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Identification of fundamental principles behind the treatment of skin diseases with acupuncture using network analysis

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Acupuncture has been used to treat various skin disorders, such as dermatitis, psoriasis, acne, and rash. Local acupoints close to the site of symptoms, distant acupoints along the meridian, and distant acupoints thought to have a particular characteristic to treat skin symptoms are assumed to be effective for treating pain diseases. However, there is still no known acupoint combination principle for the treatment of dermatological conditions. We aimed to provide an overview of networks of acupoints used to treat skin diseases and symptoms. We reviewed and analyzed acupoints in two classical literatures, "Chim-Gu-Kyung-Heom-Bang" (CGKHB) and "Sa-am-doin-chim-beub" (SDCB). With the help of network parameters (degree and centrality) and clusters identified by the network analysis, we characterized the principles of acupuncture treatment for skin diseases. While acupoints of CGKHB had a clustering pattern similar to the pattern of symptoms (*i.e.*, causes and features of skin symptoms) rather than the location of symptoms, the acupoints of SDCB displayed a clustering pattern primarily based on the location of symptoms (*i.e.*, where symptoms are present). The findings indicate that one acupuncture style used in CGKHB places an emphasis on disease symptoms, while another style used in SDCB is more focused on the locations of skin symptoms in order to locate acupoints for skin diseases. Our research will help researchers better understand acupuncture treatment strategy in dermatology. Further research is required to determine how traditional theories can benefit clinical practice and we need to develop an evidence-based clinical practice guideline for acupuncture in dermatology.

Keywords: Acupuncture, Acupoint selection, Dermatology, Meridian theory, Network analysis

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Traditional acupuncture practice emphasizes choosing the best acupoints based on empirical evidence and traditional theories, such as theory of *meridian* (a channel connecting the entire body through which *qi* flows) and *pattern identification* (identifying a pattern of symptoms). The selection of acupoints varies depending on the acupuncture style. For example, acupuncture style A emphasizes the characteristics of five elements (*Wood*, *Fire*, *Earth*, *Metal*, and *Water*). This style is fundamental in diagnosing disease patterns and thereby determining appropriate acupoints under the certain rule. In contrast, acupuncture style B prioritizes the meridian which certain acupoint belongs to when doctors select treatment points. Understanding acupuncture principle, in other words, how to select the best points to treat a particular disease, is therefore necessary to comprehend the clinical effects of various types of acupuncture treatments.

Using data science technologies, several acupoint selection strategies and their relationship to clinical features have been investigated[1-6]. Conventional acupoint selection methods can be summarized as: (1) local acupoints near the area where symptoms occur, (2) distant acupoints along the *meridian*, and (3) distant acupoints with little connection to *meridians* based on symptom differentiation. However, the procedures outlined above are primarily employed to treat pain disorders, and acupoint selection techniques can vary based on the diseases. For instance, while distant acupoints are more frequently used to treat gastrointestinal disorders, local acupoints may be used more frequently to treat pain, as pain disorders are more locally confined. On the other hand, symptoms

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related with skin diseases are much broader compared to pain (e.g. abscess, edema, rash, etc.). Therefore, acupoint selection strategies may differ between pain disorders and skin disorders.

The systematic review reported that acupuncture can improve outcome measures in the treatment of various skin disorders like dermatitis, chloasma, pruritus and urticaria, although double-blinded trials and standardized control intervention are further demanded[7]. The research on scientific mechanisms of acupuncture treatment has been in vigorous progress, such as effects on central nervous system through mechanisms like local, segmental, and extra-segmental neuromodulation, and others[8]. However, the investigation on acupoint selection for treating skin disorders has not been conducted.

For the first step to examine common and distinctive acupoint prescription strategies in acupuncture treatment for skin diseases, we conducted a literature review and network analysis of two representative classical literature of acupuncture, '*Chim-Gu-Kyung-Heom-Bang* (CGKHB)' and *'Sa-am-doin-chim-beub* (SDCB)'. CGKHB, written by Huh Im in the era of Joseon Dynasty, Korea (1664), focuses on the functions of internal organs; it emphasizes the relationships between bodily parts and internal organs, as well as how symptoms are used to determine organ's functions. SDCB is a 1988 edition of 'Sa-am-chim-beob', which is a representative book of Sa-am acupuncture, which is assumed to be written in 1664~1742, in the era of Joseon Dynasty, Korea[9]. We compared the characteristics and network parameters of acupoints used to treat dermatological diseases (e.g. dermatitis, rash, edema, etc.) in the literature, then summarized common and unique features of acupuncture style based on the network structure.

