INVESTIGATION OF DEFICIENCY AND EXCESS CHARACTERISTICS IN TRADITIONAL MEDICINE AMONG PATIENTS WITH MUSCULOSKELETAL DISORDERS

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ABSTRACT

Objective: To investigate the clinical characteristics of Excess and Deficiency patterns according to Traditional Medicine and explore associated factors in patients with musculoskeletal disorders.

Methods: A cross-sectional descriptive study was conducted on 206 patients diagnosed with knee osteoarthritis and/or lumbar spondylosis and/or rheumatoid arthritis and/or periarthritis humeroscapularis who came for treatment at Hue Traditional Medicine Hospital.

Results: The prevalence of Excess pattern was 35.9%, Deficiency pattern was 22.3%, combined Excess and Deficiency pattern was 27.2%, and neither Excess nor Deficiency was 14.6%. In the group of symptoms of Excess pattern: 26.7% of patients had a red tongue, 60.7% had a strong pulse, and 80.1% experienced constant pain. In the Deficiency pattern's symptoms group: 28.2% had a pale tongue, 46.6% had a deep pulse, and 79.6% experienced migrating pain. The study found significant associations between the Excess-Deficiency condition and tongue shape and color, pulse strength, onset context, pain characteristics and pain intensity ($p<0.05$).

Conclusion: The proportion of patients with Excess syndrome was the highest, neither Excess nor Deficiency was the lowest. Common symptoms in the Excess pattern included thick tongue coating, strong pulse, and constant pain, whereas the Deficiency group frequently presented with thin tongue coating, deep pulse, and migrating pain. The Excess-Deficiency classification was significantly associated with tongue and pulse characteristics, localized pain manifestations.

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Received date: 15/02/2025

Revised date: 10/03/2025

Accepted date: 15/03/2025

Key words: excess and deficiency, excess pattern, deficiency pattern, musculoskeletal, traditional medicine

I. INTRODUCTION

Musculoskeletal disorders (MSDs) are a common group of conditions that affect mobility and movement, leading to limitations in daily activities, reduced work productivity, and, in severe cases, disability, ultimately diminishing quality of life [1]. Therefore, accurate diagnosis and early treatment of musculoskeletal diseases play a crucial role in improving patients' quality of life.

The disease names are designated based on the location of the lesion or the characteristics of each condition. For instance, periarthritis humeroscapularis refers to shoulder pain commonly seen in periarthritis of the shoulder; lumbago denotes low back pain; knee osteoarthritis describes knee joint pain; and rheumatoid arthritis. The aforementioned conditions are also frequently encountered at the Hue Traditional Medicine Hospital, which serves as the research site for our study. In Traditional Medicine, the underlying causes are often attributed to aging, prolonged illness, or heavy labor, which lead to a deficiency of the body's vital energy. This deficiency allows pathogenic factors such as wind, cold and dampness to invade the body, disrupting the circulation of qi and blood. As a result, impaired nourishment of the musculoskeletal system leads to symptoms such as swelling, pain, numbness, and joint heaviness [2].

According to Traditional Medicine, deficiency and excess are two fundamental principles in Eight-Principle Pattern Identification. In the context of disease differentiation, deficiency refers to a state in which the body's vital essence is lost, implying depletion or inability to maintain internal balance, resulting in weakened Upright qi. In contrast, excess occurs when pathogenic factors become predominant, invading the body from the outside and causing disease manifestations [3]. In reality, human constitution, pathogenic factors and disease progression often interact in a complex

manner, leading to a condition known as " combined deficiency and excess pattern". The concepts of deficiency and excess are used to assess both the patient's condition and the pathogenic factors, serving as the foundation for opposing treatment principles: deficiency requires supplementation, while excess necessitates draining [4]. Therefore, accurately diagnosing the deficiency and excess conditions of patients is crucial in clinical practice to ensure effective treatment and prevention. The integration of the four diagnostic methods and the use of a questionnaire to assess deficiency and excess patterns enhance the accuracy, objectivity, and scientific validity of clinical examinations and diagnoses. Based on these theoretical and practical foundations, we conducted this study with two objectives:

(1) To examine the clinical characteristics of deficiency and excess patterns according to Traditional Medicine in patients with musculoskeletal disorders.

(2) Identify factors associated with deficiency and excess conditions in patients with musculoskeletal disorders.

