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Trends in Immunotherapy

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The Effect of Bloodletting Therapy on Lipid Metabolism and Glucose Control in Type 2 Diabetes: A Case Report

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Received: 17 July 2025; **Revised:** 10 September 2025; **Accepted:** 24 September 2025; **Published:** 23 January 2026

Abstract: Type 2 diabetes mellitus (T2DM) is a pervasive chronic metabolic disorder characterized by insulin resistance and hyperglycemia. While conventional treatments exist, there is groqing interest in complementary and alternative therapies, particularyl for patients with poorly controlled disease. Among these, bloodletting therapy of Traditional Mongolian medicine (TMM) has historical roots, yet it lacks robust scientific evaluation. This case report presents a 42-year-old male with uncontrolled T2DM and concomitant dyslipidemia, who demonstrated poor adherence to standard glucose-lowering medications. The therapeutic intervention involved a traditional Mongolian medicine protocol, commencing with a 5-day preparatpry regimen of an herbal blood-thinning decoction. This was followed by th bloodletting procedure itself, with no conventional anti-diabetic medications administered during the entire intervention period. This outcomes observed over 90-day follow-up were notably substantial. The patient's metabolic parameters demonstrated framatic improvements: fasting glucose decreased from 13.89 to 5.77 mmol/L, and glycated hemoglobin (HbA1c) fell from 7.31% to 6.05%. Significant enhancements were also recorded in lipid metabolism, with cholesterol and triglyceride levels dropping from 6.1 to 4.65 mmol/L and from 8.35 to 2.43 mmol/L), respectively. Furthermore, the patient exhibited considerable reductions in body mass index (from 35.7 to 29.5 kg/m^2), and blood pressure (140/90 to 130/85 mmHg), no serious adverse events reported. In conclution, the combination of traditional Mongolian bloodletting and an herbal decoction was associated with clinically meaningful improvements in glycemic control, lipid profile, and overall metabolic balance in this refractory uncontrolled T2DM case. These promising findings suggest potential immunometabolic benefits; however, rigorous controlled studies are imperative to definitively confirm its efficacy, safety, and the underlying mechanisms of action.

Keywords: Type 2 Diabetes Mellitus; Bloodletting Therapy; Mongolian Medicine; Immunomodulation; Case Report

1. Introduction

Type 2 diabetes mellitus (T2DM) accounts for approximately 90% of diabetes cases worldwide [1, 2]. It is characterized by insulin resistance and β-cell dysfunction [2]. Despite the availability of pharmacologic therapies, many patients fail to achieve optimal glycemic control [3]. Traditional Mongolian Medicine (TMM), including bloodletting therapy, has historically been applied to metabolic disorders; however, scientific validation is limited. This

report presents a unique case of bloodletting treatment combined with a herbal decoction in an uncontrolled T2DM patient, highlighting potential immunometabolic benefits. Rising rates of obesity, sedentary lifestyles, and energy-dense diets have also contributed to the emergence of T2DM in younger adults, adolescents, and even children [4]. National prevalence among adults aged 20–79 was 99.3 per 1,000, with an estimated 1,330 annual diabetes-related deaths in 2019 [5]. The economic burden of diabetes is substantial. In the United States, the average annual medical cost for a person with diabetes is approximately USD 19,736, with USD 12,022 directly attributable to diabetes care—about 2.6 times higher than costs for individuals without diabetes [6]. In Mongolia, Misheel et al. reported an average annual cost of 600,000 MNT (~190 USD) for T2DM management, compared with a national minimum wage of 420,000 MNT (~130 USD). Considering that the average household income is ~1,283,300 MNT (~400 USD), diabetes care represents a significant financial strain on affected families [7].

