

Comparative Differences Between Traditional Chinese Medicine and Western Medicine in Treating Type Two Diabetes Mellitus

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COMPARATIVE DIFFERENCES BETWEEN TRADITIONAL CHINESE
MEDICINE AND WESTERN MEDICINE IN TREATING TYPE TWO
DIABETES MELLITUS

by

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A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major in Health Sciences Pre-Clinical
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ABSTRACT

In the United States alone, there were 25.8 million people suffering from diabetes in 2010. The prevalence of diabetes is expected to markedly increase worldwide over the next 30 years, an estimated 2.8% in 2000 and 4.4% in 2030. For individuals diagnosed with type 2 diabetes mellitus (T2DM), treatment is essential to control adverse effects such as hypertension and diabetic neuropathy.

The focus of this study is to examine various approaches to maintain and improve the lifestyle of individuals suffering from T2DM. A comparative approach has been used to evaluate the differences in the treatment of T2DM with the use of traditional Chinese medicine (TCM) and Western medicine. In Western society, pharmaceuticals are commonly used as a treatment method to manage hyperglycemia, along with life-style modifications. Furthermore, TCM views the human body and its functioning in a holistic way, stating that no single body part or symptom can be understood apart from its relation to a whole. Herbal medications and other treatments in TCM are targeted to treat underlying medical complaints that resulted in symptoms, instead of treating one specific manifestation.

Data collection has been gathered through Qualitative over the phone interviews with patients suffering from T2DM, as well as TCM physicians. Interviews were conducted on patients that were diagnosed with T2DM (fasting plasma glucose levels of 126 or greater and HbA1c levels >8%), and had continued treatment longer than three months prior to interviews. Collection of chart notes containing glucose levels, levels of pain, lifestyle changes, and vital

signs were also used. A total of 21 patients from a family practice were interviewed, answering 23 constructed questions based on treatment of choice (TCM or western) and their personal input on treatment satisfaction. Patients varied in age, ethnicities, and gender, ranging from 39-70 years of age. Two traditional Chinese medicine physicians were also interviewed. Interviews with TCM physicians elaborated on course of treatment and steps taken to diagnose T2DM. Furthermore, prescription medications were also charted and documented to further analyze with secondary data.

Upon completing the interviews, the data stated 21 patients (total population questioned) had not experienced alternative medicine and were exposed only to western medicine as treatment. A major concern for most patients were the pharmaceutical side effects, and 85.1% of patients stated they would be interested in an alternative treatment. Due to insufficient sources and knowledge on TCM treatment, 14.2% of patients stated they were satisfied with their western medicine treatment of choice and would not change treatment. The research's objective was to evaluate the differences in treatment of T2DM. Data collected supported the objective and showed the lack of sources to alternative treatments aside from western medicine. The researcher informed and educated interviewees about literature review on traditional Chinese medicine about alternative treatments available to treat T2DM.

DEDICATION

To my mother and father, Martha and Herminio Morales, for encouraging me each day to strive for my fullest potential. Thank you for giving me the opportunity to excel in my academics, to one day become the Physician Assistant that both of you and I dream of. In addition, thank you to my thesis chair, Danielle Webster and my committee for helping me each step of the way on my journey, as well as my best friend Chelsey, who always reminds me I'm one step closer to finishing.

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INTRODUCTION

Chronic diseases such as diabetes, heart disease, stroke and cancer are persistent conditions that progress slowly over a period of a long duration. These diseases combined are the leading cause of mortality in the world. As they progress over time, the development of various complications lead to lifelong disabilities along with a compromised quality of life. This may become a financial and emotional cost for patients. Furthermore, diabetes prevalence is expected to markedly increase worldwide over the next 30 years. The causes of this increase are multi-factorial but include increasing obesity, decreasing physical activity, and a movement of the world's population from rural to urban areas (NCCAM, 2009).

Approximately 25.8 million people of all ages in the United States have diabetes (8.3 % of the population). Out of the 25.8 million people, 18.8 million people have been diagnosed, and 7.0 million have not been diagnosed (National Diabetes Info. Clearinghouse, 2013). Risk factors such as aging, a sedentary lifestyle and obesity are generally the cause of significant complications, most commonly targeting African-Americans, Latinos, Native Americans and Asian Americans (Copstead & Banasik, 2010). Family history of type 2 diabetes mellitus (T2DM) in a first-degree relative may lead to patients acquiring the disease, but obesity causing increased levels of hyperlipidemia (high levels of fat in the blood) contributes to a majority of diabetic complications (Copstead & Banasik, 2010).

Diabetes Mellitus consists of a number of diseases involving abnormalities in insulin production and sensitivity. Insulin is a hormone produced in the body by the pancreas that aids in the uptake of glucose into cells. However, in patients with diabetes mellitus, the pancreas is either unable to

produce enough insulin or insulin receptors on the cell's membrane are unable to bind insulin for uptake. This results in the cell's inability to carry out its metabolic functions due to the reduced influx of glucose entering the cell. Glucose provides the cells in the human body with the energy needed to accomplish physical as well as cognitive everyday tasks. With a decrease in the uptake of glucose by the cells, it accumulates in the bloodstream, which leads to hyperglycemia, a rise in the blood glucose levels. This clinically manifests as polydipsia (increased hunger), polyphagia (increased thirst), and polyuria (frequent urination) (Copstead & Banasik, 2010). Unfortunately, these symptoms do not become apparent at the time hyperglycemia develops, until there is a reduction in both insulin sensitivity and beta cell function. Overtime, continued hyperglycemia results in chronic complications such as diabetic neuropathy, a group of nerve disorders caused by diabetes (neuro-related to nerves, -pathy, disease), high blood pressure and cardiovascular diseases (National Diabetes Info. Clearinghouse, 2009).

