Clinical Research

Comparative study of Vamana and Virechanakarma in controlling blood sugar levels in diabetes mellitus

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Abstract

Diabetes mellitus (DM) with its devastating consequences is a global health problem of this era. Presently India is having the largest diabetic population of 50.8 million. The characteristic features of DM have close resemblance with Prameha (obstinate urinary disorders including diabetes) in Ayurveda. Madhumeha is a Vatika subtype of Prameha that is most close to DM. One variety of this Madhumeha (DM) is Aavarana (due to occlusion) in which Vayu aggravates due to occlusion by Pitta or Kapha. This type of Madhumeha (DM) can be managed if Samshodhana (bio-cleansing) is used in early stages of disease followed by palliative treatment. Vamana (emetic therapy) and Virechana (purgation therapy) are the Samsodhana Karma (bio-cleansing therapies) that are compatible to overcome this Aavarana (occlusion). A comparative study was planned to compare their efficacy in controlling blood sugar levels in patients with DM. Although none of them were completely able to control blood sugar in the long-term but the study yields some very interesting results in reducing the blood sugar levels which could be useful in the future studies related to DM.

Key words: Blood sugar control, Prameha, Vamana, Virechana

Introduction

Perhaps never before, the health and wealth have gone in such a contradictory manner when wealth is booming like nothing and health is dooming like anything. Diabetes mellitus (DM) with its devastating consequences is a Global Health Problem of this era. Data from global studies demonstrates that the number of people with diabetes in 2011 has reached a staggering 366 million, 4.6 million deaths are due to diabetes and health care spending on diabetes has reached 465 billion USD.[1] Presently India is having the largest diabetic population with 50.8 million people living with the disease. World Health Organization (WHO) predicts a net loss of 336.6 billion international dollars in national income of India from diabetes between years 2005 and 2015.[2] It is no more the disease of rich but a disease of people leading sedentary life.

As per the WHO, “Diabetes mellitus is a heterogeneous metabolic disorder characterized by common features of chronic hyperglycemia with disturbance of carbohydrate, fat and protein metabolism due to absolute or relative deficiency in insulin secretion and/or action or both”.[3] The characteristic features of DM have close resemblance with different varieties of a disease named as Prameha in Ayurveda.[4] Madhumeha (DM) is a Vatika subtype of Prameha that is most close to DM. One variety of this Madhumeha is Aavarana (due to occlusion) in which aggravation of Vayu is due to its occlusion by Pitta or Kapha. This type of Madhumeha (DM) can be managed if Samshodhana (bio-cleansing) is used in early stages of disease followed by palliative treatment.[5] Basic pathological factor for this Aavarana is Bahudhavakapha (excess Kapha in liquid form) along with Bahu-abaddhameda (excess and loosely bound fat).[6] One of the causative factor for this Aavarana is Asamsodhana (not getting bio-cleansing therapy at proper time).[7] This type of Madhumeha (DM) can be treated if Samshodhana is used in early stages of disease followed by palliative treatment.[8] Vamana and Virechana are the Samsodhana Karma (not getting bio-cleansing therapy at proper time). A comparative study was planned to compare their efficacy in controlling blood sugar levels in patients with DM.

Aims and Objectives

1. To assess the efficacy of Vamana in controlling the raised blood sugar level.
2. To assess the efficacy of Virechana in controlling the raised blood sugar level.
3. To compare the efficacy of Vamana and Virechana in controlling the raised blood sugar level.
Materials and Methods

Selection of patients

Inclusion criterion
Known cases of Type-2 DM attending the OPD and IPD of the Govt. Akhandanand Ayurvedic College and Hospital, Ahmedabad, in the age group of 25-60 years having none of the long-term complication of DM were primarily considered for the study. Neither of them was having muscle wasting nor was underweight. Only those patients were selected who had never taken insulin to control his/her blood sugar. Of these, only those patients were finally selected who were found fit for Vamana or Virechana and who were having fasting blood sugar level in the range of 126-250 mg/dl or postprandial blood sugar level in the range of 200-350 mg/dl or both.

