

## **A Systemic Review of Body Awareness Therapy in Patients with Musculoskeletal Disorders**

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### **Abstract**

*This study aimed to systematically review the available body awareness interventions in patients with musculoskeletal disorders. A total of 3,462 studies were searched in relevant databases using the search keywords, and six studies that met the selection criteria after review were included in the final analysis. The qualitative level of the studies was classified using the five levels of evidence-based classification, and systematic analysis was conducted according to PICO model (patient/population, intervention, comparison and outcomes). Of the six studies included in the final analysis, there were one, three, and two randomized controlled trials, non-randomized two-group studies, and case reports, respectively. Body awareness therapy was applied to patients with idiopathic scoliosis, non-specific musculoskeletal disorder, hip osteoarthritis, and amputation, who showed positive improvements after the interventions. Our results suggested that body awareness therapy is an important intervention with positive effects on the recovery of patients with musculoskeletal disorders.*

**Keywords:** *Body awareness, Body scheme, Musculoskeletal disorders*

### **1. Introduction**

Musculoskeletal diseases include chronic health disorders of the musculoskeletal system that affect the functional muscles, blood vessels, and nerves around joints [1]. Patients with musculoskeletal disorders suffer from long-term, recurrent, and persistent pain, and show significantly poorer physical and mental health than the general population [2, 3]. Among the many treatment options for musculoskeletal disorders, treatment strategies that include personalized information on treatment and exercise and emphasize increased body awareness and movement are suggested to achieve lasting therapeutic effects.

Kugel described three levels of body scheme: body plan, body awareness, and body esteem. Body plan is the aggregate of sensory and motor structures that promotes the development of body awareness, or conscious knowledge of one's own body [4]. Body awareness is defined as the first information obtained from sensory impressions, such as perception of surroundings, and is a key part of forming representations. Body esteem is the subjective opinion of one's own motor abilities and limitations, body characteristics, postures, and external features. In humans, body awareness plays an important role in learning new movements and acquiring new knowledge [5]. Patients with musculoskeletal disorders may have fixed postures or habits caused by these problems. Such patients must expand their limits of body awareness through treatment that emphasizes body

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and movement awareness. To improve posture-movement behaviors through body awareness, attention must be paid to what (and how) must be improved (body tension, posture, etc.) [6].

Body awareness therapy is a treatment model developed by Roxendal [7,8]. This body-oriented therapeutic approach uses a holistic perspective focusing on the awareness of how the body is used for functions, behavior, and interactions with oneself and others [9]. In previous studies, body awareness therapy was used for various diseases, including psychiatric disorders, personality disorders, and pain [10-12]. Although this therapeutic approach to body awareness is closely related to musculoskeletal disorders, there is currently a lack of in-depth studies that verified the effectiveness of body awareness therapy in patients with musculoskeletal disorders.

As such, this systematic literature review was conducted with the aim to investigate body awareness therapy methods and analyze the detailed interventions and their effectiveness to provide comprehensive evidence. To achieve this, we systematically reviewed the interventions related to body awareness in patients with musculoskeletal diseases.

## **2. Methods**

### **2.1 Search Strategy and Selection Process**

This study was designed to achieve a systematic review of body awareness therapy interventions in patients with musculoskeletal disorders. The search strategy was as follows: Studies published between January, 2010 and November, 2021 were searched on MEDLINE, Web of Science, Academic Search Ultimate, and PubMed databases using the keywords "body awareness", "physical awareness", or "interceptive awareness".

The inclusion criteria were: quantitative experimental design studies published in English that focused on musculoskeletal disorders and included treatment interventions for body awareness. The exclusion criteria were: studies for which the original text was unavailable that did not target humans, did not have a quantitative experimental design (qualitative, cross-sectional, review studies, etc.), did not evaluate patients with musculoskeletal disorders, and did not apply treatment interventions for body awareness.