Symptoms that arise from T2DM are an indicator for the disease, but may vary because some symptoms may appear more gradually than others. Due to this, the American Diabetes Association has recommended screening guidelines to be followed. A diagnosis of T2DM is classified by a fasting plasma glucose level of 126 milligrams and confirmed with a secondary test (Copstead & Banasik, 2010). Glycoslated hemoglobin (HbA1c) is used to measure the plasma glucose concentration over a prolonged period of time (Copstead & Banasik, 2010). The A1c test is based on the attachment of glucose to hemoglobin, the protein in red blood cells that carries oxygen (Dubowsky, 2012). Since glycoslated hemoglobin indicates levels of glucose for up to three months, testing A1c levels is helpful in long-term management. The expected A1c levels in healthy individuals are 5.6% or below, whereas diabetic patients exhibit A1c levels of

6.5 % or higher (Lukman et al. 2007 & Dubowsky, 2012). In addition, A1c levels of 5.7 % to 6.4% increase the risk of developing diabetes in the future (Lukman, He & Hui, 2007). A1c should be monitored every 3 months until it is less than 7.0 % and then rechecked every 6 months (Nestler, 2002). Proper testing and treatment, including education, are prescribed to patients to maintain lower glucose levels and prevent further deterioration of organs that can lead to chronic complications.

Once diagnosed with T2DM, patients have several options in management of the progression of the disease. In this study, the focus was to examine various approaches to maintain and improve the lifestyle of individuals suffering from T2DM. A comparative approach was used to evaluate the differences in the treatment of T2DM, either through the use of traditional Chinese medicine (TCM) or Western medicine. Both Western medicine and traditional Chinese medicine are similarly focused in reducing symptoms and preventing complications in patients. However, conceptualizing, diagnosing, and treatment are very different. Diet modification, weight loss when appropriate, exercise and pharmaceuticals are the leading management techniques in a Western medicine approach. It focuses on each individual complication separately and targets treatment accordingly. With TCM, no single body part or symptom can be understood apart from its relation to a whole. Looking at patterns of disharmony, which include emotional and psychological responses, TCM views the human body and its functioning in a holistic way (Covinton, 2001). The purpose of this research will be to elaborate and explain the two methods for managing T2DM, and the effects they have on glucose levels and patient satisfaction.

TRADITIONAL CHINESE MEDICINE

Theories

A system of healing that originated thousands of years ago was built on the basis of two theories: Yin-Yang theory and the Five Phase Theory (Five Element Theory). Ancient Chinese scholars noted that all natural phenomena could be categorized into Yin and Yang (both complementary opposites used to describe how things function with one another), everything in the universe consisted of five basic elements (wood, fire, earth, metal, and water), and the universe was constantly changing towards dynamic balance and harmony (Covinton, 2001 & 18]. The knowledge of both theories and principles led to the understanding of prevention and cures of diseases.

Yin and Yang

Nearly all-symptomatic diagnosis are based on the philosophy of yin and yang, the two forces that the Chinese believe control the workings of the universe. The yin-yang theory is interdependent on one another, unable to exist without the other, but capable of changing into one another (Covinton, 2001). Broken down, the yin and yang theory allows all physiological functions of the body, including the signs and symptoms of disease, to be differentiated. The theory symbolizes the internal organs and feminine side of nature as yin, and the external, masculine side of nature organs as yang; therefore, the symbol was created to symbolize the shady side (yin) and sunny side (yang) (Covinton, 2001 & Huang, 1997). Lying between the two

is a bit of both, defining that there are no absolutes. Based on the differences between both yin and yang, the symptoms contrast one another, as can be seen below (Covinton, 2001):

Yin: Shady side of a slope, feminine side of nature.

- Cold, stillness, darkness, inwardness, decrease, downwardness.

Yang: Sunny slope, masculine side of nature.

- Heat, movement, brightness, outwardness, stimulation, excitement, increase, upwardness.

Aside from the symptoms presented in a patient, under activity is considered as yin and over activity as yang. Pertaining to T2DM, patients are deficient in yin, the under activity.

Respectively with yin deficiency, diabetic patients have excessive thirst, excessive hunger and excessive urination, all of which are classically divided into three classes: upper, middle, and lower diabetes.

The syndrome is categorized as a kidney Yin deficiency with heat signs. A deficiency of Yin means the body is dry, producing a form of internal heat. Due to the cause of internal heat, Yin is needed to constantly cool down the Yang activities of the body. In the Chinese Herbology section, a formula has been listed to tonify (to give tone to) the Yin.

Five Element Theory

The Five Element Theory (Five Phases Theory), also known as Wu Xing, is a means of classifying phenomena in terms of five basic processes represented by the elements of wood, fire, earth, metal and water (Covinton, 2001). The theory is used to interpret the relationship found between the physiology and pathology in the body and the environment because a dynamic balance and relationship between the elements and the organs exist. If the balance is interrupted or destroyed, pathological changes may occur. Each element contains a corresponding organ, direction, color, sense and taste.

As stated by Covinton, (2001):

The clockwise movement of one element into the next (such as wood, fire, earth and so forth) whereby one element generates, acts on, or promotes the following element, is referred to as the Sheng cycle. Within the model of the Five Phases, each element is associated with an organ. Wood is associated with the liver, fire is associated with the heart, earth with the spleen-pancreas-stomach, metal with the lungs, and water with the kidneys.

Within the Five Element theory, four main cycles or ways in which the elements interact are found. These four cycles consist of Sheng (the generating cycle), Ke (the controlling cycle), Cheng (overactive cycle) and Wu (insulting cycle) (Acupuncture today, 2014).