Materials and Methods

Data extraction and processing

We searched the contents of CGKHB and SDCB manually and electrically (https://mediclassics.kr/) to extract the phrases that mentioned skin diseases, without restriction on disease types. We further excluded phrases which did not specify acupoints. Keywords of each phrase were extracted and grouped into 'acupoints', 'symptom-related keywords' (e.g. itch), 'location-related keywords' (e.g. neck), 'comorbidities', and 'others'. Two authors (ISL and KK) extracted the data independently, and any discrepancies were resolved by discussion. The names of acupoints were renamed according to the standard acupuncture nomenclature[10]. Head, face, neck, shoulder, arm, hand, chest, abdomen, back/lower back, inguinal region, leg, feet, and *meridian*-related area were the categories used to classify the locations of skin disorders and symptoms. A dermatologist with more than 15 years of clinical expertise (KK) grouped the symptoms of skin disease into 'Dermatological condition types', 'Sore and ulcer types' and 'Others'. The phrases from two books were then divided into "phrases with symptom-related keywords" and "phrases with location-related keywords", separately. We assumed that the former phrases' acupoints were utilized to treat the symptom mentioned in the phrase, whereas the latter phrases' acupoints were chosen based on the location of symptoms.

Network analysis

Network analysis was conducted for 4 sets of acupoints (acupoints used in symptom-related phrases of CGKHB and SDCB, acupoints used in location-related phrases of CGKHB and SDCB) using Gephi (version 0.9.2, https://gephi.org/). The acupoints arranged in the same phrase were defined as nodes, and the connections between them were represented as edges in the network analysis. Each network's major acupoints were classified based on their degree, weighted degree, closeness, betweenness, and eigenvector centrality. Since each node owns at least one edge, the total number of edges indicates the degree of the node[11]. Closeness centrality is the concept that reflects how accessible a node is to others in a certain network; the sum of the shortest pathways between any two nodes reflects this value[12]. The betweenness centrality is the degree to which a node plays a central role in connections with others. Any two nodes can be connected by at least one shortest path, and the betweenness centrality is calculated according to the number of shortest pathways passing through the node[11]. The eigenvector centrality is given by the weighted sum of the centralities of all nodes connected, which reflects how important a node is in a network[13]. Acupoint groups were constructed using Gephi's modularity approach, which seeks out nodes that are more closely connected than the rest of the network. The Fruchterman Reingold layout algorithm was used to display the networks.

Results

In CGKHB and SDCB, we found 30 and 41 phrases containing skin conditions, respectively.

There were a total of 46 acupoint-symptom pairs described in 22 out of 30 phrases in CGKHB. Also, we found a total of 40 acupoint-location pairs in 21 phrases in CGKHB. Meanwhile, disease sites and acupoints were mentioned in 31 out of 41 phrases in SDCB. As some phrases contain multiple combinations, there were a total of 75 phrases including the combinations of acupoints and locations in SDCB. A total of 42 acupoint-symptom pairs were found in 40 of 41 phrases in SDCB.

Acupoints used in symptom-related phrases in CGKHB

'Sore and ulcer types' was the most common of the three categories ('Dermatological condition types' (n=18); 'Sore and ulcer types' (n = 22); 'Others' (n = 6)) that acupuncture is used to treat in CGKHB. Acupoints in CGKHB used for skin diseases/symptoms-related phrases are mainly located on *Yangmeridians* (n=25; acupoints on *Yinmeridians* n=15), especially on Bladder *meridian* (BL, n=9). Additionally, the majority of the acupoints used to treat skin conditions/symptoms are *Back-shu* points (n=6) and acupoints with the *Earth* character (n=9) among the *Five-elements*. By using degree and centrality scores, we identified the major acupoints of the CGKHB: LI11 (degree = 15; weighted degree = 23; closeness centrality = 0.42; betweenness centrality = 381.84; eigenvector centrality = 1.00), HT7 (8; 12; 0.45; 315.43; 0.90), LI4 (5; 7; 0.41; 203.07; 0.63), and ST36 (6; 10; 0.37; 115.95; 0.54; Table 1). Network analysis revealed that the acupoints are divided into seven clusters, which reflect the symptom classification of CGKHB; 'Dermatological condition types' (four clusters among seven), 'Sore and ulcer types' (two clusters among seven), and 'Others'. The distribution of clusters is shown in (Fig. 1a).

