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Review Article

Feldenkrais method and movement education – An alternate therapy in musculoskeletal rehabilitation



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ABSTRACT

Introduction: Feldenkrais method (FM) is a movement education technique that emphasizes movement teaching based on sensory motor awareness and cognitive perception of the movement. Although this technique gained popularity in different parts of the world, it is still regarded as a non-conventional science.

Aim: Absence of in-depth review and high quality scientific studies in this technique necessitates the need for generation of knowledge and scientific review on this efficient method.

Discussion: This current review paper made an effort to provide conventional scientific explanation about this method that suits the medical paradigm. In this paper, a brief introduction followed by description of the technique is given with a clinical example toward its application. Furthermore, the neurophysiologic explanation and mechanical concepts are provided in the conventional scientific manner. Indications, contra indications and clinical implications were also discussed to accommodate the clinical practice in musculoskeletal rehabilitation.

Conclusions: Feldenkrais exercises can be used as an alternative therapy in musculoskeletal rehabilitation for movement education.

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1. Introduction

Feldenkrais technique is an art of movement that emphasizes control and coordination of movement and function through reeducation of sensory motor system.¹ It is an educational

system for movements guided by proprioception, sensation, control and coordination of movement.¹ The principle behind the technique is to perform movement with minimal effort and maximum efficiency. Movements performed using this technique are referred to Feldenkrais method (FM). Moshe Feldenkrais, a Israeli physicist, dedicated to the observation of

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movements in the perspective of biomechanics and neurophysiology developed FM.² Through his knowledge in physics and as a judo martial artist, he hypothesized the mechanics of movement in environments similar to the principle of systems theory and the neurophysiological adaptation similar to the concept of cybernetics. Feldenkrais regarded cybernetics as a control theory that has automatic control and communication system between the nervous system, brain and musculoskeletal system toward execution of movements. He viewed that the human motor pattern is self-organized and guided as per the dynamical system determined by cognitive, psychological and physical state of an individual in the environment.³ Therefore, FM reminds the body and mind about the body parts that are not integrated or dysfunctional during their functional movements or habitual actions. Thus, in FM, individuals are made to explore their own body parts, its control and coordination through guided and structured movements. Through FM, individuals become aware of the finer differences in the movement patterns through explorative learning of their movements through sensory motor system.

In the FM, the instructor who teaches the technique is referred to as a practitioner or a teacher. The individual who will learn the technique is referred to as client or student. As it is an art or an educational system to learn mastery of movements, it carefully avoided the usage of the terms clinicians and patients. The aim of the technique is to provide an individualized feeling and experience of movements. In this process, the client or student will be allowed to explore the movement patterns through finer movements, smaller movements, movement variations and sequences, breathing variations, body contact, movement effort, etc. and how these affect their own movement performance. Thus, the student gains supremacy in regulating and correcting their own wrong movement patterns as an explorative learning process. Hence, the role of a teacher in FM is to create an atmosphere for the student to learn to move through less resistance and more efficiency. In other words, one would say that FM is an art rather than a treatment technique. It is for the same fact that FM is seen as a non-conventional science as a conventional scientific epistemology weakly exists.⁴ However, with more research emerging that is exploring the benefits of FM, there appears to be a surge of interest among the medical community for this artistic movement technique.

2. Aim

The main aim of this review is to highlight a scientific paradigm for FM, present the details of techniques, and explore neurophysiologic principles, mechanism of action and its application to the field of rehabilitation.

3. Discussion

3.1. Feldenkrais technique

The conception of practice in FM is to enhance the attention and awareness of individuals about their movements.⁵ In

order to achieve this, two basic techniques of movement sessions were usually performed in FM. Feldenkrais coined the term for the first technique as “awareness through movements” (ATM) and the second technique as “functional integration” (FI).¹ Both of these two techniques were usually taught in supine lying initially to eliminate gravity and for better proprioceptive awareness for the students. Subsequently, the movements are performed either in sitting or standing and progressed to functional movements once the student masters the self-exploration of the movement. Each movement class lessons would take about 30–45 min generally. Fundamentally, the student would perform a basic movement and self-explore to learn changes and variations in the movements with relation to the other side, other body parts and to that of the environment. Feldenkrais believed that this way of movement learning might eliminate extra unnecessary effort and ineffectual movement patterns.²

