

## Case Report

# Auricular Electroacupuncture in the Treatment of Gestational Diabetes: A Case Report

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### Abstract

**Objective:** This article presents the case report of a 38-year-old pregnant woman who was diagnosed with gestational diabetes and a high fasting blood glucose level of 8.5 mmol/L. She sought treatment by auricular Electroacupuncture (AE) to improve her health and decrease her blood sugar level. The goal of the treatment is to reduce the level of fasting blood glucose to 5.2 mmol/L, as requested by her Obstetrician-Gynecologist (OB-GYN).

**Method:** The patient was treated with auricular Electroacupuncture (AE) using the following acupoints twice a week for 4 weeks: Diabetes, Pancreas, Pituitary, Thalamus, Endocrine and Sanjiao.

**Results:** Auricular Electroacupuncture (AE) was done twice a week for 4 weeks (total 8 times), the result of which was the patient's fasting blood glucose level dropped from 8.5 mmol/L to 5.0 mmol/L.

**Conclusion:** This case shows that auricular Electroacupuncture (AE) not only effectively reduces blood sugar levels, but it also significantly improves the subjective symptoms, helps patients to avoid taking medication, and prevents the progression of gestational diabetes.

**Keywords:** Auricular Electroacupuncture (AE); Blood glucose level; Gestational diabetes

### Introduction

Gestational Diabetes (GD), also called Gestational Diabetes Mellitus (GDM) is hyperglycemia with blood glucose values above normal but below those diagnostic of diabetes [1]. It is a type of diabetes that occurs in some pregnancies during the second or third trimester, which can cause health complications for the mother and the developing fetus. Between 3 - 20% of pregnant women develop gestational

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diabetes, depending on their risk factors [2]. Gestational diabetes occurs when the body can't make enough insulin during pregnancy. Insulin is a hormone made by the pancreas that acts like a key to let blood sugar into the cells in the body for use as energy [3]. Women with gestational diabetes are at an increased risk of complications during pregnancy and at delivery such as preeclampsia and macrosomia that seriously affect the health of the mother and baby [4]. Untreated gestational diabetes leads to increased maternal and perinatal morbidity. Treatment reduces these adverse pregnancy outcomes [5]. Because a woman's blood sugars travel through her placenta to her baby, it is important to control gestational diabetes to protect the baby's growth and development [6]. The American Diabetes Association recommends that the target for women testing blood sugar levels during pregnancy is 5.2 mmol/L or less before a meal [6].

Gestational Diabetes (GD) is a type of diabetes that is called "emaciation-thirst disease" (in Chinese, *Xiaokebing* 消渴病) in Traditional Chinese Medicine (TCM). It is associated with the clinical manifestations of polyphagia, polydipsia, polyuria and sweet-smelling urine. In ancient Chinese medicine literature, *Ye Tianshi's Gynecology Syndrome and Treatment* in Qing Dynasty (in Chinese, 叶天士女科证治秘方) records gestational diabetes as "pregnancy thirst disease"; Song Dynasty's famous medical treatise *Complete Effective Prescriptions for Women's Diseases* (in Chinese, 妇人大全良方) cites "pregnancy irritability and dry mouth". According to TCM, diabetes is divided into Upper Jiao diabetes due to excess heat in the lungs, Middle Jiao diabetes due to excess heat in the stomach, and Lower Jiao diabetes due to the deficiency of kidney yin. The TCM treatise *The Yellow Emperor's Classic of Internal Medicine* (in Chinese, 黄帝内经) believes that eating too many fatty, sweet and rich foods causes heat to rise from the stomach. This accumulation of heat causes the consumption of body fluids and the development of diabetes mellitus. The understanding of and the therapy recommended for diabetes mellitus in TCM has a 2,000-year history in China. Many physicians in past dynasties analyzed the pathogenesis and treatment of this disease from multiple perspectives. Zhang Xichun (1860-1933), the medical master of Chinese medicine in modern times, pioneered the research on the treatment of diabetes mellitus in TCM. He proposed that diabetes was caused by a lack of vital qi, the decline of the pectoral qi, and the inability of the spleen to disperse the essence of the spleen [7]. In addition, some physicians believe that the pathogenesis of diabetes mellitus is due to yin deficiency as well as dryness and heat. Accordingly, the therapeutic principles of treatment are aimed at "clearing heat, moistening dryness, nourishing yin and producing body fluids" [8].

