

Development and Evaluation of Polyherbal Formulation using Various Medicinal Plants

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Abstract - Diabetes is one of foremost reason of increasing death next to cancer and heart diseases this is for the reason that outcome of hyperglycemia resulted many other complications in individuals and people becomes more prone to kidney failure, loss of vision, arthritis, heart diseases. Therefore, research for investigation on herbal plants to explore the effective herbal formula on the Ayurvedic principles is of great interest and will keep on developing the interest in scholars unless the researcher and science combination could come up with the most potential standardized herbal drug with no side effects. The scenario is comparable to the modern combination medicines with antipyretic, cough suppressant and nasal decongestant properties used in the treatment of common cold.

Keywords- Development, Evaluation, Polyherbal formulation, Medicinal plants

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INTRODUCTION

Sushrutra Samhita places greater emphasis on surgery in addition to treating ailments, whereas Charak Samhita focuses on medicine from first principles through to aetiology and treatment, as well as providing advice on how to live a healthy lifestyle. Ayurveda classifies diabetes (Madhumeha) as a kind of Premeha (urogenital disease), with vitiated Vata, Pitta, and Kapha as the primary causal factors. It is possible for two or all three doshas (Vata, Pitta, and Kapha) to become aggravated.

Hyperglycemia, which ultimately develops into the disease known as diabetes mellitus, is the result of an unresolved disruption in homeostasis that persists for an extended period of time (Tiwari and Rao, 2002). Autonomic dysfunction, including sexual dysfunction, may develop slowly over time in people with diabetes mellitus, and so can retinopathy, which can cause blindness, nephropathy, which can cause kidney failure, and neuropathy, which can cause foot ulcers, amputation, and autonomic dysfunction. Those with diabetes are at a higher risk of developing vascular problems such as heart disease and stroke (Varughese and Scarpello, 2006).

The two most frequent types of diabetes mellitus are type 1 (insulin-dependent) and type 2 (non-insulin-dependent) (non-insulin-dependent diabetes mellitus, NIDDM). Type 1 diabetes, which often appears in early infancy, is characterized by an insulin deficiency and is thought to be caused by the autoimmune destruction of pancreatic beta cells. Individuals with type 1 diabetes often have ketoacidosis, necessitating insulin therapy

for the control of hyperglycemia. Impaired insulin production and reduced insulin sensitivity in body tissues define type 2 diabetes mellitus (T2D), which is typically diagnosed in adults but is increasingly being diagnosed in children and adolescents. The risk of developing metabolic diseases including type 2 diabetes mellitus, high blood pressure, and abnormal lipid profiles rises in direct correlation with the amount of body fat a person carries (WHO, 2006). People who are overweight and have inactive lives are more likely to develop glucose intolerance. In those with type 2 diabetes, hyperglycemia may be managed using a combination of dietary modifications and oral hypoglycemic medications. It's now generally acknowledged that certain adults (often those older than 30) may get a diagnosis of type 2 diabetes while neither being overweight nor displaying circulating autoantibodies. Type 2 diabetics are often started on oral hypoglycemic medicines before moving on to insulin. Type 1.5 diabetes, or latent autoimmune diabetes in adults (LADA), is the current name for this illness. All the pancreatic beta cells are seemingly destroyed rapidly by an immunological response that causes type 1 diabetes in children and young adults. Type 2 diabetes is identified years after the beta cell mass has been reduced to the point that normoglycemia can no longer be maintained, in contrast to LADA, which seems to be the result of an autoimmune illness (Catchpole et al., 2008).