The ATM technique comprised a series of structured movement lessons. The movement class was usually performed in larger groups of clients. In the beginning of the classes, the students or clients would do small, gentle, simple movements based on developmental motor patterns.⁶ In later sessions, these developmental movements would be integrated to movements resembling everyday functional activities.⁶ In fact, during all the movement lessons the students would be prompted and made to self-explore the joint, muscle and postural relationships to gravity and environment.⁶ In order to achieve this, the Feldenkrais instructor or practitioner would lead the students using verbal instructions to a series of movement sequences intended to improve body awareness and organization of movements.^{7,8} All the students would perform the movements as per the instructions of the practitioner. The students would be required to do the movements at their own pace and own style. Furthermore, they would be instructed to do the movements as much as it is comfortable, easy and smooth for them. On many occasions, the students were called upon to witness the movement patterns among themselves. During such a session, either the students or the instructor did not give any specific comments to the individual who was performing the movement. Neither would they attempt to correct any wrong movements nor would they demonstrate a right movement to the individual.

Hence, one should not anticipate any active feedback from the practitioner toward correcting movements during a Feldenkrais movement class. In reality, this lack of extrinsic feedback was mentioned as an intentional strategy in the FM to stimulate exploratory learning.⁷ Nevertheless, the practitioner would ask a series of meaningful questions to the students during the movement classes to facilitate movement perception and kinesthetic awareness ([Appendix 1](#)). The purpose of these questions were to arouse the thought process among the students on proprioceptive alertness, temporal-spatial consciousness of body-movement, sensory motor awakening and mind-body-movement relationship.⁷ It was suggested that this cognitive approach facilitates strategies for movement organization and learning.^{7,8} Thus, the students would be prompted to discover and learn the best movement pattern which they felt had yielded them a smooth and easy movement. In FM, this cognitive process of stimulation was

referred as “intrinsic feedback,” which the students usually would experience.

Taking into account a functional activity such as driving a car, individuals might need to turn their neck to look at the back while reversing the car. In an ATM movement lesson, the student might be asked to perform such a simulated functional movement while the practitioner was observing the movement pattern. Then, instead of initializing the movement from the pelvis or the thorax with a controlled breathing, the client might turn the neck alone to perform that simulated movement. Clinically, it is believed that this uncoordinated movement had accounted for various musculoskeletal ailments and pain syndromes. Feldenkrais practitioner would then make the students aware of this ineffective movement pattern by giving an intrinsic feedback through questions structured on the movement patterns. In this case, the Feldenkrais practitioner would never tell the student to turn back the pelvis and thorax first, before they turn the neck. Instead, the students would be asked to perform a movement lesson whereby the students need to turn back their necks repetitively. The students would be asked to feel how their body moves, which part of the body moves first, the distribution of body weight on buttocks, breathing pattern during movement, etc. Thus, awareness about movement would be delivered first which might help the student to practice the movement eventually identifying an improved movement pattern. A series of movement lessons would be delivered taking into account all body segments and coordinated movement patterns associated with the functional task, in this case, a functional activity turning the neck to reverse the car. Further progression of the movements is achieved by increasing the speed of the task, adding complexity of the movement patterns, reversing the movement patterns, altering the sequence of the movements and incorporating multiple functional activities.⁹ In principle, most prescribed movement tasks were meant to reprogram the wrong habitual movement habits among the clients.⁹

The second technique in FM was FI. While ATM is usually done as a group, FI is normally done as individual lessons on a one to one basis. Most of the lessons would be performed in supine lying position and progressed later into different positions such as sitting, standing, etc.¹⁰ FI lessons comprised kinesthetic stimulus to movement patterns generally guided by the practitioner using gentle touch on the client's body to facilitate meaningful movements or movement patterns. The principle of FI was based on the sensory-motor feedback loop created by tactile and kinesthetic stimulus to the movements.⁶ However, the practitioner would not forcefully change the movement exhibited by the client, instead, reinforcing and facilitating the movement to happen without burden. This would help the client to realize tension experienced during movements and actuate to perform movement with ease.¹¹ By practicing this, certain maladaptive movement behavioral traits such as clenching teeth, holding the breath, tensing the muscles, etc. would be eliminated.¹¹ Eventually the client would feel more of the skeletal movement integrated with smooth flow of breathing and less of muscular work to cause movements.^{10,11} This was similar to moving with least resistance or moving with ease which provides the basis for the learning of new easier movement patterns.