Auricular Acupuncture (AA) has a history of over 3,000 years in China, with theories such as "one's ears reflect one's health" and "all the twelve meridians enter the ear" having been cited in *The Yellow Emperor's Classic of Internal Medicine* (in Chinese, *Huangdi Neijing* 黄帝内经). It records the relationship between the ear, meridians and organs. By inspecting the condition of the ear, one knows whether the individual has an illness or not. As the ear where the twelve meridians meet, the ear is associated to five internal organs (lungs, liver, heart, spleen, lungs and kidneys), each with its own corresponding auricular

point (reaction zone) in the auricle. The ear is also associated with six Fu organs (large and small intestine, gallbladder, bladder, stomach, and sanjiao). Each point and their corresponding organs are linked through the qi and blood of organs and meridians. The body's physiological and pathological disorders can be reflected by the related auricular points. Stimulating ear acupoints can regulate the physiological functions of the viscera of the whole body, and certain auricular acupoints for the pancreas, endocrine, liver, spleen, and kidney also coordinate the functions of the viscera [9]. In the 1950s, Dr. Paul Nogier, a French neurosurgeon, developed the theory of embryology and published the auricular map called the "Embryo Reflection". This map theorized that the outer ear represents an inverted fetus within the womb and, thus, proposed the somatotopic correspondence of parts of the body to specific parts of the ear [10].

A combination of modern technology and traditional acupuncture, electroacupuncture is a form of acupuncture in which a small electric current is passed between pairs of acupuncture needles. Using small clips, the needles are attached to a device that generates continuous electric pulses. These devices are used to adjust the frequency and intensity of the impulse being delivered, depending on the condition being treated. Animal experimental studies have shown that electroacupuncture at different frequencies can activate cholinergic nerves and stimulate the release of  $\beta$ -endorphin and other endogenous opioid peptides by the adrenal glands, thus promoting the secretion of insulin [11-13].

## Clinical Case

### Patient Information

A 38-year-old woman, G1P0A0, had her first consultation on July 7, 2022, at 30 weeks of gestation. She had been diagnosed with gestational diabetes at 25 weeks of gestation. Her main complaint was high blood sugar levels (8.5 mmol/L fasting). She refused insulin injections and opted to be treated instead by acupuncture to improve her health and decrease her blood sugar level. Her symptoms were thirst, dry mouth, fatigue, palpitation, frequent urination, being overweight, having a BMI of 29 with PCOS before pregnancy, irritability and impatience, nighttime sugar cravings, yellow urine, and abdominal distension after eating. She typically ate supper at 9 p.m. and went to bed late, usually after midnight. Her tongue was red with a greasy and yellow coating, and with tooth marks on both sides. Her pulse was choppy and slippery.

TCM Opinion: a deficiency of kidney and spleen qi, stagnation of liver qi, heat, phlegm and dampness accumulation in the Triple Burner.

Treatment Strategy: Invigorate the kidney and spleen qi, soothe liver qi, eliminate excess body heat, and remove phlegm and dampness.

### Treatment Methods and Auricular Acupoints

Treatment protocol: auricular electroacupuncture twice a week for 4 weeks up to 34 weeks of gestation. Then follow-up treatments once a week until the due date at the beginning of September.

Auricular Acupoints: Diabetes, Pancreas, Pituitary, Thalamus, Endocrine and Sanjiao.

## Needling Technique and Manipulation

Auricular acupoint locations refer to the book Handbook of Auricular Treatment prescriptions & Formulae [14] (Figure 1).

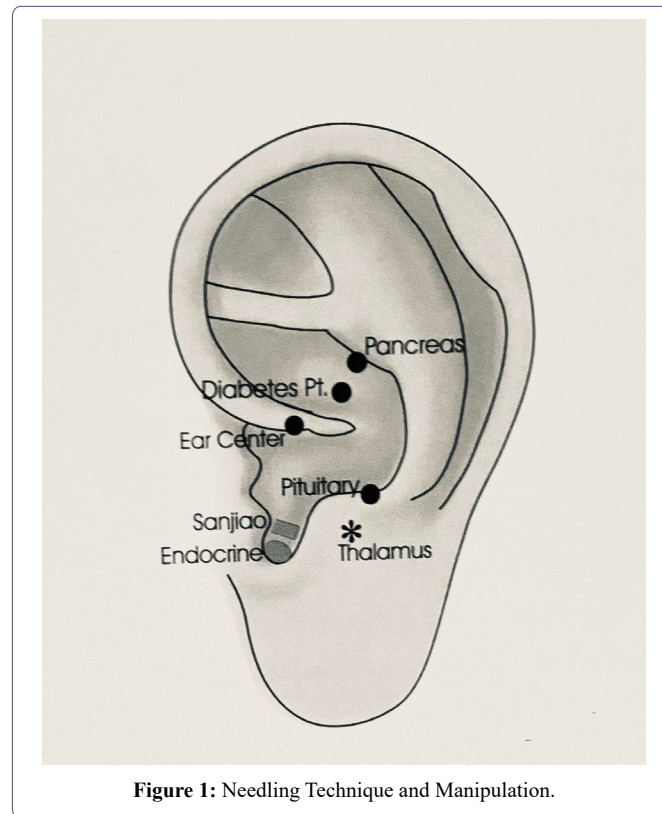


Figure 1: Needling Technique and Manipulation.