Acupoints used in location-related phrases in CGKHB

The most common body parts with skin diseases/symptoms are the face (n=9), back/low back

Table 1 — Characteristics of main acupoints of *Chim-Gu-Kyung-Heom-Bang*

Acupoints	Meridians	Degree /weighted degree	Closeness	Betweenness	Eigenvector	Characteristics*
Acupoints used in the symptom-related phrases						
LI11	Large Intestine	15/23	0.42	381.84	1	Sea; Earth
HT7	Heart	8/12	0.45	315.43	0.90	Stream; Earth
ST36	Stomach	6/10	0.37	115.96	0.54	Sea; Earth
SP4	Spleen	7/7	0.36	256.94	0.34	Connecting
L14	Large Intestine	5/7	0.41	203.07	0.63	Source
TE17	Triple Energizer	5/7	0.34	202.64	0.21	-
BL40	Bladder	5/7	0.28	129	0.14	Sea; Earth
BL13	Bladder	4/7	0.38	122.55	0.50	Back-shu
LR2	Liver	5/5	0.33	50.43	0.42	Spring; Fire
LI20	Large Intestine	5/5	0.37	99	0.45	-
Acupoints used in the location-related phrases						
LI11	Large Intestine	12/16	0.41	264.84	1	Sea; Earth
SP4	Spleen	7/14	0.36	211.27	0.41	Connecting
HT7	Heart	7/12	0.44	267.26	0.95	Stream; Source; Earth
GB21	Gall Bladder	5/10	0.29	122.5	0.14	-
L14	Large Intestine	5/8	0.42	184.85	0.74	Source
TE17	Triple Energizer	5/7	0.35	187.38	0.27	
BL40	Bladder	4/7	0.28	83	0.17	Sea; Earth
LI20	Large Intestine	6/6	0.37	125.17	0.58	-
ST36	Stomach	6/6	0.38	113.01	0.62	Sea; Earth
BL13	Bladder	4/6	0.38	109.33	0.58	Back-shu
TE10	Triple Energizer	2/2	0.22	39	0.03	Sea; Earth
GB20	Gall Bladder	1/1	0.18	0	0.013	-

BL: Bladder meridian; GB: Gallbladder meridian; HT: Heart meridian; LI: Large intestine meridian; LR: Liver meridian; SP: Spleen meridian; ST: Stomach meridian; TE: Triple energizer meridian

*In acupuncture theory, various attributes are assigned to acupoints, each of which can be explained as follows: Well points are located at the extremities and are effective for treating acute conditions; Spring points are associated with the dynamic movement of Qi and treat conditions involving sudden changes; Stream points regulate the flow of Qi and the functions of internal organs; River points are associated with the flow of Qi and blood and are effective for treating coughs, chills, and respiratory conditions; Sea points are linked to the flow of Qi within the internal organs; Tree points reflect growth, expansive energy, and liver functions; Fire points are related to heart functions and removing fever; Earth points are associated with nourishment and digestive functions; Metal points are associated with contraction, refinement, and lung functions; Water points are related to converging energy and kidney functions.