DIABETES MELLITUS HISTORY

According to Aretus the Cappadocian (-150 AD) (a), who first used the phrase, "the disease received

the name diabetes from the Greek word which signifies a syphon because, the fluid does not remain in the body, but utilizes it as a bladder to depart." An ancient Sanskrit book attributed to the Indian physicians Sushruta and Charaka first connected polyuria and a pleasant taste in the mouth. However, this discovery was not recorded in the medical literature until 1650, when it was recorded by English physician, anatomist, and physiologist Thomas Willis (b). A century later, in 1750, the Scotsman William Cullen, a physician, coined the term "mellitus" (from the Greek for "sweet"). It was not until the late 19th century that the causes of diabetes mellitus were established with any certainty (c). Two distinct populations of cells were identified in the human pancreas by Paul Langerhans in 1869 (d). Scientists Josef von Mering and Oskar Minkowski found that removing the pancreas from dogs led them to develop diabetes, showing that the pancreas played a key part in the maintenance of normal blood sugar levels, a discovery that was not made for another 20 years (e). In 1921, Canadians Frederick Banting and Charles Best, together with the University of Toronto Professor John Macleod, extracted insulin from canine pancreases. Banting and Macleod shared the 1923 Nobel Prize in Medicine (f).

An endocrine disorder characterized by erratic glucose, lipid, and protein metabolism; so says the World Health Organization (1999). As a result, blood sugar levels will increase. Hyperglycemia is the outcome of this abnormality, and diabetes mellitus develops when it continues for a long enough period. As evidenced by Leonid (2009) and Ripoll et al. (2005), diabetes was first described as "excessive big emptying of urine" in an Egyptian record dated 1500 BCE (2011). The Greek word "Diab" (meaning to pass through) was first used around 230 BCE to describe the cycle of extreme thirst and frequent urination; the Latin word "mellitus" means "sweetened with honey" and refers to the presence of sugar in the urine. Diarrhea of the Urine was described by the Roman physician Galen, indicating its rarity at the time.

The Indian physicians Sushruta and Charaka, working about 400–500 BCE, were the first to differentiate between Type 1 and Type 2 diabetes, establishing the former as a genetic predisposition and the latter as a dietary malady. Before the 1921 and 1922 invention of Insulin by Canadians Frederick Banting and Charles Herbert Best, several therapies had been tried to control diabetes. NPH insulin, a long-acting form of insulin, was produced as a consequence of this research in the 1940s.

Although several therapies and synthetic drugs have been developed since 1940 to treat diabetes mellitus, a standard for the most secure and effective management of the condition has yet to be determined. There were 194 million people with diabetes in 2003, but that number might reach 334 million by 2025, according to the International Diabetes Federation. India has the sad distinction of being named the "diabetes powerhouse of the world," joining cancer and

cardiovascular disease as the top three "Killers" of human health. Diabetes is a global pandemic, as stated by Dr. Wild (2004) in *Diabetes Care*. Dr. Wild estimates that the global incidence of diabetes in people of all ages was 2.8% in 2000 and would climb to 4.4% by 2030. The number of people with diabetes is expected to increase from 171 million in 2000 to 366 million by 2030. Despite men being more likely to get a diabetes diagnosis, women outnumber men when it comes to having diabetes. Emerging countries' urban populations are expected to grow by a factor of 2 between the years 2000 and 2030. An increase in the elderly population is the most notable demographic change connected with the worldwide diabetes pandemic.

DIABETES CLASSIFICATION:

"Diabetes mellitus is a varied metabolic chronic condition that results in alteration of protein, carbohydrate metabolism in the body," says the WHO. Previous classifications of diabetes mellitus were focused on age at beginning of the illness or on the manner of treatment; in contrast, the newly updated categorization incorporates our increased knowledge of the etiology of each variety.

Previous Classification:

NDDG published a paper in 1979 that standardized terminology and definitions for diabetes mellitus, as reported by Mayfield (1998) in their review.

There are two different forms of diabetes mellitus, each with its nomenclature based on its clinical presentation.

Those with insulin dependence have type 2 diabetes, whereas those without it have type 1 diabetes (NIDDM).

To get around this problem, researchers have come up with a new categorization system that accounts for the many subtypes of diabetes that have since been discovered, each with its unique pathophysiology. The mechanism of diabetes mellitus and a new categorization system are presented.

