Analysis on Traditional Chinese Medicine syndrome elements and relevant factors for senile diabetes

Junping Wei, Rui Wu, Dandan Zhao

Junping Wei, Department of Endocrinology, Guang'anmen Hospital, China Academy of Chinese Medical Sciences, Beijing 100053, China
Rui Wu, Department of Endocrinology, South Area of Guang'anmen Hospital, China Academy of Chinese Medical Sciences, Beijing 102600, China
Dandan Zhao, Preclinical Medicine School, Beijing University of Chinese Medicine, Beijing 100029, China

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Correspondence to: Prof. Junping Wei, Department of Endocrinology, Guang'anmen Hospital, China Academy of Chinese Medical Sciences, Beijing 100053, China. weijunping@126.com
Telephone: +86-10-88001218
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Abstract

OBJECTIVE: To explore the laws governing the distribution of Traditional Chinese Medicine (TCM) syndrome elements (SEs) of senile diabetes (SD) and their relationship to relevant factors.

METHODS: An investigation of patients who met the inclusion criteria was conducted by trained doctors, using case report forms. All related data were collected, including body mass index, glycated hemoglobin, illness course, complications, symptoms, and tongue and pulse manifestation. The SEs of each patient were judged by three qualified associate chief physicians independently.

RESULTS: The main SEs of SD are Yin deficiency, Qi deficiency, blood stasis, and phlegm turbidity. Yin deficiency, Qi deficiency, blood stasis, and phlegm turbidity are most commonly seen among 4-SE combinations. Yang deficiency is typically related to illness course and BMI, phlegm turbidity to hypertension and hyperlipidemia, excessive heat to diabetic microangiopathy, and blood stasis to illness course and diabetic macroangiopathy.

CONCLUSION: SD pathogenesis has a deficiency in origin and excess in superficiality. Deficiency syndrome mainly manifests as deficiency of both Qi and Yin, and concurrently in Yang deficiency. Excess syndrome is characterized by blood stasis and phlegm turbidity. SEs analysis provides a basis for the prevention and treatment of SD with TCM and lays the foundation for objectively evaluating multicentric clinical research for SD in TCM.

Key words: Diabetes mellitus; Aged; Medicine, Chinese traditional; Syndrome complex

INTRODUCTION

Senile diabetes (SD), a common disease among senile people, refers to diabetes that occurs after patients are 60 years old or diabetes that extends to 60-years-old or older after its onset. As the average age increases in China, SD incidence is rising yearly. A 2002 survey showed that SD incidence was 15% among people over 60 in Beijing.1 SD negatively influences quality of life, and its acute and chronic complications can cause premature disability or even death. Modern medicine can control blood glucose but has limited effects on improving SD symptoms and controlling its complications. Traditional Chinese Medicine (TCM) character-
izes treatment by syndrome differentiation and plays an increasingly important role in the treatment of SD and its complications in China. Syndrome elements (SEs) summarizing the cause, nature, focus, and situation of a disease at some stage reflect the innate character of the disease and act as the basis of its clinical treatment. Use and mastery of SEs in clinical practice are important to TCM. SEs explaining syndromes can not only solve the complexity and flexibility of TCM syndrome differentiation but also objectively reflect the law of SD pathogenesis, thus deeply studying the objectification and standardization of syndrome. In this study, we analyzed clinical data obtained in an epidemiological survey of 296 SD patients, explored the laws of SEs of SD, and analyzed relevant factors. Therefore, we provide a valuable reference for the standardization of SD syndrome differentiation to effectively direct clinical practice.

**METHODS**

**Inclusion criteria**
(a) Patients conformed to the standard for diagnosing diabetes in both Western Medicine and TCM. In Western Medicine, diabetic patients conformed to the “Standard for Diagnosing Diabetes and Other Types of Hyperglycemia” issued by WHO in 1999. The standard for diagnosing diabetes in TCM was from the teaching materials of Traditional Chinese Internal Medicine (6th edition). (b) Patients were over 60 years old. (c) Patients signed an acknowledgement agreement.

**Exclusion criteria**
(a) Patients had serious primary diseases of heart, liver, kidney, and hematopoietic system, or psychiatric diseases. (b) Patients had acute complications of diabetes such as diabetes ketosis.

