

Comparison of Classification for Headache Disorders Between Western Medicine and Traditional Chinese Medicine

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Abstract

Headache disorders (HD) are the most common neurological disorder and affect all ages, gender, and ethnicity. HD implicates huge economic costs worldwide, and has a significant impact on the quality of life for all the individuals concerned. The currently valid international headache classification is «The International Classification of Headache Disorders, 3rd edition» (ICHD-3) and has precise diagnostic criteria for each HD. To date similarly to the systematic classification of ICHD-3 is still lacking in Traditional Chinese Medicine (TCM).

A comprehensive online database search using PubMed, Cochrane Library, CNKI, Google Scholar, literature research regarding HD and its classification was performed to identify relevant references, investigating the classification of HD in Western medicine (WM) and TCM. The results were analyzed, classified and evaluated.

This paper highlights the comparison of classification for HD between WM and TCM and provides a basis for the understanding of the two systems of health care in the classification of HD.

Keywords: Headache disorders, Western medicine, Chinese medicine, classification of headache disorders

Introduction

Headache Disorders (HD) are one of the oldest maladies since the existence of humankind [1]. Studies of trephined prehistoric skulls provided findings of trepanation of Neolithic skulls indicating numerous techniques in the surgical treatment for health issues, shows the importance of HD for over 7000 years ago [2].

Around 4000 BC to 3000 BC, an unknown Sumerian author described in a poem that headache occurs in connection with visual disturbances [3].

Hippocrates (460-370 BC) mentioned seizure-like headaches, which are initiated by visual symptoms and ended by vomiting. However, he was not able to recognize migraine as an independent disease entity and to distinguish it from headaches of another genesis [4].

The earliest mention of headache in China was found on oracle bones during the Shang Dynasty around 1600 BC-1046 BC. It was described as Ji Shou, 疾首, headache caused by anger [5]. In AD 1529 the term migraine was documented for the first time in China and HD was classified into two types. Namely according to the invasion of exogenous pathogenic factors and

the internal deficiency [6].

Approximately about 1500 BC Egyptian medical documents reported records of migraine-like headaches and suggested treatment for this ailment [7]. The Egyptians thought the cause of headache is related to the work of an evil spirit. The heated head was cooled by the application of moistened mortar to the head. Another therapy derived from Egyptian mythology is a combination of coriander, wormwood, juniper, honey, and opium. The use of willow leaves is cited in treatment for an inflammatory condition: Salicylic acid is derived from willow bark, and its use led to the discovery of aspirin [8].

In «The Inner Canon of the Yellow Emperor, Ling Shu, Chapter 42, Discourse on Wind» during the Han-Dynasty around 200 BC-AD 200 headache is described as 首风, Shou Feng, Wind in the head or 脑风, Nao Feng, [9].

Headaches have been narrated and investigated since the history of humanity. It has been analyzed and tried to be classified since antiquity and further categorization followed over the centuries. We aimed to provide a comprehensive understanding of the difference between the two systems of health care in the comparison of classification for HD in this study.

Western Medicine Classification

Gaius Plinius Secundus, also known as Pliny the Elder, (AD 23-79) recommended the first headache categorization indicating distinct pain localization i.e., headache involving the entire head, temporal or occipital [10], and besides he even suggested the application of medicinal herbs for the alleviation of headache [11].

The Greek doctor Aretaeus of Cappadocia, approximately 1st part of 2nd centennial, made a basal distinction between three types of major headaches and contributed very early to HD classification [12]:

a) Heterocrania: half-sided extremely painful headache, wavering in different head areas and periodically followed by nausea, bilious vomiting, and fainting. Aretaeus then interpreted migraine as heterocrania [13]. Due to the lack of medicine for HD at that period the treatment was limited to bloodletting and laxative [14,15].

b) Cephalaea: chronic, intense headache and often difficult to treat [1].

c) Cephalgia: a mild, short duration of headache. Dangerous if correlated with fever, coldness, or decreased muscle tone [13,16]. His findings contributed basally to the international classifications of the International Headache Society regarding the categorization of migraine from tension-type headache [17].

The famous Greek physician Galen of Pergamum, who lived around AD 129–199, also categorized headache into three various types: [18].

a) Cephalgia: a mild, short duration of headache

b) Cephalaea: chronic, constant pain, with photophobia as a concomitant feature [1].

c) Heterocrania: pounding headache with sudden attacks [1].