Exclusion criterion
Patients of Type-1 diabetes or the patients of Type-2 diabetes taking insulin or having diabetes in association with other diseases like cardiovascular diseases, renal diseases, carcinoma or any type of endocrinopathies, or patients with genetic syndromes having DM were not selected for the study.

Plan of study

In the study, 20 known cases of DM with a maximum chronicity of 10 years were selected and informed consent was taken in advance. These were subdivided randomly into group ‘A’ (Vamana) and group ‘B’ (Virechana) each comprising of 10 patients to compare the efficacy of both therapies. Any ongoing treatment for DM in all the patients was withheld for 5 days and then they were subjected to blood examination. The blood sugar levels thus achieved were considered as basal level. Thereafter the following management plan was implemented.

Treatment schedule

The treatment schedule in both the group followed the sequence of Deepana-paachana (digestive and appetizer medication), Aabhyantara Snehapana (intestinal oleation), Sarvaanga Abhayangya-Swedana (whole body massage and fomentation), Vamana/Virechana, and Samsarjanakrama. In both the groups a follow up study of 15 days was also done to assure the outcome of Shodhanchikitsa (bio-cleansing therapy).

Trikatuchurna in a dose of 3-6 g/day in two divided doses was used for 3-5 days for the purpose of Deepana-paachana. After proper Deepana-paachana, Aabhyantara Snehapana was started with Triphaladi Ghrita in increasing dose as per the Kosliha (Bowel) and Agni (digestive power) of the subject for the period of 3-7 days. When the signs of proper Snehana (oleation) were achieved, Sarvaanga Abhayangya (whole body massage) with Tilatala was done followed by whole body Swedana (fomentation) by using the Swedana box (fomentation chamber). Fomentation was given only in mild form. Abhayangya–Swedana (massage–fomentation) was used for two days in group A while in group B these procedures were done for 3 days.

In the patients of group A after the 3rd day of last Snehapaan, Vamana was given by Ishkwakubesachooorna mixed with honey in a dose of 4-8 g as per requirement of patient while in group B Virechana (purgation therapy) was given after 4th day of last Snehapaan with Snuhibhavit Katuki in a dose of 6-10 g as per the Kosliha (Bowel), etc., of patient. After the Samsodhankarma, Samsarjanakrama was followed for 3-7 days as per Suddhi (outcome of bio-cleansing) achieved individually. After completion of Samsarjanakrama blood sugar levels were checked. Patients were instructed not to take any anti-diabetic medication for the next 15 days but to follow the advised anti-diabetic diet and daily regimen. They were advised to report at the earliest in case they face any kind of medical problem during this period. On completion of this follow up period all the subjects were again investigated for their blood sugar levels.

Drugs used in the trial

All the drugs used in the trial were made available by the Govt. Ayurveda Pharmacy, Rajpippala, Gujarat.

Trikatu choorna
This was prepared by mixing equal amounts of Pippali (Piper longum) powder, Santhi powder (Zingiber officinale), and Maricha (Piper nigrum) powder. This was used for Deepana-paachana needed prior to Snehapana.

Triphaladi ghrita
Ghrita (ghee) processed with equal amounts of Haritaki (Terminalia chebula), Bibhitaka (Terminalia belerica), Aamalaki (Emblica officinalis), Sunthi (Casia fistula), Patha (Cissampelos pareira), Saptakarpur (Alstonia scholaris), Vatsaka (Holarrhena antidysenterica), Mustaka (Cyperus rotundus) Madanphala (Randia dumetorum), and Nimba (Azadirachta indica) was prepared. Same methodology as mentioned by Sharangdhara for Ghrita Paka (processing of ghee) was adopted to prepare Ghrita.[12] This processed Ghrita was named as Triphaladi Ghrita and was used for Aabhyantara Snehapana in both the groups.

Ishkwaku beej choorna
Seeds from the ripened fruits of Ishkwaku (Lagenaria vulgaris) were taken out, dried, and were grinded to get the fine powder. This powder along with honey and Saindhavalavana (rock salt) was used as Vamana drug. Honey and Saindhava were used for the purpose of liquefaction and Chedana (alleviation) of Katha (mucus).[13]

Madhuyasti Phanta
Phanta (cold infusion) of Madhuyasti (Glycyrrhiza glabra) was used as Vammanopaga (medicine to induce vomiting).

