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Essential Oils in the Management of Diabetes Mellitus

Sandhya R

Abstract: ***Millions of people suffer from the debilitation of diabetes, and have to plan their lives around this health condition. Although essential oils cannot do anything to help stabilize blood sugar levels, it can help with one of the side effects of diabetes.This study was made to investigate the role of essential oils like cinnamon oil, camomile, lavender, foeniculumvulgarae, pelargonium graveolens in the management of diabetes mellitus***

Keywords: Cinnamon oil, camomile oil, lavender, Pelargonium graveolens, foeniculumvulgarae

1. Introduction

Diabetes is currently an incurable condition in which too much glucose (sugar) is present in the blood. Diabetes occurs because the body can't use glucose properly, either owing to a lack of the hormone insulin, or because the insulin available doesn't work effectively.

The full name 'diabetes mellitus' derives from the Greek word 'diabetes' meaning siphon - to pass through - and 'mellitus' - the Latin for honeyed or sweet. This is because not only is excess sugar found in the blood but it may also appear in the urine, hence it being known in the 17th century as the 'pissing evil'. Diabetes has been a recognised condition for more than 3,500 years.

According to the charity Diabetes UK, more than 2 million people in the UK have the condition, and up to 750,000 more are believed to have it without realising they do. More than three-quarters of people with diabetes have what is called type 2 diabetes mellitus.This used to be known as non-insulin dependent diabetes mellitus (NIDDM) or maturity-onset diabetes mellitus.

2. Types of Diabetes

Type 1 and type 2
In type 1, the body's unable to produce any insulin. This usually starts in childhood or young adulthood. It's treated with diet control and insulin injections.It is referred to as "insulin dependent diabetes mellitus"(IDDM) or "juvenile diabetes".

In type 2, results from insulin resistance, not enough insulin is produced or the insulin that is made by the body doesn't work properly. This tends to affect people as they get older, and usually appears after the age of 40.It is referred to as "non-insulin dependent diabetes mellitus"(NIDDM) or "adult-onset diabetes".

The third main form, diabetes occurs when pregnant women without a previous diagnosis of diabetes develop a high blood glucose level.It may precede development of type 2 DM.

Normal blood sugar control
The body converts glucose from food into energy. Glucose comes ready made in sweet foods such as sweets and cakes, or from starchy foods such as potatoes, pasta or bread once they're digested. The liver is also able to manufacture glucose. Under normal circumstances, the hormone insulin, which is made by the pancreas, carefully regulates how much glucose is in the blood. Insulin stimulates cells to absorb enough glucose from the blood for the energy, or fuel, that they need. Insulin also stimulates the liver to absorb and store any glucose that's left over. After a meal, the amount of glucose in the blood rises, and this triggers the release of insulin. When blood glucose levels fall, during exercise for example, insulin levels fall too.

A second hormone manufactured by the pancreas is called glucagon. It stimulates the liver to release glucose when it's needed, and this raises the level of glucose in the blood.

Insulin is manufactured and stored in the pancreas, which is a thin gland about 15cm (6in) long that lies crosswise behind the stomach. It's often described as being two glands in one, since in addition to making insulin it also produces enzymes that are vital for digestion of food. These include lipase, which helps to digest fat, and amylase that helps to digest starchy foods. It also releases 'bicarbonate of soda' to neutralise any stomach acid that may otherwise damage the lining of the gut.

Diabetes that isn't controlled can cause many serious long-term problems. Excess glucose in the blood can damage the blood vessels, contributing to heart disease, strokes, kidney disease, impotence and nerve damage. Uncontrolled diabetes is the most common cause of blindness in people of working age. People with diabetes are also 15 per cent more likely to have an amputation than people without the condition.

Essential oils
Essential oils can also ameliorate the stress of coping with a lifelong chronic condition such as diabetes. Aromatherapy has a long history of use for stress reduction, and aromatics have been used in many cultures to enhance quality of life. Nurses have used inhaled essential oils to help reduce their patients' stress.

