International Journal of Medical and Health Research
ISSN: 2454-9142, Impact Factor: RJIF 5.54
www.medicalsciencejournal.com
Volume 2; Issue 8; August 2016; Page No. 01-03

Herbal management of diabetes-related oxidative stress: A longitudinal study

[1] Brijesh K and [2] Kamath M

[1] Reader, Department of Agadatantra, JSS Ayurveda Medical College, Rajiv Gandhi University of Health Sciences, Mysore, Karnataka, India.

[2] Associate Professor, Division of Ayurveda, Center for Integrative Medicine & Research (CIMR), Manipal University, Manipal, Karnataka, India.

Abstract
Diabetes is a chronic health problem. the etiology of which remains mysterious to health experts, intake of well-designed foods with established anti diabetic element's is perhaps one of the best standard strategy to treat the occurrence of diabetes. Now a day's people are indulging in stressful activity leading to Glucotoxicity and Hyperglycemia resulting in oxidative stress related diabetes. There are many herbs useful in management of oxidative stress related diabetes.

Study design
Longitudinal observational study.

Material and Method
Systematic review with narrative analysis.

Keywords: Oxidative stress, Diabetes, Herbs.

Introduction

Diabetes is a disease with shifts in glucose metabolism [1]. The most common causes of oxidative stress related diabetes are Glucotoxicity and Hyperglycemia. [2, 3] People use some of the plants as an anti-diabetic remedies which are edible in nature.

Overproduction of oxygen free radicals and Impairment of antioxidant mechanism in diabetes is mainly due to increase in oxygen free radicals resulting in oxidative stress. Oxidative stress is usually an outcome of an imbalance between free radical generating and scavenge ring mechanism, which results in chronic disease manifestations like diabetes, atherosclerosis etc. Oxidative stress is at present promoted as etiopathogenesis of diabetes, where hyperglycemia causes increased production of free radicals. This can be prevented by proper usage of antioxidants. There are two types of antioxidants in a broader way. One is which is produced inside the body known as endogenous antioxidants and other acquired from the diet, dietary supplements, nutraceuticals in general and they are known as exogenous antioxidants.

There are many antioxidant enzymes like SOD, GPx, CAT present in the body [4]. Change in overproduction of free radicals in diabetes causes change in antioxidant enzymes and increase in oxidative stress [5, 6, 7, 8]. As well as polyol and causes hurt to the cell membrane in diabetes [9, 10].

Study design

Longitudinal observational study.

Material and Method

Systematic review with narrative analysis. In this study we conducted a systematic study of scientific research, review articles and documents like thesis, conference proceedings from various search engines.

Neem (BN: Azadrachtaindica)

This Plant widely used in various traditional medicine systems. Since many centuries the Neem has been used for a countless manifestations. Neem is a tree belonging to the Meliaceae family grows in the Indian subcontinent and environment like sub-arid to sub-humid. Now too in a rural area Neem twigs are used as a toothbrush. Neem is used in wide form ranging from of antimicrobial agent to contraceptive. Leaf extract possess hypoglycemic action in patients suffering from diabetes mellitus [11]. Neem has its own place in present day health care delivery, especially infectious skin disorders like fungal, bacterial origin etc. Its extracts like ethanolic extract exhibits antioxidant property in conditions like oxidative damage induced by hydrogen peroxide to RBCs and pBR322 DNA. [12].

Onion (BN: Allium cepa)

It is a most popular and most common vegetable used worldwide. It possesses both antioxidant as well as anti-hyperglycemic properties. Studies proved that intake of 50 g of fresh juice of the onion, reduces post-prandial glucose [13]. Chemical analysis has shown that it contains the highest concentration of Sulphur. In the form of the extract it is used as fibrinolytic agent [14].

Holy basil (BN: Ocimum sanctum)

Chemically, it contains Volatile oil, Triterpenoid, Flavonoids and Saponin. Ocimum sanctum exhibited the noteworthy decrease in blood sugar level i.e. anti-diabeticeffect in both normal and alloxan induced experimental diabetic rats [15, 16]. It is also having antiviral, anti-asthmatic, anti-stress activity. Research reveals that it's also useful in the treatment of cancer as an adjuvant.