He was the first physician to use the term heterocrania, which was later known as ‘hemicrania’. He assumed that excessive heat or cold could be a triggering aspect for headaches. Galen of Pergamum presumed an individual’s health relied on a personal balance or disharmony of four fluids, namely black bile, blood, humors, and phlegm [19]. His entrenched pattern carried on until the 17th century.

Caelius Aurelianus (5th century) described cephalgia as an

Table 1: Historical definition of most prevalent HD.

Physician	Aretaeus	Galen	Caelius
Migraine	Heterocrania [13]	Cephalaea [1]	Hemicrania [20]
TTH	Cephalalgia [13,16]	Cephalgia	Cephalaea [20]
CH	Cephalaea [1]	Heterocrania [1]	n/a

acute headache followed by fever. Hemicrania was characterized by pulsating pain with dizziness, nausea, or emesis and cephalaea was a chronic, sequential headache without fever [20]. Table 1 presents the historical definition/naming of the most prevalent primary and secondary headaches.

The neuroanatomist Thomas Willis (AD 1621-1671) from England was a pioneer of contemporary clinical neurology. Continuous headache, intermittent headache, and intermittent headache with vague and uncertain attacks [21] were the three common forms of headache he had distinguished at his time.

Samuel Auguste Tissot (AD 1728-1797), a renowned physician from Switzerland provided clinical insight on migraine in his work «Treatise on the nerves and nervous disorders» [22].

He differentiated between migraine, cephalalgia, cephalaea, and parietal or occipital headache and narrated precisely the recurrence and the pattern of migraine outbreaks [23]. Tissot discovered the involvement of the nervous system in migraine. As a result, he described hemianopia (half-sided blindness), hemiplegia (unilateral or hemiplegic paralysis), and aura [22]. An assistant of the famous physician Herman Boerhaave in Leiden (AD 1668- 1738) named Gerhard van Swieten (AD 1700-1772) composed in AD 1745 several volumes of influential medical textbooks discussing on the scripts of Herman Boerhaave. The content included a fundamental explanation known to date of episodic cluster headache (ECH), which conforms to the benchmark of the International Headache Society of AD 1988 for ECH [24].

An English physician named Edward Liveing (AD 1832-1919) presented new theories on migraine pathogenesis in his book «On Megrim» [25] which was published in AD 1873. His work, a collection of clinical elements, can be regarded as an essential text for neurological comprehension of migraine. He characterized migraine as an appearance of ‘nerve-storm’ and interpreted it as riddance of exuberance nerve-force through the body and brain [26].

Emil du Bois-Reymond (AD 1818-1896) interpreted migraine in AD 1860 as tetany of the vascular muscles and conjectured the pain was induced by the elevated blood pressure against the vessel walls. He also assumed migraine was an ailment of the centrum ciliospinale in the Medulla spinalis [27].

The British neurologist William Richard Gowers (AD 1845-1915) was a pioneer in modern neurology [28]. He was one of the first leading person segregating migraine treatments into abortive or preventive [29]. His, at that time a modern textbook in neurology, «Manual of Diseases of the Nervous System (AD 1886–1888)» categorizes every facet of neurological disorder formulated in a pattern according to their section. The book distinguishes epilepsy and headache and contains information about performing the appropriate neurological diagnosis [30].

The first «International Classification of Headache Disorders» (ICHD) was published in AD 1988 and updated in AD 2004 [31]. The currently valid ICHD-3 was published in AD 2018. It distinguishes more than 250 types of headaches, which are divided into primary, secondary, neuropathies & facial pains, and other headaches [32].

The three most common types of primary headaches are Tension-Type Headache (TTH), migraine, and Cluster Headache (CH), whereas migraines and CH are the most important primary headaches in a clinical context, with Medication-Overuse Headache (MOH) being the most important secondary type [33]. The cause of primary headaches to date is still not very clear.

Traditional Chinese Medicine Classification

Differentiation of syndromes in Traditional Chinese Medicine (TCM) is carried out by fact-finding and classifying of the indication achieved from the four TCM diagnostic techniques (inspection, listening-smelling, inquiry, and pulse-taking/palpation).

These steps must be followed to evaluate the persons' health status and determine the syndrome [34]. The resulting diagnosis for HD relies on multiple factors comprising knowledge of the area of pain to correlate with the respective meridian and to deduce a connection to the affected internal organ. Understanding the quality of pain, exogenous, endogenous noxae

and internal disorders [35] is advantageous to distinguish more about the pathogenesis. Each and all of these aspects must be examined to receive a concluding TCM diagnosis [36].

TCM categorizes HD evoked by exogenous factors or by internal disorders.