Besides metabolic dysregulation, T2DM is now recognized as a chronic low-grade inflammatory disease closely linked with immune dysfunction [8]. Adipose tissue expansion activates innate immune cells, particularly macrophages and dendritic cells, which release pro-inflammatory cytokines such as TNF-α, IL-6, and IL-1β [9,10]. These cytokines disrupt insulin signaling and promote insulin resistance. In addition, adaptive immune alterations—including Th1/Th17 predominance and impaired regulatory T-cell activity—contribute to β-cell dysfunction and the progression of hyperglycemia [11]. Modern immunology provides a complementary perspective: bloodletting reduces serum ferritin and iron overload, thereby decreasing oxidative stress—a key driver of chronic inflammation in T2DM [12]. This may suppress NF-κB–mediated cytokine release, improve endothelial function, and restore immune-metabolic balance [10,12,13]. Some studies have shown that bloodletting can significantly reduce triglyceride levels, especially in individuals with elevated baseline values [14]. For example, one study demonstrated a reduction in triglycerides from 287 mg/dL to 133 mg/dL, along with a decrease in ferritin levels [15]. Another study demonstrated that three bloodletting (500 ml of blood) at 2-week intervals from the arm simultaneously reduced HbA1c levels and induced significant changes in insulin secretion and insulin resistance, which differed markedly from those observed in a matched observational group of patients with high-ferritin type 2 diabetes [16]. It supports Traditional texts such as the Blue Beryl (Blue Sapphire) by the Sangye Gyamtso, which describe bloodletting as a means to separate harmful substances from the body and optimize blood quality [17]. Tserendagva et al. [18] further reported that the bloodletting procedure reduces blood viscosity and improves mineral and fluid metabolism. Although bloodletting therapy has been used in traditional medicine for centuries, scientific evidence regarding its effects on patients with type 2 diabetes mellitus remains limited. This case report evaluates the effectiveness of bloodletting therapy, in conjunction with a traditional blood-thinning decoction, in improving glucose and lipid profiles in a patient with T2DM. To our knowledge, this is the first documented application of bloodletting therapy for a T2DM patient in Mongolia receiving blood-thinning treatment.

2. Patient Information

A 42-year-old male accountant from Ulaanbaatar, Mongolia, was diagnosed with T2DM in 2014. He had poor adherence to prescribed Metformin (500 mg BID). Primary symptoms included polydipsia, fatigue, and excessive sweating. Medical history revealed mild hypertension and no significant family history of diabetes. He lived with his wife and four children. Lifestyle included sedentary work (8–10 hours/day sitting), frequent fast food, sugary drinks, smoking history (12 years), and no regular exercise. Mental health was stable.

3. Clinical Findings

Baseline examination revealed: Blood pressure, 140/85 mmHg, heart rate, 78 bpm; temperature, 36.8 °C; Body Mass Index (BMI), 35.7 kg/m^2. No signs of neuropathy, retinopathy, or psychiatric illness were observed. For further details, see the **Supplementary Materials**.

3.1. Timeline

Date/Day	Event/Findings
2014	Diagnosed with T2Dm, prescribed Metformin
Pre-Day 0	Modified diet and herbal decoction for 5 days
Day 0	Labs: FBG 13.89, HbA1c 7.3%, Cholesterol 6.1, TG 8.32; BMI 35.7, BP 140/85

Day 6 Bloodletting therapy (150–200 ml blood removed)
Day 30 Labs: FBG 7.82, HbA1c 8.31, Cholesterol 4.70, TG 3.40;
Day 90 Labs: FBG 5.77, HbA1c 6.05, Cholesterol 4.65, TG 2.43; BMI 29.5, BP 130/85

3.2. Diagnostic Assessment

Diagnostic tests included fasting plasma glucose, HbA1c, lipid profile, blood pressure, and BMI. Challenges included poor adherence to conventional therapy. Final diagnosis was T2DM with dyslipidemia. Prognosis included risk for long-term complications.

3.3. Therapeutic Intervention

Preparation: Traditional Mongolian blood-thinning remedy known as the 3-seed decoction (chebulic myrobalan, amla fruit, and belleric myrobalan in the ratio 2:1:1), 2 g/200 mL of boiling water, simmered for 5 minutes, twice daily for 5 days.