Winter cherry (BN: Withania somnifera)
In an Indian traditional system of medicine, it is known as Ashwagandha, its Root possess properties like Hypoglycemic [17], antioxidant[18]properties.

Indian Kino tree (BN: Pterocarpus marsupium)
Belongs to family Fabaceae. It is a deciduous moderate to large sized tree originated in India, predominantly in mountainous area. Chemically, it contains phytochemicals like Marsupin, Pterostilbene, Flavonoids, and pterosupin. It possesses the hypoglycemic action by acting on pancreatic beta cells. Its chemical constituents possess properties like hypolipdemic and these principles also enhances oxygen intake of the fat cells [19]. And thus it may prevent free radical formation and help in preventing oxidative stress.

Bitter melon (BN: Momordica charantia)
Bitter melon is an edible plant of Asian origin, it is used in different dosage modalities like fresh fruit juice etc. [20, 21, 22]. It contains polypeptide which is act as blood glucose lowering agent in diabetes.

Fenugreek (BN: Trigonella foenumgraecum)
An annual plant, cultivated worldwide. Fenugreek is used for digestive system disorders. Seeds of Fenugreek is contains Vitamins such as Vitamin A, C, K, Thiamine and riboflavin. It also contains chemical constituents like trigonelline, lysine etc. The Amino acids of Fenugreek seeds useful in diabetes by stimulating action of islet of Langerhans cells in human beings as well as in rats [23]. It also exhibits antioxidant [24, 25] properties.

Indian Tinospora (BN: Tinospora cordifolia)
A deciduous extensively spreading climbing shrub belongs to the Family Menispermaceae. It is widely used in the Indian traditional system of medicine like Ayurveda as antipyretic, rejuvenator, and liver tonic etc. Almost all treatise on Ayurveda mentioned the plant Guduchi for its wide range of action. In general, it is commonly known, as "Amrita, Guduchi. Various formulations like Amrita arista. Guduchisatva etc. those which act as nutritional supplement and digest ant are mentioned in Indian Formulary of Medicine. Hundreds of research publication published in various arenas like immunomodulation [26] oncology [27], and anti-diabetic area are reported. Because of its immunomodulation effect a wide research is going on in areas like HIV. It's also having potentials like anti-ulcer, anti-stressor and antioxidant [28] qualities.

Garlic (BN: Allium sativum)
Garlic is also one of the commonest spice in the daily food menu. It is most commonly grows in parts of Central Asia, Southern Europe, and Sub Indian continent. It contains chemical constituents like Allicin, Allin, Organosulphur. It shows serum fibrinolytic activity [29] S-allylcysteinsulfoxide, which controls lipid peroxidation better than glibenclamide and insulin [30].

Gymnema (BN: Gymnema sylvestre)
Gymnena sylvestre belongs to Asclepiadaceae family. It is the most common herb growing throughout the world, but mainly in countries like India, Sri Lanka etc. Chemically, it contains Resin, pararabin, triterpenegymnemic, gurmarin, gymnamine, its active ingredient gurmenic acid help in hyperglycemia It is also useful in the management of obesity, hyper cholesterolemia etc. However the mechanism of action remains uncertain. Research shows that Gymnemasylvestre is effective in oxidative stress induced diabetes in the rat experimental model [31].

Ginger (BN:Zingiberofficinale)
Zingiber officinale in layman language popularly known as Ginger. It is a rhizome belongs to the Zingiberaceae family. It is used as a spice in the kitchen, also as a flavoring agent. In a country like India it is used as a granny's recipe for cough, headache, and digestive problems like in loss of appetite, indigestion. Its extract shows antioxidant, hypoglycemic properties [32].