II. SUBJECTS AND METHODS

2.1. Subjects, location and duration

Study subjects

Patients diagnosed with periarthritis humeroscapularis and/or lumbar spondylosis and/or knee osteoarthritis and/or rheumatoid arthritis who were receiving inpatient treatment at Hue Traditional Medicine Hospital.

Inclusion criteria

- Patients aged 18 years and older, agreed and voluntarily participated in the study

- Patients diagnosed with lumbar spondylosis according to the diagnostic guidelines of the Ministry of Health (Vietnam) (2016) [5].

- Patients diagnosed with knee osteoarthritis according to the ACR 1991 criteria [6].

- Patients diagnosed with periarthritis humeroscapularis according to Tran Ngoc An [7].

- Patients diagnosed with rheumatoid arthritis according to the ACR 1987 criteria [8].

Exclusion criteria

- Patients who were unable to hear, understand, or respond to questions during the examination.

- Patients who were physically debilitated or had signs of mental disorders.

Study location and duration

This study was conducted at Hue Traditional Medicine from June 2024 to January 2025.

2.2. Method

Study design: a cross-sectional descriptive study

Sample size: the sample size was calculated using the formula

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

α: significance level (α = 0.05)

Z: standard normal distribution value at 95% confidence level

d: maximum allowable error of the estimate (d = 0.07)

The sample size for the study was calculated separately for cases with deficiency patterns and those with excess patterns, referencing the p values from the study by Jang Eunsu [9]. The final sample size was determined as the larger of the two calculated values.

The calculations were as follows:

- Proportion of cases with deficiency patterns: $p_1 = 0.536$, with $d = 0.07 \rightarrow n_1 = 195$

- Proportion of cases with excess patterns: $p_2 = 0.613$, with $d = 0.07 \rightarrow n_2 = 186$

Substituting these values into the formula, the minimum number of patients required for the study was 195. In practice, our study was conducted with a sample size of 206 patients.

Sampling method: Convenience sampling method: all patients who meet the inclusion criteria during the study period

Research tools:

- A pre-prepared research form, included:

+ The Deficiency and Excess Pattern Identification Questionnaire (DEPIQ) consists of 20 items assessing deficiency and 20 items assessing excess. Each item is rated on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The score for each pattern is the sum of all symptom scores within that pattern, with a maximum score of 100. Higher scores indicate a greater likelihood of deficiency or excess patterns. The optimal cut-off score

for identifying deficiency was 56.6 (sensitivity = 81.5%, specificity = 82.6%, AUC = 0.900), while for identifying excess, the cut-off was 47.5 (sensitivity = 76.7%, specificity = 78.2%, AUC = 0.851) [9] [10].

- Medical records, tongue depressor, flashlight, pulse pillow, stopwatch, Visual Analog Scale (VAS) for pain assessment, and weighing scale, as well as height and weight measuring tools

Research content:

- General characteristics of study subjects:

+ Demographic information (age, gender), health behaviors (physical activity habits), Body Mass Index (BMI).

+ Disease-related information: Duration of illness, pain intensity, pain severity assessed using the Visual Analog Scale (VAS), and pain onset circumstances.

- Deficiency and excess characteristics according to Traditional Medicine. Based on the classification of symptoms in the literature (including classifications according to pulse, tongue, local pain manifestations, and other systemic symptoms) and the categorization of deficiency and excess conditions according to the DEPIQ questionnaire, specifically:

+ Classification based on Pulse Diagnosis [11]:

Pulse types associated with excess patterns: Excessive (full) pulse, wiry pulse, slippery pulse, forceful pulse, tight pulse and choppy pulse.

Pulse types associated with deficiency patterns: Deficient (empty) pulse, thin pulse, weak pulse, deep pulse, intermittent pulse, floating pulse

+ Classification based on Tongue Diagnosis [12]:

Tongue color: Red or bluish-purple (excess pattern); pale (deficiency pattern); pale red (normal)

Tongue shape: Enlarged or thin (deficiency pattern); balanced figure (normal)

Tongue coating thickness: Thick coating (excess pattern); thin or peeled coating (deficiency pattern).

+ Classification based on Pain Characteristics [11]:

Excess pattern: Sudden and acute onset; fixed pain; dislike of pressure and massage; constant pain intensity; moderate to severe pain

Deficiency pattern: Gradual and spontaneous onset; moving pain; preference for pressure and massage; intermittent pain intensity; mild pain.