Procedure: Single phlebotomy session, 150–200 mL of venous blood was withdrawn from the posterior antebrachial vein using a No.11 sterilized scalpel. Before performing the bloodletting therapy, the area of the vessel where the procedure was to be performed was disinfected with antiseptic solutions, and strict aseptic techniques were followed. After the bloodletting procedure, a sterile disposable bandage was applied to prevent bleeding. Blood pressure and oxygen saturation were monitored before and after the procedure. The procedure takes approximately 5 minutes, and no sedation is required for pain management. Following treatment, the patient was observed for 30 minutes to ensure there were no immediate adverse effects, such as hemorrhage or hypotension. The incision was well-dressed, and the patient was instructed not to remove the dressing for three days and advised to keep it dry.

Post-care: Restricted diet × 2 weeks, staying hydrated and avoiding alcohol, tobacco, and fried/processed foods [19].

3.4. Follow-Up and Outcomes

Over 90 days, the patient showed improved glycemic and lipid parameters. FPG reduced from 13.89 to 5.77 mmol/L, HbA1c from 7.3% to 6.05%, total cholesterol from 6.1 to 4.65 mmol/L, and triglycerides from 8.35 to 2.43 mmol/L. BMI decreased from 35.7 to 29.5 kg/m^2. Blood pressure improved from 140/90 to 130/85 mmHg. Patient reported better mood and energy. Minor bruising at the bloodletting site resolved spontaneously. No serious adverse events occurred (**Table 1** and **Figure 1**).

Table 1. Glycemic control and lipid metabolism changes at baseline, Day 30, and Day 90.

Parameter	Baseline (Day 0)	Day 30	Day 90	Target/Normal range
Total Cholesterol	6.1 mmol/L	4.70 mmol/L	4.65 mmol/L	<5.0 mmol/L
LDL Cholesterol	2.56 mmol/L	2.43 mmol/L	2.61 mmol/L	<3.0 mmol/L
HDL Cholesterol	1.20 mmol/L	1.23 mmol/L	1.20 mmol/L	>1.0 mmol/L (male)
Triglycerides	8.35 mmol/L	3.40 mmol/L	2.43 mmol/L	<1.7 mmol/L
Fasting Glucose	13.89 mmol/L	7.82 mmol/L	5.77 mmol/L	3.9–5.5 mmol/L
HbA1c	7.31%	8.31%	6.05%	<5.7% (non-diabetic target)

Note: The transient increase in HbA1c at Day 30 may reflect delayed glycemic adaptation; however, the sustained drop by Day 90 indicates improved long-term glucose regulation.

4. Discussion

Type 2 diabetes mellitus (T2DM) remains a global health challenge, with only an estimated one-third of patients achieving optimal glycemic control despite the availability of multiple pharmacological options [20]. Poor adherence to long-term therapy, side effects of medications, and high treatment costs frequently contribute to suboptimal outcomes, particularly in resource-limited settings such as Mongolia [7]. This context underscores the importance of evaluating culturally relevant, low-cost, and potentially effective Traditional Mongolian Medicine interventions.

