A Comparative Study of The Regular Pattern of Syndrome and Treatment of Lung-intestine Related Diseases in Ancient and Modern Medical Cases Based on Data Mining

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ABSTRACT

Objective: To analyze the similarities and differences of the applications of “the lung and large intestine being interior-exteriorly related” between the ancient and modern clinical practices, and to reveal the theory meaning.

Method: Based on the ancient and modern medical cases database, 245 ancient medical records and 373 modern medical records were studied with the general statistical description and analysis of association rules, and the results were compared to summarize the similarities and differences of the regular pattern of syndrome and treatment on lung-large intestine related diseases in ancient and modern medical records.

Results: In modern medical cases, intestinal diseases appeared with the main symptom of constipation due to deficiency of lung qi and qi stagnation of large intestine were always treated by purgation together with replenishing and restoring lung qi. In ancient medical cases, large intestine heat was always caused by lung heat and a variety of diarrhea symptoms appeared. They were always treated by clearing heat and moistening lungs. In addition, the symptom of bound stool caused by qi stagnation of large intestine due to lung qi stagnation was always treated by lowering lung qi to regulate and smooth large intestine qi. And Armeniae Amarum Semen was used by both as a core medicinal herb.

Conclusion: Ascending-descending of qi movement is the core of the lung and large intestine relationship. In other words, the lung and the large intestine communicate through qi.

Key words: Medical cases, The lung and large intestine being interior-exteriorly related, Lung-large intestine related diseases, The regular pattern of syndrome and treatment, Comparative study

INTRODUCTION

“The lung and large intestine being interior-exteriorly related” is an important concept in TCM visceral manifestation theory. As early as in the “Huangdi Neijing” appeared the concept of interconnection of zang-fu viscera which are lung, large intestine, heart-small intestine, liver-gallbladder, spleen-stomach, kidney-bladder. After constant developments in the dynasties of Qin, Han, Jin, Sui, Tang, Song, Jin, Yuan, Ming and Qing, it gradually developed into a relatively complete theory system, and guide the ancient and modern clinical practice, especially the treatment on some difficult diseases have achieved curative effect. In order to better excavate the theory of “lung and large intestine being interior-exteriorly related” in clinical practice, this paper aims to make a thorough study on the former research results based on the database of ancient medical cases and the modern medical cases database, and carry out a comparative study on the pattern differentiation and treatment principles in lung-intestine related diseases, and analyze the similarities and differences between the ancient and modern clinical applications in order to expand the theory to guide the modern clinical diagnosis and treatment, and provide theoretical basis for the treatment of some difficult diseases, such as ulcerative colitis, habitual constipation, asthma, etc.

DATA AND METHOD

1. Data
1.1 Database of modern medical cases
Gao Luan retrieved published journals in recent 30 years from January 1979 to December 2009, from which, literatures related to clinical research on the theory of “the lung and large intestine being interior-exteriorly related” were selected, including clinical randomized controlled trials, controlled trial, uncontrolled series research, expert experience, case report. And the database of modern medical cases including 373 records has been established.

1.2 Database of ancient medical records
With strict inclusion and exclusion criteria, the author searched out 245 ancient medical records under the guidance of “the lung and large intestine being interior-exteriorly related” from 90 classic books recorded in “Encyclopaedia of Traditional Chinese Medicine”. Based on standardization,
database of ancient medical records and medicinal herb database were established.

2. Method

2.1 Descriptive statistics
Gao Luan\(^2\) carried on the descriptive statistics to summarize the syndrome characteristics (including symptom, syndrome, syndrome element) and treatment characteristics (including therapy, Chinese medicine, property and taste of medicinal herb, meridian distribution) of the lung-large intestine related diseases in modern medical cases reports. And the author has done the same thing to the ancient medical cases.

2.2 Association rules analysis
Association rules of data mining technology was applied and looked for the association and rules of syndrome and treatment in the lung-large intestine related diseases in ancient and modern medical records, including syndrome and symptom, symptom and medicinal herb, symptom and therapy, syndrome and therapy, medicinal herb and syndrome, medicinal herb and therapy, between medicinal herbs, and symptom-syndrome-therapeutic method-medicinal herb. According to data mining results, Gao Luan\(^2\) and the author summed up separately the regularity of TCM syndrome and treatment rules of the lung-large intestine related diseases in modern medical cases reports.