+ Classification based on additional symptoms [4], [13]:

Mental state: Fatigue (deficiency pattern); restlessness, sluggishness, irritability (excess pattern).

Facial complexion: Pale or sallow complexion (deficiency pattern); reddened complexion (excess pattern).

Conversation ability: Reluctance to speak, intermittent speech (deficiency pattern); excessive talking, disorganized speech, or off-topic conversation (excess pattern).

Voice quality: Weak, low voice (deficiency pattern); loud, resonant voice (excess pattern).

Sweating: Presence of spontaneous sweating or night sweating indicates a deficiency pattern.

+ Assessment of Deficiency and Excess Patterns using the DEPIQ Questionnaire. A cut-off score of 56.6 was used to diagnose deficiency, while a score of 47.5 was used to diagnose excess. Based on these thresholds, patients were classified into four categories. Those who exhibited deficiency but not excess were identified as having a deficiency pattern, whereas those who exhibited excess but not deficiency were classified as having an excess pattern. Patients displaying both deficiency and excess simultaneously were categorized under the combined deficiency and excess (CDaE) pattern, while those who exhibited neither deficiency nor excess were classified as having no deficiency and excess (NDaE) [9] [10].

+ To explore various factors associated with deficiency and excess patterns in the study population. Specifically, it examined the relationship between the deficiency-excess classification, as identified by the DEPIQ questionnaire, and key health-related characteristics, lifestyle habits, tongue and pulse characteristics according to Traditional Medicine, as well as localized pain manifestations.

Data Analysis

After data collection, all information was entered, cleaned, and analyzed using SPSS 22.0 statistical software. The relationships between variables were assessed using the Chi-square test and Fisher's exact test, with statistical significance determined at $p<0.05$. The Chi-square test was applied to examine the association between categorical variables. Fisher's exact test was used in cases where the expected frequencies were small (less than 5).

Research Ethics

The study was a product of a bachelor's thesis, which has been approved for implementation by the Board of Rectors and the Council of Hue University of Medicine and Pharmacy, Hue University.

The study was conducted only with informed consent and voluntary participation of all subjects. It was carried out for scientific research purposes, aiming to support disease prevention, patient care, and health protection. The confidentiality and privacy of participants' information were strictly respected throughout the study.

III. RESULTS

General Characteristics of the study subjects

Table 1. General characteristics of the study subjects

Characteristics		Quantity	%
Sex	Male	56	27,2
	Female	150	72,8
Age (years)	<40	8	3,9
	40-49	15	7,3
	50-59	45	21,8
	≥60	138	67,0
	Mean ± SD	63,8 ± 12,5	
Musculoskeletal disorders	Knee osteoarthritis	60	29,1
	Lumbar Spondylosis	163	79,1
	Rheumatoid Arthritis	8	3,9
	Periarthritis humeroscapularis	17	8,3
Duration since diagnosis (years)	<1	34	16,5
	1-5	118	57,3
	>5	54	26,2
Pain intensity (VAS)	1-3 (Mild pain)	59	28,7
	4-6 (Moderate pain)	81	39,3
	7-10 (Severe pain)	66	32,0
	Mean ± SD	5,4 ± 2,4	

The female gender accounted for 72.8%, which was 2.7 times higher than the male proportion (27.2%). The age group of ≥60 years had the highest prevalence at 67%, with a mean age of 63.8 ± 12.5 years. Lumbar spondylosis was the most common musculoskeletal disorder, diagnosed in 79.1% of patients, followed by knee osteoarthritis at 29.1%. In terms of disease duration, 57.3% of patients had the condition for 1–5 years, while those with a duration of less than one year accounted for the lowest proportion (16.5%). Regarding pain intensity assessed by the VAS scale, the 4–6 score range (moderate pain) was the most prevalent, accounting for 39.3%.