Using the search keywords, a total of 3,462 papers were identified. Of those, 1,732 duplicates, 74 studies not published in English, and 174 studies without the original text were excluded after reviewing the title and abstract. Upon reviewing the original text, 30 studies that were not considered eligible, 6 studies that did not target humans, 949 studies that did not have a quantitative experimental design, 338 studies that did not apply treatment interventions for body awareness, and 153 studies that did not target patients with musculoskeletal disorders were excluded. As a result, a total of six studies that met the selection criteria were included in the final analysis. This study was conducted in accordance with the systematic review and meta-study PRISMA Flow chart shown in Figure 1 [13].

### **2.2 Data Extraction and Analysis**

Data were extracted from the six studies that met the selection criteria. The extracted variables included the author, publication year, number of study participants, diagnostic characteristics of the study participants, treatment intervention related to body awareness, treatment period, evaluation method, and outcome. For data analysis, the quality of the studies was classified using the five levels of evidence-based classification suggested by Arbesman and Lieberman [14]. And the selected studies were systematically reviewed using the PICO model (patient/population, intervention, comparison, and outcomes).

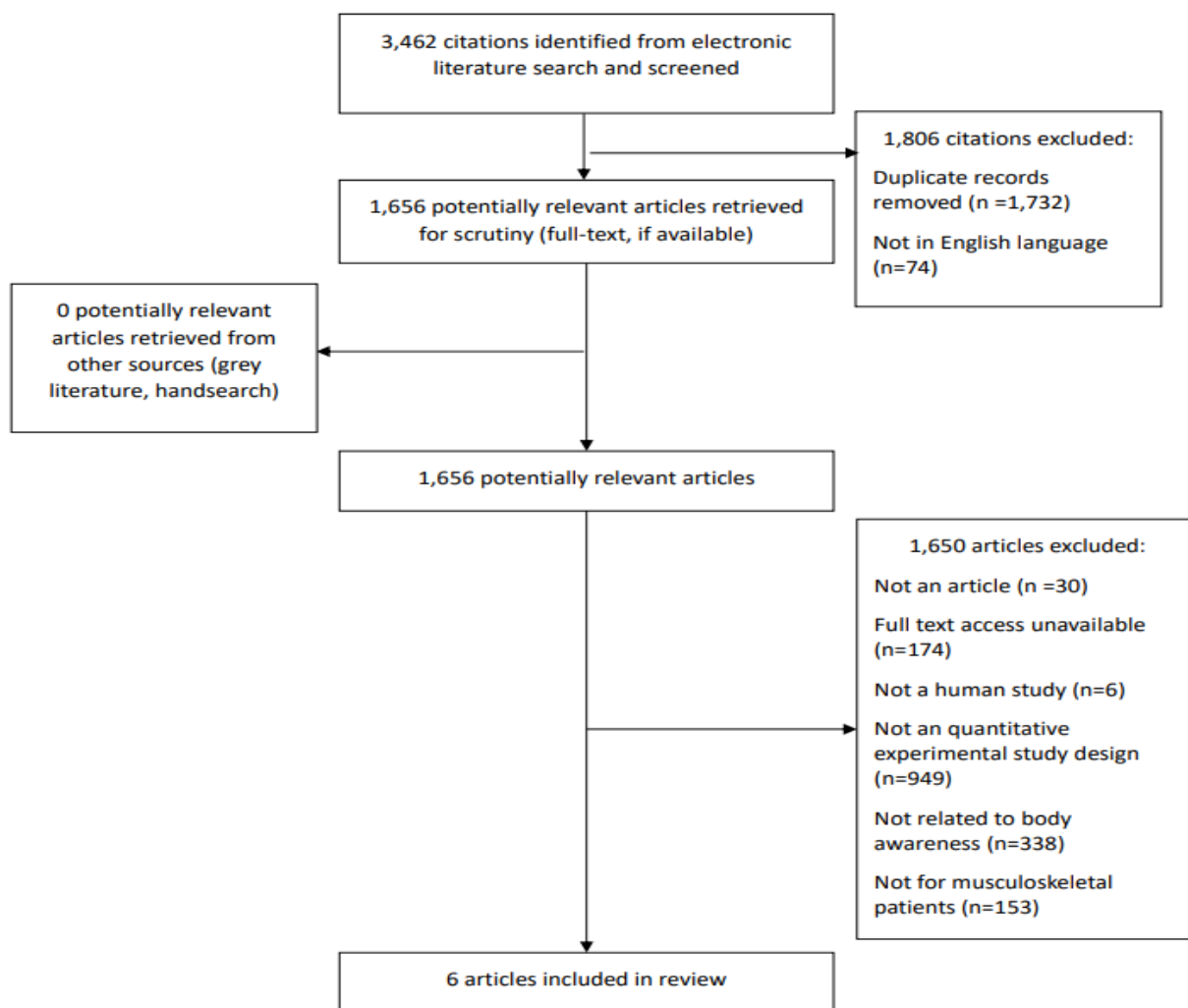


Figure 1. PRISMA flow chart

### 3. Results

#### 3.1 Qualitative Analysis of the Level of Evidence

A total of six studies were included in the final analysis. Table 1 shows the qualitative level of the selected studies using the five levels of evidence-based classification suggested by Arbesman and Lieberman (2012). One randomized controlled trials (RCTs) (16.7%), three non-randomized two-group studies (50.5%), and two case reports (33.3%) were included. Among the non-randomized two-group studies, one study compared three non-randomized intervention groups.