2.3 Classification, comparison and synthesis method
Based on previous research achievements, classified comparison is applied. The results of statistical analysis and association rules analysis on the lung-large intestine related diseases in modern and ancient medical records, including syndrome and symptom, symptom and medicinal herb, symptom and therapy, syndrome and therapy, medicinal herb and syndrome, medicinal herb and therapy, between medicinal herbs, and symptom-syndrome-therapeutic method-medicinal herb. According to data mining results, Gao Luan\(^2\) and the author summed up separately the regularity of TCM syndrome and treatment rules of the lung-large intestine related diseases in modern medical cases reports. It is the key point of this study.

Attach to a easy flow chart for the classic and modern literature search. It’s important to note that the details of data collection about classic and modern literature, database construction and content of mathematical statistics have been discussed specially in other reports. So you’ll ignore that for this article. (Figure 1).

RESULTS

1. A comparative study on syndrome characteristics
General descriptive statistics were carried out on the symptoms, syndromes, syndrome elements to get the syndrome characteristic of the application of “lung-large intestine being exterior-interiorly related” theory in ancient and modern medical records. The results are summarized as Table 1.

It can be seen from the table that, in both ancient and modern medical records under the guidance of “the lung and large intestine being interior-exteriorly related”, in symptoms, main symptoms in intestinal system are constipation, diarrhea and abdominal pain; main symptom in lung system is cough. What is different is that in the modern medical records also appeared more obvious symptoms of qi deficiency, while in ancient medical records fever also appeared more. Patterns of syndrome differed a lot. Qi deficiency is most common in modern medical records, while in ancient medical records is lung and large intestinal obstruction of Qi, and lung heat transferring to large intestine is the most common type of syndrome. In terms of disease location, both ancient and modern medical records revealed that lung and large intestine were the most common diseased location. Natures of diseases differ a lot. Modern medical records takes qi deficiency as the main deficiency pathological factor, while the ancient medical records take excess medical factors such as heat and qi stagnation as the pathological factors.

2. A comparative study on treatment characteristics
By the general descriptive statistics, therapy, frequency of medicinals, nature, taste, and channel distribution of medicinals are analyzed, treatment characteristics of the ancient and modern medical application under the guidance of “lung and large intestine being interior-exteriorly related” in ancient and modern medical records are summarized as Table 2.

From this comparison, it can be found that treatment characteristics of such diseases in the medical records are consistent with their respective characteristics of syndrome. In the modern medical records, constipation caused by deficiency of lung qi is most common, so treatment with bowel-clearing and lung-tonifying takes priority, with more sweet, warm and tonic medicinal herbs. In ancient medical records, lung heat transferring to large intestine and qi obstruction of lung and large intestine are common, so the treatment with clearing heat, nourishing yin and diffusing and descending lung qi are dominated, with medicinal herbs of bitter, cold natures to release and scatter.

3. Comparative research on association and rules of syndrome and treatment
Syndrome and symptom, symptom and medicinal herb, symptom and therapy, syndrome and therapy, medicinal herb and syndrome, medicinal herb and therapy, between medicinal herbs and symptom- syndrome-therapy-medicinal herb in ancient medical records and modern records were carried out analysis of association rules to obtain the correlation results of the ancient and modern medical records under the guidance of using the “lung-large intestine being interior-exteriorly related” shown in Table 3.

From this table, in the symptom-syndrome associated features, both ancient and modern medical records are associated with constipation and qi stagnation. Ancient medical records also unearthed the relevance between lung heat transferring to large intestine and diarrhea, loose stool,
hematochezia. In the correlation characteristics between symptom and medicinal herb, in modern medical records, core medicinal herbs for constipation as the core symptom are Armeniae Amarum Semen, Astragali Radix, Trichosanthis Fructus, Liquoric Root, which reflecting the medication characteristics of tonifying Qi and dredging the bowels. while in ancient medical records to treat constipation, Trichosanthis Fructus always goes with Armeniae Amarum Semen, Asteris Radix with Curcumae Radix, which reflects the medication characteristics of descending qi and dredging the bowels. To treat diarrhea, Scutellariae Radix is always used to clear the lung heat. In the correlation characteristics of symptom and therapy, ancient and modern medical records have constipation corresponding to the therapy of descending lung qi and nourishing yin. In ancient medical records, diarrhea corresponds to the treatment of clearing heat. In the correlation characteristics of syndrome and therapy, in modern medical records, deficiency lung qi is always related to tonifying lung qi and lubricating intestine. In ancient medical records, obstruction of lung and large intestinal qi has strong association with diffusing and depressing lung qi, and lung heat transferring to large