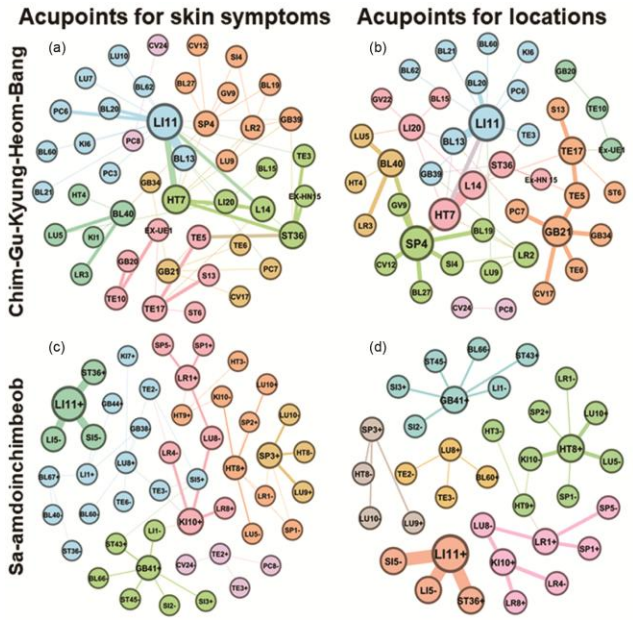

Fig. 1 — Network of acupoints used in *Chim-Gu-Kyung-Heom-Bang and Sa-am-doin-chim-beub*

(a) Network of acupoints used in the symptom-related phrases in *Chim-Gu-Kyung-Heom-Bang*. Among these, LI11, HT7, LI4, and ST36 were hubs of the networks. Details of seven clusters in this figure are as followed; red, green, purple, and yellow clusters were related to 'Dermatological condition types'; darker green cluster was related to 'Sore and ulcer types'; orange cluster was related to both 'Sore and ulcer types' and 'Others'; blue cluster does not have a clear relationship with a type of skin diseases, (b) Network of acupoints used in the location-related phrases in *Chim-Gu-Kyung-Heom-Bang*. Among these, LI11, HT7, and SP4 were hubs of the networks. Every cluster in this network did not show close relationships with a certain location of skin diseases, (c) Network of acupoints used in the symptom-related phrases in *Sa-am-doin-chim-beub*. Among these, tonification of KI10, tonification of LU8, and tonification of GB41 were hubs of the networks. Every cluster in this network did not show accurate association with types of skin symptoms, (d) Network of acupoints used in the location -related phrases in *Sa-am-doin-chim-beub*. Among these, tonification of HT, tonification of GB41, and tonification of LR1 were hubs of the networks. Details of six clusters in this figure, which are all independent with each other, are as followed; pink cluster containing acupoints located on leg, feet, and *Yin meridians*; orange cluster containing acupoints located onneck and Large Intestine *meridian*; yellow cluster containing acupoints located on any part other than the neck, *Yang meridians*; green cluster containing acupoints located on other regions, *Yin meridians*; gray cluster containing acupoints located on any part other than the Large Intestine *meridian*; blue cluster containing acupoints located on *Yang meridians*

(n=7), arms (n=5), and legs (n=4). The acupoints are divided into seven clusters through network analysis, which do not accurately reflect the locations of diseases (Fig. 1b). Acupoints on BL (n=9), *Back-shu* and *Source* points (n=6) are the most frequently used acupoints, which are primarily found on *Yang meridians* (n=25; acupoints on *Yin meridians* n=11). We discover that the hub acupoints of CGKHB, LI11 (12; 16; 0.41; 264.84; 1.00), HT7 (7; 12; 0.44; 267.26; 0.95), and SP4 had high degrees and levels of centrality (7; 14; 0.36; 211.27; 0.41; Table 1).

Acupoints used in symptom-related phrases in SDCB

The most common body parts with skin diseases/symptoms are the face (n=9), back/lower back (n=7), arms (n=5), and legs (n=4). The acupoints are divided into seven clusters through network analysis, which do not accurately reflect the types of skin symptoms (Fig. 1c). Acupoints on BL (n=9), *Back-shu* and *Source* points (n=6) were the most frequently used acupoints, which were primarily found on *Yang meridians* (n=25; acupoints on *Yin meridians* n=11). Tonification of KI10 (6; 21; 0.25; 548.00; 1.00), tonification of LU8 (6; 6; 0.22; 423.33; 0.91), and tonification of GB41 (6; 15; 0.18; 170.00; 0.58) serve as the hub acupoints (Table 2).