Headache and different ailments on the head are subject of repletion in the superior and depletion of the inferior part of the body according to «The Inner Canon of the Yellow Emperor, Ling Shu, Chapter 10, The Function of the Five Viscera to the Human Body and Their Mutual Relations» [37]. Nine types of headaches due to the pathological upward movement of qi and their treatment are also mentioned in the same textbook in chapter 24. But the description of the arise of symptoms and their pathophysiology is not provided [38].

Classification according to the acupuncture meridian system

In a modern scientific point of view of the meridians, also described by Unschooled as conduit pathways [9], are similar to the conception of a sophisticated structure of neurovascular bundles and their minor extensions in the sense of Western Medicine (WM). This complicated meridian network system links the muscles, extremities, bones, joints, and including all organ systems. By implication connected the entire body structures as one unit. Nevertheless, it still differs from the neurovascular system and physiology as defined by the WM [39,40]. Although the pathophysiology of migraine is not completely understood, it is well accepted that migraine pain can be triggered by the activation of trigeminal ganglia neurons and their nerve fibers, which innervate cranial meninges [41]. In TCM, this nociceptive trigeminal activation belongs to the Yang category. Yang is heat, light, motion, excitation, ascending, and dispersing nature, whereas Yin is cold, darkness, tranquility, inhibitory, descending, and astringing [42]. In the Textbook «Treatise of Cold Damage Disorder» passages No.13, 28, 35, 38, 56, 92, 142, 265, 378 Zhang Zhong Jing classified HD according to the six-stages pattern for the first time [43]. Table 2 provides the classification according to the acupuncture meridian system.

Meridians	Organs	Headache location	References
Yang Ming	Large Intestine-Stomach-Meridian	frontal	[-45]
Shao Yang	Triple Energizer-Gallbladder-Meridian	temporal	[-45]
Tai Yang	Small Intestine-Bladder-Meridian	occipital	[-44]
Jue Ying	Pericard-Liver-Meridian	parietal	[-44]

The following meridians are affected in HD:
 • Yang Ming [Large Intestine-Stomach-Meridian]: Affected patients often suffer from digestive disorders [44]. The pain is located in the frontal area, comparable to tension headaches [45].

• Shao Yang [Triple Energizer-Gallbladder-Meridian]: As a result of fire stasis in the Shao Yang meridian and ascending

gallbladder-fire, headache with vertigo, difficulty to sleep, uneasiness in the thoraco-abdominal area arise [46]. The pain occurs temporal and resembles a migraine [45]. These patients tend to be emotionally unstable [44].

- Tai Yang [Small Intestine-Bladder-Meridian]: mostly connected with spinal problems. Patients usually have complaints regarding pain in the occipital area, similar to occipital neuralgia [44].
- Jue Ying [Pericard-Liver-Meridian]: The pain is parietal. Patients feel exhausted with no energy [44].

Classification of headache according to TCM organ system

TCM has evolved the theory of functional systems and describes physiology referring to different functional organ systems. Even though these functional organ systems are called the same as the anatomical organs of biomedicine, their functions are different and not similar to the modern anatomical morphology [47]. The theory of the Zang-Fu organ in TCM illustrates all organ systems and the external indications of their functional and pathological condition. Zang organs consist of liver, heart, spleen, lung, kidney, and Fu organs contain gallbladder, small intestine, stomach, large intestine, bladder, and triple burner [48]. Every Zang organ is linked to a Fu organ through a meridian system. The Zang organs produce, transform and cumulate the essence whereas the Fu organs have a digesting, transporting, and discharging function. Brain, marrow, vessels, gallbladder, bones, and the uterus belong to extraordinary organs [49]. The fundamental elements for developing and preserving the physiological mechanism of the Zang-Fu organs are Yin, Yang, Qi, and blood.

Every pathological alteration is an outcome of insufficiency or misbalance of these components [50].