Clinical characteristics of Deficiency and Excess patterns in Traditional Medicine

Table 2. Distribution of Deficiency and Excess symptoms based on tongue and pulse characteristics

Characteristics			Quantity	%
Tongue	Excess	Red	55	26,7
		Bluish-purple	33	16,0
		Thick coating	82	39,8
	Deficiency	Pale	58	28,2
		Enlarged	82	39,8
		Thin	40	19,4
		Thin/ Peeled coating	124	60,2

Characteristics			Quantity	%
Pulse	Excess	Excessive (full)	125	60,7
		Wiry	81	39,3
		Slippery	47	22,8
		Forceful	33	16,0
		Tight	18	8,7
		Choppy	13	6,3
	Deficiency	Deficient (empty)	81	39,3
		Thin	63	30,6
		Weak	17	8,3
		Deep	96	46,6
		Intermittent	2	1,0
		Floating	45	21,8

Regarding tongue color, pale tongue (deficiency pattern) and red tongue (excess pattern) had nearly equal proportions, accounting for 28.2% and 26.7%, respectively. In terms of tongue shape, enlarged tongue was observed at a rate twice as high as thin tongue. Regarding tongue coating, the majority of patients exhibited deficiency-related characteristics, with thin or peeled coating found in 60.2% of cases, which was significantly higher than thick coating (excess pattern) at 39.8%.

For pulse characteristics, strong pulse (excess pattern) was observed in 60.7% of cases, higher than weak pulse (deficiency pattern) at 39.3%. Notably, deep pulse (deficiency pattern) had a relatively high prevalence of 46.6%. Among the excess-pattern pulses, wiry pulse was the most common type (39.3%), whereas tight pulse and choppy pulse had the lowest frequencies (<10%).

Table 3. Distribution of Deficiency and Excess symptoms based on other general symptoms

Symptoms		Quantity	%
Excess	Restlessness, sluggishness, irritability	23	11,2
	Reddened facial complexion	19	9,2
	Loud, resonant voice	9	4,4
	Excessive talking, disorganized speech, or off-topic conversation	28	13,6
Deficiency	Mental fatigue	47	22,8
	Pale or sallow facial complexion	102	49,5
	Weak, low voice	112	54,4
	Reluctance to speak, intermittent speech	27	13,1
	Spontaneous/ night sweating	86	41,7

The majority of general symptoms were associated with deficiency patterns, ranging from 13.1% to 54.4%, while excess-pattern symptoms had a lower prevalence (below 14%). Among these, weak, low voice had the highest occurrence at 54.4%, followed by pale/sallow facial complexion (49.5%) and spontaneous/night sweating (41.7%).

Table 4. Distribution of Deficiency and Excess symptoms based on local pain manifestations

Symptoms		Quantity	%
Excess	Sudden and acute onset	116	56,3
	Fixed pain	42	20,4
	Constant pain intensity	165	80,1
	Dislike of pressure and massage	90	43,7
	Moderate - severe pain	147	71,3

Symptoms		Quantity	%
Deficiency	Gradual and spontaneous onset	90	43,7
	Moving pain	164	79,6
	Intermittent pain intensity	41	19,9
	Preference for pressure and massage	116	56,3
	Mild pain	59	28,7

The major proportion of patients experienced a sudden, acute onset of pain (excess pattern, 56.3%), while those with a gradual, natural onset (deficiency pattern) accounted for a lower percentage (43.7%). Moving pain (deficiency pattern, 79.6%) was more common than fixed pain (excess pattern, 20.4%). In terms of pain characteristics, continuous pain (excess pattern) appeared more frequently than intermittent pain. Dislike pressure and massage (excess pattern, 43.7%) was lower than preference for pressure and massage (deficiency pattern, 56.3%). Most patients reported moderate to severe pain (excess pattern, 71.3%), while only 28.7% described their pain as mild.

Table 5. Distribution of Deficiency and Excess patterns based on the DEPIQ

Patient condition		Deficiency pattern		Total
		Yes	No	
Excess pattern	Yes	56 (27,2)	74 (35,9)	130 (63,1)
	No	46 (22,3)	30 (14,6)	76 (36,9)
Total		102 (49,5)	104 (50,5)	206 (100)

Deficiency was present in 49.5% of patients, nearly matching the non-deficiency group (50.5%). Excess was more common than non-excess (63.1% vs. 36.9%). Overall, excess pattern dominated (35.9%), followed by combined deficiency and excess pattern (27.2%) and deficiency pattern (22.3%), while the no deficiency and excess group was least common (14.6%).

