PENINSULA PUBLISHING LLC

SHIFAA
Vol. **(2025)**, 2025, **pp.** 7–13
ISSN: 3078-2686

Research Article

Association Between Cold Hypersensitivity in the Extremities and Functional Dyspepsia: Insights from a Multicenter Survey Study

Ioannis Adamopoulos[1,*]

[1] *University of West Attica, Department of Public Health Policy, Sector of Occupational & Environmental Health, School of Public Health, Hellenic Republic, Region of Attica, Department of Environmental Hygiene and Public Health and Sanitarian Inspections, Greece*.

ARTICLE INFO

Article History
Received 12 Oct 2024
Revised: 1 Dec 2024
Accepted 1 Jan 2025
Published 15 Jan 2025

Keywords
Cold Hypersensitivity,
CHHF,
Functional Dyspepsia,
Dyspepsia Symptoms,
Multicenter Survey

ABSTRACT

The study examined the effects of cold hypersensitivity in hands and feet (CHHF) on the symptoms of functional dyspepsia. A study utilizing survey methods yielded completion from 6044 individuals to determine their Hand and Foot Cold Hypersensitivity status along with their dyspepsia symptomatology. Based on their responses, participants were divided into two groups: A group assigned as CHHF comprised of 1,209 participants felt cold sensations while the remaining 1,744 participants made up a non-CHHF comparison group who experienced warm or neutral sensations. Statistical evaluation of digestive symptom frequencies occurred through chi-square tests and logistic regression methods to generate outcome ratios (ORs) and create propensity scores between the two participant groups. Dyspeptic symptoms such as poor digestion and reduced appetite and upper abdominal discomfort and motion sickness and epigastric burning and postprandial fullness and nausea and bloating were significantly more frequent among participants from the CHHF group. Participants within the CHHF group showed a statistically higher occurrence of dyspeptic symptoms with vomiting and epigastric pain alongside various gastrointestinal problems compared to controls without CHHF. The findings highlight a potential association between CHHF and a higher prevalence of functional dyspepsia symptoms. In conclusion, this study provides evidence that individuals with cold hypersensitivity in the hands and feet are more likely to experience various symptoms of functional dyspepsia. These results underscore the need for further investigation into the underlying mechanisms linking CHHF and dyspepsia, which may have implications for targeted clinical interventions and management strategies for affected individuals.

1. INTRODUCTION

Traditional Korean medical practitioners use pattern identification as a fundamental process to both diagnose a patient and choose suitable treatments. Pattern identification methodology features three approaches: The eight-principal pattern identification system, as well as constitutional and visceral patterns identification [1, 2]. The eight-principal framework employs four essential evaluation factors: yin and yang, external and interior, cold and heat, and inadequacy and excess. Within the framework of patient assessment patterns, the recognition of cold and heat stands as an essential diagnostic component. Korean medicine diagnostic procedures using the four examinations assess both patient-described temperature perceptions and objective medical findings to evaluate cold or heat patterns beyond thermal body measurements. Functional changes from disease manifestations along with natural constitutional factors produce these patterns.

The difficulty of detecting cold and heat patterns stems from how symptom assessment due to personal perception remains uncertain while objective medical tools also lack sufficient capability for diagnosis. The investigation of cold and heat patterns' effects on the body faces limited scientific research despite work towards standardized assessment tools such as Ryu et al.'s questionnaire [3] and Song et al.'s focus on knee osteoarthritis [4]. The development of verified diagnostic instruments and better-defined diagnostic patterns has been compromised by the current shortage of systematic tools.

The authors of this study decided to concentrate their research on cold hypersensitivity in hands and feet (CHHF) which affects many women specifically [5]. An individual with CHHF experiences extreme cold sensitivities during temperatures that range from cold to moderately warm conditions. The prevalence of cold sensations remains uncertain because of restricted information although one investigation documented that 38.7% of women reported such experiences [6].

This study aimed to explore the relationship between CHHF and digestive function, with a focus on functional dyspepsia symptoms. Functional dyspepsia affects 8–30% of the population [7], and the “spleen and four extremities” theory from

*Corresponding author email: adamopoul@gmail.com
DOI: https://doi.org/10.70470/SHIFAA/2025/002

the Huangdi Neijing [2] suggests a connection between limb health and digestive function. Previous research has indicated a correlation between CHHF and dyspepsia [8, 9], but these studies often had limited sample sizes or targeted specific demographic groups, such as women or particular age ranges. We hypothesized that individuals with CHHF would exhibit poorer digestive function than those without CHHF. To test this hypothesis, we analyzed questionnaire responses to compare digestive symptoms between CHHF and non-CHHF individuals. This approach aimed to provide clearer insights into the relationship between cold hypersensitivity and functional dyspepsia.