#### 3.2 General Characteristics of the Studies

The mean number of participants in the included studies was  $33.3 \pm 27.0$ , and the total number of participants in the studies ranged between 7 and 71. The diagnostic characteristics of the participants were idiopathic scoliosis in two (33.3%) studies, non-specific musculoskeletal diseases in two (33.3%) studies, hip osteoarthritis in one (16.7%) study, and amputation in one (16.7%) study. The two studies on idiopathic scoliosis included adolescent participants, and the other four (66.7%) studies were conducted in adults.

**Table 1. Number of Selected Articles by Level of Evidence**

Levels of quality	Definition	Frequency (%)
I	Randomized, controlled trials	1 (16.7)
II	Nonrandomized two-group studies	3 (50.0)
III	Nonrandomized one-group studies	0 (0.0)
IV	Single case experimental studies	0 (0.0)
V	Case reports	2 (33.3)
	Total	6(100.0)

### 3.3 Body Awareness Therapy

In the six studies on body awareness therapy, the most commonly used intervention was basic body awareness therapy in five (83.3%) studies [15-19]. In the remaining one (16.7%) study, various theories of body awareness therapy were combined with a conscious therapeutic approach [20].

In the studies that applied basic body awareness therapy, the treatment time per session was 60 min in two (40.0%) studies, 90 min in two (40.0%) studies, and unspecified in one (20.0%) study. The total treatment duration was 10 weeks in two (40.0%) studies, 12–13 weeks in one (20.0%) study, 3–4 months in one (20.0%) study, and 20 sessions in one (20.0%) study. In the one study that applied body awareness therapy integrated with a conscious therapeutic approach, treatment was provided once a week for 10 months with 30–60 min per session. The two studies that applied basic body awareness therapy to adolescent participants with idiopathic scoliosis reported greater improvement after basic body awareness therapy than after conventional exercise [18,19]. In the other two studies that applied basic body awareness therapy to participants with non-specific musculoskeletal disorders, basic body awareness therapy improved the outcome compared to conventional and individual physical therapy [15,16]. In one study that applied basic body awareness therapy combined with participant education to patients with hip osteoarthritis, body awareness intervention showed more positive results than patient education alone [17]. Lastly, in one study that combined various body awareness theories with a conscious therapeutic approach, patients with amputation showed improved outcomes [20] (Appendix 1).