The element cycle is one of the most complex systems in TCM. Due to the complexity, it can take years to fully understand the functioning behind the theory. This summary is merely an introduction to the process behind the theory and its use.

Treatment

According to the World Health Organization and the National Institutes of Health (NIH), TCM originated more than 300 years ago (Nestler, 2002). Perceived as foreign to many in the Western world, TCM is perhaps one of the most ancient healing arts known to humans. This view is based on the ancient Chinese perception of humans as microcosms of the larger, surrounding universe—interconnected with nature and subject to its forces (NCCAM, 2009). Herbal medications, acupuncture, massage/diet therapy, moxibustion (a form of heat therapy) and mind/body exercising are all included and focus on the presenting signs, as well as the patient's emotional and physical response (Covinton, 2001). The key to an accurate TCM diagnosis is identifying the internal balances through detection of the external manifestations (Nestler, 2002). As stated before, TCM practitioners view the body and its functions in a holistic way, observing and taking note of every symptom the patient experiences. Through a series of questions (based from patient history, habits and other presentations) and observations, a physician is able to present the proper treatment. Questions are constructed to assist the physician in choosing a treatment to apply to the patient, as no two patients are alike. In addition, practice of TCM is followed through theories such as the yin-yang, to balance any disharmonies and bring the body back to a normal harmony.

According to Nestler (2002), in questioning a patient, a TCM physician depends on 10 essential questions:

- 1) Cold and hot sensations
- 2) Perspirations
- 3) Head and body aches
- 4) Urination and bowel movements
- 5) Eating
- 6) Chest and tightness
- 7) Hearing loss or change
- 8) Thirst
- 9) Pulse and color of tongue
- 10) Spirits

Treatment of patients through TCM follows three stages: prevention, symptoms and diagnosis.

Prevention, the first stage used to treat patients, is used to monitor and prevent any further damage caused by the unknown disease. Secondly, symptoms experienced by the patient are observed for further examination. Unlike Western medicine, which refers to tests and symptoms as a determining factor of diagnosis, TCM merely uses tests as a reference and not as a determining factor to complete the diagnosis and treatment. An example of this in Western medicine would be the results of a blood test. Elevated blood glucose of 110 mg/dl or more, along with A1c levels over 6.5% would confirm a patient's diabetic state. The third and final stage is diagnosis, once prevention and symptoms have been reviewed. Diagnosis can be broken

down into 4 different skills: pulse, observations (objective finding), olfaction (smell), and integration. The diagnostic skills of hearing and smelling allow the physician to understand and diagnosis successfully and form the treatment plan that assists the patient in healing (Nestler, 2002). It is only then with a complete understanding that an effective diagnosis and treatment plan can be established.

KEY CONCEPTS WITHIN TCM

Meridians

It is thought that channels known as meridians, run through the body, along with blood and fluids. Meridians carry Qi, energy, which is considered the motor of all activities, as all human activities are a function of energy (Nestler, 2002). A balance of the channel allows the individual to be in a good state, but once an imbalance occurs, a disease may arise (Nestler, 2002). The points along the meridian are thought to be reservoirs of energy, ranging from subtle (low) to heat (high) energy sources. There are 12 major meridians and 8 extra “curious” meridians found deep inside the body that connect to skin surface locations. The 12 major meridians correspond to 12 major organs of the body and can be altered by the use of acupuncture and acupressure (Covinton, 2001 & Guthrie et al. 2001). Acupuncture is the insertion of small needles at specific anatomic points used to assist in the release of energy that may be blocked, which can re-establish the body’s equilibrium.

The organs work together by regulating and preserving Qi and blood through the channels to express their qualities. Diseases tend to occur after disharmony in the organs caused by pathogenic and climatic factors (Covinton, 2001). For this reason it is important to check the flow of Qi for the health to be maintained.

Pulse Analysis

The pulse in TCM is defined differently than the pulse in Western settings. Within the pulse, there are approximately 28 pulse qualities assisting the physician in understanding the

nature of the disease. Compared to the superficial pulse used in Western medicine, a depth pulse is used to reflect the levels of Qi flowing through the body and the severity of illnesses, if any are present. The rationale for pulse analysis is based on the fact that blood travels at a different pace to different organs, resulting in different shapes, which allows for characterization of the health condition of a particular organ (Lukman, He & Hui, 2007). Length of pulse, depth, and quality are all very important characteristics a physician practicing TCM focuses on. When detecting the length of a pulse, three fingers (index, middle and pointer) are rested on the patient's artery to assess the pulse length. By doing so, a shorter or longer pulse can be determined. If a pulse is not detected under all three fingers, it is considered a shorter pulse. If a pulse is detected under the three fingers and exceeds the three fingers, it is considered to be a longer pulse (Dubowsky, 2012). Establishing whether a pulse is long or short can be used to determine disquieting signs or signs of weakness, meaning the energy is not strong enough to move the blood flow (short pulse). In contrast, a short and forceful pulse can reflect a stagnant condition, due to a sort of blockage. Pulse analysis takes time to learn and is difficult to read, which is why TCM practitioners can only make subjective pulse diagnosis after years of experience. For this reason, a computational system may be used to accurately diagnosis pulse waves to achieve optimal results (Lukman, He & Hui, 2007). Pulse depth, visibility of a pulse with touch, reflects the level of Qi and the pathological condition that might be present in the patient. Superficial level pulses often indicate an exterior illness such as a cold or flu, whereas a deep pulse reflects the state of the organs and more internal conditions (Dubowsky, 2012). Lastly, pulse quality; when putting all three characteristics together, TCM practitioners may see the following in a patient with T2DM: small (length of pulse), deep (pulse depth), and rapid (pulse quality).