2. METHODS

2.1 Data Collection

From November 2006 to August 2014, researchers collected data via the KDC inside the Korea Institute of Oriental Medical Sciences (KIOM) system [10]. Data were collected from 6,044 persons aged 19 and over at 13 Korean medical facilities and 11 clinics. To eliminate interference from organic dyspepsia, the researchers excluded patients with chronic gastritis, gastroduodenal ulcers, esophagitis, fatty liver, hepatitis, and digestive tract malignancies, leaving 3,558 subjects. The classification process eliminated participants whose medical history was ambiguous for CHHF or non-CHHF status. The final study included 2,953 subjects, with 1,209 categorized as CHHF patients and 1,744 as non-CHHF. KIOM's institutional review board approved the research project (I-0910/02-001). The study design adheres to the flowchart structure shown in Figure 1. KMDC dataset includes CHHF data for cold sensitivity in the hands and feet, as well as those who did not have CHHF responses in these regions.

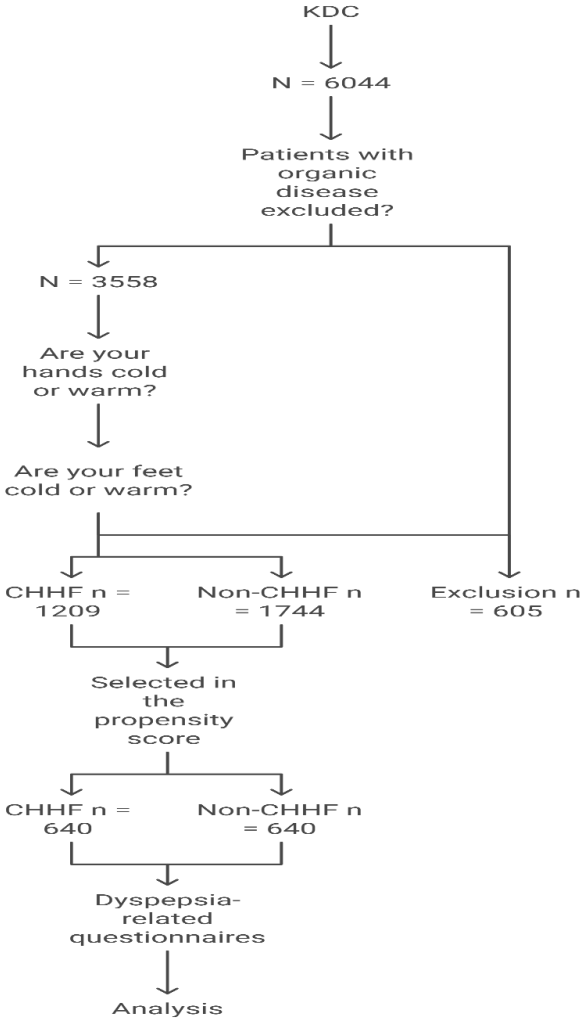

Fig .1. Study design flowchart.

2.2 Cold Hypersensitivity in the Hands and Feet (CHHF)

Participants were classified based on their answers to questions about hand and foot temperatures. Individuals who responded "cold" to both "Are the hands cold or warm?" and "Are feet cold or warm?" were placed in the CHHF category.

Those who answered "warm" or "normal" to both queries were placed to the non-CHHF category. Participants who provided inconsistent or ambiguous responses to either question were eliminated to guarantee categorization clarity.

2.3 Questionnaire on Digestion

The survey assessed nine digestive symptoms based on the Rome II criteria [11, 12] and included additional questions relevant to Korean medicine, such as digestion status, motion sickness, and exhaustion when hungry. Responses were based on the participants' usual status over the past six months, aligning with established measures like the Glasgow Dyspepsia Severity Score [13] and Rome III classification. Symptoms were rated on specific scales: for digestion status, options included "good" or "bad." Appetite was evaluated on a four-point scale ranging from "very good" to "not good," with detailed definitions provided. For dyspeptic symptoms such as nausea, epigastric pain, and bloating, responses were categorized as "often" (≥2 times/week), "sometimes" (≥3 times/month), or "rarely" (≤2 times/month).