3.2. Neurophysiologic explanation to FM

Absence of controlled trials and direct evidence on the neurophysiological mechanisms of FM depicted this technique as non-conventional science. However, available evidence from the theories of cognitive science and neurobiology was presented in this section to provide a scientific explanation to FM. The basics of FM was framed as per systems theory and cybernetics. In this context, human body or behavior of joints and/or muscles are regarded as a dynamic system.¹² The movement patterns emerging from this dynamic system were considered as the interaction of the dynamic system with the environment.¹² The interaction of movement with environment was perceived and regulated by sensory motor system referred to as cybernetics. Fundamentally, human brain is developed by a complex integration of sensory and motor neurons called sensory motor system (SMS).¹³ The main function of the SMS is to store and process sensory information to direct motor behaviors.^{13,14} Moreover, SMS was suggested to interact with a wide variety of environmental dynamics through neuro-proprioceptive pathways in order to produce the desired movement outcomes.¹⁵ This continuous interaction between human system, movements and the environment was reported to occur through a sensory motor loop.¹⁶ It might be said that this sensory motor loop facilitates the cognizance of the human system about the different movement interactions with the environment which is continuously printed as proprioceptive maps in the SMS. Any learning of new movements would be added incrementally into this SMS. Thus a cognitive map of movements is created and categorized based on motor proprioceptive prints from which movement patterns are generated.^{12,15} Detailed explanation about this process of motor system categorization and pattern creation are well discussed in neurobiology and developmental psychology literatures.¹²

In FM, when the client was made to self-explore stress and easiness in the movement pattern, differentiable meaningful motor patterns were believed to be generated and perceived by the SMS. Evidence from motor control theories suggested that these meaningful motor patterns were transformed into new motor behavior.^{17,18} Hence, the client would be able to differentiate excessive strenuous movements and learn to pursue movements with less resistance. Furthermore, studies had already proven that learning novel motor skills was accompanied by functional reorganization of motor system including the primary motor cortex.¹⁹⁻²¹ Neurophysiologic evidence also stated that such coordinated repetitive synchronized movements were capable of inducing anatomical and physiological neural plasticity at somatosensory cortex in response to this new motor experience.²²⁻²⁴ Furthermore, functional magnetic resonance imaging of the brain suggested that such neuronal plasticity occurred in primary motor cortex after three weeks of movement training.²⁵ Therefore, based on the concept of neurobehavioral training, it might be postulated that skill based movement training in FM was related with improved cortical sensitivity and efficient movement behavior.²⁶ Similarly, the explorative learning strategy in FM could be involved in the perception, correlation, integration and coordination of the best movement pattern for the client. In this case, it was mentioned that the brain would be able to make fine

sensory-motor discrimination to improve neuromuscular organization. Thus it was suggested that after FM training, the client was skilled to generate an efficient movement by learning to include previously unconsidered body parts into new whole body movement patterns.^{27,28} In summary, the above information provided a rational explanation toward a conventional knowledge in FM. For further interest and detailed knowledge, readers are recommended to read literature pertaining to the theory of neurophysiology, theory of evolution, developmental psychology and behavioral science.

3.3. Mechanical concept of FM

FM is an educational technique to improvise movements by enhancing awareness of the movements and motor control.²⁹ In other words, this technique is about moving the body with maximal efficiency but with minimal exertion.³⁰ Alternately, this concept emphasis moving the body with minimal resistance whereby the body needs to work less metabolically.³¹ Thus, energy is preserved which results in the movement becoming efficient incorporated with coordination, strength, dexterity and fastened reaction time.³⁰ In such a case, the movement could be well controlled along with the intensity, speed, rhythm and intonation of the movement.⁶ In the FM, clients would indulge their mind and body into a single entity toward movement performance, and not view them separately. This approach of single body–mind–soul unity during movement patterns helps to identify inefficient movement patterns from their everyday activities and enables them to convert these into efficient functional patterns. By becoming more aware of one's own kinesthetic sense, FM creates flexible minds rather than flexible bodies.¹

