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Letter to the Editor

## Using herbal medicine (Cheong-Yeol Sodang-decoction) for fasting blood glucose in patients with diabetes mellitus and pre-diabetes mellitus: a retrospective chart review

Diabetes mellitus (DM) and obesity have the pathophysiological commonality of insulin resistance. Seventy-five percent of type 2 diabetic patients are reported to be obese, and obese diabetic patients are reported to have a high incidence of vascular diseases, including coronary artery disease and high mortality.[1] In Korean medicine, DM has been recognized as a disease, and treatments have been given to DM patients. Cheongyeol Sodang Decoction (CYSD) is one of these treatments and consists of *Lonicera japonica* Thunb,[2] *Atractylodes japonica* Koidz,[3] *Paeonia obovata* Max,[4] *Forsythia densitolra* Nakai,[5] *Rehmannia glutinosa for. hueichingensis* (Chao et Schih) Hsia[6] herbs that are effective against diabetes. CYSD is an herbal prescription used for treating DM in clinical practice, but its effect has not been investigated. We carried out a retrospective chart review of CYSD for patients with DM who visited the Department of Oriental Internal Medicine, Semyung University Hospital, from December 2016 to December 2018. The inclusion criteria were (1) diabetic patients taking or being administered an oral hypoglycemic agent or insulin or patients with a fasting blood glucose (FBS) of at least 126 mg/dL on the first blood test; (2) patients taking CYSD; and (3) patients who underwent blood test and body composition analysis before and after taking CYSD. Patients took CYSD (decoction) twice a day for at least 4–28 weeks. The prescription composition is shown in Supplement 1. All subjects were assessed by biochemical blood testing, body mass index (BMI), body weight, and body fat percentage (PBF) using the bioelectrical resistance method (Inbody 3.0, Biospace, Korea).

The characteristics of the patients are shown in Supplement 2. The FBS, BMI, weight, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP) of patients who completed the program tended to decrease after the program ended, and there was a significant difference in BMI, weight, ALP, and FBS before, during, and after program participation (Table 1). There was no statistically significant difference in other blood test results taken before and after the program. There were no adverse reactions with the use of herbal medicine, and no abnormal findings upon hematological examination.

After taking CYSD, the effects on FBS reduction and weight loss were shown. These results suggest that insulin resistance, which is the main onset factor of type 2 diabetes, may improve with weight loss. In most diabetic patients, lifestyle improvements alone are not enough to reach the target HbA1c level; thus, insulin preparations such as oral hypoglycemic agents are needed.[7] Representatively, metformin (N,N-dimethylbiguanide) is a drug that sensitizes insulin, thus suppressing hepatic glucose production and increasing absorption and utilization of glucose around muscles, consequently promoting insulin secretion without causing hypoglycemia.[8] However, patients taking metformin initially showed gastrointestinal abnormalities such as diarrhea, nausea, and indigestion.[9] Other diabetes treatments also have a blood sugar lowering effect, but they have side effects such as hypoglycemia, and there are no measures to treat the accompanying symptoms related to diabetes, such as obesity and non-alcoholic steatohepatitis.

**Table 1**
Changes in Parameters Measured in Patients

| Variables | Pre | Post | *p* |
|---|---|---|---|
| BMI (kg/m$^{2)}$ | 24.83 ± 3.37 | 24.48 ± 3.31 | 0.024* |
| Weight (kg) | 63.11 ± 13.33 | 62.28 ± 8.10 | 0.002** |
| Percent body fat (%) | 33.59 ± 7.92 | 31.81 ± 7.27 | 0.196 |
| AST (IU/L) | 23.13 ± 7.36 | 22.06 ± 5.74 | 0.251 |
| ALT (IU/L) | 21.31 ± 9.22 | 20.19 ± 8.60 | 0.333 |
| Γ-GTP (IU/L) | 25.59 ± 24.58 | 23.56 ± 18.38 | 0.179 |
| ALP (IU/L) | 72.28 ± 22.66 | 64.22 ± 19.83 | 0.000** |
| Total cholesterol (mg/dL) | 174.38 ± 45.77 | 172.31 ± 41.85 | 0.642 |
| Triglyceride (mg/dL) | 146.19 ± 124.84 | 145.81 ± 101.00 | 0.981 |
| HDL cholesterol (mg/dL) | 50.56 ± 11.22 | 52.22 ± 13.09 | 0.171 |
| LDL cholesterol (mg/dL) | 107.84 ± 36.98 | 110.09 ± 34.41 | 0.549 |
| BUN (mg/dL) | 15.50 ± 4.37 | 15.34 ± 4.79 | 0.837 |
| Creatinine (mg/dL) | 0.84 ± 0.23 | 0.84 ± 0.24 | 0.975 |
| Glucose (mg/dL) | 139.03 ± 62.48 | 118.94 ± 33.78 | 0.025* |
| HbA1c (%) | 7.24 ± 1.00 | 7.23 ± 1.01 | 0.832 |
| HbA1c-IFCC1 (mmol/mol) | 54.41 ± 14.00 | 55.53 ± 11.06 | 0.510 |
| HbA1c-eAG (mg/dL) | 161.22 ± 28.69 | 161.72 ± 28.90 | 0.844 |

Values are the mean ± standard deviation.
* $p < 0.05$.
** $p < 0.01$.
ALP, alkaline phosphatase; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; BUN, blood urea nitrogen; eAG, estimated average glucose; HbA1c, glycated hemoglobin; HDL, high-density level; IFCC, International Federation of Clinical Chemistry; LDL, low-density level; γ-GTP, gamma glutamyl transpeptidase.

This study has several limitations. First, this study is a retrospective chart review and lacks adequate sample size. Second there is no test indicator to measure the pancreas's ability to secrete insulin, so there is no known improvement in insulin secretion.

In conclusion, the herbal medicine treatment CYSD may aid in weight loss and improve blood sugar levels without adverse effects. However, the limitation of this study hinders us from making firm conclusions. Larger population-based prospective studies are needed to confirm these findings.

## Data availability

Conceptualization: SMS. Methodology: SMS. Software: SMS and YJC. Validation: YMC. Formal analysis: SMS and YJC. Investigation: SMS and YJC. Resources: SMS. Data curation:KH and YMC. Writing - original draft: SMS. Writing - review & editing: SMS, KH and YMC. Visualization: SMS. Supervision: SMS, KH and YMC. Project administration: SMS. Funding acquisition: SMS.

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The authors declare no conflict of interest.

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This study was conducted after being reviewed by the Institutional Review Board of Jecheon Oriental Hospital of Semyung University (IRB No. SMU-EX-2018-05-0007) and approved by CRIS (Registration No.: KCT0003793).

The data associated with this study cannot be made available due to legal or ethical reasons as it contains sensitive information.

## Supplementary material

Supplementary can be found in the online version at doi:10.1016/j.imr.2020.100413.

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