2.4 Statistical Analysis

Statistical analyses were performed using SPSS 21.0 for Windows (IBM Corp., Armonk, NY, USA). Propensity score matching was applied to align the general characteristics of the CHHF and non-CHHF groups. Chi-square tests and logistic regression analyses were utilized to evaluate the association between CHHF and digestive symptoms. Detailed results are summarized in Supplementary Table I, accessible online. Both groups contained 640 matched patients according to research criteria without demonstrating population divergences between the groups (Table 1).

TABLE I: GENERAL CHARACTERISTICS OF STUDY SUBJECTS

Variable	Before Matching (CHHF)	Before Matching (Non-CHHF)	P-Value (Before Matching)	After Matching (CHHF)	After Matching (Non-CHHF)	P-Value (After Matching)
Sex	Male: 226 (18.7%), Female: 983 (81.3%)	Male: 769 (44.1%), Female: 975 (55.9%)	<0.001	Male: 168 (26.3%), Female: 472 (73.8%)	Male: 173 (27%), Female: 467 (73%)	0.752
Age (years)	44.6 ± 13.8	47.4 ± 14.8	<0.001	44.9 ± 14.8	45 ± 14.4	0.858
Height (cm)	161.3 ± 7.6	163.1 ± 8.8	<0.001	161.6 ± 8.1	161.2 ± 8.0	0.375
Weight (kg)	57.4 ± 8.8	64.2 ± 11.0	<0.001	59.8 ± 8.8	59.4 ± 9.1	0.447
BMI (kg/m²)	22 ± 2.8	24.1 ± 3.2	<0.001	22.9 ± 2.8	22.8 ± 2.8	0.731

Researchers applied a minimum distance scoring system to match patients based on their sex characteristics and age levels as well as BMI metrics. The changes in propensity score distribution between matched CHHF patients and matched non-CHHF patients are shown in Figure 2. Physical characteristics received double treatment either through enumeration with percentages or through statistical presentation with standard deviations and mean values. Statistical evaluation included chi-square assessments for classifying variables and independent samples t-testing for measuring continuous variables. The chi-square test was used for analyzing the number and percentages of responses to digestion-related survey questions among both groups. Both the propensity-matched and original group's dyspepsia odds ratios (ORs) were assessed through logistic regression analysis. For each dyspepsia-related item in the CHHF group researchers calculated the odds ratio measurements against the non-CHHF group. Researchers used $P<0.05P < 0.05$ values as their threshold for classifying statistical significance.

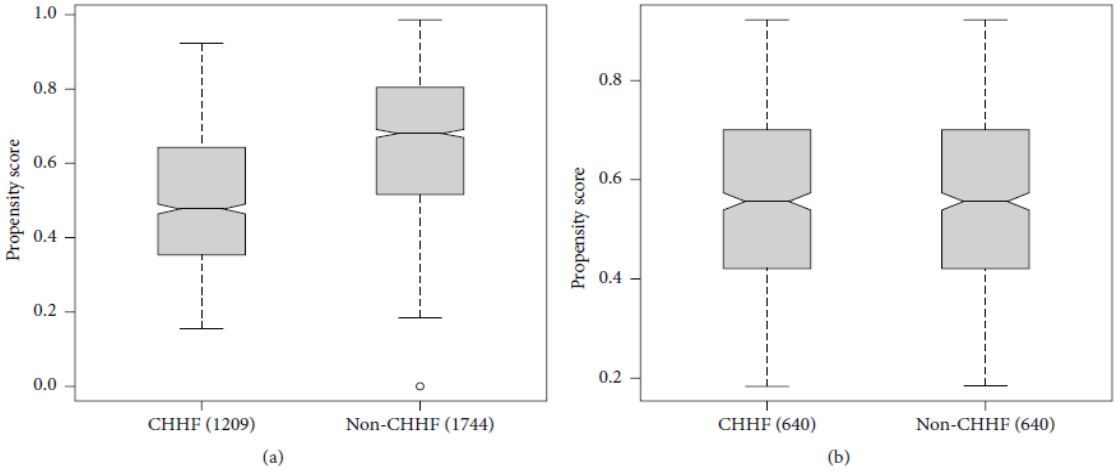

Fig .2. Before and after matching, the CHHF and non-CHHF groups were compared using their propensity scores.