Acupoints used in location-related phrases in SDCB

The most frequently described body regions in SDCB are the neck (n=14), areas around the Large Intestine *meridian* (n=12), legs (n=10), faces (n=8), feet (n=6), and head (n=5). The majority of the acupoints in SDCB phrases with location data are found on the *Yin meridian* (n=21, *Yang meridian* n=14), particularly on the Lung *meridian*. Six clusters are identified by network analysis, with few connections between the clusters. Instead, each cluster has a distinct relationship to the *meridians* and the locations of skin symptoms. Acupoints in one cluster are mainly located on *Yin meridians* and are used to treat skin diseases of the leg and feet, while acupoints in another cluster are mainly used to treat skin diseases on the neck and regions along the Large Intestine *meridian* (Fig. 1d). We determine the main acupoints by high degree and centrality levels; tonification of HT8 (6; 33; 0.35; 60.00; 1.00), tonification of GB41 (6; 30; 1.00; 15.00; 0.81), and tonification of LR1 (4; 25; 0.38; 63.00; 0.62; Table 2).

Discussion

To our knowledge, this is the first study to conduct network analysis on acupoint selection for skin disorders. We reviewed and analyzed the network characteristics of acupoints used to treat skin diseases in two pieces of literature of acupuncture treatment, CGKHB and SDCB. According to the network

Table 2 — Characteristics of main acupoints of *Sa-am-doin-chim-beub*

Acupoints	Meridians	Degree/ weighted Degree	Closeness	Betweenness	Eigenvector	Characteristics*
Acupoints used in the symptom-related sentences						
LI11+	Large Intestine	3/48	0.13	83	0.14	Sea; Earth
KI10+	Kidney	6/21	0.25	548	1	Sea; Water
SP3+	Spleen	5/18	0.13	123.5	0.44	Stream; Earth
SI5-	Small Intestine	2/17	0.15	120	0.20	River; Fire
LI5-	Large Intestine	1/16	0.12	0	0.06	River; Fire
ST36+	Stomach	1/16	0.12	0	0.06	Sea; Earth
LR1+	Liver	4/16	0.22	447	0.35	Well; Tree
GB41+	Gall Bladder	6/15	0.18	170	0.58	Stream; Tree
HT8+	Heart	6/12	0.16	327.5	0.60	Spring; Fire
LU8-	Lung	2/11	0.23	432	0.44	River; Metal
Acupoints used in the location-related sentences						
LI11+	Large Intestine	3/90	1	3	0.15	Sea; Earth
HT8+	Heart	6/33	0.35	60	1	Spring; Fire
GB41+	Gall Bladder	6/30	1	15	0.81	Stream; Tree
LI5-	Large Intestine	1/30	0.6	0	0.09	River; Fire
SI5-	Small Intestine	1/30	0.6	0	0.09	River; Fire
ST36+	Stomach	1/30	0.6	0	0.09	Sea; Earth
KI10+	Kidney	3/27	0.26	27	0.30	Sea; Water
LR1+	Liver	4/25	0.38	63	0.62	Well; Tree
LU8-	Lung	2/17	0.32	36	0.39	River; Metal
SP3+	Spleen	3/12	1	3	0.15	Stream; Earth

BL: Bladder meridian; GB: Gallbladder meridian; HT: Heart meridian; KI: Kidney meridian; LI: Large intestine meridian; LR: Liver meridian; LU: Lung meridian; SI: Small intestine meridian; SP: Spleen meridian; ST: Stomach meridian; TE: Triple energizer meridian; +: tonification; -: sedation

*In acupuncture theory, various attributes are assigned to acupoints, each of which can be explained as follows: Well points are located at the extremities and are effective for treating acute conditions; Spring points are associated with the dynamic movement of Qi and treat conditions involving sudden changes; Stream points regulate the flow of Qi and the functions of internal organs; River points are associated with the flow of Qi and blood and are effective for treating coughs, chills, and respiratory conditions; Sea points are linked to the flow of Qi within the internal organs; Tree points reflect growth, expansive energy, and liver functions; Fire points are related to heart functions and removing fever; Earth points are associated with nourishment and digestive functions; Metal points are associated with contraction, refinement, and lung functions; Water points are related to converging energy and kidney functions.

analysis, we found distinctive features of two acupuncture styles, one highlights the symptoms of skin diseases, while the other highlights their locations, although the time gap between two textbooks is not so long. The findings suggest that the acupuncture used in CGKHB focuses more on disease symptoms that may reflect an imbalance of pathological factors (e.g. LI11, PC3, LI4, LU7, BL13, LI10, HT7, PC6 were chosen to treat rash induced by *Wind* and *Warm*). The *Sa-am* acupuncture described in SDCB, on the other hand, is more centered on the locations of skin symptoms and the modulation effect of acupuncture on the imbalanced function of internal organs and *meridians* (e.g. Large Intestine tonification treatment for a nucleus on the right side of the Large Intestine *meridian* region under the ear; examples in Table 3).