USES
Air freshening
Bathing | Amount of essential oils to use in bath
Compresses
Foot and hand baths
Hair care | Amount of essential oils to use in shampoo
Jacuzzis

Massage | Amount of essential oils to use in massage blend
Saunas
Showers
Sitz bath
Skin care | Amount of essential oils to use in creams
Steam inhalations
Vaporization

3. Lavender Oil

Plant/Part: Shrub/Flowers (Source: England, France and Yugoslavia)
Latin Name: Lavandulaangustifolia/officinalis/vera
Family: Lamiaceae (Labiatae)
Extraction: Steam Distillation
AROMA: Floral, light and clear with woody undertones.

Chemical Constituents: Linalol, Linalyl Acetate, Lavandulol, Lavandulyl Acetate, Terpineol, Limonene, Caryophyllene.

Precautions: Some people with low blood pressure may feel a bit dull and drowsy after using this oil. It is an emmenagogue too, so best avoided in the early months of pregnancy.

Blends: Bay, Bergamot, Chamomile, Citronella, Clary Sage, Geranium, Jasmine, Lemon, Mandarin, Nutmeg, Orange, patchouli, Pine, Thyme, Rosemary.

Therapeutic Properties
The therapeutic properties of lavender oil are antiseptic, analgesic, anti-convulsant, anti-depressant, anti-rheumatic, anti-spasmodic, anti-inflammatory, antiviral, bactericide, carminative, cholagogue, cicatrisant, cordial, cytophylactic, decongestant, deodorant, diuretic, emmenagogue, hypotensive, nervine, rubefacient, sedative, sudorific and vulnerary.

Uses
Lavender oil has a soothing and calming effect on the nerves, relieving tension, depression, panic, hysteria and nervous exhaustion in general and is effective for headaches, migraines and insomnia.

It is also very beneficial for problems such as bronchitis, asthma, colds, laryngitis, halitosis, throat infections and whooping cough and helps the digestive system deal with colic, nausea, vomiting and flatulence.

Lavender oil relieves pain when used for rheumatism, arthritis, lumbago and muscular aches and pains, especially those associated with sport.

On the skin, lavender oil tones and revitalizes and it is useful for all types of skin problems such as abscesses, acne, oily skin, boils, burns, sunburn, wounds, psoriasis, lice, insect bites, stings and also acts as an insect repellent.

Lavender oil is one of the few essentials oils that can be used neat on the skin, and this is especially useful when treating a minor burn wound.

4. Camomile oil

Plant/Part: Dried Flowers/Herb (Source: Germany)
Latin Name: Matricaria chamomilla or M. recutia
Family: Asteraceae [Compositae]
Extraction: Steam Distillation
Aroma: The odour is sweet and adds a warm, long-lasting undertone in perfumes. Spicy, sharp, sweet and musky.

Therapeutic Properties: German chamomile AKA blue chamomile or chamomile matricaria. The blue colour is from azulene which is formed during the distillation of the oil. All the Chamomiles are used in massage oils and herbal mixtures. Its analgesic action eases dull muscular pain particularly when connected to nervous conditions. Low back pain seems to respond well. In the same way useful for headaches, neuralgia, toothache and earache. Useful with menstrual problems since helps to regulate the menstrual cycle and eases period pain. Seems to be a popular choice for calming irritable effects of pre-menstrual tension and the menopause. Soothes the stomach and often relieves gastritis, diarrhoea, colitis, peptic ulcers, vomiting, wind, inflammation of the bowels - may be useful for irritable bowel syndrome. Also said to be helpful with liver problems, jaundice as well as disorders of the Genito-urinary tract. Indicated for use with repeated infections since stimulates production of hire corpuscles which help to fight bacteria and fortify the defence system. Could be effective against anaemia

Chemical Constituents: Main constituents: Chamazulene, (Produced during steam distillation, not present in the fresh plant), Bisabolol oxide, Enyndicycloether, Farnesene.

