Case Report

*Ayurveda* treatment can be helpful in management of snoring, obesity and type 2 Diabetes Mellitus: A case report

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**Abstract**

Sleep is responsible for proper metabolic balance. Disturbances in sleep causes insulin resistance, beta cell dysfunction and obesity through various pathways. Snoring is one of the important indicative symptoms of sleep apnoea that leads to disturbances in sleep. A 54-years old male patient was presented to Kayachikitsa casualty Government Ayurveda College Nagpur with complaints of snoring, difficulty in breathing while climbing stairs since 10 years. After evaluation he was diagnosed as obese with type 2 Diabetes mellitus (DM). Sleep study revealed presence of sleep apnoea. We treated this patient following the principle of Vyadhi Hetu Sankar (~one cause for many diseases). In such a case treatment of Hetu (~cause of disease) can be principle of treatment. Snoring was subsided in patient after one -month of treatment. Significant reduction in HbA1c, fasting and post prandial blood glucose level were observed along with reduction in Lipid levels and BMI in three months. Ayurveda concepts can bring major breakthrough in treatment of metabolic disorders. Various Ayurvedic concepts of gut, lung endocrinal pathways and Agni (~metabolic power) can generate future studies in this direction.

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1. Introduction

Disturbances in sleep are responsible for weight loss as well as weight gain. [1. Su 21/5]. Sleep is also responsible for proper metabolic balance [1 Su 21/36]. Disturbances in sleep may cause insulin resistance, beta cell dysfunction and obesity through various pathways.

Snoring is one of the important indicative symptoms of sleep apnoea. Sleep apnoea produces sleep disturbances; mechanisms are intermittent hypoxia, followed by high oxygen perfusion that causes metabolic disturbances. Hypoxia affects insulin receptors and in turn lowers uptake of glucose by adipose tissue [2].

Parasympathetic nervous system works predominantly in person with normal sleep; but disturbed sleep leads to elevation of sympathetic predominant increase in metabolic rate. This causes metabolic disorders such as obesity and Diabetes mellitus [3].

We treated the patient who was presented for complaints of snoring. After evaluation he was diagnosed as Class II obesity and type 2 Diabetes. The treatment goal was to reduce snoring and induce proper sleep; that is to treat cause of disease. Treatment modalities used were Abhyanga (~Massage with oils), Utsadan (~Massage with powders) Oral medications and Basti (~Medicated enema). Bitter herbs were used for Oral route and Basti established proper respiratory cycle during the sleep [1 Su 21/52,53,54]. These herbs act through Bitter receptors present in lungs and intestines. Studies performed on Basti showed that Basti can reduce weight and various inflammatory markers [4] This particular case is important because we treated the case through fundamental principles of treatment of sleep apnoea, respiration, obesity and snoring mentioned in *Ayurveda* classics.

2. Patients information

A 54 years old obese male patient was referred to Kayachikitsa from Shalakyatantra Department, Government Ayurveda College, Nagpur (GACN) with complaints of snoring, difficulty in breathing during stair climbing since 10 years. He did not have any history of Diabetes, Hypertension, ischaemic heart disease, tuberculosis etc. He used to consume alcohol occasionally. He is non-smoker non tobacco chewer with sedentary life style.

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3. Clinical findings

General examination

Patient’s general condition was good, afebrile, pulse 90/min, blood pressure 120/90 mm Hg. He was centrally obese.

Systemic examination

Respiratory and cardiovascular system functioning were within normal limits. Central nervous system examination was also normal. Pupillary reflexes, superficial and deep tendon reflexes were normal.

3.1. Ashvaghosh Parikshan

His Nādi (~pulse) was Vātākhaj, frequent Mal Vībandh (~ constipation) Matri (~urine) was normal, Jīvha (~tongue) was coated, Shabd (~speech) was clear, Sparś (~temperature) was normal, Drīk (~vision) was normal, Aśkriti (~body built) was Sthul (~obese) BMI 34.6 kg/m².

