

# Management of Diabetic Microangiopathies Through Unani Herbal Drugs: Haemorrhological Consideration\*

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## Abstract

Diabetes mellitus is such a complex disorder that affects the histological, biochemical as well as haemorrhological components of the body and its fluids, resulting from number of factors in which an absolute or relative deficiency of insulin or its function usually present. It has been observed that Diabetes mellitus directly affects the haemorrhological properties in addition to other pathologies. All blood constituents viz. RBCs, WBCs, Platelets and Plasma are modified in such a way that they lead to hypoxia, acidosis, capillary damage and microvascular disease. Haemodilution, the most vital measure to increase the fluidity of blood, is a way of rheological therapeutics which enhances the perfusion at multiple organ sites. This can be achieved by administration of various potential Unani drugs. This phenomenon also approves the concept of *Jilain Rooh* to heal up the body and mind. The aim of rheological intervention through Unani drugs is to improve the blood circulation under driving forces which has become stagnated due to either reasons. This stagnation usually caused by rauleux formation, cell deformity and changes in viscosity. Unani drugs are reported to produce haemodilution which corrects the hypoxia, haematocrit, viscosity, cellular aggregation and rigidity to enable the microcirculation to be restored. The paper deals in details, how the diabetic microangiopathies take place and by exploiting the repository of Unani drugs the haemorrhological disturbances can be corrected, which is indispensable in the management of this condition.

**Keywords:** Diabetic microangiopathies, Haemorrhology, Haemodilution, Unani Medicine

## Introduction

Diabetes mellitus is such a complex disease which affect the anatomic as well as biochemical constituents of the body resulting from number of factors in which an absolute or relative deficiency of Insulin or it's function usually present (Harrison, 2012).

It has been observed that Diabetes mellitus with additional pathologies shows different haemorrhological properties. All blood constituents viz. RBCs, WBCs, platelets and plasma are modified in such a way that they lead to hypoxia, acidosis, capillary damage and microvascular diseases (Young *et al.*, 2008).

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Patients with Diabetes mellitus experience significant morbidity and mortality from microvascular (Retinopathy, neuropathy, nephropathy) and or its complications (heart attacks, stroke and peripheral vascular diseases). Chronic elevation of blood glucose level leads to damage the blood vessel (Andrew, 2000).

Studies revealed that uncontrolled DM represent the prevalence of cutaneous microangiopathies upto 67.9%. In relation to dermopathies, it was found that 41.3% cases were reported having cutaneous microangiopathies in Diabetics and 57.1% were found having systemic microvascular complications of Diabetes mellitus. Peripheral neuropathy is considered the higher in prevalence i.e. 55.7% followed by retinopathy, 47.2% and hypertension 10.7% while least prevalence found as nephropathy i.e. 1.9% (Bashir *et al.*, 2006)

Another study in India suggests that in a tertiary care hospital, the maximum number of peripheral sensory neuropathy in poorly glycaemic controlled cases, was found 37%, whereas nephropathy in 20% and retinopathy in 17% cases (Kumar *et al.*, 2006).

The aim of rheological therapy is to improve the blood circulation under driving forces which has become stagnated due to either reason. This stagnation usually caused by rauleux formation, cell deformity and changes in viscosity. Reports are there that the haemodilution decreases, the pulmonary as well as systemic resistance which is already caused by hemoconcentration. Studies reveal that the haemodilution corrects the hypoxia, haematocrit, viscosity, cellular aggregation and rigidity to enable the microcirculation to be restored.

Effects of Diabetes mellitus on Hemorrhheological Parameters (Young *et al.*, 2008).

- (i) Effects of D.M. on Plasma Viscosity – It is observed that D.M. increases the plasma viscosity which contribute in slowing the microcirculation.
- (ii) Effect of D.M. on Red Cell aggregation – It was found that aggregates formed faster in diabetics than non-diabetics. As the glycoselation increases the aggregation increases leading to slowing of minicirculation.
- (iii) Effect of D.M. on Red cell deformability – It is reported that in diabetics the RBCs become rigid in nature and do not show the bending pattern resulting into occlusion in microcirculation.