Revised classification:

In June 1997, a WHO worldwide expert group produced a report with revised approvals for the categorization and diagnosis of diabetes mellitus, as addressed in the literature by Mayfield Jennifer (1998).

GESTATIONAL DIABÈTES MELLITES (GDM)

Type 1 Diabètes mellites

Every hour of every day, someone is said to be diagnosed with type 1 diabetes, a condition that now

costs over \$100 billion annually in health care costs in the United States alone. Type 1 diabetes often takes a firm hold on individuals once they reach the age of 30. Not only do these individuals have a lifelong need for insulin, but they also run the danger of developing eye and heart problems, as well as renal failure. Diabetes cannot be cured with insulin; it is only used as a life support system.

Both children and their childhood suffer from type 1 diabetes. Dietary management is key, as is monitoring blood glucose levels every 2 to 3 hours daily (by lancing a finger). In other words, you need to be always on the lookout and adhere to some quite rigid norms. The average lifespan of a family will drop by 15 years, requiring everyone to adhere to a strict schedule. As a result of the destruction of the pancreatic β -cells responsible for manufacturing insulin, those who suffer from Type 1 Diabetes must rely solely on daily insulin injections for survival.

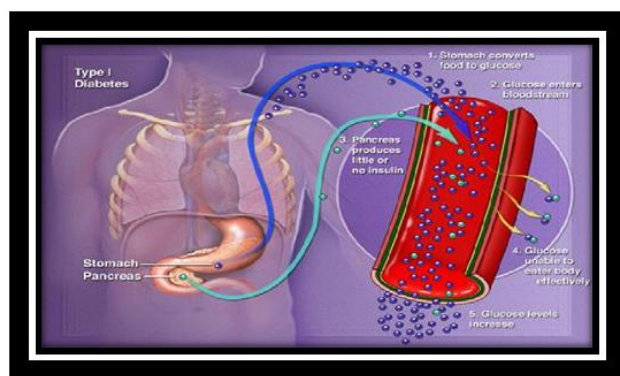


Figure 1: Type 1 Diabetes mellitus

This kind of diabetes affects a wide swath of North America and Europe, while its rate of spread varies considerably from place to place. Although adults are not immune, the condition is more often associated with childhood and is hence commonly referred to by the term "Youth-onset diabetes. It's an autoimmune disease characterized by insulin and islet cell resistance as well as the destruction of pancreatic beta cells. The primary therapy for type 1 diabetes consists of insulin replacement, which may be begun as soon as the illness is diagnosed. Lack of insulin may lead to diabetic ketoacidosis.

The president of the Juvenile Diabetes Research Foundation (JDRF), Mary Tyler Moore, has said, "Diabetes is like a time bomb that might go off tomorrow, next year, or in 10 years; it threatens the lives of millions of people and must be neutralized. The only way to cure a disease is to start therapy at the first sign of illness. In light of this, the group's only purpose is to expeditiously discover a cure for this illness and its associated problems by providing financial assistance for research.

Type 2 Diabetes mellitus

The high blood sugar levels of type 2 diabetes result from a complicated interplay between insulin malfunction and poor insulin sensitivity (often termed reduced insulin sensitivity). A decline in insulin sensitivity is most noticeable at the onset of the disease. Although regaining insulin sensitivity or decreasing glucose synthesis by the liver might reverse a rise in plasma glucose level, the imbalance of insulin secretion worsens with time, and insulin replacement therapy is generally necessary. It is estimated that 90% of the global population has this kind of diabetes. The association between Type 2 illness and aging was also described by the "National Institute of Diabetes and Digestive and Kidney Disease." even if older kids and teens have been hit worse by it in recent years. As a result, it was determined that this kind of diabetes was best categorized as "maturity-onset" or "adult-onset".

