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CLINICAL EFFECTIVENESS OF ACUPRESSURE COMBINED WITH REHABILITATION THERAPY IN THE TREATMENT OF TEMPOROMANDIBULAR DISORDERS: EVIDENCE FROM A PROVINCIAL HOSPITAL IN VIETNAM

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ABSTRACT

This study aimed to evaluate the effectiveness of acupressure massage combined with rehabilitation therapy in the treatment of patients with temporomandibular disorders at Thanh Hoa General Hospital, Vietnam. A total of 33 patients diagnosed with temporomandibular disorder (TMD) according to the American Academy of Orofacial Pain (AAOP) 2018 criteria were included in the study. Patients underwent a treatment program consisting of temporomandibular joint exercises, acupressure massage of the head, face, and neck regions, together with therapeutic ultrasound. Treatment outcomes were assessed using the Visual Analog Scale (VAS) at hospital admission, discharge, and follow-up after treatment. The results demonstrated that the mean VAS pain score significantly decreased from 5.61 ± 1.62 at admission to 0.24 ± 0.64 at discharge ($p < 0.001$). Complete pain relief was achieved in 84.8% of patients at discharge and 100% after a two-week follow-up period, with no recurrence or treatment-related complications observed. These findings suggest that acupressure massage combined with rehabilitation therapy is a safe and effective therapeutic approach for reducing pain, improving temporomandibular joint function, and enhancing the quality of life of patients with TMD.

Keywords: Temporomandibular disorders; acupressure massage; rehabilitation therapy; Visual Analog Scale (VAS); non-pharmacological treatment.

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1. INTRODUCTION

According to the definition of the American Academy of Orofacial Pain (AAOP), temporomandibular disorders (TMD) comprise a group of musculoskeletal and neuromuscular conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and associated structures, potentially resulting in significant impairment in function and quality of life. TMD is currently recognized as one of the most common causes of chronic orofacial pain unrelated to dental pathology [1]. The symptoms of TMD not only interfere with chewing function, communication, and sleep quality but also increase the risk of anxiety, psychological distress, and reduced quality of life [1]. Several studies have demonstrated that individuals with TMD frequently experience difficulties in daily activities such as chewing, speaking, yawning, and opening the

mouth widely, thereby directly affecting both physical and psychological well-being [2].

In recent years, TMD has attracted increasing attention due to its growing prevalence worldwide. A systematic review and meta-analysis conducted by Alqutaibi et al. (2025) involving 27 studies with 20,971 participants reported an overall global prevalence of approximately 29.5%, corresponding to nearly one-third of the world's population. The study also found that TMD prevalence was significantly higher in females than in males (36.7% versus 26.7%), with females exhibiting approximately 1.75 times greater risk of developing TMD [3]. Similarly, a meta-analysis by Calixtre et al. (2024) confirmed that TMD remains one of the most prevalent musculoskeletal disorders affecting the maxillofacial region, particularly among young and middle-aged adults [4].

The etiology and pathophysiological mechanisms of TMD are highly complex and multifactorial, involving various contributing factors such as masticatory muscle dysfunction, occlusal abnormalities, maxillofacial trauma, psychological stress, bruxism, arthritis, degenerative joint disorders, and hormonal influences

[3]. A systematic review by Da-Cas et al. (2024) identified several important risk factors associated with TMD, including female sex, psychological disorders, prolonged stress, sleep disturbances, and other chronic pain conditions [5]. Due to its multifactorial nature, effective management of TMD often requires a multimodal approach combining various treatment strategies aimed at pain control, functional improvement, and enhancement of patients' quality of life.

Current treatment options for TMD include pharmacological therapies such as analgesics, muscle relaxants, and anti-inflammatory medications; occlusal splint therapy; physical therapy; rehabilitation programs; psychological interventions; and, in selected cases, surgical procedures [3,5]. However, prolonged medication use may lead to undesirable side effects, whereas invasive interventions often involve high costs and potential complications. Consequently, current treatment trends increasingly favor conservative, minimally invasive, and non-pharmacological approaches as first-line management options. Among conservative interventions, rehabilitation therapy combined with acupressure massage has gained increasing attention due to its safety profile, cost-effectiveness, and broad applicability in clinical practice [6]. Acupressure massage has been reported to promote muscle relaxation, improve local circulation, reduce masticatory muscle tension, and assist in pain control. Additionally, rehabilitation exercises contribute to improving TMJ range of motion, enhancing coordination of masticatory muscles, and reducing the risk of recurrence [7]. The combination of these approaches is expected to provide more comprehensive therapeutic benefits compared with either intervention alone.