3.3. Factors Associated with Deficiency and Excess patterns in patients with musculoskeletal disorders

Table 6. Association between Deficiency and Excess patterns and tongue and pulse characteristics

Patient condition Characteristics		Deficiency	Excess	CDaE	NDaE	p
Tongue characteristics						
Shape	Enlarged	28 (34,1)	27 (32,9)	21 (25,6)	6 (7,3)	<0,001*
	Thin	11 (27,5)	10 (25)	9 (22,5)	10 (25)	
	Balanced figure	7 (8,3)	37 (44)	26 (31)	14 (16,7)	
Color	Pale	28 (48,3)	13 (22,4)	16 (27,6)	1 (1,7)	< 0,001**
	Red	6 (10,9)	32 (58,2)	12 (21,8)	5 (9,1)	
	Bluish-purple	2 (6,4)	15 (45,5)	11 (33,3)	5 (15,2)	
	Pale red	10 (16,7)	14 (23,3)	17 (28,3)	19 (31,7)	
Coating thickness	Thin/ Peeled	16 (12,9)	16 (12,9)	23 (18,5)	69 (55,7)	> 0,05*
	Thick	7 (8,5)	19 (23,2)	19 (23,2)	37 (45,1)	

Patient condition Characteristics		Deficiency	Excess	CDaE	NDaE	p
Pulse characteristics						
Intensity	Deficient (Empty)	30 (37,0)	8 (9,9)	35 (43,2)	8 (9,9)	<0,05*
	Excessive (Full)	16 (12,8)	66 (52,8)	21 (16,8)	22 (17,6)	
Pulse condition	Deficiency pulse (n=107)	42 (39,3)	22 (20,6)	33 (30,8)	10 (9,3)	<0,001*
	Excess pulse (n=149)	27 (18,1)	68 (45,6)	47 (31,5)	7 (4,7)	
Note: * *Chi-Square Test* ** *Fisher Exact Test* CDaE: Combined deficiency and excess; NDaE: No deficiency and excess						

There was a significant association between deficiency and excess syndromes and tongue shape, tongue color, pulse intensity, and pulse classification ($p < 0.05$).

Table 7. Association between Deficiency and Excess pattern and local pain characteristics

Patient condition Characteristics		Deficiency	Excess	CDaE	NDaE	p
Onset	Gradual and spontaneous	32 (35,6)	9 (10)	34 (37,8)	15 (16,7)	<0,001*
	Sudden and acute	14 (12,1)	65 (56)	22 (19)	15 (12,9)	
Location	Moving	40 (24,4)	61 (37,2)	43 (26,2)	20 (12,2)	> 0,05*
	Fixed	6 (14,3)	13 (31)	13 (31)	10 (23,8)	
Response to touch	Dislike of pressure	40 (34,5)	32 (27,6)	35 (30,2)	9 (7,8)	<0,001*
	Preference for pressure	6 (6,7)	42 (46,7)	21 (23,3)	21 (23,3)	
Intensity	Intermittent	10 (24,4)	17 (41,5)	9 (22)	5 (12,2)	> 0,05*
	Constant	36 (21,8)	57 (34,5)	47 (28,5)	25 (15,2)	
The severity (VAS)	Mild	16 (27,1)	17 (28,8)	8 (13,6)	18 (30,5)	<0,001**
	Moderate	16 (19,8)	25 (30,9)	32 (39,5)	8 (9,9)	
	Severe	14 (21,2)	32 (48,5)	16 (24,2)	4 (6,1)	
Note: * Chi-Square Test ** Fisher Exact Test CDaE: Combined deficiency and excess; NDaE: No deficiency and excess						

There was a significant association between deficiency-excess patterns and the onset context, response to touch, and pain intensity based on the VAS scale ($p < 0.001$).

IV. DISCUSSION

Clinical characteristics of Deficiency and Excess patterns in Traditional Medicine