**Design of experiment**
The experiment was a clinical cross-sectional survey. We used a custom form for observing TCM SEs of SD to collect clinical data on diabetics over 60 years old in Guang’anmen Hospital under China Academy of Chinese Medical Sciences from April 2011 to June 2012. This study conformed to the standards of medical ethics and was approved by the ethics committee of the hospital. All patients signed an acknowledgement agreement. Three trained chief physicians judged the SEs of 296 SD patients. TCM SEs were divided into types, in reference to syndromes in TCM terms of clinical diagnosis and treatment and Chinese standards for diagnosing and treating diabetes combining TCM and Western Medicine. The rules for judging SEs were according to The Principle for Directing Clinical Research into New Chinese Drugs, TCM diagnostics, and teaching material of Traditional Chinese Internal Medicine (6th edition). Nine groups of syndromes comprised 52 symptoms, tongue conditions, and pulse conditions.

- Qi deficiency manifests as tiredness, pale complexion, short breath, excessive sweating, spontaneous sweating, softened and weakened limbs, pale tongue with a thin coating, and a weak and thready pulse. Yin deficiency manifests as dysphoria with a hot sensation in the chest, palms and soles, night sweating, dry mouth, dry throat, blurred vision, insomnia, red tongue with less coating or no coating, and a fast and thready pulse. Yang deficiency manifests as aversion to cold, cold limbs, pale complexion, facial and body edema, loose stool, frequent night urination, urinary incontinence, a pale enlarged tongue with a white coating, and a deep or deep-slow pulse. Blood deficiency manifests as pale or yellow complexion, pale lips, dizziness, vertigo, palpitation, dreaminess, and a thready pulse. Phlegm turbidity manifests as a heavy sensation of body and limbs, abdominal distension, oppressed feelings in the chest, poor appetite, a sticky and greasy tongue with a white-greasy or white-thick coating, and a slippery pulse. Excessive heat manifests as eating and large appetite, thirst and excessive drinking, vexation, insomnia, dry stool, yellow urine, a red tongue with yellow coating, and a rapid pulse. Damp-heat manifests as a poor appetite, abdominal distension, a heavy sensation of body and limbs, thirst, bitter taste in mouth, a sticky and greasy tongue, sticky stool, dry or loose stool, yellow urine, a red tongue with a yellow greasy coating, and a slippery and rapid pulse or a rapid pulse. Cold dampness manifests as aversion to cold, a heavy sensation of head and body, joint pain, abdominal distension, loose stool, a pale tongue with a white coating, and a slippery pulse. Blood stasis manifests as numbness of the limbs, difficulty in movement, dry and rough skin, general pain, chest pain, waist pain, knee pain, purple lips, petechiae and purpura on the tongue or its edge, a light or dark purple tongue with hypoglossal purple collaterals, a rough pulse, a deep and rough pulse, a thready and rough pulse, or a taut pulse.

**Clinical data**
Among the 296 SD patients were 136 males (45.9%) and 160 females (54.1%) aged 60-87 years, (70 ± 7) years on average. Illness course was 1-40 years, with an average of (14±9) years.

**Statistic method**
SPSS 17.0 statistics software (SPSS Inc., Chicago, IL, USA) was used to build a database. $\bar{x} \pm s$ was used to express measurement data in normal or similarly normal distribution. Quartiles were used to express measurement data not in normal distributions. 0 or 1 were used to express binary enumeration data and frequency was counted. Logistic regression analysis was used for factors influencing SEs. $P<0.05$ or $P<0.01$ was considered statistical difference.
RESULTS

Distribution of SEs in SD patients
Among the SEs of SD, Yin deficiency and Qi deficiency had the highest frequency, followed by blood stasis, phlegm turbidity, and less by cold dampness. Among SE combinations, the 4-SE combination was the most common, 6-SE combination was the least common, and no single SE was found. Among the 4-SE combinations, the combination of Qi deficiency, Yin deficiency, phlegm turbidity, and blood stasis was most common. Among the 296 patients were 14 cases of deficiency syndrome (4.7%), 282 cases of deficiency-excess complication (95.3%), and no cases of excess syndrome (0%).