In Vietnam, studies on TMD management have mainly focused on the field of dentistry and maxillofacial medicine, whereas investigations evaluating the effectiveness of acupressure massage combined with rehabilitation therapy remain relatively limited, particularly in provincial general hospitals [8,9]. Assessing the effectiveness of non-pharmacological treatment approaches in real-world clinical settings is necessary to provide additional scientific evidence supporting the selection and implementation of appropriate therapeutic strategies. Therefore, the present study aimed to evaluate the clinical effectiveness of acupressure massage combined with rehabilitation therapy in the treatment of temporomandibular disorders using evidence obtained from Thanh Hoa General Hospital, Vietnam, thereby contributing further scientific evidence for the application of non-pharmacological treatment modalities in clinical practice.

2. MATERIALS AND METHODS

This study was conducted using a prospective clinical interventional design with pre- and post-treatment assessments to evaluate the effectiveness of

acupressure therapy combined with rehabilitation treatment in patients with temporomandibular disorders (TMD). All eligible patients were continuously monitored throughout the treatment period and reassessed after completion of the intervention.

2.1. Study Setting and Duration

The study was conducted at the Department of Rehabilitation, Thanh Hoa General Hospital, Vietnam, from January 2025 to October 2025.

2.2. Study Participants

The study population consisted of patients diagnosed with temporomandibular disorders and treated at the Department of Rehabilitation during the study period. Patients were enrolled in the study if they met all of the following inclusion criteria: diagnosis of temporomandibular disorder according to the American Academy of Orofacial Pain (AAOP) 2018 criteria, presence of pain in the temporomandibular joint region or masticatory muscles, age ≥ 18 years, willingness to participate in the study, and adherence to the prescribed treatment protocol.

The following patients were excluded from the study: patients with a history of temporomandibular joint surgery, patients with neurological or psychiatric disorders that could affect pain assessment, patients with acute maxillofacial trauma, and patients who did not complete the treatment course or declined continued participation in the study.

2.3. Sample Size

During the study period, a total of 33 patients who fulfilled all inclusion criteria and did not meet any exclusion criteria were enrolled in the study.

2.4. Clinical Assessment Procedure

All patients underwent clinical examination by rehabilitation specialists. Data collected included demographic and clinical characteristics such as age, sex, disease duration, pain location, clinical symptoms, and associated comorbidities.

Pain intensity was assessed using the Visual Analog Scale (VAS). The VAS is a widely used subjective tool for evaluating pain intensity in both clinical practice and rehabilitation research. In studies related to temporomandibular disorders, the VAS has been recognized as one of the most commonly used instruments for monitoring changes in pain severity and evaluating treatment effectiveness [10].

Table 01: Classification of pain severity based on the VAS

Score	Pain severity	Clinical interpretation
0	No pain	No pain sensation.
1–3	Mild pain	Tolerable pain with minimal impact on daily activities.

4-6	Moderate pain	Pain affecting daily activities, particularly during mouth opening or chewing.
7-9	Severe pain	Significant pain with marked impairment of joint function and quality of life.
10	Very severe pain	Intense, unbearable pain.

Source: Adapted from Tung et al., 2025 [11].
Patients were assessed at four time points: before treatment (upon hospital admission), at the completion of inpatient treatment (upon discharge), two weeks after treatment, and one month after treatment.

2.5. Intervention Protocol

All patients were treated according to the standardized rehabilitation protocol of the Department of Rehabilitation, which consisted of the following components: (1) acupressure therapy, performed by experienced traditional medicine physicians and therapists with more than five years of clinical experience; (2) manual therapy and acupressure techniques, applied to reduce masticatory muscle tension, increase joint flexibility, and improve mandibular functional movement; (3) temporomandibular joint functional exercises, including specific TMJ movement exercises; and (4) therapeutic ultrasound, administered to the temporomandibular joint region using a frequency of 1 MHz and an appropriate treatment intensity according to the hospital rehabilitation protocol. The treatment duration for each joint side ranged from 5 to 7 minutes.

2.6. Statistical Analysis

The study data were entered and analyzed using IBM SPSS Statistics version 20.0.