The disease lesions described in the two literatures also differed; CGKHB primarily contained sentences describing skin disease on the face and back, whereas SDCB primarily contained sentences describing skin disease on the neck and Large Intestine meridian areas. Furthermore, we discovered that more sentences in CGKHB were classified as ‘Sore and ulcer types’ than others, while more sentences in SDCB were classified as and 'Others'. We could speculate that medical subjects of two literatures differed at that time, thereby evoking the difference of types of disorders. Huh Im, the author of CGKHB, worked as a court doctor, whereas acupuncture practiced by Sa-am, the author of SDCB, was conducted on common people. It is possible that the differences in lesions and symptoms of skin diseases reported in the two literatures reflect the patients' different backgrounds and environments.

Back-*shu* points and Front-*mu* points, which are known for the function of tonifying the *Qi* of internal organs[14], are frequently used in CGKHB. Moreover, pathogens and comorbidities were more frequently described in CGKHB than in SDCB. It may indicate

Table 3 — Examples of phrases of *Chim-Gu-Kyung-Heom-Bang* and *Sa-am-doin-chim-beub* showing the principles of acupoints selection.

Chim-Gu-Kyung-Heom-Bang	*Sa-am-doin-chim-beub*
1. Two acupoints named 'EX-LE5' are located under patella, bilateral hollow points. These acupoints are used for treating abscess and pain of knee and leg induced by *Wind*.	1. A three-year-old kid always had diarrhea, face gone yellow, had a bit of edema, and felt a mass under the chest. Since a boil was seen under the ear, on the Large Intestine *meridian* region, this kid was treated with a tonification of Large Intestine several times, and was cured.
2. If a patient has jaundice on whole body and eyes, chest pain, redness on face and oliguria due to alcohol abuse, this patient is treated with SP4·BL19·GV9·BL40·SI4·CV12·HT7·BL27.	2. A man had a dry skin on facial and four extremities area, especially on Lung *meridian* area. He was treated with the tonification of HT8·LU10 and sedation of LU5·KI10 (sedation of Lung) and was cured because sedation treatment of lung was routinely used for lung diseases with upper body symptoms.
3. Use LI11, PC3, LI4, LU7, BL13, LI10, HT7, PC6 to treat rash induced by *Wind* and *Warm.*	3. A woman had a burn around the throat. She was treated with kidney remedy (tonification of LU8, sedation of BL60·TE2·TE3) for four times and was cured. Since she also had some bothersome small boils on the skin of the neck, on the Large Intestine *meridian* region, tonification treatment of Large Intestine was used for three to four times, and was perfectly cured.

EX: Extra points; BL: Bladder meridian; CV: Conception vessel; GV: Governor vessel; HT: Heart meridian; LI: Large intestine meridian; LU: Lung meridian; PC: Pericardium meridian; SI: Small intestine meridian; SP: Spleen meridian

that the author of CGKHB emphasized both the treatment of the pathological states of internal organs that may have caused the dermal symptoms (so-called 'treatment of the root') and the treatment of dermal symptoms (so-called 'treatment of the branch'). Moreover, investigating the general pattern of selected acupoints in CGKHB, LI4, LI11, HT7 and SP4 were the main acupoints. SP4 was found to be highly ranked in the network of lesion-related acupoints, whereas LI4, LI11, and HT7 were found to be highly ranked in the network of symptom-related acupoints. As LI4, LI11 and HT7 have a characteristic of *Earth* element or *Source* acupoints, the results also indicate that acupoints in CGKHB were prescribed to treat the pathological cause of the dermatological symptoms. Additionally, in the aspect of neurological studies, LI4 is the representative acupoint for pain reduction and LI11 is effective in reduction of fever[15]. Moreover, acupuncture stimulation on HT7affects cardiac autonomic neural regulation, mainly through the parasympathetic nervous system[16], which is related with the change of sensation.