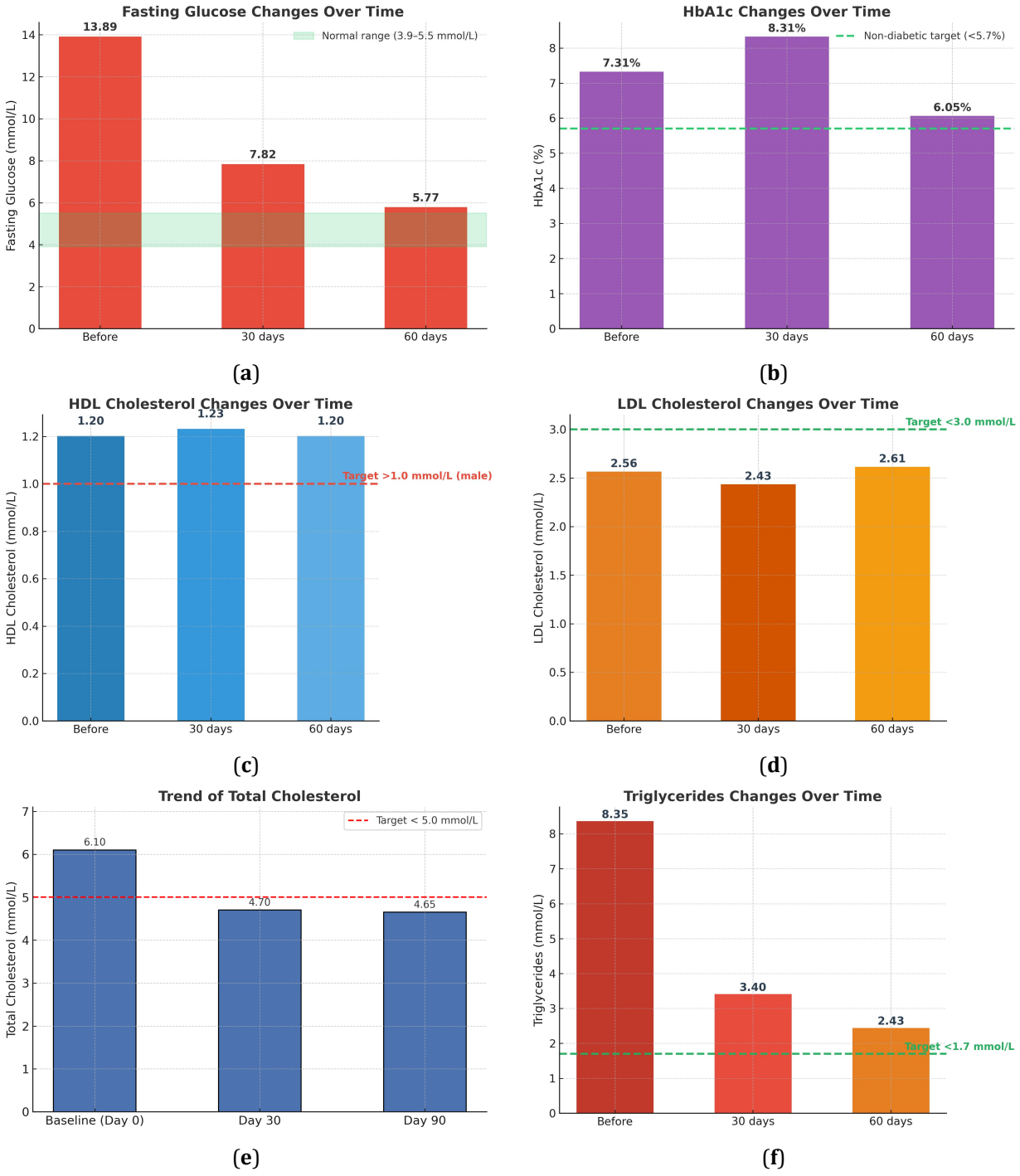

Figure 1. With target/Normal ranges shown in green. Glycemic control and lipid metabolism changes at baseline, Day 30, and Day 90. (**a**) Fasting glucose; (**b**) Glycated hemoglobin (HbA1c); (**c**) HDL Cholesterol; (**d**) LDL Cholesterol; (**e**) Total cholesterol; and (**f**) Triglycerides.

In this case, Traditional Mongolian bloodletting therapy combined with a short course of a herbal decoction resulted in substantial improvements in fasting blood glucose, HbA1c, lipid parameters, blood pressure, and BMI. These changes occurred in the absence of conventional glucose-lowering medication, suggesting that the observed effects may be attributable to the intervention itself rather than confounding pharmacotherapy.

4.1. Possible Mechanisms

1. Reduction of systemic inflammation: Bloodletting decreases circulating pro-inflammatory cytokines (e.g., TNF-α, IL-6), which are known to impair insulin signaling [21,22].
2. Lowering of iron overload and oxidative stress: Removal of blood decreases serum ferritin and reactive oxygen species, protecting pancreatic β-cells and enhancing insulin secretion [23,24].
3. Improved lipid metabolism: Bloodletting may reduce triglycerides and cholesterol by removing lipid-rich blood components [25].
4. Enhanced microcirculation: Decreased blood viscosity improves endothelial function and perfusion [26].