The observation of tongue characteristics provides valuable insights into the deficiency-excess patterns of internal organs and the prosperity or decline of qi and blood [4]. As shown in Table 2, regarding tongue morphology, this study focused on forms associated with deficiency syndromes. Among them, an enlarged tongue appeared twice as frequently as a thin tongue. In terms of color, pale tongues (deficiency) and red tongues (excess) were nearly equally distributed, accounting for 28.2% and 26.7%, respectively. Our study also found that a thin or peeled tongue coating, indicative of deficiency (60.2%), was the most common presentation, whereas a thick coating, suggestive of excess, was observed in 39.8% of cases. These findings align with those reported by Tran Nhat Minh et al., who studied patients diagnosed with rheumatoid arthritis, osteoarthritis, and spinal degeneration, noting a thick coating in 34.0% and a thin or peeled coating in 63.4%, with a higher prevalence of an enlarged tongue compared to a thin tongue [14]. In Traditional Medicine, an enlarged with a pale tongue is classified as a deficiency syndrome, commonly associated with blood deficiency, qi deficiency, spleen qi deficiency, and yang deficiency. These conditions impair the nourishment of qi and blood to the head and face, leading to such tongue presentations. This explanation aligns with the physical condition of our study participants, the majority of whom were elderly (67.0% aged over 60) with long disease durations (83.5% had been affected for over a year). The prolonged illness likely contributed to qi and blood deficiency, weakened organ functions, and a decline in vital qi, manifesting as deficiency syndromes. Besides, table 3 further supports this observation, as most participants exhibited systemic deficiency-related symptoms (ranging from 13.1% to 54.4%). The most prevalent was weak and low voice (54.4%), followed by a Pale or sallow facial complexion (49.5%) and spontaneous or night sweating (41.7%). In contrast, symptoms associated with excess syndromes had a much lower prevalence (<14%).

Regarding pulse characteristics, we observed that full pulses (excess syndrome) were 1.5 times more prevalent than empty pulses (deficiency syndrome). Among the excess-type pulses, the wiry pulse was the most common (39.3%), whereas among the deficiency-type pulses, the deep pulse had the highest prevalence (46.6%). A deep pulse indicates interior disease, signifying that the pathogenic factors have penetrated deeply into the body, while a wiry pulse is associated with pain and liver-gallbladder disorders. This finding can be explained by the fact that most study participants had weakened Upright energy, making them more susceptible to external pathogenic factors such as wind, cold, and dampness. These factors can obstruct meridians externally while damaging internal organs. Furthermore, individuals with underlying qi and blood deficiency are more prone to stagnation, leading to a complex interplay of deficiency and excess, where acute pain (excess syndrome) manifests on a background of chronic pain.

Our study also found that the majority of patients experienced moderate to severe pain on the Visual Analog Scale (VAS) (71.3%, excess syndrome), while only 28.7% reported mild pain (deficiency syndrome). According to Traditional Medicine, wind, cold, dampness, and heat are key pathogenic factors in Bi syndrome. Wind is the primary cause, while cold causes severe pain with stiffness, worsening in cold weather. Heat generally does not cause pain unless combined with dampness, which represents environmental humidity and leads to a heavy, aching sensation that intensifies with weather changes [3]. During the study period, the climate in Hue City fluctuated frequently, with high humidity and persistent rainfall, leading to an increase in external pathogenic factors. In the course of disease progression, pathology rarely manifests as purely excess or purely deficiency syndromes. Instead, inadequate or improper treatment can cause pathogenic Qi to stagnate internally, ultimately weakening the body's vital Qi. Conversely, individuals with an underlying Qi deficiency may lack the capacity to expel pathogenic factors, resulting in fluid retention, phlegm-damp accumulation, and blood stasis—pathological byproducts that contribute to complex pain manifestations. This interplay between deficiency and excess is particularly evident in musculoskeletal disorders, which tend to progress into chronic conditions, further complicating symptom presentation. Regarding pain characteristics, our study found that constant pain, associated with excess syndrome, was

predominant (80.1%). This finding aligns with studies by Nguyen Quang Tam [15] and Nguyen Duc Minh [16] on patients with lumbar spine pain, where continuous pain was reported in 92.7% and 75% of cases, respectively.

Based on the DEPIQ questionnaire, 49.5% of patients exhibited deficiency syndrome, while 50.5% did not; 63.1% had excess syndrome, whereas 36.9% did not. These findings are consistent with Baek et al. [10], who reported deficiency and excess syndromes in 53.6% and 61.3% of cases, respectively. After classification into four syndromic groups, excess syndrome was the most prevalent (35.9%), followed by combined deficiency and excess (CDaE) (27.2%), deficiency syndrome (22.3%), and the lowest proportion in the normal (no deficiency and excess - NDaE) group (14.6%).

Factors associated with Deficiency-Excess Patterns in patients with musculoskeletal disorders

Traditional medicine diagnoses diseases based on the four diagnostic methods: inspection, listening and smelling, inquiry, and palpation. Among these, tongue inspection and pulse diagnosis are particularly significant but highly dependent on the practitioner's subjective experience. The DEPIQ, primarily based on inquiry with 40 items, has been validated as a reliable and objective tool for assessing deficiency-excess syndromes [9][10].