2.5 Chi-Square Tests for the Relationship Between Dyspepsia and CHHF

All dyspepsia-related items showed significant differences (P<0.001P < 0.001) between the matched CHHF and non-CHHF groups before matching occurred. Subjects from the CHHF group showed worse digestion performance and appetite reduction than those without CHF. Dyspepsia symptoms occurred more frequently across the board in the CHHF group including upper abdominal discomfort and vomiting and feeling sick when moving along with hunger exhaustion and dealing with gas pain.

The matched analysis revealed P < 0.001 differences for digestion alongside P < 0.001 differences for postprandial fullness and P < 0.001 differences for bloating and P < 0.05 differences for upper abdominal discomfort, motion sickness, epigastric burning, nausea and appetite. People in the CHHF group experienced dyspepsia symptoms with greater frequency than members of the non-CHHF group. Vomiting as well as exhaustion when hungry and epigastric pain and belching showed no significant statistical variations between the groups as provide in Table II.

2.6 Odds Ratios for Dyspepsia Based on CHHF Status

A comparison of dyspepsia between CHHF and non-CHHF groups used odds ratios (ORs) presented in Table III and Supplementary Figure 1. Analyses before matching indicated substantial differences existed throughout all measurements. The analysis produced major distinctions measuring P<0.001P < 0.001 regarding bad digestion alongside motion sickness together with postprandial fullness and bloating. The evaluated symptoms of vomiting and epigastric burning together with nausea and epigastric pain displayed important statistical variations (P<0.05P < 0.05). New research reveals no meaningful differences occurred between groups regarding poor appetite and upper abdominal discomfort or exhaustion when one needs to eat and belching. Table III shows that bad digestion had the highest OR value of 2.423 before matching while bloating achieved 1.883 after matching.

After matching processes occurred both bloating responses marked "often" and "sometimes" became statistically different. The distribution of responses shifted markedly post-matching between "often" and "sometimes" ratings for symptoms including upper abdominal discomfort, vomiting, motion sickness, exhaustion when hungry, epigastric burning, postprandial fullness, nausea, and epigastric pain. No significant change existed concerning the frequency of belching based on the additional beef no meal consumption (Supplementary Figure 1).

TABLE II: DYSPEPSIA IN GROUPS WITH AND WITHOUT CHHF PRIOR TO AND FOLLOWING PROPENSITY MATCHING.