Patient had complaints of snoring, difficulty in breathing during stair climbing since 10 years.

Berlin questionnaire [5] score for snoring was very high (Table 1).

4. Diagnostic assessment

During routine investigation patient was diagnosed as obese with type 2 DM. In pathological evaluation, HbA1c was 9.7%, Blood Glucose level (BGL) fasting was 189 mg/dl with type 2 DM. In pathological evaluation, HbA1c was 9.7%, Blood glucose taken for digestion of 30 ml hot water till complete digestion of empty stomach. Patient was asked not to consume anything except 17,18]. Test dose of 30 ml calculated from test dose (~Snehapan Kal Basti Kram MK 7/3) were advised after meals.

Indications for obesity diagnosis were height, weight, BMI, Abdominal circumference, waist circumference, waist hip ratio were considered as indicative symptoms of completion of digestion.

Based on time taken for digestion of 30 ml Guggulu Tiktak Ghritam we calculated Madhyama Matra of Shodhan Sneh. For this patient it was 90 ml. Considering Krur Koshta (~hard bowel) 7 days would require to complete Samyak Snehana (~proper internal oleation). Guggul Tiktak Ghrit in 90 ml dose given for 7 days.

Virechan was prescribed after evaluating clinical symptoms for Samyak Snehpan symptoms. [7. Su 16/30,31].

6. Follow up and outcomes

Snoring was completely subsided after 1 month of treatment (Table 1). Reduction in weight, BMI abdominal circumference and waist hip ratio was also observed. There was a slight increase in cholesterol and triglycerides which may have occurred due to Snehpan or some other confounding factors. We expect reduction in lipid levels on longer follow up after improving metabolism; the rationale for this expectation is improvement in liver health and decrease in liver enzymes; which will aid in improving lipid profile as liver play important role in lipid metabolism (Table 1).

7. Discussion

Disturbances in sleep causes insulin resistance and beta cell dysfunction through various pathways. Bradycardia, low blood pressure, and slow basal metabolism due to predominance of parasympathetic nervous system are prominent features during sleep. Sleep fragmentation triggers activation of sympathetic nervous system, this leads to higher rates of basal metabolism and higher level of stress hormones can contribute for development of type 2 DM. Sleep apnoea also leads to obesity [10]. Meta-analysis studies have also confirmed that Snoring leads to Diabetes [11].

It is very well known that gut microbiota plays very important role in pathogenesis of obesity and type 2 diabetes. Alternations in gut microbiodata leads to obesity and type 2 Diabetes [12]. Sleep disturbances modulates Gut microbiota leading to Type 2 Diabetes and obesity [13]. Gut lung Axis is a recently evolved concept [14] where Gut and respiratory system has impact on each other. Thus alternations in respiratory mechanisms plays major role in pathogenesis of various metabolic disorders. Bitter receptors are situated in Gut as well as lung. When bitter receptors are stimulated they produce bronchodilation. They also have effects on reduction in blood sugar and reduction in snoring [15]. Ayurveda has nicely explained this concept as follows.

Obstructions to Pran Vayu leads to Pranwah Strotas Dushti. (~respiratory disturbances) [1. Vi 5/7]. Mulśthana (~origin) of Pranwah Strotas are Hruday (~heart and lungs) [16] and Mahastrotas (~alimentary canal). Snoring causes obstruction of Vayu and Ras –Rakt Vahan at the level of Mahastrotas [1-verse 5–9].

All routes of Mahastrotas are obstructed by Meda Dhatu during pathogenesis of Sthulya. This obstructed Vayu situated in Mahastrotas increases Jathargni and decreases Meda Dhatvagni. Increased Agni leads to excessive eating and weight gain [1-verse 5–9]. Madhavkar has also explained role of snoring in pathogenesis of obesity (~Sthulya) [17].

Vyan Vayu maintains normal circulation through Hruday (~heart) [7. Su 12/6]. Hruday resembles with lotus that opens during awakening and closes during sleep. Hruday is also a site of Chetana and Ojja [6. PK 5/76–78,89-90].