The mechanical concepts of FM is closely applicable to the musculoskeletal system, which has 90% connectivity with the nervous system.³² The central nervous system was indicated to regulate movements through its control on the skeletal system, muscles and fascia.³³ In FM, it was believed that movement should be ideally initiated and limited through the skeleton and not with the muscular interference.³⁴ Thus, when the movement is initiated with skeletal effort, it occur with least effort. However, it is viewed to occur with maximal work and tension if the movement is initiated with skeleton along with the muscular interference. Therefore, the important mechanical concept of Feldenkrais movement class would be to improve awareness to the body on reducing the unnecessary effort adapted during execution of movement. Several neuromotor educational strategies such as repetition of movement, alterations of speed and sequence of movement, incorporation of breathing, etc. would be used during the session (Appendix 2). Appendix 3, shows the basic mechanical concepts encouraged among the clients to perceive movement awareness in the movement classes.⁶ Appendix 4, indicates the usual expression by the clients toward movement awareness after they had undergone Feldenkrais session.

In a rehabilitation setting, an individual with neck pain who is presented with a habitual forward neck posture would be a good example. In terms of application of the mechanical concept of FM, the forward neck posture displayed by the individual might put the movements under undue stress accompanied by movement limitation around neck joints.

In this scenario, muscles were said to working excessively to hold the posture of the neck as the skeleton was not able to hold up and support the neck. This might result in muscle imbalances, strenuous movements with heaviness and minimal efficiency contributing to painful syndromes.¹⁰ In this case, the FM class provides an opportunity for the client to be aware of the movement dysfunction in the neck. Thus, during a movement class, the client would be encouraged to feel subconsciously the disassociation of movements at the cervical and thoracic junction and the associated compensation that occurs with the muscular system. Further sessions of movement classes would guide the client to become kinesi-thetically aware of the lighter movement patterns associated with right posture. Successive sessions would be focused on reprogramming the movement organization at SMS and thereby, helping the student to learn to move efficiently with minimal effort. Thus, it was mentioned that FM differs from other exercises as it is more on exploring the movement quality rather than working on the quantity of movement.^{3,35}

3.4. Indications and contraindications to FM

FM has never been applied for the diagnosis of any disease and not as treatment of any illness.¹ Therefore, the intention is to teach movement awareness and to improve the quality of movements. By doing so, one might say that it would help to resolve problems associated with movement dysfunctions. Literature suggests the application of this technique for movement disorders related to orthopedic, neurological, psychosomatic and anxiety disorders, for example eating disorders.^{1,6,34} The benefits of FM method were also attributed to specific populations such as professional players, athletes, musicians, dancers, martial artists, etc.¹ In this case, it might be said that the goal of the FM is to enhance movement patterns and improve movement functions. Another population which was shown to benefit from FM was patients with chronic pain. The goal of this technique in chronic pain is to teach the patients to be aware of their movement pattern and to perform their movement with ease. Evidence was available over the benefits of FM on pain management which includes improved range of motion, muscle activity, enhanced breathing pattern and positive results in functional mobility and quality of life.³⁶ It is the author's opinion that FM might be very helpful for patients with respiratory disorders as a high emphasis is placed on breathing techniques in the movement training sessions.³⁷ Studies that had reported on reduced exertion levels, improved relaxation and sense of well being might suggest that this movement technique would be appropriate for anyone who seeks a healthy life mentally and physically.^{38–40}

As per the evidence from the past studies, there was no accounted contraindications for FM.¹ However, it was recommended to stop the movement sessions if the client had complained of any pain or swelling in any of the affected joint. Presence of any ongoing inflammation might be considered in such cases for which appropriate medical intervention should be sought. Furthermore in such cases, working on the unaffected joints or movements was suggested as an alternative option.⁶ As FM involves teaching of movement awareness, it might take time for our motor patterns to change and adapt to the new movement patterns. Therefore, it might not be the

best choice of movement training strategy for someone who expects a faster recovery.⁶

