The use of darker colors and bolder text in her illustrations represents the escalating severity and persistence of her pain. This visual shift conveys that the increasing intensity is not merely a function of time passing;

instead, the very nature of her pain has altered, transforming it into a more invasive and dominating experience. The dark hues, particularly reds and blacks, further highlight the gravity of her situation, symbolizing the intense psychological burden and feelings of hopelessness she endures.

Theme Analysis

The patient's narrative underscores the significant psychological toll that accompanies the progression of her pain. Initially, her pain was somewhat manageable, but as it became more complex and pervasive, it evolved into a relentless, 24-hour ordeal. This progression had a profound impact on her mental well-being, with feelings of hopelessness and loneliness intensifying as her condition worsened. The continued deterioration of her physical abilities, coupled with the constant presence of pain, led to a significant decline in her quality of life. Her attempts to find solace in playing the flute—a small psychological refuge - became less effective as her pain intensified, leaving her with limited coping mechanisms. Additionally, her expression of the pain as a "thud" that pierced her heart, due to the lack of understanding from those around her, highlights the deep emotional impact of both the pain and the associated isolation. This sense of being misunderstood contributed to a decline in her sense of self-efficacy and hindered her psychological recovery.



Figure 6: Pain illustration by the 43-year-old Woman with 27 Years of Fibromyalgia

Case 2: 60-year-old woman - Visualizing complex pain with icons and onomatopoeia

A 60-year-old woman who has endured fibromyalgia for 30 years, with grip strength below 10, is so physically weakened that even mild exertion like walking causes post-exertional fatigue, leaving her bedridden for 80% of the day. She only leaves the house once or twice a month for medical appointments. She vividly depicted her complex, multilayered pain that radiates throughout her body using icons and onomatopoeia, with illustrations of the human body as the focus.

During this excruciating pain, she experiences a profound sense of loneliness and sadness, feeling that those around her do not fully comprehend the depth of her suffering.

Visual Analysis

The patient's pain is depicted with intricate visual detail, highlighting its complexity and multi-layered nature. Onomatopoeic expressions such as "gabū" and "garigari" vividly convey the gnawing and scraping sensations around the collarbone and shoulder blade. When this pain extends to the sciatic nerve,

it is visualized as a shock-like sensation described as “bean.” This layered representation illustrates the progression of pain, showing how different sensations overlap and intensify, creating a compounded experience for the patient.

Additionally, the curvature of the spine, caused by the weakening of visualized with the expression “boom!” Although this pain is extremely intense, it is sometimes overshadowed by other layers of pain, revealing the daily struggle of the patient. The coldness in her muscles, akin to lying on an ice sheet, is effectively portrayed with onomatopoeic words like “zoon” and “dawn.” These visuals emphasize the multi-layered nature of her pain and demonstrate that visual representation is crucial for a deeper understanding of her experience.

Theme Analysis

Three primary themes emerged from the patient's narrative:

1. Progression and Multi-layered Pain

The patient's pain has grown more complex and multi-layered over time. Different types of pain interact and intensify her overall suffering. This multi-layered accumulation of various sensations severely impacts her life, indicating that her pain is not a singular experience but a compounded burden that worsens with time.

2. Psychological Impact and Loneliness

The narrative reveals a deep sense of loneliness and sadness. The phrase “I'm smiling on the outside, but crying on the inside” encapsulates the significant psychological toll her pain takes on her. Her sense of isolation exacerbates her psychological burden, suggesting that this loneliness is a barrier to her mental recovery.

3. Impact on Daily Life

Muscle stiffness and spinal curvature severely restrict the patient's ability to perform daily activities. These limitations further intensify her psychological distress. This case underscores the importance of pain visualization in understanding the complexity of the patient's experience and highlights the crucial role of psychological support in pain management.