Here, it can be concluded that :

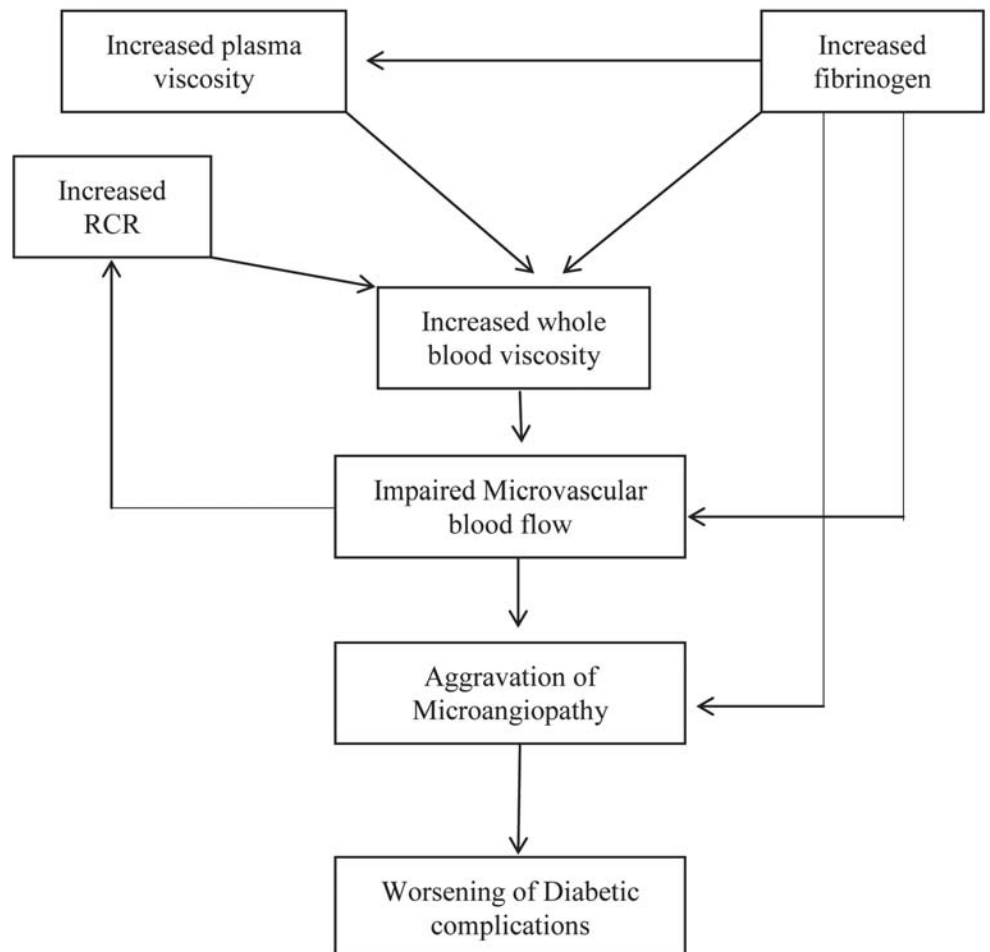
- Raised Plasma viscosity, RCA (Red Cell Aggregation) and platelet aggregation seems to be the factors responsible for diabetic microangiopathies.
- Decreased perfusion and increased hematocrit are to be said the factors responsible for microangiopathies.

- Diabetic microangiopathies may also be caused by capillary hypertension causing increased macromolecular leakage and deposition on the microvascular wall leading to increased basement membrane material synthesis.

Both these factors cause Diabetic microangiopathy

- Diabetic microangiopathies are caused due to increased RCR and hypoxia.
- Increased HbA1C causes raised RCR (Red Cell Rigidity) and aggregability.
- Cell rigidity may be due to associated hypercholesterolemia which decreases membrane fluidity and deformability.
- Cigarette smoking also causes further cell rigidity and rise of carboxyhemoglobin.