Discussion.
Recent advances show the connection of oxidative stress is worsening the state of diabetes. The aim of this paper is to collect details regarding the efficacy of medicinal plants in management of oxidative stress in diabetes. Diabetes mellitus is one of the metabolic disease. In both developed and developing countries the prevalence of diabetes is reaching new heights. Commonly practiced conventional treatment includes the use of anti-hyperglycemic agents and using insulin in the form of injection. There are many medicinal plants to treat oxidative stress in diabetes. In fact, herbs have been widely used in the management of Diabetes. The reason for using herbs and its various dosage modalities will help in coping us with disease manifestation. It is observed that list of plants useful in the management of diabetes available in traditional system of medicine, however, evidence based case studies are getting prioritization since the last few years. We have to work hard to find suitable anti-diabetic medicine along with free radical scavenger's i.e. Antioxidant therapy. This can be done by proper utilization of antioxidant from plant recourses which are easily available and economical also.

Conclusion.
As we know diabetes is a multifactorial disease with several micro and macro vascular complications, and so it requires the attention of multiple therapeutic tactic. Recent advances show the connection of oxidative stress in worsening the state of diabetes, we have to work hard to find suitable anti diabetic medicine along with free radical scavengers i.e. antioxidant therapy.

References
1. Bach JF Insulin-dependent diabetes mellitus as a beta-cell targeted disease of immunoregulation. J Autoimmun, 1995; 8:439-463.
2. Ceriello A, Quatraro A, Giugliano D. Diabetes mellitus and hypertension: the possible role of hyperglycemia through oxidative stress. Diabetologia 1993; 36:265-266.