Continuous variables were presented as mean $\pm$ standard deviation (Mean $\pm$ SD), while categorical variables were expressed as frequencies and percentages.

Differences in VAS pain scores before and after treatment were analyzed using the paired samples t-test. Statistical significance was considered at $p < 0.05$.

2.7. Ethical Considerations

The study protocol was approved by the Hospital Administration Board and the Biomedical Research Ethics Committee of Thanh Hoa General Hospital before implementation. All participants received a complete explanation regarding the study objectives and voluntarily signed informed consent forms prior to participation. Personal information of the participants was kept confidential and used solely for scientific research purposes.

3. RESULTS

3.1. Characteristics of the Study Population

Distribution of Patients by Sex and Age

Table 02: Distribution of Patients by Age and Sex

Characteristics by Sex and Age		Number (n)	Percentage (%)
Sex	Male	7	21.2
	Female	26	78.8
Age	18-39	14	42.4
	40-59	9	27.3
	>60	10	30.3

The results showed that among the 33 patients included in the study, 26 were female, accounting for 78.8%, while 7 were male, accounting for 21.2%. The age group of 18-39 years represented the largest proportion of participants (42.4%). Patients aged over 60 years accounted for 30.3%, whereas 27.3% of patients were between 40 and 59 years of age.

Distribution of Patients According to Diagnosis

Table 03: Distribution of Patients According to Diagnosis

Diagnosis	Number (n)	Percentage (%)
Combined disorder	4	12.1
Joint disorder	26	78.8
Muscle disorder	3	9.1

According to the diagnostic classification, among the 33 patients included in the study, 4 patients were diagnosed with combined temporomandibular disorders, accounting for 12.1%; 26 patients had temporomandibular joint disorders, accounting for 78.8%; and 3 patients had masticatory muscle disorders, accounting for 9.1%.

Distribution of Pain Location According to Diagnosis

Table 04: Distribution of Pain Location According to Diagnosis

Pain Location	Muscle disorder		Joint disorder		Combined disorder		Total Patients	
	n	%	n	%	n	%	N	%
Temporomandibular joint pain	1	33.33	23	88.5	0	0.0	24	72.7
Masseter muscle pain	1	33.33	2	7.7	2	50.0	5	15.2
Temporalis muscle pain	1	33.33	1	3.8	2	50.0	4	12.1

The findings presented in Table 4 showed that among the 33 patients included in the study, 24 patients experienced temporomandibular joint pain, accounting for 72.7%; 5 patients had masseter muscle pain, accounting for 15.2%; and 4 patients reported temporalis muscle pain, accounting for 12.1%. Among patients with temporomandibular joint disorders, temporomandibular joint pain was the most prevalent symptom, accounting for 88.5%. In contrast, joint pain

was also the most common symptom in the joint disorder group, representing 87.5% of cases. Among patients with combined disorders, temporalis muscle pain and masseter muscle pain occurred with equal frequency, each accounting for 2 out of 4 cases. In the masticatory muscle disorder group, all three types of pain symptoms identified in the study were observed. Distribution of Pain Severity According to Pain Location

Table 05: Distribution of Patients According to Pain Location and Pain Severity

Pain Location	Number (n)	Pain Severity ($\bar{X} \pm SD$)
Temporomandibular joint pain	24	5.83±1.80
Masseter muscle pain	5	5.63±0.75
Temporalis muscle pain	4	5.0±1.7
General Average	33	5.61±1.62

The mean pain intensity at hospital admission, as measured by the Visual Analog Scale (VAS), was 5.61 ± 1.62. Specifically, the mean VAS score for temporomandibular joint pain was 5.83 ± 1.80, while the mean pain scores for masseter muscle pain and temporalis muscle pain were 5.63 ± 0.75 and 5.0 ± 1.7, respectively.

Distribution of Patients According to Comorbidities

Table 06: Distribution of Patients According to Comorbidities

Comorbidities	Number (n)	Pain Severity ($\bar{X} \pm SD$)
No comorbidity	25	5.44±1.58
Diabetes mellitus	2	6.5±2.12
Hypertension	3	6.0±1.0
Diabetes mellitus and hypertension	3	6.0±2.65

The findings presented in Table 6 showed that the majority of patients in the study population had no associated comorbidities, accounting for 63.6%. The lowest mean pain intensity was observed in patients without comorbidities, with a mean VAS score of 5.44 ± 1.58. In contrast, patients with comorbid conditions demonstrated higher pain levels, with the highest mean VAS score observed in patients with both diabetes mellitus and hypertension (6.50 ± 2.12).