Variable	Before Matching (CHHF)	Before Matching (Non-CHHF)	P-Value (Before Matching)	After Matching (CHHF)	After Matching (Non-CHHF)	P-Value (After Matching)
Digestion	Good: 814 (67.3%), Bad: 395 (32.7%)	Good: 1453 (83.3%), Bad: 291 (16.7%)	<0.001	Good: 440 (68.8%), Bad: 200 (31.3%)	Good: 513 (80.2%), Bad: 127 (19.8%)	<0.001
Appetite	Extremely good: 74 (6.1%), Good: 608 (50.3%), Average: 423 (35%), Not good: 103 (8.5%)	Extremely good: 131 (7.5%), Good: 1014 (58.1%), Average: 508 (29.1%), Not good: 91 (5.2%)	<0.001	Extremely good: 43 (6.7%), Good: 319 (49.9%), Average: 223 (34.9%), Not good: 54 (8.5%)	Extremely good: 45 (7.0%), Good: 366 (57.2%), Average: 188 (29.4%), Not good: 41 (6.4%)	0.045
Discomfort in Upper Abdomen	Often: 74 (6.1%), Sometimes: 441 (36.5%), Rarely: 694 (57.4%)	Often: 40 (2.3%), Sometimes: 410 (23.5%), Rarely: 1294 (74.2%)	<0.001	Often: 32 (5.0%), Sometimes: 210 (32.8%), Rarely: 398 (62.2%)	Often: 17 (2.7%), Sometimes: 193 (30.2%), Rarely: 430 (67.2%)	0.038
Vomiting	Often: 5 (0.4%), Sometimes: 133 (11%), Rarely: 1071 (88.6%)	Often: 5 (0.3%), Sometimes: 98 (5.6%), Rarely: 1641 (94.1%)	<0.001	Often: 3 (0.5%), Sometimes: 67 (10.5%), Rarely: 570 (89.1%)	Often: 3 (0.5%), Sometimes: 45 (7.0%), Rarely: 592 (92.5%)	0.094
Motion Sickness	Often: 40 (3.3%), Sometimes: 327 (27%), Rarely: 842 (69.6%)	Often: 19 (1.1%), Sometimes: 292 (16.7%), Rarely: 1433 (82.2%)	<0.001	Often: 16 (2.5%), Sometimes: 165 (25.8%), Rarely: 459 (71.7%)	Often: 11 (1.7%), Sometimes: 113 (17.7%), Rarely: 516 (80.6%)	0.001
Exhaustion When Hungry	Often: 132 (10.9%), Sometimes: 524 (43.3%), Rarely: 553 (45.7%)	Often: 120 (6.9%), Sometimes: 617 (35.4%), Rarely: 1007 (57.7%)	<0.001	Often: 60 (9.4%), Sometimes: 260 (40.6%), Rarely: 320 (50%)	Often: 41 (6.4%), Sometimes: 245 (38.3%), Rarely: 354 (55.3%)	0.057
Belching	Often: 135 (11.2%), Sometimes: 408 (33.7%), Rarely: 666 (55.1%)	Often: 125 (7.2%), Sometimes: 578 (33.1%), Rarely: 1041 (59.7%)	<0.001	Often: 70 (10.9%), Sometimes: 217 (33.9%), Rarely: 353 (55.2%)	Often: 53 (8.3%), Sometimes: 224 (35.0%), Rarely: 363 (56.7%)	0.272
Epigastric Burning	Often: 48 (4.0%), Sometimes: 354 (29.3%), Rarely: 807 (66.7%)	Often: 41 (2.4%), Sometimes: 396 (22.7%), Rarely: 1307 (74.9%)	<0.001	Often: 19 (3.0%), Sometimes: 194 (30.3%), Rarely: 427 (66.7%)	Often: 17 (2.7%), Sometimes: 156 (24.4%), Rarely: 467 (73.0%)	0.049
Postprandial Fullness	Often: 73 (6.0%), Sometimes: 326 (27%), Rarely: 810 (67%)	Often: 47 (2.7%), Sometimes: 285 (16.3%), Rarely: 1412 (81%)	<0.001	Often: 32 (5.0%), Sometimes: 166 (25.9%), Rarely: 442 (69.1%)	Often: 19 (3.0%), Sometimes: 120 (18.8%), Rarely: 501 (78.3%)	0.001

Nausea	Often: 32 (3.6%), Sometimes: 228 (25.6%), Rarely: 631 (70.8%)	Often: 20 (1.6%), Sometimes: 187 (15.2%), Rarely: 1024 (83.2%)	<0.001	Often: 13 (2.8%), Sometimes: 121 (25.7%), Rarely: 336 (71.5%)	Often: 12 (2.6%), Sometimes: 74 (16.2%), Rarely: 370 (81.1%)	0.002
Epigastric Pain	Often: 40 (3.3%), Sometimes: 250 (20.7%), Rarely: 919 (76.0%)	Often: 22 (1.3%), Sometimes: 223 (12.8%), Rarely: 1499 (86.0%)	<0.001	Often: 12 (1.9%), Sometimes: 118 (18.4%), Rarely: 510 (79.7%)	Often: 9 (1.4%), Sometimes: 90 (14.1%), Rarely: 541 (84.5%)	0.078
Bloating	Often: 76 (6.3%), Sometimes: 422 (34.9%), Rarely: 711 (58.8%)	Often: 51 (2.9%), Sometimes: 419 (24%), Rarely: 1274 (73.1%)	<0.001	Often: 35 (5.5%), Sometimes: 228 (35.6%), Rarely: 377 (58.9%)	Often: 16 (2.5%), Sometimes: 157 (24.5%), Rarely: 467 (73.0%)	<0.001