Proof such as blood work is used as a reference to support the symptoms the patient complains about when diagnosing T2DM, but is not the main determining factor of diagnosis.

Chinese Herbology

Herbal medication has been an integral part of TCM for more than 2,000 years (Covinton, 2001). The use of traditional medications is usually reserved as an adjuvant to improve diabetic syndromes in combination with routine anti-diabetic drugs.

Applications of Chinese herbs in clinical practice are based on the nature of the herbs, clinical diagnosis, energies, flavors, and pathways of the herbs prescribed (Nestler, 2002). Herbal medications are classified based on the effects the herbs may have: hot, cold, and cool. These four energies are divided into Yin and Yang, hot and warm, and cold and cool energies (Nestler, 2002). Once again, the theory is tied.

TCM physicians are knowledgeable and trained in the use of medical plants. It is important to be quite knowledgeable in the different types of herbal plants and formulas. When treating T2DM with herbal medications, there are several common medications used to construct the herbal formula. Since symptoms vary by individuals, herbal prescriptions are based on the prominent symptoms the patient might suffer. A commonly used formula for the Kidney Yin deficiency with heat signs is the Liu Wei Di Huang Wan (Lee, n.d.) At its most basic composition, the formula consists of three tonifying herbs: Shu Di Huang, Shan Zhu Yu, and Shan Yao.

Lee (n.d.) stated the following:

Shu Di Huang tonifies blood and the kidney Yin, as well as essence. It enters the kidney to nourish the essence in cases of slow development in infants and children. Shan Zhu Yu tonifies the liver and kidney Yin. It can also astringe the Yin and essence, and is capable of holding back the fluids in cases of night sweats, seminal emissions, and frequent urination. Lastly, Shan Yao tonifies the Yin of the lung, spleen and kidney. This herb astringes fluid to some degree in order to hold back urination or seminal emissions in cases of kidney deficiency.

Other common prescribed herbs for diabetes treatment are Membranous Milkvetch Root, Rehmannia Root, Mongolian Snakegourd Root, Ginseng, Chinese Magoliavine Fruit, Golden Thread, and so forth, which are mainly guided by the theory of TCM (Xei, Zhao & Zhang, 2011). Listed are examples of two commonly used herbs and their studied effect on diabetic patients:

Among the constituents of the herb, at least five have been shown to exert hypoglycemic effects. In one study, treatment with ginseng lowered blood glucose levels, in addition to improved mood and psychological performance as compared with placebo (Covinton, 2001). A recommended dosage is 100-200 mg/day, however, studies are still being performed to identify the result of chronic overdosed administrations (Covinton, 2001).

Golden thread, another herbal remedy is commonly used to treat diabetes mellitus in China. Containing the active ingredient berberine, it had a significant anti-hyperglycemic effect in a study with 36 patients newly diagnosed with T2DM and also in 48 poorly controlled patients with T2DM. The effect of this herbal medication was comparable to metformin. It increased

glucose uptake, stimulated glycolysis, and inhibited glucose absorption by suppressing disaccharide activities (Xie et al. 2011). The only effects noted were transient gastrointestinal adverse effects. Additionally, a study was conducted for 60 days with 60 individuals divided randomly into six groups consuming cinnamon capsules. Groups one, two and three were each given 1, 3 and 6g of cinnamon capsules as group four, five and six were assigned to respective placebo groups. This study demonstrated effects of low levels of cinnamon in the reduction of glucose, triglyceride, LDL cholesterol, and total cholesterol levels in subjects with T2DM within the 60-day time frame. As a result, subjects decreased glucose levels by 18-29% depending on the cinnamon dosage (1g, 3g, 6g) (Lukman, He & Hui, 2007). As natural hypoglycemic agents, both golden thread and cinnamon provided individuals with the means to lower blood glucose levels.

Although herbal medications may help with T2DM, there is still insufficient evidence to draw definitive conclusions about the efficacy of TCM for diabetes (Xie et al. 2011). In addition, the FDA does not regulate herbs, minerals, animal products, and patent formulas that come into the United States from China (Covinton, 2001). For this reasoning, it is important to ascertain the creditability for the herbalist and training received.

WESTERN MEDICINE

In western society, blood test results with a high A1c and fasting glucose levels greater than 126 milligrams are a determining factor for T2DM. Along with the results, patients may experience symptoms such as increased thirst, increased urination and increased hunger. Together, these factors support the diagnosis of diabetes.

Dieting and Exercise

Obesity, specifically abdominal body fat, has shown to be an independent risk factor for the development of T2DM, as well as an impediment to adequate glycemic control (Feinglos & Bethel, 1998). Enlarged adipose tissue mass that defines the cause of obesity is also linked to systemic insulin resistance, but the reasoning remains unknown. What is known is a need for obesity control to help regulate the patient's glucose levels.

One of the first things for someone with T2DM to learn is how to read a food label and manage their daily carbohydrate intake. There are multiple food guides available from Myplate.gov to the Exchange lists for meal planning that can help educate on carbohydrate management. Along with food labeling, portion control is used to guide patients with adequate food sizes. A handy guide to portion sizes uses the palm, fist, thumb, and thumb tip to measure foods. The palm is used to measure protein (3 oz of boneless meat), while the fist is used to measure carbs (about 1 cup or about 30 grams). Estimations of dressings and fats/oils can also be done by using the thumb (about 1 tablespoon or 1 serving size of dressing) and the thumb tip (1 teaspoon or 1 serving size of fats/oils).