3.2. Rehabilitation Outcomes of Temporomandibular Disorders and Related Factors

Pain Intensity of the Study Population According to the VAS Scale

To evaluate pain intensity among the study participants using the Visual Analog Scale (VAS), patients were assessed and summarized as presented in Table 7 below:

Table 07: Pain Intensity of the Study Population

Time Point Pain Severity	At Admission		At Discharge		Two Weeks After Discharge	
	n	%	n	%	n	%
No pain	0	0	28	84.8	33	100
Mild pain	4	12.1	5	15.2	0	0
Moderate pain	20	60.6	0	0	0	0
Severe pain	9	27.3	0	0	0	0
Very severe pain	0	0	0	0	0	0
Total	33	100	33	100	33	100

The findings presented in Table 7 showed that at hospital admission, most patients experienced moderate to severe pain levels, accounting for 87.9% of the study population. Only four patients presented with mild pain. However, these four patients had previously received various treatment interventions for an extended period before hospital admission, although complete symptom resolution had not been achieved. At discharge, 84.8% of patients reported complete pain relief, while 15.2% experienced mild pain. At the two-week follow-up, complete pain relief was observed in 100% of patients. No recurrence was recorded after one month of follow-up. These findings suggest that patients who adhered to post-discharge recommendations showed favorable clinical outcomes, and no cases of recurrence were observed. The overall VAS scores of the study participants progressively improved over time, indicating gradual improvement in temporomandibular joint function. The differences across assessment time points were statistically significant ($p < 0.001$) (Table 8). At the two-week follow-up assessment, the majority of patients had achieved complete pain resolution.

Table 08: VAS Scores of the Study Population

VAS Scores	At Admission	At Discharge	p-value
Mean ± Standard Deviation	5.61±1.62	0.24 ± 0.64	0.000

Factors Associated with Functional Rehabilitation Outcomes After One Month

The one-month follow-up results demonstrated that the combination of acupressure therapy and rehabilitation treatment provided significant clinical benefits in reducing pain intensity among patients with temporomandibular disorders. Across all study groups, VAS scores showed a substantial decline from hospital

admission to discharge. Notably, at the two-week post-discharge follow-up, the mean VAS score in all groups reached 0, indicating complete pain resolution. Stratified analysis further showed that baseline pain intensity and treatment outcomes were not significantly influenced by demographic characteristics or associated comorbidities. Regarding sex differences (Table 09): no statistically significant difference in VAS scores was observed between male and female patients at hospital admission or at discharge.

Table 09: Functional Rehabilitation Outcomes According to Sex

Sex VAS Scores	Male(n=7)	Female (n=26)	p-value
At Admission	5.14 ±1.773	5.73± 1.589	0.402
At Discharge	0.14 ±0.378	0.27± 0.667	0.636
Two Weeks After Discharge		0	

The results according to patient age groups showed that although elderly patients (≥60 years) tended to present with higher baseline pain intensity and a slightly slower recovery rate at discharge compared with younger age groups, no differences in pain intensity were observed two weeks after discharge (Table 10). Similarly, the presence of comorbidities did not appear to adversely affect the treatment process. The trend of pain reduction at discharge was highly comparable between patients with and without associated comorbidities (Table 11).

Table 10: Functional Rehabilitation Outcomes According to Treatment Duration

Age VAS Scores	18-39 (n=14)	40-59 (n=9)	≥60 (n=10)	p-value
At Admission	5.71 ±1.490	5.0± 1.732	6.00± 1.700	0.396
At Discharge	0.07 ±0.267	0.22± 0.667	0.5 ± 0.850	0.246
Two Weeks After Discharge	0	0	0	

Table 11: Functional Rehabilitation Outcomes According to Comorbidities

Comorbidity VAS Scores	No Comorbidity (n=25)	Comorbidity Present(n=8)	p-value
At Admission	5.445±1.583	6.13 ±1.727	0.305
At Discharge	0.24 ±0.597	0.25 ±0.707	0.492

Two Weeks After	0	0	
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Therefore, the combined treatment protocol involving acupressure therapy and rehabilitation demonstrated consistent and stable pain reduction outcomes, with broad applicability among patients with temporomandibular disorders regardless of differences in sex, age groups, or the presence of underlying comorbid conditions.