Precautions: A gentle oil suitable for the young and fragile. One of the few essential oils that can be used on inflamed skin conditions, although high concentrations may further irritate. Best avoided in pregnancy.

Blends: Blends well with: Bergamot, Jasmine, Neroli, Clary Sage, Rose.

USES:
The plants are related and the oils very similar. German chamomile oil contains more azulene, and its anti-inflammatory properties are somewhat stronger.

Digestive: stimulates the flow of gastric juices (carminative) and bile, tones the stomach, improves appetite, tones the liver, relaxes digestive muscles, thus relieving flatulence. used for dyspepsia, colic, indigestion, gastritis, diarrhoea, ulcers, colitis, nausea.

Genito-Urinary: stimulates the production of urine (diuretic) and menstrual blood (emmenagogue), has an antiseptic effect, and is used to treat infections in the area, pain-relieving and relaxing, relieves menstrual cramps and pms. for similar reasons, as well as its anti-inflammatory properties, it is used for urinary stones.

Muscles/Joints: relaxes and relieves pain. used for muscular pains (also due to over-exertion), rheumatism, arthritis, inflamed joints, sprains, neuralgia.

This entry might more properly be headed 'Camomiles' as there are several varieties used in aromatherapy and herbal medicine. Three or four kinds grow wild in the British Isles, and will be familiar to most people, with their daisy-like flowers and feather leaves, as well as the distinctive, apple-like scent. The varieties used in aromatherapy are Anthemisnobilis, the Roman Camomile, and Matricaria Chamomilla, or German Camomile. The medicinal properties of the two overlaps to a large extent.

Camomile is one of the plants that has been recognised both in folk medicine and official pharmacopoeias. Camomile tea (or tisane) is one of the most widespread herbal remedies in popular use; for stomach upsets, cystitis, children's ailments and simply as a refreshing and relaxing drink. Camomile tea can be drunk as a back-up to aromatherapy treatment with the essential oil.

Camomile is therefore valuable in treating any condition where there is inflammation present, whether internal or external. It can be used in hot **compresses** on **boils**, **abscesses**, infected cuts, splinters, etc. and on tooth abscesses until the sufferer can get to a dentist. Camomile tea, and massage or compresses over the affected area should be used for internal inflammatory conditions, particularly of the digestive tract, such as colitis, gastritis and diarrhoea, especially if the latter is chronic. Tension and anxiety are often at the root of these conditions, and Camomile has a profoundly calming effect on the emotional level. The properties and uses of Camomile often overlap with those of **Lavender**, and if you need to decide whether to use Lavender or Camomile in any particular situation, it may be useful to remember that Camomile is generally better for dull aches and pains, while Lavender may be better for a pain that is sharp and piercing.

Camomile is also an analgesic, and disinfectant, especially of the **urinary tract**. For all urinary infections, such as cystitis, copious amounts of Camomile tea should be taken and massage or compresses of Camomile applied to the lower abdomen. A few drops of essential oil in a warm bath will also help. The tea, taken daily, is also a good preventive measure against bladder or kidney stones. Menstrual pain and menopausal problems can, in many instances, be relieved by the same combination of compresses, massage, baths and teas.

Camomile can be used in **massage** for muscular pain, and for inflamed joints in such conditions as arthritis. It is very effective in treating sprains, inflamed tendons, and swollen painful joints in bursitis (Housemaid's Knee, for example), always remembering that injuries and swellings must not be massaged, but a cold compress applied. Camomile is valuable for many skin problems, especially where the skin is very sensitive.

The action of Camomile as a local vasoconstrictor (i.e., it causes small blood-vessels to shrink) can help reduce the redness of cheeks due to enlarged **capillaries**, though it may be months before any improvement is seen. As suggested above, the mental and emotional effects of Camomile can be seen to parallel its physical effects, as with so many essential oils, for it is soothing, calming and antidepressant, and particularly helpful where stress or anxiety are inclined to make a person fretful, irritable or nervous. It is best used as a massage oil and in baths - perhaps blended with other oils.