TABLE III: BASED ON CHHF STATUS, ODDS RATIOS (OR) AND 95% CI FOR INDIGESTION BEFORE AND AFTER SIMILARITY MATCHING

Variable	Before Matching	After Matching
Digestion: bad	OR: 2.423 (95% CI: 2.036–2.884), P<0.001P < 0.001P<0.001	OR: 1.836 (95% CI: 1.421–2.372), P<0.001P < 0.001P<0.001
Appetite: not good	OR: 1.693 (95% CI: 1.264–2.268), P<0.001P < 0.001P<0.001	OR: 1.349 (95% CI: 0.885–2.056), P=0.165P = 0.165P=0.165
Discomfort in Upper Abdomen	OR: 2.134 (95% CI: 1.825–2.495), P<0.001P < 0.001P<0.001	OR: 1.245 (95% CI: 0.990–1.566), P=0.061P = 0.061P=0.061
Vomiting	OR: 2.053 (95% CI: 1.572–2.680), P<0.001P < 0.001P<0.001	OR: 1.515 (95% CI: 1.031–2.226), P=0.035P = 0.035P=0.035
Motion Sickness	OR: 2.008 (95% CI: 1.689–2.389), P<0.001P < 0.001P<0.001	OR: 1.641 (95% CI: 1.264–2.130), P<0.001P < 0.001P<0.001
Exhaustion When Hungry	OR: 1.621 (95% CI: 1.398–1.879), P<0.001P < 0.001P<0.001	OR: 1.238 (95% CI: 0.994–1.542), P=0.057P = 0.057P=0.057
Belching	OR: 1.207 (95% CI: 1.041–1.400), P=0.013P = 0.013P=0.013	OR: 1.065 (95% CI: 0.854–1.329), P=0.573P = 0.573P=0.573
Epigastric Burning	OR: 1.490 (95% CI: 1.268–1.751), P<0.001P < 0.001P<0.001	OR: 1.347 (95% CI: 1.060–1.711), P=0.015P = 0.015P=0.015
Postprandial Fullness	OR: 2.095 (95% CI: 1.769–2.481), P<0.001P < 0.001P<0.001	OR: 1.615 (95% CI: 1.255–2.077), P<0.001P < 0.001P<0.001
Nausea	OR: 2.038 (95% CI: 1.656–2.509), P<0.001P < 0.001P<0.001	OR: 1.716 (95% CI: 1.260–2.336), P=0.001P = 0.001P=0.001
Epigastric Pain	OR: 1.931 (95% CI: 1.598–2.332), P<0.001P < 0.001P<0.001	OR: 1.393 (95% CI: 1.044–1.858), P=0.024P = 0.024P=0.024
Bloating	OR: 1.899 (95% CI: 1.625–2.219), P<0.001P < 0.001P<0.001	OR: 1.883 (95% CI: 1.489–2.382), P<0.001P < 0.001P<0.001

3. DISCUSSION

This study explored the relationship between cold hypersensitivity in CHHF and functional indigestion, guided by the "spleen and four extremities" theory from Huangdi's classic text [2]. According to this theory, the spleen governs digestion and the distribution of nutrients to the limbs, linking extremity symptoms to digestive function. This principle underpins many traditional Korean medicine practices, such as acupuncture and herbal prescriptions. The high frequency of functional dyspepsia (8-30%) [7] made CHHF a practical way to study possible associations with indigestion.

CHHF encompasses discomfort due to cold sensations in the limbs, characterized by reduced temperature or a subjective feeling of cold. Unlike Raynaud's phenomenon, CHHF has a broader scope and is relatively common in Korea, particularly among women [5]. It has been linked to peripheral vasoconstriction, although its exact cause remains unclear. Prior studies, such as those by [14] and [5], have explored its diagnosis and treatment, while others like Kondo and Okamura [6] examined its association with cold sensitivity indices.

Functional dyspepsia, defined by symptoms like postprandial fullness, epigastric pain, and bloating in the absence of organic disease [15], was the primary focus of this study. To reduce confounding factors, participants with known digestive diseases were excluded. Using data from the Korean Medicine Data Center (KDC), individuals were categorized into CHHF and non-CHHF groups based on survey responses, and differences in digestion were analyzed via KDC digestion feedback form. Similar data have been used in prior research, including studies on constitutional diagnostics [16, 20].

The study confirmed a higher prevalence of functional indigestion in the CHHF group, with bloating showing the most pronounced difference (OR: 1.883 after matching). Significant differences were also observed in digestion, appetite, and dyspepsia symptoms like motion sickness and epigastric burning after matching. General characteristics such as a higher female ratio (81%) and lower BMI in the CHHF group were addressed through propensity score matching, balancing sex, age, and BMI between groups (640 patients per group).

Results indicated a strong correlation between CHHF and functional dyspepsia, with significant differences before and after matching in key dyspepsia symptoms. These findings align with prior research, such as Tokunaga et al.'s study on

cold sensitivity [15] and Nietert et al.'s work on Raynaud's phenomenon [21], suggesting that cold-related conditions may impact overall health.