Sleep disturbances are responsible for disturbances in functions of Hruday (~Heart), Hruday (~Heart), Basti (~Urinary system) and Shir (~Brain). These are Trimarma (Vital Parts of body) [1. Si 9/4];
and they are also included in Dashpranayatan [1. Su 29/3] (=places of Pran). They are interdependent.

There are two types of Madhumeha. One is Dhatu Kshayjanya (=causes by depletion of 7 main constituents of body) & another is Dosha Avritta Patha ie Sthul (=occurs in obese) [7. Ni 10/18]. Vitiation of Kapha, Pitta, Meda and Mansa Dhatu and its accumulation at Basti, results obstruction in path of Vayu. This vitiated Vayu brings Oja Dhatu into Basti which results into Madhumeha [1. Su 17/79].

Pran Vayu maintains Agni through process of respiration. Snoring Causes disturbance in respiration (=Shwas prashaws kriya). Balance of Shwas Prashawas also maintains Jatharagni [6. PK 5/89, 90]. Disturbances in Shwas Prashawas leads to disturbances in

| Blood investigations | 8/2/2019 | 13/2/2019 | 3/3/2019 | 29/3/2019 | 15/5/2019 |
|----------------------|---------|---------|---------|---------|---------|
| Investigation/Date   |         |         |         |         |         |
| Haemoglobin (gm/dl)  | 14.6    | 12.1    |         |         |         |
| RBC count (million/cumm) | 4.44  | 4.20    |         |         |         |
| PCV (%)              | 42.6    | 38.8    |         |         |         |
| MCV (fentolitres)    | 95.9    | 92.3    |         |         |         |
| MCH (pgm)            | 32.8    | 28.8    |         |         |         |
| MCHC (%)             | 34.2    | 31.1    |         |         |         |
| Platelets (lakh/cumm) | 2.66   | 3.42    |         |         |         |
| RDW (%)              | 13.2    | 13.9    |         |         |         |
| TLC (cummm)          | 5600    |         |         |         |         |
| DLC                  |         |         |         |         |         |
| Polymorphs (%)       | 58      | 58      |         |         |         |
| Lymphocytes (%)      | 38      | 34      |         |         |         |
| Eosinophills (%)     | 02      | 06      |         |         |         |
| Monocytes (%)        | 02      | 02      |         |         |         |
| PS FOR opinion       |         |         |         |         |         |
| RBCS                 | Normocytic mild Hypochromic | Normocytic mild Hypochromic |         |         |         |
| WBCS                 | Normal in counts and morphology | Normal in counts and morphology |         |         |         |
| Platelet             | Adequate in number and normal in morphology | Adequate in number and normal in morphology |         |         |         |
| Parasites            | Malarial and other blood parasites not seen | Malarial and other blood parasites not seen |         |         |         |
| Cholesterol (mg/dl)  | 174     | 154     | 322     |         |         |
| Triglycerides (mg/dl) | 286.1 | 161     | 259     | 408     |         |
| HDL (mg/dl)          | 45.8    | 49      |         |         | 55      |
| LDL (mg/dl)          | 72      | 185     |         |         |         |
| VLDL (mg/dl)         | 32      | 81      |         |         |         |
| Total: HDL RATIO     | 3.1     | 5.8     |         |         |         |
| HDL: LDL Ratio       | 1.4     | 3.3     |         |         |         |
| HBA1C (%)            | 9.7     | 6.8     |         |         |         |
| BSL- Fasting (mg/dl) | 189     | 103     | 92      | 81      |         |
| Post meal (mg/dl)    | 295     | 153     | 121     | 121     |         |
| SGOT (IU/L)          | 66.1    | 22      |         |         |         |
| SGPT (IU/L)          | 70.4    | 18      |         |         |         |
| Billirubin (Total) (MG/DL) | 0.37   | 0.7    |         |         |         |
| Billirubin (direct) (mg/dl) | 0.04 | 0.1    |         |         |         |
| Alkaline phosphate (mg/dl) | 169   | 97     |         |         |         |
| Blood Urea (mg/dl)   | 25.3    | 29      |         |         |         |
| Serum Creatinine (mg/dl) | 1.27  | 1.2    |         |         |         |
| Sr. Uric acid (mg/dl) | 3.7    |         |         |         |         |
| Sodium (mEq/L)       | 140     |         |         |         |         |
| Pottasium (mEq/L)    | 4.6     |         |         |         |         |