Camomile is one of the gentler oils, and is particularly suitable for treating **children**. Teething infants can be soothed by rubbing a little Camomile, diluted to 1 % into the cheeks. You might try a few teaspoons of weak Camomile tea, sweetened with a little honey, in a spoon or bottle, especially just before bedtime. Earache can be relieved by massaging around the ear, or applying hot compresses of Camomile. If the earache persists, or is recurrent, a doctor must be consulted.

5. Cinnamon Oil

Plant/Part: Tree/Bud/Bark/Leaf (Source: Sri Lanka)
Latin Name: Cinnamomumzeylanicum
Family: Lauraceae
Extraction: Steam Distillation
AROMA: A lovely room fragrance, especially during Xmas

Properties: Anaesthetic, Antidontalgic, Antiseptic, Antputrefactive, Antispasmodic, Aphrodisiac, Astringent, Cardiac, Carminative, Emmenagogue, Escharotic, Haemostatic, Insecticide, Parasiticide, Sialogogue, Stimulant, Stomachic, Vermifuge. Warms and stimulates. A strong antiseptic, it has a cleansing effect. Used as a comforting oil during the cold season. Very strong antiseptic and has a tonic effect on the respiratory tract, eases colds through its very warming action by slightly raising body temperature, indicated for infleuenza. Generally restores heat to the body . Eases breathing difficulties and restores the senses during fainting fits. as an excellent reputation for resisting viral infections and contagious diseases. Seems to have a spurring action on bodily fluids since it stimulates tears, saliva and mucous.

Chemical Constituents: Linalool (Alcohol), Benzaldehyde Cinnamic, Furfurol (Aldehyde), Eugenol, Safrole (Phenols), Cymene, Dipentene, Phellandrene, Pinene (Terpenes).

Precautions: Can cause skin irritation; moderate dermal toxicity.

Blends: Blends well with: Caraway, Citrus oils, Clove, Myrtle, Nutmeg.

Uses
Cinnamon is of great value to mankind. It is known for its antiseptic and antispasmodic properties. Usually yellow or brown in color, it is slightly oily in touch. The method used for oil extraction from cinnamon is steam distillation. Cinnamon has an earthy, woody and spicy aroma that makes it a popular choice amongst the other available essential oils. It makes an excellent astringent. It is said to be an awesome aphrodisiac. To know more about cinnamon essential oil use, read on.

Cinnamon has proved to be extremely effective in treating numerous diseases such as flatulence, rheumatism, exhaustion, low blood pressure, stress and constipation. Due to the multitude of health benefits that cinnamon oil offers, it

has been witnessing increasing growth in its demand. The oil extracted from the bark can be a bit unsafe to use, therefore it is best to use the oil that has been taken out from the leaf.

Cinnamon essential oil is very useful in fighting cholesterol and indigestion problems. Cinnamon oil has at times been alleged for causing skin irritation. The fragrance of this oil is more suggestive of the aroma of clove rather than cinnamon. It can be ascribed to the presence of a larger amount of eugenol in it. These days, more and more people are going in for the cinnamon oil massage, which can be attributed to its soothing, comforting and soporific effects.

6. Fennel Oil

Botanical Name: *Foeniculum vulgare*
Common Method of Extraction: Steam Distilled
Colour: Clear with a Faint Yellow Tinge
Consistency: Thin
Perfumery Note: Top/Middle
Strength of Initial Aroma: Medium – Strong

Aromatic Description: Sweet, somewhat spicy, licorice-like (Anise) aroma.

Fennel Oil Uses: Bruises, cellulites, flatulence, gums, halitosis, mouth, nausea, obesity, toxin build-up, water retention.