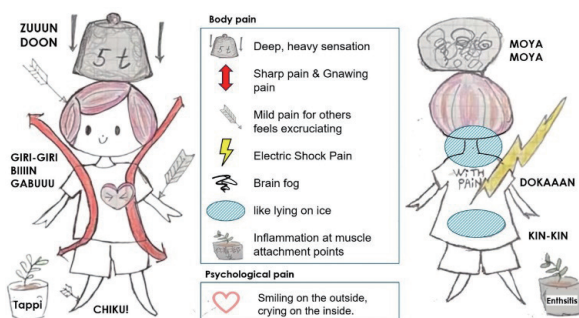


Figure 7: Pain illustration by 60-year-old Woman with 30 Years of Fibromyalgia

Case 3: A 65-year-old Woman Who Used Onomatopoeia and Body Icons to Express Eight Different Types of Pain

This 65-year-old woman has been living with fibromyalgia for 8 years and works part-time as a lecturer (4 days a week, 4-5 hours a day). She identified and categorized her pain into eight distinct types, using onomatopoeic words to describe each one. To capture the holistic nature of her pain, she employed color-coding

to represent different body parts and used sensory descriptors like cold, hot, and pressure to convey the texture of her pain. Her self-analysis involved tracking the onset and management of each pain type, offering valuable insights into her coping strategies. This case underscores the importance of personalized pain management strategies and highlights the significant impact chronic pain can have on an individual's quality of life.

Visual Analysis

The patient uses onomatopoeic words to vividly depict eight different pain sensations, effectively visualizing each pain and its management. The use of color and shapes in the graphics offers a detailed portrayal of the pain's texture, location, and intensity. For example, the sharp, persistent pain described as “zuki!” is shown in deep red, indicating a concentrated pain in a specific area. The expression “zowazowa,” representing muscle coldness, is illustrated in blue, conveying the sensation of cold spreading throughout the body. These visuals help provide a more concrete understanding of how the patient experiences pain, making it easier for medical professionals to assess its complexity. Moreover, the use of color and design also reflects the patient's joy in finally being able to express her pain, which had previously been difficult to communicate. This visual expression not only highlights the severity of the pain but also the patient's sense of achievement and the anticipation of smoother communication with others.

Theme Analysis

Two main themes emerge from the patient's narrative: “pain diversity” and “self-management.” The theme of “pain diversity” is evident as the patient uses onomatopoeia to describe various sensations and details how each type of pain affects her daily life. The narrative illustrates how diverse and complex the pain is, and how much it restricts her daily activities.

The theme of “self-management” is also prominent, as the patient experiments with various methods to manage her pain. Her narrative reveals that she is trying treatments such as trigger point injections, acupuncture, and cryotherapy, and that her sense of self-efficacy is growing as she discovers coping strategies that work for her. Her statement, “there are times when the pain makes me lose confidence, but I have been able to cope with it in my own way,” highlights her successful efforts to manage her pain and the psychological achievement she feels as a result. It is clear that her psychological recovery has been supported by her ability to manage the diversity of her pain through self-management techniques.

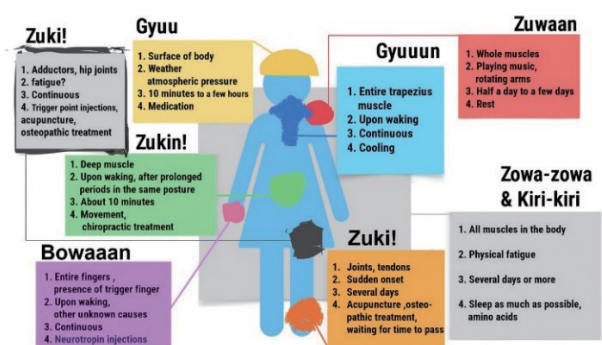


Figure 8: Pain illustration by 65-year-old Woman with 8 Years of Fibromyalgia

4. Discussion

4.1 Individuality and Multi-layered Structure of Pain

The experience of pain in fibromyalgia is highly individualized, as evidenced by the three cases in this study, which also suggest that pain has a complex, multi-layered structure. We will discuss these themes of “individuality of pain” and “multi-layered structure of pain” in comparison with previous studies.

Firstly, regarding the individuality of pain, as shown by Lorig^[4], the way chronic pain patients perceive and manage their pain varies greatly from one individual to another. Similarly, in this study, while the patient in Case 1 experienced an increase in complexity and intensity of pain over time, the patients in Cases 2 and 3 were able to identify different types of pain and find ways to manage each one. These differences are attributable to the patients' life experiences and perceptions of pain, emphasizing the highly individualized nature of pain experiences. However, what was consistently observed across the three cases was the presence of a “multi-layered structure” of pain.