A dietary regimen in combination with exercise frequently has a goal of body fat reduction for the control of T2DM. Reduction in caloric intake is commonly used to facilitate weight loss and thereby combat insulin resistance (Feinglos & Bethel, 1998). For weight loss, either low-carbohydrate, low-fat calorie-restricted, or Mediterranean diets may be effective in the short-term (up to 2 years). Individuals at risk for type 2 diabetes should be encouraged to limit their intake of sugar-sweetened beverages (SSBs). Other modifications include a diet low in fat and cholesterol to reduce the risk of atherosclerosis. Substitution of whole for refined grains and an increased intake of vegetables is also recommended (American Diabetes Association, 2013).

Saturated fat intake should be <7% of total calories consumed, or use less than 15 grams per day for the standard 2,000-calorie diet. Per the American Heart Association, reducing trans fat to less than two grams per day is the recommended intake to facilitate lower LDL and higher HDL (American Heart Association, 2014).

Physical activity and behavior modification are two important components included in weight loss programs and are most helpful in maintenance of weight loss (American Diabetes Association, 2013). Benefits of exercise have been shown to increase insulin sensitivity, enhance glucose uptake and improve lipid balance in patients with T2DM (Feinglos & Bethel, 1998). Important acute effects on glucose metabolism also occur with exercising.

Prior to exercising, glucose levels should be checked. If glucose levels are < 100 mg/dL, patient should consume 20 - 30 grams in carbohydrates. If glucose levels are \geq 300 mg/dL (or \geq 240 mg/dL with elevated ketones), exercise is contraindicated unless under medical supervision. It is important to track glucose levels before, during and after exercise to prevent any potentially dangerous blood sugar fluctuations. Other safety

precautions include discouraging exercising in the evening to prevent any delayed hypoglycemia that may occur, using proper footwear for those with diabetic neuropathy, and having carbohydrates readily available if needed (PowerPoint communication, July 15, 2013).

Various benefits come from exercising, but it is also important to exercise wisely. Since patients vary in exercise ability, it is important to modify exercise depending on the patient. There are two types of exercises that are recommended for T2DM patients: aerobic and moderate-intensity strength training.

Finding by Colberg et al. (2010) stated the following:

Aerobic exercise has been the mode traditionally prescribed for diabetes prevention and management. Even 1 week of aerobic training can improve whole-body insulin sensitivity in individuals with type II diabetes. Moderate and vigorous aerobic training improve insulin sensitivity, albeit for only a period of hours to days, but a lesser intensity may also improve insulin action to some degree. In a randomized control trial, one hour of moderate aerobic exercise resulted in greater insulin action.

An increase in aerobic training may increase HDL, but doesn't significantly decrease LDL.

Recommended exercise prescription are typically 3 to 5 days a week with a focus on duration of exercise versus intensity. Moderate intensity of 10 to 15 strength-training repetitions is also recommended, unless stated otherwise. Furthermore, whether the patient may be participating in aerobic training or strength training, any physical activity is beneficial to reducing their T2DM.

Medications

For patients who are unable to modify their blood glucose levels through lifestyle modifications such as diet and weight loss, hypoglycemic pharmaceutical drugs such as biguanides (also known as Metformin), are one of the oldest and most commonly used pharmaceutical drugs today. In this research study, patients were interviewed and uses of medications were noted. All interviewed patients used Metformin and most used sulfonylureas like glipizide. (See Appendix C).

In a study conducted by Einhorn, D. et al., to determine which pharmaceuticals are best at maintaining normal blood glucose levels, it was determined that treatment using a combination of medications was best. The study included three groups: 1) a group taking a placebo 2) a group with placebo plus Metformin and 3) a group taking Metformin and Pioglitazone, a thiazolidinedione class medication that also alters glucose levels. When taking Metformin in conjunction with Pioglitazone, patients displayed a significant decrease in blood glucose. Patients receiving Pioglitazone 30 mg in conjunction with Metformin had statistically significant mean decreases in HbA1c (-0.83%) and fasting plasma glucose (FPG) levels (-37.7 mg/dL) compared with placebo and Metformin ($p < \text{or} = 0.05$) (Einhorn, Rosenzweig, Egan, Mathisen & Schneider, 2000). In conclusion there was a greater decrease in blood glucose levels when using Metformin in conjunction with Pioglitazone.

High blood pressure is a common comorbidity of T2DM. A medication most commonly used in this study by patients was Lisinopril, with a total 76% of patients consuming the medication. The mechanism behind this medication is to decrease blood pressure. Lisinopril is a

type of angiotensin-converting enzyme inhibitor (ACE) that works by decreasing certain chemicals that tighten the blood vessels (American Heart Association, 2012). Along with Lisinopril, another commonly used medication is Hydrochlorothiazide (HCTZ), “water pill”, a diuretic that works by assisting the kidneys in getting rid of any excess water and salt from the body (Medline Plus, 2014). In the literature review, a study was conducted on 334 obese men and women between 21 to 75 years of age suffering from hypertension over 12-weeks. In the Lisinopril group, one patient was withdrawn because of chest pain and increased BP over the limits allowed by the protocol. Patients were withdrawn from HCTZ treatment because of headache (n=3) and dry cough (n=1) (Reisin et al., 1996). Overall, the 211 patients (both the Lisinopril and Hydrochlorothiazide group) that completed the study significantly reduced diastolic blood pressure (-8.3 and -7.7 versus -3.3 mm Hg, respectively; $P < .005$) from baseline than placebo, as well as systolic blood pressure -9.2 and -10.0 versus -4.6 mm Hg, respectively; $P < .05$) (Reisin et al., 1996).

Medications are used to control T2DM and augment lifestyle improvements, but not replace them (Colberg, et al. 2010). Patients should be educated on the importance of controlling their glucose levels through medications, but lifestyle changes must also be made to assist these medications.