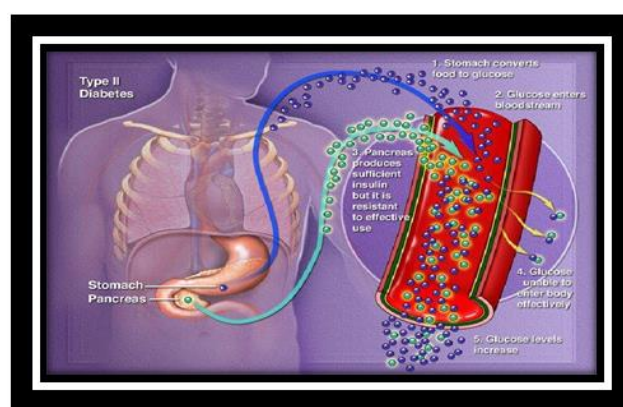


Figure 2: Type 2 Diabetes mellitus

The most common kind of diabetes is called type 2, but many other types may be diagnosed and treated in their own right. Diabetes of this kind does not fit the criteria for either type-1 or type-2 diabetes, or diabetes connected to pregnancy. Some kinds of diabetes may be caused by genetic predisposition (even in children), malnutrition, medical treatments, infectious processes, surgical procedures, and other conditions (Nichols and Henry, 2015).

Gestational Diabetes

A metabolic disorder in which the body has trouble using the insulin it produces properly, leading to persistently high blood sugar levels. Several similarities to type-2 diabetes exist. It's a pregnancy-related condition that affects females. Most cases of this kind of diabetes in women are cured after they have children. Gestational diabetic women are at increased risk for acquiring type 2 diabetes in the future (Baynest HW, 2015). Therefore, it is crucial for women to monitor their blood glucose levels throughout their lives and take special care in the beginning to normalize maternal blood levels.

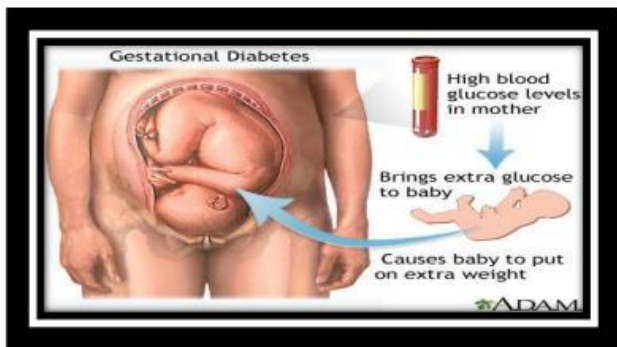


Figure 3: Gestational diabetes

Latent Auto-immune Diabetes in Adults

The beta cells of the pancreas, which are the source of insulin, are destroyed in latent autoimmune diabetes in adults (LADA), a hereditary illness with a genetic component. An autoimmune disease, like LADA, may be thought of as an "allergy to self," presented in its simplest form.

Stenström et al. (2005) found that LADA is often misdiagnosed in its early stages because it mimics the symptoms of type 2 diabetes. Even though LADA is very similar to type 1 diabetes and has many of the same physiological criteria of type 1 diabetes including metabolic disturbances, hereditary predisposition, and autoimmune features, LADA does not affect children and is thus categorized separately from juvenile diabetes.

SYMPTOMS OF DIABETES:



Figure 4: Symptoms of Diabetes

Ayurvedic approach to managing the diabetes mellitus

According to Krishna K et al. (2013), Ayurveda is an ancient Indian medical system that derives its name from the Sanskrit words "ayur" (life) and Veda (knowledge) and is widely believed to have its roots in the fourth Veda, the Athar Veda. As part of Ashtanga Ayurveda, its 8 sub-disciplines include the specialties of surgery (Shalya), medicine (Kaychikitsa), dermatology (Bhutavidya), paediatrics (KaumaryaBhrit ya), rejuvenation (Rasayantantra), toxicology

(Agattantra), and pharmacology (Bajikaran) (Geriatrics).

Prithvi (earth), Jal (water), Vayu (air), Agni (fire), and Akash (ether) are the five components of Panchmahabhoot that Ayurveda posits as the building blocks of all matter (ether).

Prithvi is the human body's framework, while Akash represents its empty regions, such as the thoracic and abdominal ones.