Constituents: Anethole, Myrcene, Cineole, Eugenol, Methyl Chavicol, Thymol, Limonene, Phellandrene, Alpha Terpene, Pinene, Fenchone, Geraniol.

USES

Fennel contains anethole, which can explain some of its medical effects. Polymers act as phytoestrogen (14).

The essence of fennel can be used as a safe effective herbal drug and have lower potency than mefenamic acid at the current study level. (15)

7. Geranium Oil

Uses
Like all species of geranium essential oil, the Bourbon type is balancing and regulating to both body and mind; used in skin care it normalises sebum levels in dry or greasy skin and promotes cell renewal, whilst on the emotional system it stabilises anger, depression, irritability, nervous tension, PMS and all forms of roller-coaster emotions. It is also an effective adoptogen, which means that it strengthens the body's immune, glandular and nervous systems, thereby increasing resistance to stress. It is an absolutely indispensable oil.

Geranium Bourbon essential oil makes a welcome addition to any blend since it adds a lovely floral note, without the usual floral oil cost! Many aromatherapists prefer to use this geranium oil since it blends so easily with a very wide range of other oils. Try mixing it with basil, bergamot, black pepper, cedarwoods Atlas and Virginian, chamomile Roman, citronella, clary sage, clove, jasmine, juniper berry, lavender, neroli, patchouli, peppermint, petitgrain, rose, rosemary, sandalwood, vetiver and all citrus oils.

You may read in some aromatherapy books that geranium oil can cause contact dermatitis in hypersensitive individuals. As is often the case in poorly researched aromatherapy books, these reports appear to have based from the action of the plant, and not the essential oil. Good quality, unadulterated geranium oil from any origin is well tolerated by the skin when used at normal levels.

Oral Hypoglycemic Drugs

Oral hypoglycemic drugs are used only in the treatment of type 2 diabetes which is a disorder involving resistance to secreted insulin. Type 1 diabetes involves a lack of insulin and requires insulin for treatment. There are now four classes of hypoglycemic drugs:

- Sulfonylureas
- Metformin
- Thiazolidinediones
- Alpha-glucosidase inhibitors.

These drugs are approved for use only in patients with type 2 diabetes and are used in patients who have not responded to diet, weight reduction, and exercise. They are not approved for the treatment of women who are pregnant with diabetes.

Sulfonylureas – Sulfonylureas are the most widely used drugs for the treatment of type 2 diabetes and appear to function by stimulating insulin secretion. The net effect is increased responsiveness of ß-cells (insulin secreting cells located in the pancreas) to both glucose and non-glucose secretagogues, resulting in more insulin being released at all blood glucose concentrations. Sulfonylureas may also have extra-pancreatic effects, one of which is to increase tissue sensitivity to insulin, but the clinical importance of these effects is minimal.

Pharmacokinetics– Sulfonylureas differ mainly in their potency & their duration of action. Glipizide, glyburide (glibenclamide), and glimepiride are so-called second-generation sulfonylureas. They have a potency that allows them to be given in much lower doses.

Those drugs with longer half-lives (particularly chlorpropamide, glyburide, and glimepiride) can be given once daily. This benefit may be counterbalanced by a substantially increased risk of hypoglycemia.

Side effects – Sulfonylureas are usually well tolerated. Hypoglycemia is the most common side effect and is more common with long-acting sulfonylureas. Patients recently discharged from hospital are at the highest risk for hypoglycemia.

Patients should be cautioned about those settings in which hypoglycemia is most likely to occur. They are:

- After exercise or a missed meal.
- When the drug dose is too high.
- With the use of longer-acting drugs (glyburide, chlorpropamide).

- In patients who are undernourished or abuse alcohol.
- In patients with impaired renal or cardiac function or inter-current gastrointestinal disease.
- With concurrent therapy with salicylates, sulfonamides, fibric acid derivatives (such as gemfibrozil), and warfarin

Metformin– Metformin has been used in Europe for over thirty years, and has been available in the United States since March 1995. It is effective only in the presence of insulin but, in contrast to sulfonylureas, it does not directly stimulate insulin secretion. Its major effect is to increase insulin action.