Snuhibhavit Katuki
Katuki Choorn (Picrorhiza kurro) was subjected to the single Bhavana (processing) of Snuhibhavita (Euphorbia neriifolia) in stone marbles. Then it was kept in open shadow to dry for one day. This dried powder was used for Virechana Karma in the present study.

Criterion for assessment

The overall assessment of therapy was done by comparing the percentage change in fasting and postprandial blood sugar levels before treatment and after treatment (i.e., after Samsarjanaka). Besides that a follow up study of 15 days after Samsarjanakrama was also done and the results so found were compared with the blood sugar levels at the start of treatment. Then these two results were compared to assess the actual efficacy of procedures.

To calculate the percentage relief in blood sugar, the normal range of fasting blood sugar (FBS) (i.e., ≤125 mg/dl) and postprandial blood sugar (PPBS) (i.e., ≤200 mg/dl) were considered as base line and so percentage relief was calculated on both the occasions by using the formula:

\[
\text{% Relief in Fasting Blood Sugar} = \left( \frac{(\text{BT} - \text{AT})}{(\text{BT} - 125)} \right) \times 100
\]

where BT is the blood sugar level before treatment, and AT is the blood sugar level after treatment.
% Relief in Postprandial Blood sugar = ((BT ‑ AT)/(BT - 200))×100

The outcome of treatment was assessed in the manner as described below [Table 1].

**Statistical analysis**

The obtained information was analyzed statistically in terms of mean score (x), Standard Deviation (SD) and Standard Error (SE). Paired ‘t’ test was carried out at the level of 0.05, 0.02, 0.01, 0.001 of P levels. The results were interpreted as,

- $P < 0.05$ and $P < 0.02$ Improvement
- $P < 0.01$ Significant improvement
- $P < 0.001$ Highly significant improvement.

**Observation and Result**

Study was done on 20 patients who were randomly selected for Vamana or Virechana group. Each group comprised of 10 patients. Most of the patients (45%) were in the age group of 41-50 years. Majority of patients under study were male (75%), Hindu (75%), and married (75%). Maximum number of patients were Graduate (30%), in service (30%), or running their own business (30%). Majority belonged to middle socio-economic status (60%). Most of the patients under trial had diabetes since less than a year (55%). Of total patients, 75% had positive family history.

**Analysis of blood sugar level and relief in group – ‘A’ (Vamana)**

In the Vamana group A, before treatment the mean FBS was 143.9 mg/dl while mean PPBS was 251.9 mg/dl. After Vamana (emetic therapy followed by Samsarjanakrama) mean FBS became 135.9 mg/dl with a relief of 42.3%, whereas in the follow up study its value further lowered to be 133 mg/dl with a 47% relief. Hence, on both occasions, results were statically significant ($P < 0.01$). In this group the mean PPBS came down to 229 mg/dl after Samsarjanakrama with a relief of 44.1%, whereas in the follow up it was found to be 231.9 mg/dl with a relief of 38%. Both of these show a statically significant ($P < 0.01$) reduction in PPBS also [Table 2].

In this group, 50% patients were having their FBS under control on both the occasions, that is, after Samsarjana as well as in follow up. Patients with moderate relief were just 10% after Samsarjana but during follow up, 20% were having moderate relief. In the same group 60% were having their PPBS under control after Samsarjana but in follow up study, PPBS of only 40% was under control leaving the remaining 20% to the range of marked relief [Table 3].

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**Table 1: Assessment of relief via change in blood sugar**

| Result          | Fasting blood sugar | Postprandial blood sugar |
|-----------------|---------------------|--------------------------|
| Controlled      | FBS within normal limit (i.e. ≤125 mg/dl) | PPBS within normal limit (i.e. ≤200 mg/dl) |
| Marked relief   | FBS improved by ≥75% than before treatment | PPBS improved by ≥75% than before treatment |
| Moderate relief | FBS improved by ≥50% than before treatment | PPBS improved by ≥50% than before treatment |
| Mild relief     | FBS improved by ≥25% than before treatment | PPBS improved by ≥25% than before treatment |
| No relief       | FBS not improved or improved by ≤25% than before treatment | PPBS not improved or improved by ≤25% than before treatment |