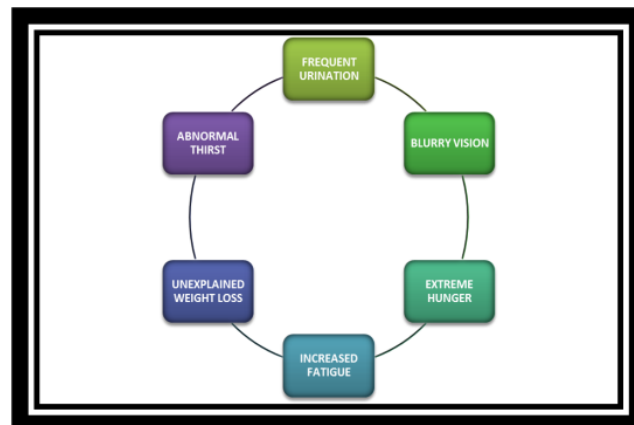


Figure 5: Panch-mahabhoot (5 elements)

Therefore, the Ayurvedic terms Vata, Pitta, and Kapha regulate all of the body's biological, psychological, and pathological processes. They are known as "Doshas" when considered separately, and as "three Doshas" when together. They keep everything in check and promote wellness. Illness and sickness may be brought on by any vikriti (imbalance) in the aforesaid condition. They also appear in the world following the supremacy of the aforementioned five components (Panchmahabhoot). Vata is made up of air (Vayu) and Ether (Akash), fire (Agni) and water (Jal), and earth (Prithvi) and water (Kapha) (earth) An overview of the fundamentals of Ayurveda that clarifies the interplay between the Panchmahabhoot, the tridoshas, the rasas, and the gunas.

ALLOPATHIC DRUGS AND THEIR ADVERSE EFFECT

Insulin and other oral antidiabetic agents such as sulfonylurea, metformin, a-glucosidase inhibitors, and thiazolidinediones are currently available treatments for diabetes. To gain improved glycemic balance, these medications are used as monotherapy or in combination. One of the above oral agents has a variety of significant side effects (Zhang and Molter, 2000). The sulfonylurea class of drugs is still the most common today.

Metformin should be used as a first-line medication for diabetes. It is beneficial for obese patients since

it may not induce the weight gain associated in sulfonylureas, and it can also cause some weight loss. Metformin is almost as effective as sulfonylureas at lowering HbA1c. Metformin often has a favorable impact on lipid oxidation, reducing serum triglyceride and LDL cholesterol levels by around 10% whilst also lowering fatty acids. Metformin has the potential to cause side effects. Up to 30% patients report gastrointestinal problems, but these are typically minor and transient, particularly if dosages are progressively increased. The most serious problem of metformin is the possibility of lactic acid buildup. Evidence of renal impairment, severe liver disease, persistent alcoholism, or congestive heart failure are both contraindications of this medication (Ketz, 2001).

CONCLUSION

GDM encompasses a wide range of glucose intolerance, from mild to severe, that either worsens during pregnancy or is first identified at this time. Whether or if the condition persists after pregnancy is irrelevant to this criterion, as is the use of insulin for treatment vs dietary changes alone. It's not possible to rule out the possibility of undiagnosed glucose intolerance before to or during pregnancy. About 7% of all pregnancies are affected by GDM, which affects more than 200 thousand women each year. The prevalence may range from 1% to 14% of all pregnancies, depending on the population investigated and the diagnostic techniques used. Children of moms with GDM have an increased risk of obesity, glucose intolerance, and diabetes in late adolescence and early infancy. The best time to assess the mother's risk of getting GDM is at the first prenatal visit. Women who have GDM symptoms or risk factors should have their glucose levels checked (such as extreme weight gain or a family history of diabetes). Women with GDM are a high-risk group for cardiovascular disease and may be identified years before the beginning of adverse events, despite the fact that the incidence of type 2 diabetes is growing at epidemic rates (Buchanan and Xiang, 2005).

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