METHODS

Interviews

This study has been submitted and approved by the Institutional Review Board at the University of Central Florida. In this study, 21 patients suffering from T2DM were interviewed. Preference of treatment in either TCM or Western medicine was accounted for, as well as actual use of current treatment. The participants were patients from a family practice physician. Patients interviewed were chosen based on the following criteria:

- 1) Diagnosed with T2DM (fasting plasma glucose levels of 126 or greater and HbA1c levels >8%), and have continued treatment prior to interviews longer than three months (medications, alternative therapies).
- 2) Patients were representatives of a large population suffering from T2DM receiving the same treatment. Collection of chart notes containing glucose levels, lifestyle changes, levels of pain, and vital signs were reviewed. Patients represented a variety of ethnicities, between the ages of 39-70.

Data collection was carried out as a qualitative research design, performing face-to-face interviews (Appendix A). A total of 21 questions were asked to each interviewee. Cultural background, gender, and duration of T2DM diagnosis were also accounted for. A suitable location such as providing a comforting environment for the interviewee and maintaining rapport are key characteristics to conducting proper qualitative research design questions. It was important to establish and maintain a relationship between both the participant and interviewer to

strengthen the validity of the data. The researcher was able to establish and maintain the relationship with participants through prior experience at a primary care office and build new relationships with integrative medicine doctors. Two integrative doctors were interviewed. Background knowledge from integrative physicians was used to replace the lack of patients that used alternative medicine. Diagnosis, treatment procedures and course of treatment were the questions answered by these physicians. Data was used to support secondary data from literature review on TCM and to elaborate how each physician carries out treatment.

A remark by one of the integrative medicine physician, Dr. Wai Tao, D.O. in regards to why he chose alternative medicine, stated the following in his interview: “Clinical nutrition is based on medicine, with no guideline. I don’t view a person as a flow chart. I take my time with my patients and educate them on simple things such a dieting and nutrients because the imbalance of these things is what has brought them here today”. This statement made an impact on the researcher about the duration of time the integrative physician spends with his patients. The additional time was used to educate the patient versus only treat the manifestations. The effect to give more time to each patient limits Dr. Tao’s availability to additional consultations, but illustrates his focus on overall health.

RESULTS

When being interviewed, patients were asked to answer a series of questions pertaining to their T2DM and treatment of choice. Patients were questioned on satisfaction of treatment, medications used, diabetic neuropathy, glucose monitoring, treatment preference and symptoms they could recall prior to diagnosis (excessive urination, hunger and thirst). These questions were used to help the researcher understand the patient's experience and exposure to treatment.

After gathering the result of 21 patients, a trend was noticed on treatment preference. 86% of patients stated they would prefer to try a treatment other than Western medicine (pharmaceuticals). Those who stated they would prefer a different treatment concluded they were not satisfied with the side effects resulting from the medications (76% suffered from side effects). Amongst the patients, 57% of also stated they were unaware of alternatives aside from Western medicine up until the interview, while 43% stated they had researched alternative medicine on their own. In addition, 76% were satisfied with Western medicine treatment administered by their primary care physician, while 14% informed the researcher they were not interested in alternative treatment due to lack of alternative knowledge. Due to a limitation on glucose monitoring, data was not collected but a patient's perspective on improvement was noted. Data concluded that 57% of patients noticed a decrease in their glucose levels with pharmaceuticals, while 43% of patients did not notice a decrease.

The results lacked primary data on the use of alternative medicine patients. The methodological limitations section states the reasons why this occurred.

DISCUSSION

A correlation from the results was noticed between treatment satisfaction of Western medicine and medication side effects. Both resulted in 76% of patients stating they were satisfied with Western medicine, but also experienced medication side effects. The 76% population that was satisfied with their treatment was related to the care their primary care physician gave them. Individuals that would consider an alternative treatment (86%) stated they would seek a treatment with less associated side effects. A case that astonished the researcher was a patient diagnosed with T2DM approximately 5 years ago. When being asked about treatment preference, the patient emphasized a lower preference for treatment involving pharmaceuticals and mostly likely choosing a treatment that was natural and less harmful. The patient emphasized on the harm he was exposed to due to pharmaceuticals and the damage that was done to him as a participant in a research study. The patient responded, “The outcome of the research study caused me to feel violated and used as a lab rat. Since the study, I only visit the doctor’s office due to medication refills and have researched alternatives to treat my diabetes” (Patient 12, personal communication, Sept., 2013).

METHODOLOGICAL LIMITATIONS

Limitations were found in primary data collection of TCM. There was a shortage in patients experiencing alternative medicine in the research, as well as TCM physician's willing to be interviewed. The researcher faced some difficulty on TCM physician's response to the interviews, which in turn led to difficulty in TCM qualitative data, and a shortage in access to patients. Those physicians who gave approval of patient interviews with their consent, stated patients typically come and go as they please, which was a usual lack of follow-up with most patients seen at their clinics. A steady flow of patient checks-up and regularity was a difficulty most integrative physician's faced. The cause of this may have been the cost of visits (out of pocket) since most insurance companies do not cover these types of visits, or the lack of insurance.

Methodological limitations were also found in patients interviewed using Western medicine treatment. There was a difficulty with patient compliance on glucose monitoring. Patients interviewed were not typically compliant with daily or weekly glucose monitoring despite it being perceived as recommended practice. Patients were also hesitant to allow follow-up on glucose monitoring since they were resistant to commit to continued documentation. Physician visits seldom provided fasting glucose levels since they are only required on a six month basis. Routine check-ups occur every three months, but fasting glucose monitoring is only performed if patient is voicing a complaint.