4. DISCUSSION

The present study was conducted to evaluate the effectiveness of rehabilitation combined with acupressure massage in the treatment of patients with temporomandibular disorders (TMD) and to analyze several factors associated with treatment outcomes. Based on the obtained findings, several important observations were identified.

4.1. Clinical and Paraclinical Characteristics of the Study Population

Sex Distribution

The study identified a male-to-female ratio of 1:5. This finding is consistent with numerous studies worldwide reporting a marked difference in the prevalence of TMD between males and females, with a substantially higher prevalence observed among women.

According to Robinson et al. (2020), although the etiology of TMD has not yet been fully elucidated, estrogen has been recognized as an important risk factor because it actively participates in the mechanisms underlying chronic pain expression in TMD and may influence multiple targets within both the peripheral and central nervous systems [12]. The effects of estrogen further complicate the understanding of trigeminal pain modulation mechanisms associated with TMD [13].

In contrast to estrogen, which may aggravate TMD symptoms, testosterone has been demonstrated to exert protective effects against temporomandibular joint pain sensitivity in male animal models [13]. Although further investigations are needed to clarify these biological mechanisms, current evidence may partially explain why the prevalence of TMD is considerably higher among females than males.

Age Distribution

Participants aged 18 years and older were selected based on the findings of the meta-analysis by Zieliński et al. (2024), which identified individuals aged 18–60 years as having the highest prevalence of temporomandibular disorders (TMD) [14]. The results of the current study showed that the 18–39-year age group represented the largest proportion (42.4%), followed by the 40–59-year group and the ≥60-year group [14]. These findings are consistent with the study conducted by Qin et al. (2024), in which the majority of TMD patients were concentrated in younger and middle-aged populations, with 68.6% belonging to the 16–35-year age group [15].

Diagnostic Classification

The study population was categorized into three groups according to the AAOP 2018 classification system, including muscle disorders, joint disorders, and combined disorders, accounting for 16.7%, 26.7%, and 56.7%, respectively. These findings differ from studies employing the DC/TMD diagnostic system. According to Schiffman et al. (2014), DC/TMD provides more detailed diagnostic criteria for myalgia, arthralgia, and intra-articular disorders, which may result in variations in the distribution of diagnostic categories [16]. Similarly, Toh et al. (2021) also reported differences in diagnostic group distributions when applying the DC/TMD classification system [17]. These findings suggest that the use of different diagnostic systems (AAOP, RDC/TMD, or DC/TMD) may substantially influence classification outcomes and the reported prevalence of TMD subgroups.

Pain Characteristics

Clinical examination findings indicated that temporomandibular joint pain represented the most common symptom (72.7%), followed by masseter muscle pain (15.2%) and temporalis muscle pain (12.1%). Only the masseter and temporalis muscles were evaluated because these muscle groups are commonly included in the pain assessment criteria for TMD according to both the AAOP and DC/TMD diagnostic frameworks [16].

These findings are consistent with those reported by Yap et al. (2002), in which pain in the masseter and temporalis muscles was identified as among the most common muscular pain sites in patients with TMD [18]. Furthermore, Manfredini et al. (2011) demonstrated that joint pain is one of the most frequently reported manifestations of intra-articular temporomandibular disorders [19].

In the present study, the mean VAS score for temporomandibular joint pain was 5.83 ± 1.80 , while the mean scores for masseter muscle pain and temporalis muscle pain were 5.63 ± 0.75 and 5.0 ± 1.7 , respectively. According to the classification proposed by Boonstra et al. (2014), most participants in the present study were categorized as experiencing moderate pain intensity.

Among the 33 study participants, the highest mean VAS score was observed for temporomandibular joint pain (5.83 ± 1.80). The mean pain scores for masseter muscle pain and temporalis muscle pain were 5.63 ± 0.75 and 5.0 ± 1.7 , respectively. Therefore, while temporomandibular joint pain and masseter muscle pain ranged from moderate to severe intensity, temporalis muscle pain was classified as moderate according to the criteria proposed by Boonstra et al. Overall, the majority of participants in this study experienced moderate levels of muscular and joint pain.

Distribution of Comorbidities

The study findings indicated that patients with underlying comorbid conditions exhibited higher mean VAS scores than those without comorbidities. This suggests that systemic diseases may influence pain

perception. Chronic conditions such as diabetes mellitus and hypertension are associated with persistent low-grade systemic inflammation. Such inflammatory processes may increase the sensitivity of nociceptors in the temporomandibular joint region, causing patients to experience more severe pain compared with individuals without underlying medical conditions [20].