Mechanism of Development of Diabetic microangiopathies (Jennings, 1988; George *et al.*, 1996; Casper *et al.*, 2005)



The management of Diabetic microangiopathies:

(i) Scientifically validated Antidiabetic plants (Grover *et al.*, 2002)

1. Babool (*Acacia arabica*)
2. Berge Bel (*Aegle marmalos*)
3. Busul (*Allium cepa*)
4. Seer (*Allium sativum*)
5. Sibr (*Aloe vera*)
6. Supari (*Areca catechu*)
7. Afsanteen (*Artemisia pallens*)
8. Boranjasif (*Annona squamosa*)
9. Kalmegh (*Andrographis paniculata*)
10. Talmukhana (*Asteracantha longifolia*)
11. Neem (*Azadirachta indica*)
12. Chuqandar (*Beta vulgaris*)
13. Rai (*Brassica juncea*)
14. Biskhapra (*Boerhavia diffusa*)
15. Amaltas (*Cassia auriculata*)
16. Karanjwa (*Caesalpinia bonducella*)
17. Kibr (*Capparis decidua*)
18. Arhar (*Cajanus cajan*)
19. Hanzal (*Citrullus colocynthis*)
20. Kundru (*Coccinia indica*)
21. Kishneez (*Coriandrum sativum*)
22. Kamoon (*Cuminum cyminum*)
23. Gazar (*Daucus carota*)
24. Jamun (*Eugenia jambolana*)
25. Bergad (*Ficus bengalensis*)
26. Gurmar (*Gymnema sylvesteris*)
27. Aslussoos (*Glycyrrhiza glabra*)
28. Gurhhal (*Hibiscus rosa-sinensis*)
29. Shakar Qand (leaves) (*Ipomoea batata*)
30. Konch (*Mucuna pruriens*)
31. Janglikarela (*Momordica charantia*)
32. Rehan (*Ocimum sanctum*)
33. Chirayata (*Swertia chirata*)

- |               |                                      |
|---------------|--------------------------------------|
| 34. Hulba     | ( <i>Trigonella foenum graecum</i> ) |
| 35. Gilo      | ( <i>Tinospora cordifolia</i> )      |
| 36. Zingibeel | ( <i>Zingiber officinale</i> )       |
| 37. Unnab     | ( <i>Zizyphus sativa</i> )           |

The routine herbal antidiabetic drugs affect the human physiological system in various ways. The mechanism of action of these drugs are understood as follows (Marles and Farnsworth, 1996; Pulok *et al.*, 2006).

- Adrenomimeticism – Pancreatic b cell potassium channel Blocking, CAMP (2<sup>nd</sup> messenger) stimulation
- Inhibition in Renal Glucose reabsorption
- Stimulation of Insulin secretion from b cell of Islet or/and inhibition of Insulin degradative processes.
- Reduction in Insulin resistance

In addition to their routine antihyperglycaemic effects, these drugs play an important role in correction of haemorrhological disturbances already exist in microcirculation of the targeted tissues. Due to this mechanism, these drugs enhances the restoration of the oxygen supply and ultimately improve the healing procedure.

Brahmi (*Centella asiatica*) has been used in India for the treatment of Dermatitis, Diabetes mellitus, cough and other diseases. It is also used to improve memory. In Europe an infusion of the aerial parts of the plant was used to purify blood and treat wound, ulcer, Dermatitis and Hypertension. A study was conducted on 50 cases with Diabetic microangiopathy to assess the effect of *C. asiatica*. Thirty cases received oral Triterpine fraction of *C. asiatica* (TTFCA) 60 mg twice daily for 06 months, 10 cases received placebo and 10 cases received no treatment. Measures of microcirculation improved in cases receiving *C. asiatica* after 6 month of treatment. No change was noted in cases receiving placebo or in those receiving no treatment. It was concluded that TTFCA has a potential role in improving microcirculation in patients with diabetic microangiopathies (Cesarone *et al.*, 2001)

(ii) Through Haemodilution (Young *et al.*, 2008)

Haemodilution means relative increase of plasma in comparison to solid constituents of the blood. This increases the fluidity corrects the hypoxia and acidosis. Haemodilution corrects the rheological parameters like –