3. Wolff SP, Jiang ZY, Hunt JV. Protein glycation and oxidative stress in diabetes mellitus and ageing. Free Radic BioI Med 1991; 10:339-352.
4. Freeman BA, Crapo JD. Biology of diseases: free radicals and tissue injury. Lab Invest 1982; 47:412-426.
5. Wohaied SA, Godin DV. Alterations in free radicals tissue defence mechanism in streptozotocin-induced diabetes in rat. Effect of insulin treatment. Diabetes 1987; 36:1014-1018.
6. Hunt JV, Smith CCT, Wolff SP. Autoxidative glycosylation and possible involvement of peroxides and free radicals in LDL modification by glucose. Diabetes 1990; 39:1420-1424
7. Ceriello A, Quatraro A, Giugliano D. New insights on non-enzymatic glycosylation may lead to therapeutic approaches for the prevention of diabetic complication. Diabet Med, 1992; 9:297-299.
8. Packer L. The role of antioxidative treatment in diabetes mellitus. Diabetologia 1993; 36:1212-1213.
9. Siddiqui MR, Taha A, Moorthy K, Hussain ME, Basir SF, Baquer NZ. Amelioration of altered antioxidants status and membrane linked functions by vanadium and Trigonella in alloxan diabetic rat brains. J Biosciences. 2005; 30:101-108
10. Inoguchi T, Li P, Umeda F, Yu HY, Kakimoto M, Imamura M et al High glucose level and free fatty acids stimulate reactive oxygen species production through protein kinase C- dependent activation of NAD (P) H oxidase in cultured vascular cells. Diabetes 2000; 49:1939-1945
11. Upreti, Jaya, Shakir Ali, Seemi Farhat Basir. Amelioration of altered antioxidant status by sodium-orthovanadate and azadirachtaindica leaf extract on cardiac and skeletal muscles antioxidant defence system in streptozotocin induced diabetic rats. World j pharmacy and pharmaceutical sci. 2014; 6:2176-2187.
12. Manikandan P, Anandan R, Nagini S. Evaluation of Azadirachtaindica leaf fractions for *in vitro* antioxidant potential and protective effects against H2O2-induced oxidative damage to pBR322 DNA and red blood cells. Journal of agricultural and food chemistry 2009; 57(15):6990-6996.
13. Mathew PT, Augusti KT. Hypoglycemic effects of onion, Allium cepa Linn. on diabetes mellitus- a preliminary report. Ind. J. Physiol. Pharmacol. 1975; 19:213-217.
14. Augusti KT. Partial identification of the fibrinolytic activators in onion. Atherosclerosis 1975; 21(3):409-416.
15. Vats V, Grover JK, Rathi SS. Evaluation of antihyperglycemic and hypoglycemic effect of Trigonellafoenumgraecum Linn, Ocimum sanctum Linn and Pterocarpusmarsupium Linn in normal and alloxanized diabetic rats. J. Ethnopharmacol. 2002; 79:95-100.
16. Rai V, Iyer U, Mani UV. Effect of Tulasi (Ocimum sanctum) leaf powder supplementation on blood sugar levels, serum lipids and tissue lipid in diabetic rats. Plant Food for Human Nutrition, 1997; 50:9-16.
17. Andallu B, Radhika B. Hypoglycemic, diuretic and hypocholesterolemic effect of winter cherry (Withaniasomnifera, Dunal) root. Indian journal of experimental biology 2000; 38(6):607-609.
18. Panda S, Kar A. Evidence for free radical scavenging activity of Ashwagandha root powder in mice Indian J PhysiolPharmacol, 1997; 41:424-426.
19. Ahmad F, Khalid P, Khan MM, Rastogi AK, Kidwai JR. Insulin like activity in (−) epicatechin. Acta. Diabetol. Lat. 1989; 26:291-300.
20. Leung L, Birtwhistle R, Kotecha J, Hannah S, Cuthbertson S. Anti-diabetic and hypoglycaemic effects of Momordicacharantia (bitter melon): A mini review. Br J Nutr. 2009; 102(12):1703-1708.
21. Grover JK, Yadav SP. Pharmacological actions and potential uses of Momordicacharantia: A review. J Ethnopharmacol. 2004; 93(1):123-132.
22. Rathi SS, Grover JK, Vats V. The effect of Momordicacharantia and Mucunapruriens in experimental diabetes and their effect on key metabolic enzymes involved in carbohydrate metabolism. Phytother Res. 2002; 16(3):236-243.
23. Sauvaire Y, Petit P, Broca C, Manteghetti M, Baissac Y, Fernandez-Alvarez J. et al. 4-hydroxyisoleucine: a novel amino acid potentiator of insulin secretion. Diabetes, 1998; 47:206-210.
24. Ravikumar P, Anuradha CV. Effect of fenugreek seeds on blood lipid peroxidation and antioxidants in diabetic rats. Phytother. Res.1999; 13:197-201.
25. Dixit PP, Ghaskadbi SS, Hari M, Devasagayam TPA. Antioxidant properties of germinated fenugreek seeds. Phytother. Res., 2005; 19:977-983.
26. Thatte U, Chabaria S, Karandikar S M, Dahanukar S. Immunotherapeutic modification of E. coli Abdominal Sepsis and Mortality in Mice by Indian Medicinal Plants, Indian Drugs,1987; 25(3):95.
27. http://www.exoticnatural.com/tinospora. html cited on 10 Feb 2016.
28. Methew S, Kuttan G. Antioxidant activities of Tinosporacordifolia and its usefulness in the amelioration of cyclophosphamide induced toxicity, J ExpClin Cancer Res, 1997; 16:407.
29. Bordia Arun K. Effect of essential oil of garlic on serum fibrinolytic activity in patients with coronary artery disease. Atherosclerosis 1977; 28(2):155-159.
30. Kumari Kumud, Augusti KT. Antidiabetic and antioxidant effects of S-methyl cysteine sulfoxide isolated from onions (Allium cepa Linn) as compared to standard drugs in alloxan diabetic rats. Indian journal of experimental biology 2002; 40(9):1005-1009.
31. Kang Myung-Hwa. Hypoglycemic activity of Gymnemasylvestre extracts on oxidative stress and antioxidant status in diabetic rats. Journal of agricultural and food chemistry. 2012; 60(10):2517-2524.
32. Sharma M, Shukla S. Hypoglycemic effect of ginger. J Res Ind Med Yoga Homeopath. 1977; 12:127-30.