Order of SEs
SEs related to Qi deficiency appeared in the following order: Yin deficiency (n=205) > blood stasis (n=159) > phlegm turbidity (n=100) > Yang deficiency (n=97) > blood deficiency (n=79) > excessive heat (n=68) > damp-heat (n=62) > cold dampness (n=22).
SEs related to Yin deficiency appeared in the following order: Qi deficiency (n=205) > blood stasis (n=169) > phlegm turbidity (n=116) > Yang deficiency (n=103) > blood deficiency (n=88) > excessive heat (n=80) > damp-heat (n=71) > cold dampness (n=23).
SEs related to Yang deficiency appeared in the following order: Yin deficiency (n=103) > Qi deficiency (n=97) > blood stasis (n=87) > phlegm turbidity (n=55) > blood deficiency (n=34) > excessive heat (n=27) > damp-heat (n=25) > cold dampness (n=13).
SEs related to blood deficiency appeared in the following order: Yin deficiency (n=88) > Qi deficiency (n=79) > blood stasis (n=72) > phlegm turbidity (n=44) > excessive heat (n=34) > Yang deficiency (n=34) > damp-heat (n=26) > cold dampness (n=6).
SEs related to phlegm turbidity appeared in the following order: Yin deficiency (n=116) > Qi deficiency (n=100) > blood stasis (n=85) > Yang deficiency (n=55) > blood deficiency (n=44) > excessive heat (n=31) > damp-heat (n=29) > cold dampness (n=13).
SEs related to excessive heat appeared in the following order: Yin deficiency (n=80) > Qi deficiency (n=68) > blood stasis (n=54) > blood deficiency (n=34) > phlegm turbidity (n=31) > Yang deficiency (n=27) > damp-heat (n=23) > cold dampness (n=0).
SEs related to damp-heat appeared in the following order: Yin deficiency (n=71) > Qi deficiency (n=62) > blood stasis (n=53) > phlegm turbidity (n=29) > blood deficiency (n=26) > Yang deficiency (n=25) > excessive heat (n=23) > cold dampness (n=0).
SEs related to cold dampness appeared in the following order: Yin deficiency (n=25) > Qi deficiency (n=24) > blood stasis (n=20) > phlegm turbidity and Yang deficiency (n=13) > blood deficiency (n=6) > excessive heat and damp-heat (n=0).
SEs related to blood stasis appeared in the following order: Yin deficiency (n=169) > Qi deficiency (n=159) > Yang deficiency (n=87) > phlegm turbidity (n=85) > blood deficiency (n=72) > excessive heat (n=54) > damp-heat (n=53) > cold dampness (n=20).

Order of two SEs
Two SEs appeared in the following order: Qi deficiency and Yin deficiency (n=205) > Yin deficiency and blood stasis (n=169) > Qi deficiency and blood stasis (n=159) > Yin deficiency and phlegm turbidity (n=116) > Qi deficiency and phlegm turbidity (n=100) > Yin deficiency and Yang deficiency (n=103).
SEs related to Qi deficiency and Yin deficiency appeared in the following order: blood stasis (n=138) > phlegm turbidity (n=89) > Yang deficiency (n=79) > blood deficiency (n=70) > excessive heat (n=61) > damp-heat (n=56) > cold dampness (n=21).
SEs related to Yin deficiency and Yang deficiency appeared in the following order: Qi deficiency (n=79) > blood stasis (n=67) > phlegm turbidity (n=46) > blood deficiency (n=24) > excessive heat (n=21) > damp-heat (n=19) > cold dampness (n=10).
SEs related to phlegm turbidity and Yin deficiency appeared in the following order: Qi deficiency (n=89) > blood stasis (n=75) > Yang deficiency (n=46) > blood deficiency (n=37) > excessive heat (n=30) > damp-heat (n=26) > cold dampness (n=12).
SEs related to phlegm turbidity and Qi deficiency appeared in the following order: Yin deficiency (n=89) >

| Table 1 Distribution of SEs of SD patients (n=296) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | Qi deficiency   | Yin deficiency  | Yang deficiency | Blood deficiency | Phlegm turbidity | Excessive heat | Damp-heat | Cold dampness | Blood stasis |
| n               | 238             | 271             | 131             | 80              | 140             | 92             | 128             | 27             | 205             |
| %               | 80.4            | 91.6            | 44.3            | 27.0            | 47.3            | 31.1           | 43.2            | 9.1            | 69.3            |