How metformin increases insulin action is not known but it is known to affect many tissues. One important effect appears to be suppression of glucose output from the liver.

Clinical use – Metformin is most often used in patients with type 2 diabetes who are obese, because it promotes modest weight reduction or at least weight stabilization. This is in contrast to the increased appetite and weight gain often induced by insulin and sulfonylureas.

Metformin typically lowers fasting blood glucose concentrations by approximately 20 percent, a response similar to that achieved with a sulfonylurea.

Metformin given in combination with a sulfonylurea lowers blood glucose concentrations more than either drug alone.

In addition to causing modest weight loss, metformin has two other advantages as compared with sulfonylureas. They are:

- It is less likely to cause hypoglycemia.
- It has prominent lipid-lowering activity, producing a significant reduction in serum triglyceride and free fatty acid concentrations, a small reduction in serum low-density lipoprotein (LDL) cholesterol concentration, and an elevation in serum high-density lipoprotein (HDL) cholesterol concentration.

There are, however, two disadvantages to metformin: the risk for lactic acidosis described below and its prominent gastrointestinal side effects.

Pharmacokinetics– Metformin should be taken with meals and should be started at a low dose to avoid intestinal side effects. The dose can be increased slowly as necessary to a maximum of 2550 mg/day (850 mg TID).

Side effects– The most common side effects of metformin are gastrointestinal, including a metallic taste in the mouth, mild anorexia, nausea, abdominal discomfort, and diarrhoea. These symptoms are usually mild, transient, and reversible after dose reduction or discontinuation of the drug.

Thiazolidinediones– The thiazolidinediones such as Avandia (Rosiglitazone) and Actos (Pioglitazone) reverse insulin resistance by acting on muscle, fat and to a lesser extent liver to increase glucose utilization and diminish glucose production.

The mechanism by which the thiazolidinediones increase insulin action is not well understood but they may be acting by redistributing fat from the visceral compartment to the subcutaneous compartment. We know that visceral fat is associated with insulin resistance.

Efficacy– In one large study of 284 patients with type 2 diabetes treated with Rezulin, the fall in mean fasting blood glucose concentration was significant but not dramatic over 12 weeks; patients treated with placebo had a fall in blood glucose concentration of only 4 mg/dL. The HbA1c value in the troglitazone group fell from 8.6 to 8.1 percent.

Thiazolidinediones are also effective when given in combination with metformin, although they are not currently approved for this purpose.

Safety – There have been reports of severe liver injury in small numbers of patients receiving Rezulin and this product has now been removed from the market. Most cases of liver damage occurred early in treatment with the drug and were reversible when it was stopped but there have been some deaths. The newer agents such as Actos and Avandia have a much lower incidence of this side effect.

Alpha-Glucosidase Inhibitors – The alpha-glucosidase inhibitors include acarbose (Precose) & Miglitol (Glycet) and are available in the United States. They inhibit the upper gastrointestinal enzymes that converts dietary starch and other complex carbohydrates into simple sugars which can be absorbed. The result is to slow the absorption of glucose after meals.

As in patients with type 2 diabetes, patients with type 1 diabetes have a reduction in the amplitude of glucose excursion and HbA1c and a possible reduction in nocturnal hypoglycemia with alpha-glucosidase inhibitors.

The main side effects of alpha-glucosidase inhibitors are flatulence and diarrhoea. These symptoms are usually mild and do not necessitate cessation of therapy.

8. Conclusion

It suggests that administration of essential oil of lavender, camomile,cinnamon ,fennel and P. graveolens may be helpful in the prevention of diabetic complications associated with oxidative stress. Our results, therefore, suggest that the rose-scented geranium could be used as a safe alternative antihyperglycemic drug for diabetic patients.

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