Disharmony pattern in the Zang-Fu organ system

- Hyperactivity of Liver Yang: According to the Zang-Fu organ theory, the physiological aspect of the liver is to store yin-blood. It also regulates the unimpeded movement of the qi and smooth circulation of blood and fluids. Within this context, this means the liver conducts the activity of qi, balances mental activity i.e., anger and mood, management of the upward movement of spleen qi, and distribution action of stomach qi [51]. Prolonged emotional disbalance, especially anger and resentment, which is governed by the liver, leads to liver qi stagnation. Deficiency of Yin blood, results in an excess of liver Yang qi, causing liver Yang qi with blood to ascend towards the head, evoking HD. This outcome is because the dredging and soothing function of the liver becomes pathological [52].
- Kidney deficiency: In TCM the physiological function of the kidney is to store essence, controls growth, development, and reproduction. It is also responsible to govern water and bones, generate marrow, transform blood, deal with the reception of qi, sustain and warm the Zang-Fu organs [53]. The decrease of kidney Yang, its deficiency in fostering the body, decay of kidney Yin as an outcome of overextension and chronic disease and depletion of kidney essence provokes kidney deficiency, leading to HD.
- Spleen deficiency: The spleen is the source of qi, blood, and fluid. As a physiological function, the spleen controls the transformation and transport, supplying nutrients for muscle and energy metabolism. Its hemopoietic function manages blood and is responsible for proper circulation in the vessels [54]. Improper diet, continuous overthinking, exhaustion debilitate

the spleen, leading to spleen qi deficiency and decline in the function of transformation and transport [55]. The spleen qi is incapable to arise adequately to the head and symptoms like vertigo, fatigue, and headache occur [56].

Classification according to TCM pathogenesis

Wind, cold, heat, and dampness are associated with the six elements also known as six qi [wind, cold, heat, dryness, dampness, and summer heat] of the natural environment in TCM [57]. Unusual and sudden changes of these elements are regarded as six pathogenic exogenous factors (six excess) syndromes [58].

According to TCM pathogenic mechanism theory, the manifestation of diseases can be determined by the influence of six pathogenic exogenous factors, retention of phlegm, blood stasis, improper diet, and life habit. If the immune system becomes weak, the adaptability of the human body is overstrained, and due to the inability of the body to adjust to the alteration of these mentioned factors diseases breakout [59]. In TCM theory of six qi, the wind is Yang in nature and always in movement. Cold is the Yin category. Pathological cold coagulates Yang-qi, blood, and fluid, which leads to abnormal tightening of muscles, tendons, and vessels [60]. The classification according to TCM pathogenesis is presented in Table 3.

- Wind-Cold headache: Wind belongs to the pathogenic factor

Table 3: Classification according to the pathogenesis.

Headache Type	Causing factor	Location	Types of pain
Wind-Cold headache	exogenous wind	Occipital, - neck-, and back pain	sudden pain and tension-type headache [84]
Wind-Heat headache	pathogenic heat	the entire head	distending pain [84]
Wind-Dampness headache	exogenous wind associated with dampness	the entire head	migratory and heavy pain [84]
Qi and blood insufficiency headache	Qi and blood insufficiency	the entire head	persistent pain or dull pain [84]
Phlegm retention headache	overstrain, laze, incorrect or irregular diet	the entire head	heavy pain as if the head is swathed [84]
Blood stasis headache	Injuries, qi insufficiency, qi stagnation, hemorrhage	the entire head	stabbing pain, fixed location [84]

of Yang. According to the theory of «Huang Di Nei Jing—Su Wen», the head is the highest segment of the body and is the confluence of all yang-meridians [61]. The head can be easily and quickly invaded by the pathogenic exogenous wind. Through the attack of the pathogenic exogenous wind in the head, Yang qi is inhibited. Qi and blood in the meridians and network vessels tend to coagulate, leading to pain due to obstruction of the Tai Yang conduit pathway. Occipital, - neck-, and back pain are mostly the symptoms occurring in an intermittent intermission [62].

- Wind-Heat headache: Heat as a Yang category ascends. Unresolved wind- cold converted into pathogenic heat or wind linked with pathogenic heat affecting the Yang meridians gives rise to inflated pain induced by pathogenic wind-heat [63].

- Wind-Dampness headache: Pathogenic exogenous wind associated with dampness penetrates the head and blocks the orifices. The manifestation is a head feeling tightly compressed, burdensome extremities, less desire for food, abdominal fullness, tiredness, chest tightness, and voiding dysfunction. This pathogenesis is attributable to the malfunction of the spleen

because dampness amasses in the middle burner preventing the spleen to control its transformation and transportation mechanism [62].

- Qi and blood insufficiency headache: Qi belongs to Yang and blood to Yin category. The affiliation between them is a relationship between Yin and Yang. Qi controls the flow of blood whereas blood is the origin for qi alteration. Qi and blood insufficiency consequently result in a diminished function and nutrition deficiency of the Zang-Fu organs related to the meridian network system. Pale complexion, fatigue, dizziness, sleeplessness, chronic headache, thin, and weak pulse are the outcome of qi and blood insufficiency [64].