CONCLUSION

Diagnoses of diabetes mellitus is projected to increase. In fact, by the year 2050, it is expected that one out of three Americans will be diagnosed with Type II diabetes mellitus, if present trends continue (American Diabetes Association, 2014). The focus of Western medicine treatment is and has been to focus on each individual complication separately, targeting treatment for each complication. Although treatment helps patient's complications, medication side effects have been an issue involved within the treatment. Patient satisfaction are seen within the treatment provided by primary care physician, but treatment preference would be changed if given the opportunity to do so, as a result of the side effects associated. Survey data from this study results shows side effects as a prominent issue that interferes with patient satisfaction of treatment. Alternative treatments are also available to manage and improve the lifestyle of individuals suffering from this chronic disease. Western medicine used in conjunction with traditional Chinese medicine has showed a decrease in fasting blood sugar levels and pain associated with diabetic neuropathy, while limiting side effects.

In addition, an awareness of alternative medicine is limited. There is a limited amount of research conducted on treatment, as well as exposure to treatment. In this study, 57% patients interviewed stated they had no knowledge to alternative treatments available. Patients stated they were unaware of other treatments beside Western medicine to treat their type II diabetes mellitus. Western medicine is pharmaceutically driven, giving it an advantage from backing of large pharmaceutical corporations. A disadvantage traditional Chinese medicine may face may be the population's limited exposure due to advertisement and insurance compliance

with treatment. An example of this would be herbal medications administered by integrative physicians. Alternative treatment is not covered by most health care insurance providers, causing patients to pay out of pocket fees for medication and visits. This results in patients becoming more geared towards Western medicine.

APPENDIX A

Qualitative Survey Research. Face-to-face interviews

Patient number:

1. What is your current age?

2. What is your ethnicity?

White/Caucasian Latino/Hispanic Black/African American
Asian/Pacific Islander Native American Indian Other_____

3. What is your gender?

Male Female

4. Do any of the following biologically (blood) related people have type 2 diabetes mellitus?

Mother____ Father____ Grandmother____ Grandfather____

5. How long ago were you diagnosed with type 2 diabetes mellitus?

<6 months ago 6 months-1 yr 1 yr-2yr 2-3 yrs 3+

6. What were your symptoms prior to your diagnosis of type II diabetes? (Order in the way you found [1] first, [6] last)

__Frequent urination/thirst __Always tired __Weight Gain
__Numbness and tingling in feet __Always hungry __Blurred vision __None

7. Which treatment would you prefer (Order in rank of likelihood [5] Most likely [1] least likely)?

__Acupuncture __Herbal medications __Pharmaceutical medications
__Massage therapy __Life-style change

Please state your reasoning for choice.

8. In the past year, how many times did you visit your primary care physician for an overall check-up on your health?

0...1...2...3...4...5...6...7...8...9...10 a year

8. What medications are you taking currently taking to lower blood glucose levels?

(Medications indicated below along with dosage)

9. On a weekly basis, how often do you check your blood sugar level?

_____ Times per week

Indicated (circle): Postprandial or Fasting

10. Throughout treatment and medications, have you seen a decrease in fasting glucose levels (blood glucose levels in the morning)?

Yes No

11. Throughout your treatment and medications, have you seen a decrease in your glucose levels after meals (postprandial)?

Significant decrease Somewhat A little Not at all

12. Have you experienced any numbness and tingly sensations in your extremities?

Yes No

13. → If so, have you seen a decrease in the numbness and tingly sensations in your extremities with the treatment of your choice?

Yes No

If yes, where _____

If yes,

14. If you have experienced nerve disturbances, please indicate the disturbances (6 being the most painful or bothersome, 1 being the least)?

→ Legs and feet ___

→ Gastrointestinal tract, sex organs or urinary ___

→ Unilateral thighs, hips or buttocks ___

→ Head, torso or legs ___

→ Speech, vision and hearing problems ___

→ Males: Sexual erectile dysfunction ___

15. In the past year, how many times a yr did you visit your primary care physician for an overall check-up on your health?

Less than once a yr 0...1...2...3...4...5...6...7...8...9...10 a year

16. Rate your pain on the scale before treatment?

1...2...3...4...5...6...7...8...9...10

Not painful

Very Painful

17. What is your pain on the scale after treatment?

1...2...3...4...5...6...7...8...9...10

Not painful

Very Painful

18. Are you satisfied with your treatment of choice and the total outcome of your treatment choice?

Extremely Satisfied Very Satisfied Satisfied Somewhat Satisfied Not at all

19. What is your overall satisfaction after treatment (10 being unsatisfied, 1 being extremely satisfied)?

1...2...3...4...5...6...7...8...9...10

20. Would you have changed the treatment of choice? (Interval)

Yes No

If yes, please state why _____

21. The following question pertains to a patient who has used both TCM and western medicine.

Which treatment did you find most effective (order from most effective [1] to least effective)?

__Acupuncture __Herbal medications __Pharmaceutical medication

__Massage therapy __Life-style change

APPENDIX B

Questions for Alternative medicine doctors

Name: Jacqueline YT Cheng D.O.M., Dipl. O.M. Clinic Director

Organization name: Alternative school of medicine, Orlando, FL

1. *When treating a patient, what are some factors that would have to be considered when choosing a treatment of choice?*

- 1) Prevention
- 2) Symptoms
 - i. In Western medicine, some tests do not catch internal diseases
 1. Ex. EKG: no proof found in EKG or BW
 - a. These are used as references.
- 3) Diagnosis
 - Diagnosis vary from person to person
 - Different skills are used to diagnose.
 - Observations – Objectical finding
 - Olfaction-smell
 - Integration
 - Asking patients about symptoms
 - Pulse taking (pulse taking is not similar to Western)
 - Ying & Yang
 - Systems used/ organ imbalance

2. *Approximately how many patients are treated due to T2DM.*

- a. An exact number cannot be given. Documentation isn't noted on how many patients are seen due to specifically T2DM.