| Anthropometric parameters | 8/2/2019 | 25/2/2019 | 3/4/2019 | 12/4/2019 | 17/5/2019 |
|---------------------------|---------|---------|---------|---------|---------|
| Anthropometric parameters/Date |         |         |         |         |         |
| Height (cm)               | 170     | 170     | 170     | 170     | 170     |
| Weight (kg)               | 100     | 94      | 95      | 93      | 90      |
| BMI (kg/m²)               | 34.60   | 32.52   | 32.87   | 32.17   | 31.14   |
| Waist circumference (cm)  | 120     | 109     | 118     | 111.5   | 107     |
| Hip circumference (cm)    | 113     | 106.5   | 112     | 106.5   | 108     |
| Abdominal circumference (cm) | 117   | 110.5   | 108     | 111.5   | 116     |
| Waist hip ratio           | 1.06    | 1.02    | 1.05    | 0.98    | 0.99    |
| Shoulder fold thickness (cm) | Rt-8   | Rt-8    | Rt-8    | Rt-7    | Rt-7    |
| Abdominal fold thickness (cm) | 7.5  | 7.5     | 7.5     | 7       | 7       |

| Berlin questionnaire score | Category I | Category II | Separate question | Category III |
|---------------------------|------------|-------------|-------------------|-------------|
|                           | 18         | 12          | 4                 | 1           |
Table 2
Details of treatment.

| Date       | Treatment plan                      | Dose  | Ayurvedic action                      | Karma(Actions)                  |
|------------|-------------------------------------|-------|---------------------------------------|---------------------------------|
| 8/02/2019  | 1. Punarnavadi kwath gharvati       | 500mg | After meals with lukewarm water       | Shodhat—reduces swelling, Amlaoman |
|            | 2. Tab Lo-MEDUS                     | 1gm   | After meals with lukewarm water       | Lipid reducer and anti—atherosclerotic |
|            | (Guggul—commiphora mukul), Amritat—(Tinospora cordifolia), |       |                                       |                                 |
|            | Aasan—(Porocarpus mansupaum), Vidange—(Embelia ribes) | 3gm | After meals with lukewarm water       | Mutrula excretes excessive kled |
|            | Chitrak—(Plumbago zeylanics), Marichat(Piper nigrum), Pippali—(Piper longum), Nagara—(Zingiber officinale), Loha | 250mg | After meals with lukewarm water       | Medogat vicar nashanam, Prameha |
|            | (Bhasm—(Incinerated iron))       |       |                                       | nashanam through its action on pravastrotas          |
|            | 3. Gokhar churna                   | 125mg | After meals with lukewarm water       |                                 |
|            | Godanti bhasma                     |       |                                       |                                 |
|            | 4. Lakshmivilas Ras(8)             |       |                                       |                                 |
| 12/2/2019  | 1. Punarnavadi kwath gharvati       | 500mg | After meals with lukewarm water       |                                 |
|            | 2. Tab Lo-MEDUS                     | 1gm   | After meals with lukewarm water       |                                 |
|            | 3. Sudarshan Ghanvati[9]            | 750mg | After meals with lukewarm water       |                                 |
| 21/2/2019  | 1. Tab Lo-MEDUS                     | 1gm   | After meals with lukewarm water       |                                 |
|            | 2. Sudarshan Ghanvati              | 750mg | After meals with lukewarm water       |                                 |
|            | 3. Shrawaktila ras[4]              | 125mg | After meals with lukewarm water       |                                 |
| 3/4/2019   | 1. Triphala churna                  | 59gm  | On empty stomach and after the meals  | Rasa, Anulom, Sthalyu medo      |
|            | Durhuridra churna                   | 59gm  |                                       | Framhagha aamphuchan            |
|            | Kaki Churna                         | 20gm  |                                       |                                 |
|            | Musla Churna                        | 59gm  |                                       |                                 |
|            | Pittapada Churna                    | 59gm  |                                       |                                 |
|            | Churag Churna                       | 29gm  |                                       |                                 |
|            | Chireta Churna                      | 59gm  |                                       |                                 |
|            | Tulsi Churna                        | 49gm  |                                       |                                 |
|            | Combination divided in 150 equal doses | 31gm | After meals with lukewarm water       |                                 |
|            | 2. Punarnavadi kwath gharvati       | 500mg | Before meals with lukewarm water      |                                 |
| 14/3/2019  | 1. Harischahtuk churna vati[7. Chi 14/35] | 2gm  | After meals with lukewarm water       | Anulom, Agni, Vrdhikar             |
|            | 2. Tab ecosyl neutral(contains: Achyranthes aspera, Botot, Chitroon eligiosalhvides, Glicnia indica, Green tea, Inulin, L-Carnitine, pyridoxine, taurine) | 2tab | Before meals with lukewarm water      | Framhagha, Sthalyu shri, Vrdhikar |
|            | 3. Prameha vati                      | 1gm   | After meals with lukewarm water       |                                 |
|            | (contains: amalaki—(emblica officinalis), Haritaki—(terminalia chebula), Bibhitaki—(Terminalia bellirica), Kadaliyam—(neemtela indica), Haridrai—curcuma longa), Jamunbool—(syzygium cumina),(Chirnayt—swertia chirnaya), guduchi—(tinospora cordifolia), Mustak—(cyperus rotundus)) |       |                                 |
Jatharagni. Impaired Jatharagni produces Ama in body. This Ama causes Ras-Rakta Dhatu Dushhti [7. Su 13/25].