Notes: SE: syndrome element; SD: senile diabetes.

| Table 2 Distribution of SE combinations of SD patients (n=296) |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                     | 2 SEs               | 3 SEs               | 4 SEs               | 5 SEs               | 6 SEs               |
| n                   | 13                  | 88                  | 168                 | 22                  | 5                   |
| %                   | 4.4%                | 29.7%               | 56.8%               | 7.4%                | 1.7%                |

Notes: SE: syndrome element; SD: senile diabetes.
blood stasis (n=66) > Yang deficiency (n=37) > blood deficiency (n=34) > excessive heat (n=25) > damp-heat (n=20) > cold dampness (n=11).

SEs related to Yin deficiency and blood stasis appeared in the following order: Qi deficiency (n=138) > phlegm turbidity (n=75) > Yang deficiency (n=67) > blood deficiency (n=60) > damp-heat (n=48) > excessive heat (n=47) > cold dampness (n=19).

SEs related to Qi deficiency and blood stasis appeared in the following order: Yin deficiency (n=68) > phlegm turbidity (n=66) > blood deficiency (n=56) > damp-heat (n=45) > excessive heat (n=44) > cold dampness (n=18).

**Logistic regressive analysis of SE factors**

Seven SE factors are BMI, hypertension, hyperlipidemia, diabetic macroangiopathy and microangiopathy, illness course, and glycated hemoglobin. These seven SE factors are unrelated to Qi deficiency, Yin deficiency, blood deficiency, damp-heat, and cold dampness. Yang deficiency is positively correlated to illness course and BMI (P<0.05), and phlegm turbidity to hypertension and hyperlipidemia (P<0.05). Excessive heat is negatively correlated to diabetic microangiopathy (P<0.05). Blood stasis is positively correlated to illness course and diabetic macroangiopathy (P<0.05). The results are shown in Tables 5-8, respectively.

**DISCUSSION**

TCM syndromes manifest in the cause, focus, and nature of a disease and the relationship between evil Qi and vital energy. The occurrence and development of a syndrome is influenced by many factors. An SE, the smallest unit of a syndrome, has specific symptoms different from other SEs. All clinical syndromes consist of SEs. In this study, we have found that SD pathogenesis belongs to deficiency in origin and excess in superficiality, based on investigation of the SEs. Deficiency syndrome is characterized by deficiency of both Qi and Yin, and by Yang deficiency. Excess syndrome mainly manifests as blood stasis and phlegm turbidity. Relevant research has found that Yang deficiency is typically related to illness course and BMI, phlegm turbidity to hypertension and hyperlipidemia, excessive heat to diabetic microangiopathy, and blood stasis to illness course and diabetic macroangiopathy.

**Deficiency of both Qi and Yin is the pathologic basis of SD**

The results of this study show that Yin and Qi deficiency are most common. The incidence of each exceeds 80% and the incidence of both reaches 69.4%. The seven factors in the logistic regressive analysis are unrelated to Qi deficiency and Yin deficiency. Therefore, deficiency of both Qi and Yin are the pathologic bases of...
Yang deficiency is manifest in fat body and weak pulse. "Yang deficiency is man said that "- with Yang i n B M 0 ≥ a h I v a higher waist-to-hip ratio (WHR). 60% of SD manifests as central (abdominal) obesity with a much number of insulin receptors in peripheral target tissue, and BMI. Central obesity is an important SD-induc things and are lazy in daily life”. Therefore, the removal of blood stasis can quench thirst. Therefore, when SD patients are treated with replenishing Qi and nourishing Yin, balancing Yin and Yang should be emphasized.

### Phlegm turbidity and blood stasis are important SEs of SD

Phlegm turbidity and blood stasis are not only pathological products but also pathogenic factors of SD and they are important in the development of SD. It is difficult to eliminate phlegm turbidity and blood stasis because they interact as both cause and effect. The results of this study indicate that phlegm turbidity and blood stasis are important SEs of SD excess syndrome.