3. *When treating a patient with T2DM, how would the treatment procedure go about?*

T2DM TREATMENT

- 1) Lung heat- excessive thirst
- 2) Heart heat
- 3) Stomach heat

Watch what you eat and weight loss

Observe the pts lifestyle and diet

- 4) Kidney polyuria

1. Assessment

2. Treat symptoms

3. Nutritional counseling

- ii. Food therapy and change diet/workout

4. Herbal form

Balance the body, which will allow the body to work itself back to normal

Formulas are made depending on the patient. The formulas change as the body changes.

Symptoms & root

They see everything when a patient comes in, regardless. Diabetes is just part of manifestation

Questions for Alternative medicine doctors

Name: Dr. Wai To, D.O.

Organization name: Center for Family Care

1. *When treating a patient, what are some factors that would have to be considered when choosing a treatment of choice*

- 1) Body typing

- a. Qi (energy) is evaluated and 5 elements. These are evaluated to see which ones they are deficient in and focus on it.

- 2) Balance laws of mass

- a. Lifestyle, mental, chronic issues. Ex: G.I, lung problems

- b. Input and Output

- i. Input: How much does the patient put in the body

- ii. Output: How much do the put out of the body (waste products)

2. *When treating a patient with T2DM, how would the treatment procedure go about?*

First and foremost, the physician's consultation is 30 minutes long with the patient. This time is used to educate the patient on disease, what the action of treatment will be and the risk factors.

- 1) Adjust diet and lifestyle

- i. A strict, low carbohydrate diet with high protein consumption has been created. The diet has been created to fuel imbalances of micronutrients and to help patients feel better.
 - 2) Understand hormonal balances
 - a. 99% of PCP are trained not see these balances
 - 3) Balance the mind with mental health and cranial psychology.
 - 4) Herbal supplements
- 3. *Approximately how many patients are treated due to T2DM.*
 - Approximately 25% of patients

APPENDIX C

Patient medications

<u>Patient Number</u>	<u>BW results?</u>	<u>Metformin -glucose</u>	<u>Glipizide -glucose</u>	<u>Lisinopril -BP</u>	<u>Simvastat. -Choles.</u>	<u>Glucose levels</u>
1	No	500mg	5mg	10mg	--	---
2	Yes	500mg	5mg	5-10mg	20mg	109mg/dl
3	No	500mg	50/100mg	16mg	--	120mg/dl
4	Yes	500mg	5mg	10mg	----	143mg/dl
5	Yes	1000mg	10mg	40mg	--	309mg/dl
6	No	500mg	5mg	Yes	--	117mg/dl
7	No	500mg	5mg	40mg	--	--
8	Yes	850mg	10mg	25mg	40mg	82/A1c 9.4
9	Yes	500mg	5mg	20mg	---	112mg/dl
10	no	850mg/dl	--	12.5-80mg	20mg	60mg/dl
11	No	1000mg/dl	--	40mg	20mg	107mg/dl
12	Yes	1000mg/dl	5mg	--	--	--
13	Yes	850mg/dl	--	20mg	---	116mg/dl
14	Yes	850mg/dl	--	--	--	140mg/dl
15	Yes	500mg/dl	--	---	---	152mg/dl
16	Yes	1000mg/dl	5mg	2.5mg	Januvia-100mg	326 mg/dl
17	Yes	850mg	Pioglitazone 15mg	--	--	130 mg/dl
18	Yes	1000mg	5mg	2.5mg	--	326 mg/dl
19	No	Yes.	5mg	12.5 mg	--	--
20	No	850mg	--	Yes	Yes	104mg/dl
21	No	500mg	--	25mg	--	90mg/dl
Total		100%	62%	76%	29%	

APPENDIX D

Interview Results. Patients experience and exposure to Western treatment

Diabetes duration:

6 mon-yr: 5% patients
 1 yr-2 yrs: 0% patients
 2-3yrs: 19% patients
 3+yrs: 76% patients

Glucose levels monitoring: *Frequency in a week:*

1x: 29% 3x: 20%
 2x: 9% 4-6x: 0%
 7x: 14% 9+: 29%
 8x: 0%

Treatment Preference	<u><i>Most likely</i></u> *Acupuncture: 10% *Herbal Medications: 48% *Pharmaceuticals: 19% *Massage therapy: 5% *Lifestyle change: 19%	<u><i>Least likely</i></u> *Acupuncture: 33% *Herbal Medications: 5% *Pharmaceuticals: 62% *Massage therapy: 0% *Lifestyle: 0%
Yearly checkups	<u><i>Diabetes Check-up:</i></u> 1x yrly: 5% 3x yrly: 19% 2x yrly: 43% 4+ yrly: 33%	<u><i>Check-ups not pertaining to diabetes:</i></u> 0x yrly: 14% 3x yrly: 5% 1x yrly: 19% 4+ yrly: 33% 2x yrly: 29%
Decrease in glucose levels with treatment	<i>Yes: 57%</i>	<i>No: 43%</i>
Diabetic Neuropathy	<i>Yes: 43%</i>	<i>No: 57%</i>
Treatment Satisfaction of western medicine	<i>Yes: 76%</i>	<i>No: 24%</i>
Medication Side effects	<i>Yes: 76%</i>	<i>No: 24%</i>
Would you change treatment of choice?	<i>Yes: 86%</i>	<i>No: 14%</i>
Knowledge of alternative treatments	<i>Yes: 43%</i>	<i>No: 57%</i>

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