This phenomenon, where multiple types of pain coexist and are perceived as distinct sensations, aligns with Melzack's “matrix theory of pain.” This theory suggests that pain is not a singular sensation but rather a complex mixture of sensory, emotional, and cognitive elements.^[5] In light of this theory, the “multi-layered structure” observed in this study indicates that patients' perceptions of pain are complex and layered, making pain management particularly challenging.

4.2 Enhancing Self-Efficacy through Metacognition of Pain

The process of visualizing and verbalizing pain using onomatopoeia, graphics, illustrations, and colors enabled patients to “externalize” their pain and view it objectively. This externalization triggered a metacognitive effect, allowing patients to observe and understand their pain from a more detached perspective. This process helped them feel that their pain was under their control, contributing to an improvement in self-efficacy. Melzack also emphasized the subjectivity of pain, suggesting that visualization can complement this subjectivity by providing a more concrete understanding^[5].

The metacognitive approach through visualization and verbalization provided patients with a “map” of their pain, helping them to organize it more concretely and find appropriate coping strategies. As a result, patients better understood the complexity of their pain and found it easier to develop strategies for managing it. This aligns with Pennebaker's findings that visualization and increased self-efficacy are closely related. Such an improvement in self-efficacy is crucial for effective pain management, as it supports patients in achieving psychological stability while living with pain^[6]. This process not only contributed to an increase in self-efficacy but also deepened patients' understanding and management of their pain, potentially leading to an improvement in their quality of life.

4.3 Social Isolation and the Role of Sharing and Empathy in Pain

Social isolation experienced by fibromyalgia patients arises not only from the pain itself but also from the lack of understanding from others. Pain is a subjective experience, and in fibromyalgia, its severity often goes unnoticed due to the lack of visible signs or diagnostic markers, making patients more susceptible to

feelings of loneliness and misunderstanding. In this study, it was observed that when patients visually expressed their pain using onomatopoeia and illustrations, communication with others was facilitated, and feelings of isolation were alleviated, as reflected in the patients' more relaxed expressions.

Non-verbal tools such as onomatopoeia and graphics proved effective in conveying pain that is difficult to describe verbally. This allowed patients to communicate their pain more effectively to others, reducing their psychological burden through empathy. The assurance that their pain was understood contributed to an improvement in self-affirmation and self-efficacy. Pennebaker et al. demonstrated that verbalizing emotions and experiences contributes to psychological well-being, and this study confirmed that non-verbal means can have a similar effect when verbalization is difficult^[6]. Sharing pain with others not only alleviated feelings of isolation but also promoted an increase in self-efficacy. This process is a critical element in pain management and psychological recovery, indicating that social support plays a significant role in treatment.

Overall, the sharing and empathy of pain are essential in preventing social isolation and promoting psychological recovery in fibromyalgia patients. The use of non-verbal tools in pain expression plays a crucial role in achieving this.

5. Conclusion

This study explored how the process of visualizing and self-analyzing pain among fibromyalgia patients can lead to new interpretations and expressions of their pain, and how this contributes to psychological recovery. The use of onomatopoeia and graphics allowed patients to perceive and communicate their pain more concretely and visually. This process of visualization and verbalization functioned as a means to externalize and objectively understand their pain, which contributed to the enhancement of their self-efficacy and self-affirmation. By providing a foundation for organizing the complexity of their pain and finding appropriate coping strategies, patients were better able to manage their pain. Additionally, being able to interpret and express their pain enabled patients to share their experiences with others, reducing their sense of social isolation. These processes were shown to be not only tools for pain management but also essential for promoting psychological recovery.

However, it is important to note that this study was limited to three cases, and thus, generalizing the results requires caution. Future research should focus on a more diverse group of patients, examining how cultural backgrounds and individual personalities influence pain interpretation and management. This will help establish more effective and comprehensive treatment approaches for fibromyalgia patients.

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