- Phlegm retention headache: Phlegm is classified as Yin. Misbalance and assemble of fluid in the body is induced by six excesses, overstrain, laze, incorrect or irregular diet. Enduring emotion disturbances initiate the malfunction of qi transformation and generate phlegm. The organs, lung, liver, spleen, kidney, and the triple burner get then negatively affected in their physiology. This impaired mechanism obstructs the meridians and blocks the circulation of qi and blood.

Dizziness, headache, chest distress, breathlessness, nausea, and emesis are the attribute of phlegm retention headache [65].

- Blood stasis headache: The pathological blood flow in the meridians, network vessels and Zang-Fu organs causing confinement of the blood leads to blood stasis. The cold of the six

excess is likely to contract the blood vessels and obstruct them, letting blood stasis occurs. Blood stasis also arises, because the overabundance of pathogenic heat makes the blood pour out of the vessels. Injuries, qi insufficiency, qi stagnation, hemorrhage all influence the development of blood stasis. Blood stasis headache is marked by dull and stabbing pain, fixed location, and aggravating at night [66,67] and the pain is persistent and hard to be relieved [68].

Discussion

The World Health Organization (WHO) survey showed that in the past few years, people suffering from HD have reached 50% of the global population. Among these people, 30% or more proclaimed suffering a migraine. Nearly half of adults have had at least once in their life headache. According to the WHO, 1.7- 4% of adults worldwide endure headache attacks 15 or more days monthly [69].

The Global Burden of Diseases, Injuries, and Risk Factors (GBD) studies came to the finding that around three billion people suffered from migraine or TTH in AD 2016. TTH was

the third common and migraine the sixth in AD 2016 of all GBD causes of disease [70]. This condition reveals that headache is a major global burden affecting the patient's work, quality of life, and having a massive impact on the rising of health insurance costs and straining the national economy [71]. Besides migraine, TTH, MOH, trigeminal neuralgia, and CH are among the most important headache types [33]. TTH, episodic and chronic [72] are the most typical types of primary headache [73].

Around one million people in Switzerland are affected by migraine with an estimated migraine prevalence of 10–15% [74]. HD in China surged from around 112.4 million individuals in AD 1990 to 482.7 million individuals in AD 2017. In the years lived with disability, people with migraines (5.5 million) were superior to TTH persons in China (1.1 million) [75]. All over the world, HD is very common symptoms in primary health care [76]. Moreover, it is often difficult and challenging for an unexperienced physician in HD to precisely classify different types of HD to make the exact diagnosis due to different pathophysiology [77,78]. Particularly in primary headache, the classification is not based on laboratory medical tests but only on anamnesis criteria, therefore it is predestined for classification. As a disease, HD is often underestimated, misdiagnosed or not treated properly [79]. Consequently, HD must be taken seriously including accurate assessment and diagnosis.

TCM is considered as an ancient holistic medicine originating through evidence by tradition, whereas modern WM is rather more resulting from evidence-based medicine. Although, the TCM classification is a historical categorization based on empirical and phenotypic experience, there are some similarities respectively to the ICHD-1 classification, which mainly includes phenotypic viewpoints of experts over a period of 30 years [32]. By adapting to scientific evidence, pathophysiology, and clinical findings, the ICHD-1 has been aligned over the past decade and all adaptations in the latest version of ICHD-3 are based on such findings.

Conclusion

In conclusion, the TCM classification in HD is predominately orientated on TCM pathogenesis, disharmony patterns in the Zang-Fu organ system, and meridian systems. Its differentiation derived from ancient times and has not been greatly modified to date. Considering the historical development of the ICHD, the current ICHD-3 is now designed based on scientific evidence and research. However, to date similarly to the systematic classification of ICHD-3 is still lacking in TCM.

Physicians compile a diagnosis derived from their diagnostic methods to design the therapy concept for the affected person. Therefore, an adequate therapy and the precise diagnosis should be of importance for the HD patient.

This study can be used by physicians and therapists involved in TCM in understanding the comparison of the two systems of health care in the comparison of classification for HD.

The combination of TCM and WM in clinical trials have shown evidence that the collaboration of these two medical treatment paradigms is more efficient than monotherapy [80–83].

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Authors' contributions

SKP planned the study. SKP & AG designed the study. SKP wrote the draft study report. YL-Z was responsible for additional Chinese literature research. SKP, AG, YL-Z, YM-L revised the manuscript. All authors reviewed the manuscript and approved the final version for publication.

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The authors declare that there is no conflict of interests regarding the publication of this paper.

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