This study aims to explore the relationship between DEPIQ-based syndrome classification and specific characteristics or individual symptoms assessed through the four diagnostic methods. By doing so, we seek to evaluate the objectivity of syndrome classification based on traditional medical theory and enhance the reliability of diagnosis in Traditional Medicine.

Our study, as shown in Table 6, found a significant association between deficiency-excess syndromes in Traditional Medicine and tongue shape and color ($p < 0.001$). Enlarged or thin tongue, as well as pale tongue, were most frequently observed in the deficiency group, with prevalence rates of 34.1%, 27.5%, and 48.3%, respectively. Meanwhile, red and bluish-purple tongue were more common in patients classified as having excess syndromes, which aligns well with the theoretical basis of tongue diagnosis in Traditional Medicine. Additionally, according to theory, a thick tongue coating often indicates strong pathogenic Qi and deep-seated disease, typically associated with excess syndromes, while a thin coating is considered either normal or reflective of newly acquired and superficial diseases. However, our statistical analysis did not find a significant association between deficiency-excess classification and tongue coating thickness ($p > 0.05$). Regarding pulse characteristics, our findings also demonstrated a significant correlation between deficiency-excess syndromes and pulse intensity and classification ($p < 0.001$). Specifically, full pulse (52.8%) and excess-type pulses (45.6%)-including wiry, slippery, forceful, tight, and choppy pulses-were predominantly observed in the excess syndrome group. In contrast, empty pulses were most common in CDaE (43.2%) and deficiency patterns (37%). Deficiency-type pulses (39.3%)-including thin, weak, deep, large, and floating pulses-were most frequently found in the deficiency group. These findings are consistent with traditional pulse diagnosis literature, which states that strong pulses are typically seen in excess syndromes, whereas weak pulses are characteristic of deficiency syndromes.

In Traditional Medicine, pain reflects an imbalance between vital energy and pathogenic factors, indicating the body's deficiency-excess status. As shown in Table 7, we found a significant association between deficiency-excess patterns and pain onset, response to touch, and the severity based on the VAS scale ($p < 0.001$). Specifically, sudden and acute onset (56.0%), dislike of pressure (46.7%), and severe pain (*45.8%*) were most common in the excess pattern group. Meanwhile, gradual onset (35.6%), preference for pressure (34.5%), and mild pain (27.1%) were more prevalent in the deficiency syndrome group. Our observations suggest that patients with sudden pain onset often experienced trauma, poor posture, or weather changes—factors linked to blood stasis or excessive pathogenic factors such as wind, cold, dampness in TM. In contrast, gradual onset was more common in chronic cases, worsening with weather fluctuations. Prolonged illness leads to blood-qi depletion and weakened Upright qi, making the body more susceptible to pathogenic invasion. According to Traditional Medicine, pain is explained through two primary mechanisms: "pain due to obstruction" and "pain due to deficiency". "Pain due to obstruction" refers to pain caused by stagnation of blood and qi, leading to blocked meridians, which corresponds to excess syndromes. This type of pain is often due to strong pathogenic factors, blood stasis, or external invasion, disrupting energy circulation. It

typically presents as acute onset, severe, localized, persistent pain that worsens with pressure. "Pain due to deficiency" occurs when blood and qi are insufficient, failing to nourish the meridians, leading to deficiency syndromes. This condition results from prolonged illness, depletion of Upright qi, or imbalances in yin and yang, causing gradual onset, dull, diffuse pain without a fixed location, and preference with pressure.

V. CONCLUSIONS

Among patients with musculoskeletal disorders, the majority exhibited excess pattern, followed by combined deficiency and excess, deficiency pattern, and the lowest proportion was no deficiency and excess. In terms of clinical characteristics, tongue manifestations were predominant in the deficiency syndrome group, whereas full pulse intensity (excess syndrome) was more frequently observed compared to empty pulse intensity (deficiency syndrome). Local pain symptoms were complex, often presenting as a combination of deficiency and excess syndromes.

There was a statistically significant association between deficiency-excess syndrome and disease duration, BMI, sleep quality, physical activity habits, tongue shape, tongue color, pulse characteristics, pain onset conditions, pain nature, and pain intensity ($p < 0.05$).

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