FBS: Fasting blood sugar, PPBS: Postprandial blood sugar

**Table 2: Statistical analysis of blood sugar level in group ‘A’ (Vamana)**

| Blood sugar | Mean blood sugar (mg/dl) | % relief | SD (±) | SE (±) | ‘t’ | $P$  |
|-------------|--------------------------|----------|--------|--------|-----|------|
| BT          | After Samsarjana         | Follow up study |
| A.S.J.      | 135.9                   | 42.3     | 1.88   | 0.59   | 3.35 | <0.01|
| FBS         | 143.9                   |          | 1.83   | 0.58   | 4.12 | <0.01|
| PPBS        | 251.9                   |          | 2.00   | 0.63   | 3.63 | <0.01|

FBS: Fasting blood sugar, PPBS: Postprandial blood sugar; SD: Standard deviation; SE: Standard error; A.S.J.: After Samsarjana, F.U.: Follow up study

**Table 3: Assessment of relief in group ‘A’ (Vamana)**

| Group ‘A’ | Relief in fasting sugar level | Relief in postprandial sugar level |
|-----------|-------------------------------|-----------------------------------|
|           | After Samsarjana              | Follow up study                    |
|           | No. of patients | % of patients | No. of patients | % of patients | No. of patients | % of patients |
| Controlled| 5                          | 50                          | 5                          | 50                          |
| Marked relief | -                          | -                          | -                          | -                          |
| Moderate relief | 1                          | 10                         | 2                          | 20                          |
| Mild relief   | -                          | -                          | -                          | -                          |
| No relief     | 4                          | 40                          | 3                          | 30                          |

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Analysis of blood sugar level and relief in group 'B' (Virechana)

In group 'B', before treatment the mean FBS was 167.5 mg/dl, whereas mean PPBS was 254.9 mg/dl. After Virechana (purgation therapy followed by Samsaranakarma), mean FBS became 145.6 mg/dl with a relief of 51.5%, whereas in the follow up study its value increased to 152.7 mg/dl with a reduced relief of 34.8%. Results were found to be statistically significant ($P < 0.01$) on both the occasions. In this group, the mean PPBS came down to 210.4 mg/dl after Samsaranakrama with a relief of 81.6%, which is statically a highly significant result. In follow up it was found to be 224.1 mg/dl with a relief of 56.1%, which shows a statically significant ($P < 0.01$) reduction in PPBS (Table 4).

After Samsarjana, the fasting blood sugar of 40% was found under control, whereas 10% each were having marked and mild relief in FBS. In the follow up study, only 30% patients were found with controlled blood sugar, 10% were with moderate relief, and 20% were in the range of mild relief but 10% achieved a marked relief level. Interestingly at this time the patients with no relief were reduced from 40% to 30%. In this group, after Samsarjana the PPBS of 50% patients was totally under control, whereas patient with marked, moderate, and mild relief in PPBS were equal, that is, 10%. In the follow up study, 40% patients were having PPBS under control, 10% patients were having marked relief, whereas 20% were with mild relief (Table 5).

After Samsarjana in this group, a total of four patients had both FBS and PPBS under control. In the follow up study, only three were having both FBS and PPBS under control.

Comparison of efficacy of Vamanaa and Virechana on FBS and PPBS

After Samsarjana, the FBS levels were improved by 42.3%, which further improved by 47% in the follow up study in group 'A'. In group 'B', the relief in FBS was 51.5% just after Samsarjana but in the follow up, it declined to 34.8%. In group 'A' the relief in PPBS was significant 44.1%, which lowered to 38% in follow up. In group 'B', the PPBS improved by 81.6% but in the follow up study, the improvement in PPBS was 56.1% (Table 6).

Discussion

Type-2 diabetes occurs due to impaired insulin secretion, peripheral insulin resistance, and excessive hepatic glucose production. Insulin resistance impairs glucose utilization by insulin sensitive tissues and increase hepatic glucose output, both these effects contribute to the hyperglycemia. Increased hepatic glucose output predominantly accounts for increased fasting hyperglycemia, whereas decreased peripheral glucose uptake results rise in postprandial hyperglycemia.