- Whole blood viscosity
- Plasma viscosity
- RCR (Red Cell Rigidity)

- RCA (Red Cell Aggregation)
- Platelet aggregation

This improvement restores the normal blood flow through the capillaries, also helps in cleaning out the already formed RBCs clumps. The haemodilution can be achieved by the use of various medicaments of Unani medicine such as citrus fruits, Busl (*Allium cepa*), Seer (*Allium sativum*), Zanjabeel (*Zingiber officinale*), zardchob (*Curcuma longa*), Darchini (*Cinnamomum zeylanicum*), Akhrot (*Juglans regia*), Enab (*Vitis vinifera*), Anar (*Punica granatum*), Podina (*Mentha arvensis*), Aslussoos (*Glycyrrhiza glabra*), Tarbooz (*Citrullus vulgaris*), Kheera (*Cucumis sativus*), Hulba (*Trigonella foenum-graecum*) (Hamdani, 1980; Kabir, 2002; [www.naturalbloodthinners.org](http://www.naturalbloodthinners.org))

(iii) The effects of Musaffiat, Moaddilat-e-Dam (Blood Purifiers) and antidiabetic drugs on other Haemorrhological disturbances

These drugs repair the endothelium (Ling *et al.*, 2007; Zahid *et al.*, 2007) reduces the elevated level of fibrinogen and correct the level of plasma viscosity (Kiesewetter *et al.*, 1990; Hasni-Ranjbar *et al.*, 1990). These drugs also affect the higher level of cholesterol and help in restoring the normal blood flow (Hasni-Ranjbar *et al.*, 2010; Wan *et al.*, 2007) such as –Chobchini (*Smilax china*), Sarphoka (*Tephrosia purpurea*), Muquill (*Commiphora mukul*), Hulba (*Trigonella foenum-graecum*), Aslussoos (*Glycyrrhiza glabra*), Murmakki (*Commiphora myrrha*), Seer (*Allium sativum*) and Rewandchini (*Rheum ribes*) (Hasni – Ranjbar *et al.*, 2010). Unani medical literature suggests that chiraita (*Swertia chirata*), Gule mundi (*Sphaeranthus indicus*) and Gule surkh (*Rosa damascena*) normalizes the pH of blood, whereas Aftimoon (*Cuscuta reflexa*) and Bisfaij (*Polypodium vulgare*) normalizes the viscosity (Latif, 2010). *Andrographis paniculata* is also reported having antiplatelet aggregation and antidiabetic effects (Shabid, 2011).

(iv) Drugs which produce Jila in Rooh (Ibn Sina, 1996)

Avicenna in 'AdviatulQalbia' has described various drugs which according to him produces Jila in rooh and removes the darkness. This might be interpreted as the drugs which clears the saudavimawad from the blood, are helpful in producing Jila means oxygenation. In other words the drugs which checks the formation of rauleux and clear the already formed clumps, increase the fluidity, removes the hypoxia and acidosis/might be given alongwith the routine antidiabetic medicaments. Such as – Abresham (*Bombyx mori*), Bisfaij(*Polypodium vulgare*), Gulesurkha (*Rosa damascena*), Ghariqoon (*Agaricus alba*), Nana (*Mentha arvensis*), Zafran (*Crocus sativus*), Darchini (*Cinnamomum zeylanicum*), Amla (*Embllica officinalis*), Ulraj (*Citrus limon*), Ustukhuddoos (*Lavendula stoechas*), Badranjboya (*Nepeta hindostana*), Musk (*Mosculus moschiferus*).

## Conclusion

Diabetes mellitus is a complex pathological condition which affect the anatomic and biochemic constituents of the body. It has been observed that Diabetes mellitus affects the various haemorrhological parameters like WBV (Whole Blood Viscosity), PV, RCA, RCR, PA etc. resulting into hypoxia, acidosis, capillary damage and microvascular diseases.

These conditions might be corrected through haemodilution by the intervention of Unani medicament which corrects various hemorrhological parameters and restore the normal microcirculation.

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