These mechanisms align with prior phlebotomy studies in diabetic and dysmetabolic populations. For example, Fernández-Real et al. [16] demonstrated improvements in HbA1c and insulin sensitivity following therapeutic bloodletting, while Dijkstra et al. [27] observed an average 12% HbA1c reduction in diabetic subjects after blood donation. Together, these findings suggest that bloodletting can improve insulin sensitivity and maintain metabolic benefits for up to a year, supporting its potential long-term efficacy.

4.2. Strengths and Limitations

A strength of this report is its detailed intervention and 90-day follow-up outcomes. The patient's poor adherence to conventional therapy allowed evaluation of the standalone potential of bloodletting therapy. This is also the first documented case in Mongolia integrating traditional practice with immunometabolic perspectives.

However, limitations include the single-patient design, limited generalizability, and lack of continuous glucose monitoring or immunological biomarkers. The transient rise in HbA1c at 30 days highlights the need for longer-term monitoring.

4.3. Relevance to Literature

Historically, bloodletting was practiced across civilizations [28]. Modern studies on high-ferritin T2DM and metabolic iron overload report improvements in HbA1c and lipid profiles [16]. This case adds to the literature by contextualizing bloodletting within Mongolian medicine alongside herbal decoctions [29,30].

4.4. Takeaway Lessons

Traditional Mongolian bloodletting therapy may be a culturally relevant and low-cost adjunct for selected T2DM patients. It suggests possible immunometabolic benefits, but controlled clinical trials are required to confirm efficacy, safety, and mechanisms before integrating it into modern diabetes care.

4.5. Patient Perspective

"Following a course of Traditional Mongolian bloodletting therapy, a 90-day observational period demonstrated a subjective enhancement in strength and general well-being, which was objectively corroborated by laboratory analyses indicating a reduction in blood glucose and lipid levels. The minor incision made for the bloodletting procedure healed rapidly."

"Following the treatment, the observable improvement in general condition and the positive changes in laboratory results instilled a sense of trust in the therapy's efficacy, thereby reinforcing adherence to the physician's recommendations. It is concluded that this therapeutic modality is a safe, well-tolerated, and minimally invasive non-pharmacological intervention with potential adjunctive benefits in the management of type 2 diabetes mellitus."

5. Conclusions

This case report demonstrates that traditional Mongolian bloodletting therapy, combined with a short course of a herbal blood-thinning decoction, was associated with notable improvements in lipid metabolism and glycemic control in a patient with uncontrolled type 2 diabetes. Over 90 days, the patient experienced reductions in total cholesterol, triglycerides, fasting glucose, and HbA1c, with minimal adverse effects and no use of standard glucose-lowering medications. While the findings are promising, they must be interpreted with caution due to the single-subject design. Larger studies with control groups are needed to confirm these results and assess reproducibility,

safety, and long-term efficacy.

Supplementary Materials

The supporting information can be downloaded at https://ojs.ukscip.com/files/TI-1416-Supplementary-Material.pdf.

Author Contributions

Conceptualization, S.S. (Seesregdorj Surenjid), S.S. (Sainbileg Sonomtseren), and T.U.; methodology, S.S. (Seesregdorj Surenjid) and S.S. (Sainbileg Sonomtseren); software, T.B. and N.U.; validation, T.B., S.S. (Seesregdorj Surenjid), S.S. (Sainbileg Sonomtseren), and T.U.; formal analysis, T.B.; investigation, T.B.; resources, T.B.; data curation, T.B. and N.U.; writing—original draft preparation, T.B. and E.V.; writing—review and editing, W.-T.C. and N.U.; visualization, T.B. and N.U.; supervision, E.V. and W.-T.C.; project administration, S.S. (Seesregdorj Surenjid) and S.S. (Sainbileg Sonomtseren). All authors have read and agreed to the published version of the manuscript.

Funding

The publication fee for the research paper was covered by the Mongolian National University of Medical Sciences (MNUMS) Rector's Research Grant-2023 funding.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of MNUMS Research Ethics Review Committee Meeting (No. 2021/03-13, 24 December 2021).

Informed Consent Statement

Written informed consent was obtained from the patient for publication of this case report.

Data Availability Statement

Data will be made available on request.

Conflicts of Interest

The authors declare that there is no conflict of interest.

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