Figure 1. Flow chart for the classic and modern literature search
In the association characteristics of medicinal herb and syndrome, in modern medical records, the deficiency of lung qi is associated with medicinal herbs that has effects of benefiting lung qi, promoting qi and removing qi stagnation. Armeniae Amarum Semen Armeniae Amarum Semenis the medicinal herb that has strongest association with the syndrome. While in ancient medical records, medicinal herbs that have strong association with obstruction of lung and large intestinal qi include Asteris Radix, Armeniae Amarum Semen Armeniae Amarum Semen, Curcumae Radix, Trichosanthis Fructus. And lung heat transferring to large intestine is associated with several medicinal herbs that can clear heat and nourish yin.

In the association characteristics of medicinal herb and therapy, some modern medical therapies are strongly associated with Armeniae Amarum Semen Armeniae Amarum Semen. While in ancient medical records, diffusing and descending lung qi are associated with Asteris Radix, Trichosanthis Fructus, Curcumae Radix, Platycodonis Radix, Armeniae Amarum Semen Armeniae Amarum Semen. Clearing heat is associated with Lonicera Japonicae Flos, Plaster Stone, Gardeniae Fructus, Scutellariae Radix. Nourishing yin is associated with Rehmanniae Radix and Ophiopogonis Radix. In the correlation characteristics of medicinal herbs, Armeniae Amarum Semen Armeniae Amarum Semenis commonly used in combination both in ancient and modern medical records.

In the correlation of the symptom, syndrome, therapeutic method and medicinal herb, in modern medical records, there are two corresponding modes. The first is constipation—purging fu organs—Aurantii Fructus Immaturus, Officinal Magnoliae Officinalis Cortex, Trichosanthis Fructus, Armeniae Amarum Semen, Platycodonis Radix, Ophiopogonis Radix. And the second is deficiency of lung qi - purging fu organs –Trichosanthis Fructus, Armeniae Amarum Semen. In ancient medical cases, there are three corresponding modes of symptom, syndrome, therapy and medicinal herb, which are lung heat transferring to large intestine-clearing heat - Scutellariae Radix, lung heat transferring to large intestine—nourishing yin—Ophiopogonis Radix, Rehmanniae Radix, and obstruction of lung and large intestinal qi—constipation—diffusing and descending lung qi—Armeniae Amarum Semen, Asteris Radix, Trichosanthis Fructus, Platycodonis Radix, Curcumae Radix.

### DISCUSSION

Based on the ancient and modern medical records database, the general statistical description and association rules analysis are carried out on 245 ancient medical records and 373 modern medical data. Comparing the research results and analyzing the similarities and differences of applying the “lung and large intestine being interior-exteriorly related” theory on guiding the diagnosis and treatment of disease, it can be found:

Firstly, on the characteristics of syndrome, lung disease involving large intestine and treating large intestinal disease from lung reflected in ancient medical records are more complex. The more common is the lung heat transferring to large intestine, inducing intestinal diarrhea, constipation. And another one is constipation caused by obstruction of
### Lung and Large Intestine Syndrome

Lung and large intestinal qi. While related diseases on lung disease involving large intestine and treating large intestine diseases from lung in modern medical records is mainly intestinal constipation, and that caused by deficiency of the lung qi is most common, which may be related to the fact that modern clinical research attaches importance to the diagnosis and treatment on refractory deficiency constitution, and authors prefer to publish medical reports with obvious effect. However, this conclusion inevitably has some limitations. Therefore, to apply the “lung and large intestine being interior-exteriorly related” theory to guide the clinical diagnosis and treatment of related diseases, importance should be attached to not only the intestine diseases caused by deficiency of lung qi, but also the intestine diseases caused by lung heat and qi stagnation.