Both diabetes mellitus and hypertension may also contribute to microvascular damage, thereby reducing blood supply to joint structures and surrounding tissues [21,22]. This ischemic condition may contribute to the development or exacerbation of pain symptoms. In addition, psychological factors may also play an important role. The burden of managing chronic diseases may result in prolonged psychological stress [23]. Stress has been recognized as an important risk factor capable of initiating and aggravating symptoms of temporomandibular disorders, including pain manifestations [5].

4.2. Rehabilitation Outcomes in Temporomandibular Disorders and Associated Factors

Pain Intensity Outcomes Based on VAS Scores

The study results demonstrated a significant effect of the rehabilitation process in reducing pain among patients with temporomandibular disorders. At the time of discharge, the majority of patients (84.8%) reported complete pain relief, while only 15.2% continued to experience mild pain symptoms. This condition improved remarkably over time. At the two-week post-discharge follow-up, the proportion of pain-free patients reached 100%.

Most notably, at the one-month follow-up, no cases of pain recurrence were observed. These findings indicate that from hospital admission to two weeks after discharge, patients achieved a 100% treatment response rate, suggesting excellent responsiveness to the rehabilitation protocol combined with massage and acupressure therapy, together with patient adherence to a soft and liquid diet regimen.

Furthermore, comparison of pre-treatment and post-treatment pain scores revealed a substantial reduction, with the difference being statistically significant ($p < 0.001$). Compared with findings from previous studies in the field of musculoskeletal rehabilitation, the present results appear highly favorable and consistent with existing evidence. Several studies have reported that interventions involving massage therapy, acupressure techniques, home exercise programs, and adherence to soft or liquid dietary recommendations can provide substantial pain reduction during the first 4–6 weeks of treatment for temporomandibular disorders. The high proportion of patients experiencing complete pain relief or only minimal residual symptoms at discharge, followed by complete pain resolution after two weeks, further supports the effectiveness of this therapeutic approach.

Therefore, it can be concluded that early rehabilitation intervention, involving a combination of massage

therapy, acupressure treatment, and maintenance of a soft/liquid diet throughout the treatment period, may significantly reduce pain intensity in patients with temporomandibular disorders. This finding is particularly important because pain intensity directly affects rehabilitation outcomes. Patients experiencing severe pain tend to limit jaw movements, such as mouth opening and chewing activities, thereby reducing the beneficial effects of early mobilization. In addition, prolonged movement restriction may increase the risk of muscular stiffness and consequently extend the time required for functional recovery of the temporomandibular joint.

Factors Associated with Functional Rehabilitation Outcomes after One Month

Functional Rehabilitation Outcomes According to Sex: The present study utilized a rehabilitation approach combining massage therapy and acupressure techniques for patients with temporomandibular disorders. Comparison of pain intensity (VAS scores) between male and female patients before and after treatment showed no statistically significant differences at the time of discharge ($p > 0.05$), and complete pain resolution was observed in all patients after two weeks of follow-up. At discharge, although female patients had a slightly higher mean pain score than male patients (0.27 vs. 0.14), this difference was not statistically significant ($p = 0.636$).

These findings are consistent with numerous studies worldwide regarding sex-related differences in pain perception, particularly in chronic orofacial pain conditions. From a biological perspective, females generally have lower pain thresholds and greater sensitivity to painful stimuli. Factors such as hormones (particularly fluctuations in estrogen levels during the menstrual cycle), neurological mechanisms, and psychosocial factors (including pain coping strategies and symptom reporting behavior) are believed to play important roles in these differences [12]. Temporomandibular disorders have also consistently shown a substantially higher prevalence in females than in males, suggesting that sex-related factors are closely associated with the pathophysiology of the disease.