3.5. Implications to clinical practice in rehabilitation

Movement patterns, coordination and control were always considered as an integral part of clients' health in medical and allied health practice. Faulty movement patterns and compensations were noticed in most of the painful conditions. Thus, evaluation and management of the motor patterns, movement compensation and movement control are seen as critical management objectives to prevent or to address problems related to joints, tendons, muscles, etc. In routine practice, mobility and motion are always regarded in terms of strength, endurance, power, agility, etc. However, understanding the concept of FM provides clinicians an opportunity to see the psychosomatic aspects of movement creation. Application of this technique and training might address the movement origin and creation in the central nervous system. Clinicians might also get accessibility to gain control of the sensory motor, neuro-developmental and behavioral aspects of movement system of the client to improve the quality of the movement. If the quality of the movement was a contributing factor for the suffering encountered by the individual, then, FM might be an effective therapy that complements the routine medical practice. Moreover talking about the holistic approach in health practice, the inter-relationship between mind and body in any suffering cannot be ignored. It should be noted that the basics of FM appeared to be one of the techniques that integrates mind and body through movement lessons in order to develop sense of holistic well being.

Perhaps, awareness of the movement should be started first before conditioning of the movement and training of the movement as the latter are widely used in rehabilitative settings. One possible direction is to start to practice and develop patterns of clinical reasoning toward movement awareness experienced by the people with mobility limitation disorders. In addition, it is worthwhile to explore movement awareness, various movement errors and unhealthy habitual movement compensations adopted by individuals with chronic pain or movement dysfunctions. The result could be beneficial to all who seek rehabilitation services. In the current health paradigm, with a large focus of research investigating how cognitive processes are related to physical health outcome, one cannot deny the fact that the interrelationship between mind and body has gained wider acceptance in medical practice.⁴¹ One could ask the question, where, what and how does FM play a part in this holistic health care practice? At this point, it must be emphasized that the available scientific evidence and proportion of research on FM remain limited. In future, well designed scientific studies and controlled trials are warranted to add strength to this beneficial technique.

4. Conclusions

FM is a movement education technique embedded with artistic creation to improve quality of movement, function and performance of the client. Theories and working

principles to support this artistic maneuver are gaining awareness and popularity. In conclusion, FM is a method of movement education which has potential positive effects in the rehabilitation of musculoskeletal conditions.

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None declared.

Appendix 1. Questions to cue explorative/intrinsic learning during movement lesson – “Bending the knee in supine lying”.

1. What do the students feel about their body in terms of its contact to the floor?
2. Where do they feel maximum contact? Which part of the body is not in contact to the floor?
3. Are you able to breathe clearly as you try to think of which part of your body is in contact with the floor?
4. Which part of the body you feel to move first? Did you notice hip to move first or ankle to move first?
5. Any differences between two sides of the body as you bend your knee on both sides?
6. Did both sides of the body have equal contact with the floor as you bend your knees?
7. Were you able to breathe freely as you bend your knee? What difference did you notice in your breathing when you bend your knees? What is their relationship?

Appendix 2. Motor educational strategies to progress and organize movement patterns.

1. Repeating the movement pattern.
2. Visualizing the movement pattern.
3. Reinforcing, constricting and interrupting movement habits.
4. Altering the speed and sequence of the movement patterns.
5. Guiding to the focus on awareness of movements rather than doing it as a goal.
6. Making best use of the available movement to stimulate proprioceptive sense rather than causing strain by excessive movements.
7. Introducing rest and pause in between the movement to prevent fatigue and distraction.

Appendix 3. Fundamental mechanical concept to emphasize movement awareness.

1. Encourage awareness of body parts that moved or did not move during a simple movement.
2. Envision body parts involved during a movement in the neural cognitive image of the client.

3. Make the clients to feel and perceive how different body parts coordinate and work during a movement.
4. Reflect on the habitual wrong pattern of movements after becoming aware about how the body parts move in any simple movement.
5. Provide the feeling to differentiate between movements which was performed with and without tension.
6. Enhance the ability of the client to appreciate the easy and hard patterns in daily functional activity through this movement awareness process.
7. Synchronize breathing all over during the movement patterns.

Appendix 4. Client response relevant to movement awareness.

1. I feel light.
2. I feel my body contact to the floor when I was lying down was more.
3. I can feel new areas of my body parts are working together in my movement.
4. I feel easy to move.
5. I feel more stable.
6. I think I am more conscious of the way I move and how movement works.
7. I am more aware that I am breathing now.
8. I become more aware of my surroundings when I move.

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