Despite its contributions, the study has several limitations. First, the cross-sectional design relied on subjective survey responses, which may introduce bias. Second, the KDC data were collected from traditional medicine patients, not the general population, limiting generalizability. Third, CHHF status was based on self-reported symptoms rather than clinical diagnoses. Fourth, while the dyspepsia questions were grounded in Rome II criteria [12], a validated questionnaire was not used, and differences in response scales limited the ability to calculate composite scores. Fifth, exclusions for organic digestive diseases were also based on self-reported data, without medical verification.

Future research should focus on clarifying the mechanisms linking CHHF and functional dyspepsia, using validated diagnostic tools and larger, more diverse populations. Longitudinal studies are needed to establish causality and uncover the underlying pathways between these conditions. This study provides foundational evidence supporting a connection between CHHF and dyspepsia, emphasizing the need for further investigation into their relationship and shared etiology.

4. CONCLUSIONS

Using traditional Korean medical standards that relate digestive wellness with disorders affecting the extremities, a recent study examined the relationship between CHHF and functional dyspepsia. The analysis used KDC database information to separate participants into CHHF and non-CHHF groups then performed digestion analysis before and after aligning the groups through Propensity Score Matching. Our analysis establishes a meaningful link between CHHF and functional dyspepsia since patients in the CHHF group presented higher frequencies of digestive symptoms. Key digestive symptoms of poor digestion, motion sickness and postprandial fullness, bloating, epigastric burning, nausea and epigastric pain demonstrated noteworthy variations between CHHF and non-CHHF participants after the matching process. The strongest statistical link was seen between bloating and CHHF based on an odds ratio value of 1.883. Results show that patients with CHHF demonstrate increased vulnerable sensitivities pertaining to functional dyspepsia based on existing research regarding health consequences from cold-stranded symptoms. The propensity scores matching process produced balanced results by eliminating initial distribution discrepancies regarding sex, age and BMI across the CHHF participant group. This study incorporates limitations from self-reported survey data alongside missing objective diagnostic tests and medical evaluations of organic digestive diseases. The study population consisted of patients who received treatment at traditional Korean medicine clinics which hampered broader population applicability of analysis results. Analysis of this research reveals essential information connecting CHHF to functional dyspepsia even though it includes several research constraints. More research must be conducted to understand these findings more fully while identifying how CHHF interacts with dyspepsia through clinical pathways and developing specific diagnostic and therapeutic options. A better knowledge of these connections would enhance management approaches for people who have CHHF together with functional dyspepsia.

Funding:

The research was conducted without financial contributions from external funding bodies, foundations, or grants. The authors confirm that all research costs were covered independently.

Conflicts of Interest:

The authors declare no conflicts of interest in relation to this study.

Acknowledgment:

The authors acknowledge their institutions' substantial moral support and availability of research resources.

References

[1] H. J. Kim, H. S. Bae, S. U. Park, S. K. Moon, J. M. Park, and W. S. Jung, "Clinical approach to the standardization of oriental medical diagnostic pattern identification in stroke patients," *Evid.-Based Complement. Altern. Med.*, vol. 2011, Art. no. 768492, pp. 1–7, 2011.

[2] World Health Organization, *WHO International Standard Terminologies on Traditional Medicine in the Western Pacific Region*, Geneva, Switzerland: World Health Organization, 2007.

[3] H. Ryu, H. Lee, H. Kim, and J. Kim, "Reliability and validity of a cold-heat pattern questionnaire for traditional Chinese medicine," *J. Altern. Complement. Med.*, vol. 16, no. 6, pp. 663–667, 2010.

[4] J. Y. Song, M. J. Kim, W. S. Sung *et al.*, "Efficacy and safety of herb medication according to cold-heat tendency of knee osteoarthritis patients," *J. Korean Acupunct. Moxibustion Med. Soc.*, vol. 29, no. 5, pp. 97–108, 2012.

[5] Y.-M. Hur, J.-H. Chae, K. W. Chung *et al.*, "Feeling of cold hands and feet is a highly heritable phenotype," *Twin Res. Hum. Genet.*, vol. 15, no. 2, pp. 166–169, 2012.