Bahudravasleshma and Bahubaddhameda are the basic

### Table 4: Statistical analysis of blood sugar level in group 'B' (Virechana)

| Blood sugar level | Mean blood sugar (mg/dl) | % relief | SD (±) | SE (±) | 'f' | $P$ |
|-------------------|--------------------------|----------|--------|--------|-----|-----|
| BT                | After Samsarjana Follow up study |
| FBS               | A.S 145.6               | 51.5     | 1.94   | 0.61   | 3.25 | <0.01 |
|                   | F.U. 152.7              | 34.8     | 1.72   | 0.54   | 3.47 | <0.01 |
| PPBS              | A.S 210.4               | 81.6     | 1.71   | 0.54   | 4.8  | <0.001 |
|                   | F.U. 224.1              | 56.1     | 1.82   | 0.57   | 3.46 | <0.01 |

BT: Before Treatment, F.U.: Follow up study, FBS: Fasting blood sugar, PPBS: postprandial blood sugar, SD: Standard deviation, A. S.J.: After Samsarjana

### Table 5: Assessment of relief in group 'B' (Virechana)

| Group 'B' | Relief in fasting sugar level | Relief in postprandial sugar level |
|-----------|--------------------------------|----------------------------------|
|           | After Samsarjana | Follow up study | After Samsarjana | Follow up study |
|           | No. of patients | % of patients | No. of patients | % of patients | No. of patients | % of patients | No. of patients | % of patients |
| Controlled | 4                | 40             | 3                | 30             | 5                | 50            | 4                | 40             |
| Marked relief | 1            | 10             | 1                | 10             | 1                | 10            | 1                | 10             |
| Moderate relief | 0            | 0              | 0                | 0              | 1                | 10            | 1                | 10             |
| Mild relief | 1                | 10             | 2                | 20             | 1                | 10            | 2                | 20             |
| No relief  | 4                | 40             | 3                | 30             | 2                | 20            | 3                | 30             |
pathological factors for Prameha (obstinate urinary disorders including diabetes). Bahudravasleshma can be some sort of target tissue defect, whereas Bahu-abaddhameda can be correlated with free fatty acids, which are released from intra abdominal central adipose tissues. Free fatty acids may cause insulin resistance.\[15\]

As far as Vamana is concerned it alleviates primarily Kapha and to some extent pitta also.\[16\] Here Vamana seems to reduce the peripheral insulin resistance in muscles by alleviating Bahudravasleshma and so helping to increase the glucose uptake. As Vamana also reduces the Meda, it must be promoting the function of insulin by reducing the circulating free fatty acids in the body.\[17\]

As role of Virechana is on the site of Pitta it can be assumed that by acting primarily on liver and pancreas it may help to reduce hepatic glucose production and overcome the impaired insulin secretion. Both of these can justify its role in reducing both FBS and PPBS considerably in comparison to Vamana as was seen in group ‘B’ [Figure 1].

On the basis of results found, it is clear that in both groups the reduction in FBS and PPBS were statically significant (\( P < 0.01 \) or \( P < 0.001 \)) on all the occasions. As far as group ‘A’ is concerned, the percentage improvement in FBS and PPBS was comparably in the lower side than in group ‘B’ at the time of both assessments, that is, after Samsarjana, and in follow up. In both groups, the percentage improvement in blood sugar level was tending to decrease during follow up study except the FBS level of group ‘A’, which showed an increase in percentage relief. [Figure 2] Data clearly suggests the elevation of both FBS and PPBS levels in both groups (except FBS in follow up in Group ‘A’) but at a slower pace in group ‘A’. An interesting observation is that after Samsarjana in both groups, percentage of patients with controlled PPBS was more than with controlled FBS.