Secondly, on the treatment characteristics, whether in ancient medical records or modern records, Armeniae Amarum Semen, Trichosanthis Fructus and Liquoric Root are the three mostly frequently used herbs. It is clear that the three herbs play important role in the treatment of such diseases. Bitter Apricot Seed descends and diffuses lung qi and as well as lubricating intestines. Liquoric Root has functions of supplementing, relieving and reconciling the various medicinal herbs. Trichosanthis Fructus has the functions of broadening qi pathway in chest while lubricating intestines. The function characteristics of these three medicinal herbs reveal the importance of regulating qi in treating such diseases, which proves that the ascending and descending of qi movement plays important role in the relationship between the lung and large intestine.

Finally, on the association of the syndrome and treatment of the lung and large intestine related diseases, through comparing the association rules data mining results of ancient and modern medical records, it can be summed up into three basic models of the pattern syndrome differentiation and treatment. Among them, the basic model of modern

<table>
<thead>
<tr>
<th>Syndrome - symptom</th>
<th>Therapy - medicinal herb</th>
<th>Syndrome - medicinal herb</th>
<th>Medicinal herb - medicinal herb</th>
<th>Symptoms - therapy - medicinal herb</th>
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<tr>
<td>Lung heat transferring to large intestine-diarrhea, loose stool; blood in the stool; Qi obstruction-constipation</td>
<td>Clearing heat-cough, fever, thirst, diarrhea, yellow tongue coat, slippery pulse, rapid pulse; nourishing yin - blood in the stool, rapid pulse; diffusing and descending lung qi – constipation</td>
<td>Lung heat transferring to large intestine - Rhizoma Anemarrhenae, Lonicer Japonicae Flos, Snakegourd Root, Tree Peony Bark, Forsythia Suspen, Fritillaria Cirrhosa, Dendrobie, Ophiopogonis Radix, Scutellariae Radix, Rehmanniae Radix, Liquoric Root; Qi movement blocking - Trichosanthis Fructus, Armeniae Amarum Semen, Asteris Radix, Curcumae Radix</td>
<td>Diffusing and descending lung qi- Trichosanthis Fructus, Armeniae Amarum Semen, Platycodonis Radix, Asteris Radix, Curcumae Radix, Fermented Soybean; Clearing heat- Scutellariae Radix, Gardeniae Fructus, Rhizoma Anemarrhenae, Lonicer Japonicae Flos, Snakegourd Root, Forsythia Suspen, Fermented Soybean, Plaster Stone, Glove Talc; Nourishing yin- Ophiopogonis Radix, Rehmanniae Radix</td>
<td>Lung heat transferring to large intestine –clearing heat-Scutellariae Radix; Lung heat transferring to large intestine –nourishing yin - Ophiopogonis Radix, Rehmanniae Radix; Qi movement blocking - constipation - diffusing and descending lung qi - Armeniae Amarum Semen, Trichosanthis Fructus, Platycodonis Radix, Asteris Radix, Curcumae Radix</td>
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<thead>
<tr>
<th>Ancient medical records</th>
<th>Modern medical records</th>
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<tr>
<td>Deficiency of lung qi - stool hard</td>
<td>Difficulty in defecation, constipation, fatigue, pale tongue-Trichosanthis Fructus, Armeniae Amarum Semen, Liquoric Root, Radix Astragali</td>
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<td>Purging fu organs- abdominal fullness, difficulty in defecation, constipation, red tongue</td>
<td>Deficiency of lung qi - Trichosanthis Fructus, Armeniae Amarum Semen, Platycodonis Radix, Liquoric Root, Astragali Radix, Atractyloides, Cannabis Fructus, Tangerine Peel</td>
</tr>
<tr>
<td>Lung qi deficiency- purging fu organs, tonifying lung and lubricating intestine</td>
<td>Purging fu organs- Trichosanthis Fructus, Armeniae Amarum Semen; Tonifying qi - Armeniae Amarum Semen, Liquoric Root, Astragali Radix, Atractyloides; Embelish aperient bowel - Armeniae Amarum Semen, Platycodonis Radix, Cannabis Fructus</td>
</tr>
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<td>Ophiopogonis Radix, Rehmanniae Radix - Armeniae Amarum Semen- Asteris Radix - Curcumae Radix</td>
<td>Rehmnniae Radix -Armeniae Amarum Semen- Ophiopogonis Radix, Angelica Sinensis- Astragali Radix</td>
</tr>
<tr>
<td>-Trichosanthis Fructus; Armeniae Amarum Semen- Loquat Leaf, Mulberry Leaf, Fermented Soybean, Bitter Orange, Gardeniae Fructus, Platycodonis Radix; Fermented Soybean-Gardeniae Fructus; Tangerine Peel-Liquoric Root; Rehmnniae Radix - Ophiopogonis Radix; Gardeniae Fructus- Scutellariae Radix</td>
<td>-Trichosanthis Fructus -Armeniae Amarum Semen; Perilla Fruit-Trichosanthis Fructus - Armeniae Amarum Semen</td>
</tr>
<tr>
<td>Deficiency of Lung Qi</td>
<td>Constipation –purging fu organs –Auranti Fructus</td>
</tr>
<tr>
<td>Trichosanthis Fructus, Armeniae Amarum Semen, Radix Asteris, Radix Curcumae; diahea-Radix scutellariae, Liquoric Root</td>
<td>Immaturus-Trichosanthis Fructus; Asteris Radix</td>
</tr>
<tr>
<td>Deficiency of Lung Qi</td>
<td>Immaturus, Magnoliae Officinalis Cortex, Trichosanthis Fructus, Armeniae Amarum Semen, Platycodonis Radix, Ophiopogonis Radix; Deficiency of Lung Qi – purging fu organs - Trichosanthis Fructus, Armeniae Amarum Semen</td>
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#### Table 3. Comparison of ancient and modern medical data mining correlation results
medical records can be summed up as follows: The core symptom of large intestinal disease is constipation which is caused by deficiency of lung qi leading to qi stagnation of large intestine. And the corresponding therapeutic methods are purging fu organs and invigorating lung qi. Aurantii Fructus Immaturus, Magnoliae Officinalis Cortex, Trichosanthis Fructus, Armeniae Amarum Semen, Platycodonis Radix, Ophiopogonis Radix are always applied. The basic pattern of ancient medical records can be summed up as follows: first, to treat the large intestine overheat owing to lung heat with many large intestine symptoms such as diarrhea, the therapeutic method takes clearing heat and moistening lung as the principle thing, and Scutellariae Radix, Rehmanniae Radix, Ophiopogonis Radix are always applied. Second, to treat stagnation qi of large intestine due to stagnation of lung qi and appear constipation, the therapeutic method should be regulating qi movement of lung and large intestine. Bitter Apricot Seed, Asteris Radix, Trichosanthis Fructus, Curcumae Radix, Platycodonis Radix are always applied.