[6] M. Kondo and Y. Okamura, "Cold constitution: analysis of the questionnaire," *Nihon Sanka Fujinka Gakkai Zasshi*, vol. 39, no. 11, pp. 2000–2004, 1987.

[7] U. C. Ghoshal, R. Singh, F.-Y. Chang, X. Hou, B. C. Y. Wong, and U. Kachintorn, "Epidemiology of uninvestigated and functional dyspepsia in Asia: facts and fiction," *J. Neurogastroenterol. Motil.*, vol. 17, no. 3, pp. 235–244, 2011.

[8] S.-Y. Choi, M.-J. Lee, E.-K. Kim *et al.*, "A study on the correlation of cold hypersensitivity and common health indexes in young women," *Korean J. Obstet. Gynecol.*, vol. 24, no. 4, pp. 62–70, 2011.

[9] E.-Y. Nam, J.-I. Lee, G.-M. Kim, and H.-J. Kim, "A study on the correlation of cold hypersensitivity and digestive function," *J. Orient. Obstet. Gynecol.*, vol. 27, no. 1, pp. 140–151, 2014.

[10] H. J. Jin, Y. Baek, H. S. Kim, J. Ryu, and S. Lee, "Constitutional multicenter bank linked to Sasang constitutional phenotypic data," *BMC Complement. Altern. Med.*, vol. 15, Art. no. 46, 2015.

[11] C. Huh, C. H. Yang, J. G. Jang *et al.*, "Functional dyspepsia and subgroups in Korea and short-term outcome of therapeutic trial of cisapride; Multicenter study," *J. Neurogastroenterol. Motil.*, vol. 4, no. 1, pp. 1–12, 1998.

[12] D. A. Drossman, "The functional gastrointestinal disorders and the Rome II process," *Gut*, vol. 45, no. 2, pp. II1–II5, 1999.

[13] E. M. el-Omar, S. Banerjee, A. Wirz, and K. E. McColl, "The Glasgow Dyspepsia Severity Score—a tool for the global measurement of dyspepsia," *Eur. J. Gastroenterol. Hepatol.*, vol. 8, no. 10, pp. 967–971, 1996.

[14] K.-S. Park, K.-I. Park, J.-W. Kim *et al.*, "Efficacy and safety of Korean red ginseng for cold hypersensitivity in the hands and feet: a randomized, double-blind, placebo-controlled trial," *J. Ethnopharmacol.*, vol. 158, pt. A, pp. 25–32, 2014.

[15] H. Tokunaga, K. Munakata, K. Katayama *et al.*, "Clinical data mining related to the Japanese kampo concept 'hie' (oversensitivity to coldness) in men and pre- and postmenopausal women," *Evid.-Based Complement. Altern. Med.*, vol. 2014, Art. no. 832824, pp. 1–9, 2014.

[16] D. A. Drossman, "The functional gastrointestinal disorders and the Rome III process," *Gastroenterology*, vol. 130, no. 5, pp. 1377–1390, 2006.

[17] N. Manabe, K. Haruma, J. Hata *et al.*, "Clinical characteristics of Japanese dyspeptic patients: is the Rome III classification applicable?" *Scand. J. Gastroenterol.*, vol. 45, no. 5, pp. 567–572, 2010.

[18] J.-H. Do, E. Jang, B. Ku, J.-S. Jang, H. Kim, and J. Y. Kim, "Development of an integrated Sasang constitution diagnosis method using face, body shape, voice, and questionnaire information," *BMC Complement. Altern. Med.*, vol. 12, Art. no. 85, 2012.

[19] H. Chae, S. Lee, S. H. Park, E. Jang, and S. J. Lee, "Development and validation of a personality assessment instrument for traditional Korean medicine: Sasang personality questionnaire," *Evid.-Based Complement. Altern. Med.*, vol. 2012, Art. no. 657013, pp. 1–12, 2012.

[20] E. Jang, Y. Baek, K. Park, and S. Lee, "The Sasang constitution as an independent risk factor for metabolic syndrome: propensity matching analysis," *Evid.-Based Complement. Altern. Med.*, vol. 2013, Art. no. 492941, pp. 1–6, 2013.

[21] P. J. Nietert, S. R. Shaftman, R. M. Silver *et al.*, "Raynaud phenomenon and mortality: 20+ years of follow-up of the Charleston Heart Study cohort," *Clin. Epidemiol.*, vol. 2015, pp. 161–168, 2015.