On the other hand, Five-*shu* points were mainly used in SDCB, especially acupoints with the characteristics of sedating *Fire*, *Metal* and *Water* element, and tonifying *Tree* element. According to the traditional pathology of skin diseases, most of the pathological elements of dermal disease are linked to the excess of Fire element and deficiency of Earth element, and thus acupoints which can suppress *Fire* and boost *Earth* element were mainly used. According to the network analysis, KI10, LU8, HT8 were the main acupoints used in SDCB. HT8 was found to be highly ranked in the network of lesion-related acupoints, while KI10 and LU8 were found to be highly ranked in the network of symptom-related acupoints. HT8 has *Fire* characteristic located on meridian with *Fire* characteristic, KI10 has *Tree* characteristic located on meridian with *Water* characteristic, and LU8 has *Metal* characteristic located on meridian with *Metal* characteristic. From this analysis, it can be inferred that HT8 with *Fire* character is used for the local therapeutic effect, whereas other two acupoints are used to control the other elements besides *Fire*.

General acupuncture allows clinicians to select acupoints from 14 *meridians*, as well as *Ashi* acupoints and extra-acupoints, that are suited for symptoms and diseases. *Sa-am* acupuncture, on the other hand, combines *Five-shu* acupoints, each of which has its unique characteristics of the *Five-elements* (*Wood*, *Fire*, *Earth*, *Metal*, and *Water*), to produce tonification and sedation of *Qi*[17-19]. Although these two acupuncture styles with distinct underlying theories are popular in South Korea, data-based evidence is still insufficient to demonstrate how acupoints in dermatology clinics are selected based on these two acupuncture styles. Acupuncture principles for treating skin diseases may also involve stimulating the nerve and spinal cord in Western Medical Acupuncture. The role of nerve stimulation in dermatology has been studied in a few studies, and the evidence suggests that electrical nerve stimulation may reduce itch[20-22]. However, it is still unknown how acupuncture improves other clinical symptoms, such as dermatitis, chloasma, and psoriasis[7,23,24]. Recent studies suggested that acupuncture may modulate the reward circuit in the brain[25] and inflammatory and

serotonin-related changes[26]. As the demand for integrative medicine has been steadily increasing in dermatology[27], more research is required to reveal the underlying mechanisms and principles of acupuncture in dermatology, in addition to examining the treatment's clinical outcomes and safety. This process would be necessary for providing the evidence for novel clinical practice guidelines.

The study has some limitations. First, not all acupuncture treatments for skin diseases may be consistent with our findings since we only examined two classical literatures. Second, there might be skewed translations of medical terms used in the books into current medical terminology. We attempted to overcome this restriction by using a term classification method held by a dermatology specialist (KK) based on the disease classification of dermatology[9,28]. Third, this study focused on acupoints from literatures, not from the real-world clinical data. In the future, the conduction of network analysis on real-world data of skin disorders should be done for the development of practical medical guidelines in traditional Korean medicine.

Conclusions

In conclusion, we found that two representative acupuncture literature, CGKHB and SDCB, used different principles when prescribing acupoints to treat skin diseases; CGKHB emphasized pathological causes and symptom identification when selecting acupoints, and widely used *Back-shu* and acupoints on the BL. SDCB, on the other hand, emphasized the location of skin symptoms in acupoint prescription. Our findings would help in further research on acupuncture theory in dermatology as well as a better understanding of conventional acupoint selection techniques. We still need more research to fully comprehend the clinical outcomes of acupuncture therapy and develop an evidence-based theory and dermatology practice guideline.

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Conflict of Interest

Authors have no conflict of interest to declare

Author Contributions

Conceptualization: ISL, KK. Methodology: YC, ISL, KK. Investigation: HM, ISL, KK. Formal analysis: HM, ISL. Writing – original draft: HM, YC. Writing – review and editing: YC, ISL, KK. Supervision: ISL, KK. Funding acquisition: ISL

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Ethics Statement

Not applicable

Informed Consent

Not applicable

Data Availability

All the data will be available from corresponding author upon reasonable request.

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