## 4. Discussion

This study systematically reviewed the outcomes of body awareness therapy interventions applied to patients with musculoskeletal disorders to analyze the detailed interventions and their effectiveness. A total of six studies were included in the final analysis using the selection criteria. The qualitative designs of the selected studies were RCTs, non-randomized two-group studies, and case reports. In the selected studies, the diagnostic characteristics of the participants were idiopathic scoliosis, non-specific musculoskeletal disorders, hip osteoarthritis, and amputation. In the study of patients with idiopathic scoliosis, one study selected adolescent patients, while the five remaining studies were conducted in adults.

The most commonly used therapy was basic body awareness therapy [15-19]. In one study, various theories of body awareness were combined with a conscious therapeutic approach [20]. Basic body awareness therapy led to greater improvements in adolescents with idiopathic scoliosis than conventional exercise [18,19]. Similarly, in patients with non-specific musculoskeletal disorders, basic body awareness therapy led to improved results compared with conventional and individual physical therapy [15,16]. In patients with hip osteoarthritis, basic body awareness therapy combined with patient education was associated with more positive results than patient education alone [17]. In patients with amputation, various theories of body awareness integrated with a conscious therapeutic approach led to improvement [20].

Body awareness therapy aimed to normalize posture, balance, muscle tension, and stiffness. This therapy was designed to increase body awareness and included basic body awareness therapy and Mensendieck–Feldenkrais therapy [21]. Basic body awareness therapy focuses on the basic functions of movement related to posture, coordination, free breathing, and awareness that constitute basic movement, quality of movement, self-expression, interaction with others, and participation in life activities. The goal of basic body awareness therapy is to allow integration of the body with the total experience of self and restore body awareness and control [21]. Feldenkrais therapy was designed by Moshe Feldenkrais to identify alternative ways to use the body and improve the function of daily life, work, and leisure activities by increasing awareness of exercise habits. Feldenkrais therapy method is considered a learning process, and is thus classified as an educational method. The ultimate goal is to use sensory-motor experiences and specific exploratory movements to become a self-directed learner, thereby increasing awareness of habitual solutions to motor problems and selecting more efficient movement postures [22]. In the articles by Malmgren-Olsson and Armelius and Malmgren-Olsson, Armelius, and Armelius analyzed in this study, the effects of basic body awareness therapy, Mensendieck–Feldenkrais therapy, and conventional therapy groups were compared in patients with non-specific musculoskeletal disorders [15,16]. There was a significant improvement in those patients who underwent basic body awareness therapy and Feldenkrais therapy compared to those who received traditional treatment. As such, this study systematically reviewed papers that applied body awareness therapy to patients with musculoskeletal disorders and confirmed its effectiveness.

However, several limitations must be considered in the interpretation of this study. First, only studies published in English were selected from a limited number of databases. Therefore, the studies included in this systematic review do not represent the entire selection of studies on body awareness therapy in patients with musculoskeletal disorders. The selected studies were also found to have a low level of evidence, as most studies did not use probability sampling methods, which limited the generalizability of the results of the studies. In addition, review studies and qualitative studies on body awareness therapy were also included. To compensate for these limitations, future studies must use various keywords related to body awareness to search articles in different databases and select studies, which applied probability sampling methods to verify the effectiveness of body awareness therapy through meta-analysis.

## **5. Conclusion**

This study conducted a systematically comprehensive review of evidence for body awareness therapy in patients with musculoskeletal disorders. A total of 3,462 studies were searched in databases using the search keywords, and six studies were included in the final analysis. The qualitative level of the studies was classified using the five levels of evidence-based classification. One RCTs, three non-randomized two-group studies, and two case reports were included. According to systematic analysis, body awareness therapy was applied to patients with idiopathic scoliosis, non-specific musculoskeletal disorder, hip osteoarthritis, and amputation, who showed positive improvements after the interventions. The most commonly used therapy was basic body awareness therapy. These results are significant as the evidence of general treatment types and body awareness therapy characteristics were reviewed. Our results suggested that body awareness therapy is an important intervention with positive effects on the recovery of patients with musculoskeletal disorders.