Xue Zheng Lun said that "The reason for thirst is that blood stasis inside the body makes Qi unable to lift wa ter. Therefore, the removal of blood stasis can quench thirst". Blood stasis has been shown to influence blood rheology, microcirculation, free radicals, and blood biochemistry in diabetics. Additionally, phlegm turbidity is one of the core mechanism of dia-

### Notes:
- B: regression coefficient \( \beta \) value; S.E.: standard error; Df: degree of freedom; Sig.: significance; Exp (B): odds ratio.
- BMI: body mass index; S.E.: standard error; Df: degree of freedom; Sig.: significance; Exp (B): odds ratio.

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#### Table 5 Analysis of factors of Yang deficiency

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Df</th>
<th>Sig.</th>
<th>Exp (B)</th>
</tr>
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<tbody>
<tr>
<td>Illness course</td>
<td>0.382</td>
<td>0.195</td>
<td>3.839</td>
<td>1</td>
<td>0.050</td>
<td>1.466</td>
</tr>
<tr>
<td>BMI</td>
<td>0.328</td>
<td>0.152</td>
<td>4.634</td>
<td>1</td>
<td>0.031</td>
<td>1.388</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.148</td>
<td>0.713</td>
<td>9.083</td>
<td>1</td>
<td>0.003</td>
<td>0.117</td>
</tr>
</tbody>
</table>

Notes: BMI: body mass index; B: regression coefficient \( \beta \) value; S.E.: standard error; Df: degree of freedom; Sig.: significance; Exp (B): odds ratio.

#### Table 6 Analysis of factors of excessive heat

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Df</th>
<th>Sig.</th>
<th>Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microangiopathy</td>
<td>-0.898</td>
<td>0.335</td>
<td>7.197</td>
<td>1</td>
<td>0.007</td>
<td>0.407</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.044</td>
<td>0.298</td>
<td>0.022</td>
<td>1</td>
<td>0.882</td>
<td>0.957</td>
</tr>
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</table>

Notes: B: regression coefficient \( \beta \) value; S.E.: standard error; Df: degree of freedom; Sig.: significance; Exp (B): odds ratio.

#### Table 7 Analysis of factors of blood stasis

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Df</th>
<th>Sig.</th>
<th>Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease course</td>
<td>0.436</td>
<td>0.201</td>
<td>4.726</td>
<td>1</td>
<td>0.030</td>
<td>1.546</td>
</tr>
<tr>
<td>macroangiopathy</td>
<td>0.721</td>
<td>0.343</td>
<td>4.435</td>
<td>1</td>
<td>0.035</td>
<td>2.057</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.833</td>
<td>0.537</td>
<td>2.406</td>
<td>1</td>
<td>0.121</td>
<td>0.435</td>
</tr>
</tbody>
</table>

Notes: B: regression coefficient \( \beta \) value; S.E.: standard error; Df: degree of freedom; Sig.: significance; Exp (B): odds ratio.
et al. said that "Most obese people must have taken too much sweet and fat food. Internal heat generated by fat food and abdominal distention induced by sweet food make ascending Qi form diabetes." Research indicates that diabetic macroangiopathy is related to blood stasis, and hypertension and hyperlipidemia are related to phlegm turbidity. In the future, it is necessary to further explore the effects of phlegm turbidity and blood stasis in the development of SD.

Activating blood circulation and eliminating phlegm turbidity can enhance the curative effect of SD patients with more deficiency and less excess. Applying drugs for activating blood circulation to treat diabetic macroangiopathy, including pathological changes of the lower limb vessels and carotid artery should be emphasized. Phlegm-removing methods cannot only treat SD but also control hyperglycemia, hypertension, and hyperlipidemia.

Overall, the results of this study reflect the law of SD syndromes, deepens research into the standardization of SD syndromes, and lays the foundation for a new system of syndrome-differentiating methods. Research into the SEs of SD and into combinations of SEs will provide evidence for treatment of SD and plays a role in directing clinical treatment. However, too few cases and limited objective indexes make it necessary to set up a better system of syndrome differentiation. This is necessary to carry out multicentric research of large samples according to strict requirements of evidence-based medicine, study coordinated influences of objective indexes on syndromes to deepen the connotation of "treatment based on syndrome-differentiation", and enhance the curative effect of TCM on SD.

REFERENCES