In group ‘A’ much sustained results in follow up suggests that Vamana acts on the basic pathology of Bahudravasleshma and Bahu-abaddhameda. It is clear that both Vamana and Virechana are reducing the insulin resistance, more aggressive reduction in both FBS and PPBS in group ‘B’ suggests that Virechana must be increasing insulin secretion also. However, this trend could not be maintained in follow up where increase in both FBS and PPBS was noted.

\[\text{Figure 1: Comparative analysis of FBS and PPBS in Group ‘A’ (Vamana) and Group ‘B’ (Virechana)}\]

\[\text{Figure 2: Comparison of percentage change in blood sugar levels in Group ‘A’ (Vamano) and Group ‘B’ (Virechana)}\]
In few cases, sugar level was on an increasing trend suggesting the fact that only Vamana or Virechana is not capable enough to maintain the sugar levels. Prameha has been mentioned as Aamushangiyadhi (disease having relapsing nature), which literally means a relapsing nature.[18] Hence, for better control of blood sugar levels, along with this palliative treatment Rasayana chikitsa (rejuvenation therapy) is also needed.[19] There were some patients in both groups who could maintain their FBS and PPBS well in control even after the follow up with the antidiabetic diet regimen and life style changes. This clearly suggests that if patient is in early stage of disease when Kapha is dominant than Shodhana itself may be enough to control sugar levels. As Prameha passes through transitional states it is better to use Shodhana in early stage when Kapha or Pitta is dominant otherwise it becomes incurable.[20]

**Probable mode of action**
In Prameha, the dominant Dosha (morbid matter) and Dushya (target tissue) are Kapha and Meda (fat) so here Trikaturchurna was selected for Deepana-paachana as besides increasing the Agni (digestive power) it alleviates Kapha and Meda also. It is considered in Prameha, hence, probably it helps in breaking the pathogenesis of Prameha.[21] Sampraptivighatana (alleviation of pathological process) at the cellular level is the ideal treatment to uproot any disease. Hence, it is mandatory to have a carrier that can facilitate the drug or its pharmacological properties to get into the cell. Cell membrane is made up of phospholipids which does not allow the passage of water soluble molecules but it provides free passage to lipids and lipid soluble substances. Ghrita (ghee) has been mentioned as best Sneha (unctuous substances) in Ayurveda because of its specific qualities of Yogavahita (substance which acquires the property of another substance when combined together) and Samsakaranuvartana (property to assimilate effectively the properties of other substances). Besides that, it has been told to be Saatmayia (congenial) since birth and is easy to consume.[22] Its bioavailability is much more than any other Sneha (unctuous substances). Hence, Ghrita was chosen for Abhyantarasnehana purpose. Ghrita was processed with 10 drugs as mentioned for Santarpan janya vyadi (disease caused due to excessive nourishment) in Charakasamhita.[23,24] This processed Ghrita may help to reduce the insulin resistance at cellular level as well as the circulating free fatty acids in the blood. Paste of Ikshwaku seeds is indicated for Vanama in Prameha and its mode of action is same as other Vanama (emetic) drugs.[25,26] Patients with Madhumeha (DM) are Durvirechya (tough for purgation) so in them Teekshna Virechana (strong purgative) is necessary.[27] Snuhi (Euphorbia nerifolia) has been mentioned as strongest purgative and is indicated in Madhumeha (DM) also.[20,29] Katuki (Picrohiza kurro) is mainly Pittavirechaka (cholagogue) and processed with Snuhi (Euphorbia nerifolia) it can eliminate both Kapha-Pitta even in patients of Madhumeha (DM). As in DM, there is increased hepatic glucose production, it is a possibility that Katuki (Picrohiza kurro) being Pittavirechaka (cholagogue) reduces various enzymes responsible for this mechanism and so reduce hepatic glucose production. Vanama seems to reduce blood sugar levels chiefly by reducing insulin resistance while Virechana probably reduces insulin resistance as well as promotes insulin secretion.

**Conclusion**
It can be summarized that both Vamana and Virechana cause marked reduction in FBS and PPBS levels. In early course of disease Samshodhana must be the choice of treatment; as at this stage, patient has dominance of Kapha and Pitta. It seems that Vanama by reducing Kapha and Meda helps to minimize insulin resistance, whereas Virechana by lowering down the hepatic glucose production helps to control blood sugar. As Prameha is an Aamushangiyadhi, neither Vanama nor Virechana alone acts as the complete treatment for it. To get definite output regarding specific role of Vanama and Virechana on FBS and PPBS, further study is necessary. The present study was carried on a small sample and for a limited time. As it showed encouraging results, further research must be done at a higher level with a large sample with longer duration so that a definite theory can be promulgated.

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