Functional Rehabilitation Outcomes According to Patient Age: When comparing pain intensity (VAS scores) among different age groups (18–39, 40–59, and ≥ 60 years) at discharge, no statistically significant differences were observed ($p = 0.396$). Nevertheless, an interesting trend was identified in which elderly patients (≥ 60 years) consistently demonstrated higher mean pain scores than the other two age groups throughout all follow-up periods. This finding may reflect physiological differences related to aging and tissue recovery capacity. Biologically, aging is frequently associated with natural degeneration of joint structures, including cartilage and subchondral bone, rendering the temporomandibular joint more vulnerable and less capable of recovery after injury [24]. Furthermore, in older individuals, tissue regeneration and musculoskeletal recovery

mechanisms generally occur more slowly than in younger populations. Common age-related conditions such as arthritis and osteoporosis may also contribute to increased pain perception and prolonged treatment duration [25]. Therefore, despite receiving the same therapeutic intervention, elderly patients may require a longer period to achieve pain reduction outcomes comparable to those of younger individuals.

Functional Rehabilitation Outcomes According to Comorbidities: The study findings suggest that the presence of underlying systemic diseases may significantly influence treatment effectiveness and patient recovery processes. From a pathophysiological perspective, many chronic diseases, including diabetes mellitus, cardiovascular diseases, and autoimmune disorders, commonly induce persistent low-grade systemic inflammation. This inflammatory state may exacerbate local inflammatory responses in the temporomandibular joint, resulting in increased pain perception and impaired healing processes.

Additionally, certain comorbid conditions or their pharmacological treatments may affect the body's natural healing capacity and alter pain perception thresholds within the central nervous system. Such mechanisms may increase pain sensitivity and lead to a slower response to therapeutic interventions. Therefore, when managing patients with temporomandibular disorders, comprehensive assessment and appropriate management of associated comorbidities should be considered essential components for optimizing treatment outcomes.

Complications after Treatment

Based on the findings from the present study involving 33 patients diagnosed with temporomandibular disorders, the rehabilitation approach combining massage therapy and acupressure techniques proved to be an effective and particularly safe intervention. No treatment-related complications were observed among the study participants.

Treatment effectiveness: The intervention demonstrated clear and positive effects on clinical symptoms. Following the treatment course, the majority of patients experienced substantial improvements in pain intensity, increased temporomandibular joint range of motion, and reduced masticatory muscle tension. These therapeutic benefits were well maintained throughout the post-treatment follow-up periods.

Safety profile: One of the most important findings of the present study was that the treatment protocol did not produce any complications or adverse effects during or after the intervention period. This finding further confirms that this therapeutic approach represents a non-invasive, well-tolerated, and highly safe treatment option for patients with temporomandibular disorders.

5. CONCLUSION

The study demonstrated that the combination of acupressure therapy and manual therapy produced

positive clinical outcomes in the treatment of patients with temporomandibular disorders (TMD) at Thanh Hoa General Hospital. Following the intervention, a significant reduction in pain intensity was observed. Specifically, the rehabilitation protocol combined with massage and acupressure showed a substantial and statistically significant reduction in pain scores ($p < 0.001$), with mean VAS scores decreasing from 5.61 ± 1.62 before treatment to 0.24 ± 0.64 after treatment. In addition, the treatment approach demonstrated a high success rate and sustained therapeutic benefits. Clinical outcomes were highly favorable, with 100% of patients reporting complete pain resolution two weeks after discharge, and no cases of pain recurrence were observed during the one-month follow-up period. Furthermore, patients with associated medical comorbidities (such as hypertension and diabetes mellitus) presented with higher baseline VAS scores than those without comorbid conditions, suggesting that systemic factors may influence disease progression and pain perception in TMD.

Beyond pain reduction, the intervention also contributed to improvements in temporomandibular joint function and overall clinical status without any significant adverse events reported during the study period. The combination of acupressure and manual therapy appears to provide a comprehensive therapeutic effect through multiple mechanisms, including reduction of muscle tension, improvement of local blood circulation, enhancement of joint flexibility, and support of functional recovery.

The findings suggest that this treatment approach is safe, cost-effective, easy to implement, and suitable for routine clinical practice in provincial healthcare settings in Vietnam. However, given the relatively small sample size and the absence of a control group, future studies with larger sample sizes, randomized controlled trial designs, and longer follow-up periods are warranted to strengthen the scientific evidence regarding the long-term effectiveness of this intervention.

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None.

8. CONFLICT OF INTEREST

The author declares no conflict of interest.

9. INFORMED CONSENT

Not applicable.

10. ETHICAL STATEMENT

The author confirms that this study was conducted in accordance with accepted ethical standards and complied with all applicable research ethics guidelines.

11. AUTHOR CONTRIBUTIONS

The author solely conceived the study, designed the research, collected and analyzed the data, interpreted the results, and wrote and approved the final manuscript.

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