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**Appendix 1. Evidence of Body Awareness Therapy for Musculoskeletal Disorder (N = 6)**

Authors	Level of evidence, Participants (n)	Intervention		Measurements	Outcome
		Group (n)	Sessions		
Yagci, Ayhan, & Yakut (2018)	Level I, Idiopathic scoliosis (n = 20)	Basic body awareness therapy (n=10), Traditional exercises (n=10)	60 minutes, five times per week, 10 weeks	King and Moe Classification, Cobb's angles, Angle of trunk rotation (ATR), Posterior Trunk Symmetry Index (POTSI), Walter Reed Visual Assessment Scale (WR VAS), SRS-22 Questionnaire	Basic body awareness therapy group improved curve magnitude, body symmetry and trunk deformity.
Malmgren-Olsson & Armelius (2003)	Level II, Non-specific musculoskeletal disorders (n=61)	Basic body awareness therapy (n=14), Feldenkrais (n=23), Conventional and individual physiotherapy (n=24)	20 sessions	Pain drawing, West Haven Yale Multidimensional Pain Inventory (MPI), Arthritis Self-Efficacy Scale (ASES), Dynamic balance, Symptom Check-List-90, Structural Analysis of Social Behaviour (SASB), 36-item Short Form Health Survey (SF-36), Sense of Coherence	Body Awareness Therapy and Feldenkrais were significantly more likely to achieve a positive therapeutic effect than individual physical therapy.
Yagci, Yakut, & Simsek (2018)	Level II, Idiopathic scoliosis (n = 32)	Core stabilization exercise (n=11), Basic body awareness (n=10), Traditional exercise (n=11)	60 minutes, twice per week, 10 weeks	Cobb angles, Risser grade, Spatial orientation, Visual and postural subjective perception tests	There were improvements in visual, postural and haptic vertical perception in stabilization exercise training and basic body awareness treatment group.
Malmgren-Olsson, Armelius, & Armelius (2001)	Level II, Non-specific musculoskeletal disorders (n=71)	Basic body awareness therapy (n=23), Feldenkrais (n=22), Conventional individual treatment (n=26)	90 minutes, twice a week at first and once a week later on, 3~4 months	Symptom Check- List-90 (SCL-90), West Haven Yale Multidimensional Pain Inventory (MPI), Structural Analysis of Social behaviour (SASB)	There were few significant differences among the groups but effect-size analysis indicated that the group treatments using Body Awareness Therapy and Feldenkrais might be more effective than conventional treatment.
Strand et al. (2016)	Level V, Hip osteoarthritis (n=7)	Patient education combined with basic body awareness therapy (n=5), Patient education only (n=2)	90 minutes, once a week, 12-13 weeks	Numeric rating scale (NRS), Hip disability and Osteoarthritis Outcome Score (HOOS 2.0), Harris Hip Score (HHS), University of California at Los Angeles (UCLA) University of California at Los Angeles (UCLA) Activity Score, EuroQol 5 Dimensions (EQ-	Basic body awareness therapy and patient education may be beneficial for hip osteoarthritis, but the additional effects of basic body awareness will need to be further investigated.



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				5D-5L), Timed Up and Go (TUG) test, Range of motion (ROM), Patient Global Impression of Change (PGIC)	
Sjödahl, Jarnlo, & Persson (2001)	Level V, Unilateral transfemoral amputation (n=9)	Several theories of body awareness originating combined to a conscious therapeutic approach (n=9)	30-60 minutes, once a week, 10 months	Gait-analysis	This combination of psychological and physiotherapeutic treatment has led to considerable gait improvement in this group of transfemoral amputees

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