Disposable sterile needles, size 0.25x15 mm, are inserted perpendicularly in all points to a depth of 5 mm. An electroacupuncture stimulator (Great Wall brand, model KWD-808I) is connected at selected auricular acupoints.

The patient lies on her left side. After disinfecting all points in the ear using a cotton ball dipped in alcohol, hold the ear with the thumb and the middle finger of the left hand. Use the right hand to needle the selected points, and twist the needles slightly until the patient feels a slight sense of soreness. Needles remain inserted for 25 minutes each session with the auricular points needled bilaterally and alternately in both ears. The needles are then connected to the electroacupuncture stimulator, and set to a continuous wave, the intensity of which is based on the patient's preference.

## Outcomes

After only one treatment, the next day, her fasting blood glucose level dropped to 4.5 mmol/L. The level stayed between 5.0 and 5.2 mmol/L fasting in the following weeks. After 4 weeks of twice-a-week auricular electroacupuncture (total 8 times), her fasting blood glucose levels dropped and stayed at 5.0 mmol/L. She continued auricular electroacupuncture treatment once a week (4 more times) until she gave birth to a healthy baby boy at 39 weeks on September 5, 2022 and her blood glucose levels returned to normal. Overall, her general health improved, including decreased thirst, less frequent urination, controlled weight, stabilized mood, no more irritability and palpitation, recovered energy (she no longer felt tired during the day), and no more bloating after eating.

## Discussion

Gestational Diabetes (GD) is usually diagnosed between weeks 24 and 28 of gestation. Pregnancy usually causes some form of insulin resistance. Insulin is a hormone produced in the pancreas that regulates the body's metabolism of fats and carbohydrates. It also helps the body turn sugar into energy. Gestational diabetes occurs when hormones from the placenta block the effect of insulin, preventing the body from effectively regulating increased blood sugar levels common in pregnancy. This causes hyperglycemia (or high levels of sugar in the blood), which can damage the nerves, blood vessels and organs in your body when left unmanaged [15].

When treating diabetes, acupuncture works to regulate and optimize the metabolic function of the organs which affect blood sugar – the spleen, liver, kidneys and pancreas – with the goal of stabilizing and balancing blood sugar levels. Acupuncture can balance the yin and yang energy of the human body in order to clear excess body heat and relieve symptoms like thirst, frequent urination, sugar cravings, and abdominal distension. Acupuncture helps regulate blood glucose levels by invigorating the kidney and spleen qi, soothing the liver qi, eliminating excess body heat, and removing phlegm and dampness [16].

Auricular Acupuncture (AA) can regulate the internal organs through the acupoints in the ear, harmonizing the qi and blood of the human body by stimulating the acupoints. It can lower blood sugar, improve insulin sensitivity, reduce clinical symptoms, and enhance the body's self-regulation mechanism for blood sugar. Modern research has found that auricular acupoints can adjust hormone levels and regulate the function of the autonomic nervous system [17].

In this article, the treatment strategy determined was to use electroacupuncture at the auricular acupoints Diabetes, Pancreas, Pituitary, Thalamus, Endocrine and Sanjiao. The functions of each acupoint are listed below.

**Diabetes and Pancreas points:** this pair of points is the special point for treating diabetes mellitus. Insulin is a hormone made by the pancreas. During gestational diabetes the body cannot produce enough insulin to handle the effects of a growing baby and changing hormone levels that results when the amount of sugar in the blood rises. Therefore, diabetes and pancreas points should be considered as the two most important points in the treatment of gestational diabetes [9].

**Pituitary, Thalamus and Endocrine points:** these three points together promote insulin secretion to reduce blood sugar. The endocrine glands are an important system in regulating the physiological function of the human body. The functions of the endocrine glands are regulated by the thalamus and pituitary glands which secrete trophic hormones. These trophic hormones stimulate secretion by targeted glands. The insulin secretor centre is in the hypothalamus [9].

**Sanjiao point:** It is selected to excite the vagus nerve and to promote the secretion of insulin. This point is located where the mixed branch of the vagus nerve, glossopharyngeal nerve and facial nerve pass [9]. It can help to reduce the blood sugar level.

To help control the blood sugar level, recommendations for lifestyle changes were given. These include managing weight by eating a healthy, low-sugar diet without too much fat and calories, 30 minutes of moderately intense cardio exercise per day, and strength training three times per week throughout pregnancy.

## Conclusion

Auricular Electroacupuncture (AE) is an effective treatment for gestational diabetes. Not only can it lower blood sugar but it can also control excessive thirst, reduce the frequency of urination, improve circulation of qi and blood, balance the yin and yang energy, and improve a patient's health outcomes naturally.

## Authorship and Contribution

Xiangping Peng wrote the manuscript. Guanhu Yang contributed on the use of Traditional Chinese Medicine (TCM) theory for Diabetes Mellitus (DM).

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## Conflict of Interest

The authors declare no conflict of interest.

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