CONCLUSION

It is obvious that the focus on the application of the “lung and large intestine being interior-exteriorly related” theory differs in ancient and modern medicine on guiding the clinical practice. Ancient physicians attach importance to the ascending-descending of qi movement, fluid metabolism function between lung and large intestine and apply it to guide the lung-intestine excess syndromes such as excess heat, qi stagnation diseases. Modern doctors attach importance to mutual subsidy among qi, blood, body fluid of the lung and large intestine, and the harmony of qi movement ascending-descending to guide the lung and large intestine diseases due to deficiency. In addition, in the ancient and modern medical records, to treat the lung and large intestinal diseases, Armeniae Amarum Semen has very high frequency, and is regarded as the most core medicinal herb to treat such diseases. The characteristics of Armeniae Amarum Semen that can both diffusing lung qi and descending lung qi reflects that the ascending-descending of qi movement possess the basic position between the lung and large intestine. In other words, the lung and the large intestine communicate with each other through qi. And it also reveals profoundly theory meaning of “lung and large intestine being interior-exteriorly related”. At the same time, the conclusion provides a new idea for doctors to treat refractory disease of lung and large intestine.

It should be noted that: the conclusion stems from the further analysis on available literatures and previous research achievements. Because of limited data, it has some limitation. Therefore, supplementary data and perfect results should be done in further study.

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