Hruday is made up of Prasad Bhog (~Pure part) of Rakta and Kapha [6. PK 5/76]. Rakta Dushhti and Vitiation of Kapha causes Hrudaya Dushhti. Involvement of vitiated Vyana and Apan Vayu are responsible for Prameha [18]. This patient was treated for Strotrodhjanya Madhumeh and Sthautya, through basic understanding of Shwas Prakriya, Sleep, Sthautya and Agni.

Tikta (~bitter) dominant herbs were used in Basti, Abhyang, Udavartan, Virechan. Reduction in snoring, obesity, blood sugar thereby achieving reduction in HbA1C was achieved. Details of treatment protocol are summarized in time line and Table 2. Improvement of sleep quality, Shwas Prashwas Kriya treatment protocol are summarized in time line and Table 2. there by achieving reduction in HbA1C was achieved. Details of metabolic disorders through various gut, lung endocrinal pathways. Future studies in this direction are warranted.

8. Result

Reduction in Berlin Snoring Questionnaire categories, Weight, BMI, Blood Glucose levels, waist hip ratio, and abdominal circumference were observed. Table 1 summarizes changes in these variables.

9. Conclusion

Ayurveda concepts can bring major breakthrough in treatment of metabolic disorders through various gut, lung endocrinal pathways. Future studies in this direction are warranted.

10. Patient perspective

I was irritated initially but later with decline in snoring; I felt fresh and energetic. With subsequent weight reduction I felt very light. (In his own Language).

Declaration of patient consent

The authors certified that they have obtained all appropriate consents from patient. The patient has given his consent for images and clinical information to be uploaded to journal portal. The patient understands that his name and identity will not be published and due efforts will be made to conceal his identity.

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Conflict of Interest

There are no Conflicts of interest.

Author contributions

Conceptualization and Treatment Plan - AN. Rough Draft and Ayurveda formulation preparation - AN, PK. Critical Editing of Draft - AN. Data Collection AN, PK. Data Presentation - AN, PK.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaim.2021.08.001.

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