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Effect of Dwikala Bhojan and Pathya Ahara in Prevention and Treatment of Sthaulya with special reference to Insulin Metabolism -A Case Report.

Name of the First Author: Dr. Ruddri A. Raval
Affiliations (current and primarily carried out):
Dr. Ruddri Ashishbhai Raval; Final Year P.G. Scholar, Dept of P.G. Studies in Swasthavritta
KAHER'S Shri B.M.K Ayurveda Mahavidyalaya, Post-Graduation Studies & Research Centre
Shahapur, Belagavi-Karnataka - 590003
Name of the Second Author: Dr. Amulya Murthy Aku
Affiliations (current and primarily carried out):
Dr.Amulya Murthy Aku; Final Year P.G. Scholar, Dept of P.G. Studies in Swasthavritta
KAHER'S Shri B.M.K Ayurveda Mahavidyalaya, Post-Graduation Studies & Research Centre
Shahapur, Belagavi-Karnataka - 590003
Name of the Third Author: Dr. Mukta
Affiliations (current and primarily carried out):
Dr. Mukta;Assistant professor, Department of Swasthavritta and Yoga, National institute of Ayurveda (Deemed to be university) Jaipur.
Name of the Fourth Author: Dr. Ashok Patil
Affiliations (current and primarily carried out):
Dr. Ashok Patil (M.D., Ph.D(Ayu)); Professor and H.O.D., Dept. of P.G. Studies in Swasthavritta
KAHER'S Shri B.M.K Ayurveda Mahavidyalaya, Post-Graduation Studies & Research Centre
Shahapur, Belagavi-Karnataka - 590003

Abstract
Obesity is a growing global issue, World Health Organization (WHO) proclaimed it a global epidemic, coining the term "globesity." Dwikala bhojan and pathya ahara are two ayurvedic principles that can serve as a preventive, a curative aspect of dietary treatment and it is useful in treating sthaulya (obesity). The present case study investigated a 19-year-old female patient who visited the department of Swasthavritta and Yoga OPD at the KLE Ayurveda Hospital and medical research centre in Belagavi, Karnataka with primary complaints of weight gain, breathlessness, increased perspiration, and fatigue for eight months. The patient was given a one-month customized dietary regimen that incorporates the fundamental ideas of Dwikala bhojana, Aharaj pathya, and viharaj pathya. After the treatment, there was a substantial difference in anthropometric measurements, fat analysis, and blood insulin levels. After this intervention, the intensity of breathlessness, increased perspiration, and fatigue also decreased.

Keywords: Dwikala bhojana, Pathya ahara, Sthaulya (Obesity), Serum insulin

Introduction
Obesity, or sthaulya, is critical to the body and the mind. [1] According to estimates, 38% of adults worldwide will be overweight and another 20% will be obese by 2030 if secular trends continue.

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[2]Obesity encourages a series of secondary illnesses, such as metabolic syndrome, hyperlipidaemia, inflammation, thrombosis, hypertension, and diabetes.[3] Modern medicine treats obesity with synthetic pharmaceuticals, bariatric procedures, and various fasting techniques including ketogenic diet, intermittent fasting, high protein – low carb diet and others. But many of these have long-term side effects. As a result, it is unable to treat obesity and causes negative side effects. [4]

The care of Sthaulya (obesity) in the form of medications and nutrition has received considerable attention in Ayurveda using a variety of approaches. In Ayurveda, the management of sthaulya follows the path of treatment known as Guru and Apatarpan.[5] Kalavat bhojan is one of the fundamental guidelines for ahara consumption that are outlined in Ayurvedic literature. Dwikala bhojana is crucial for maintaining the health of Agni and insulin metabolism. The lifestyle of today is irregular and sedentary. Hence it is important to study the role of Dwikala bhojan and pathya ahara in the prevention and treatment of sthaulya (obesity).

Patient Information

A 19-year-old female participant with primary complaints of weight gain, breathlessness, increased perspiration, and fatigue for eight months visited the Department of Swasthavritta and Yoga OPD at the KLE Ayurveda Hospital and Medical Research Centre in Belagavi, Karnataka. The patient Shareera Prakriti was Kaphavataj, overeating and irregular eating were noted with consuming unhealthy food like bakery items and the patient frequently consumed a varied diet. She had a habit of drinking tea twice daily. Bowel movements were not as smooth and constipation was noticed and sleeping in the afternoon was frequent (Shown in Table 1).

Table 1**:** Personal History before starting the treatment.

Personal History Before the Treatment	
Blood Pressure	120/80mmHg
Pulse	76 beats/mins
Ahara (Food habit)	Mixed diet, non-vegetarian once in 15 days
Vihara (Lifestyle)	Adhyashana (Overeating), Vishamashana (irregular eating), Divaswapna (Habit of day sleep) Sedentary Lifestyle.
Appetite	Good
Bowels	Slight Constipated
Micturition	2-3 times a day,1-2 times at night
Sleep	Sound sleep

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Habits	Fond of bakery items, junk food, sweets items, tea twice a day

The patient appeared big and well-fed, with a normal build. Edema, icterus, pallor, and cyanosis were absent as well as Lymphadenopathy was absent (Shown in Table-2).

Table 2: General Physical Examination.

General Physical Examination	
Appearance	Bulky
Nourishment	Well-nourished
Gait	Normal
Pallor	Absent
Icterus	Absent
Cyanosis	Absent
Edema	Absent
Lymphadenopathy	Absent

The patient Nadi was Kaphanubandhi Vata, Ishata Vibandhita Mala Pravrutti (slightly constipated) was observed, Mootra Pravrutti (micturition), Sabda (ears) and Drik (eyes) was Prakruta (normal). Additionally, Lipta Jihva (coated tongue) was discovered, Anushnasheetha Sparsha (normal skin temperature) was noted and Akriti (body built) had the Sthoola (obese) (Shown in Table 3).

Table 3**:** Astasthana Pareeksha.

Astasthana Pareeksha	
Nadi	Kaphanubandhi Vata
Mala (Defecation)	Ishata Vibandhita mala Pravrutti (Slightly constipated)
Mootra (Micturition)	Prakrita (Normal)
Jihva (Tongue)	Lipta ta (Coated)
Sabda (Ear)	Prakrita (Normal)
Sparsha (Touch)	AnushnaSheetha (Normal skin temperature)

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Drik (eyes)	Prakrita (Normal)
Aakruti (built)	Sthoola (obese)

Clinical Findings

Sthaulya was graded according to a variety of classical characteristics from the Ayurvedic canon. In the presence of Utsaha Hani (less enthusiasm), Sweda Adhikya (excessive sweat), Ayase Swasa (Dyspnoea on exertion), Nidra Adhikkya (excessive sleep), Alpa Vyayama (less physical activity), Anga Gaurav (heaviness), Anga Ahithilatha (flabbiness of body), and Gatra Sada (fatigue), grade2 was given prior to therapy. (Shown in Table 4)

Table 4: various features of obesity had been considered and grading was given.

Grading of Obesity	
Subjective Parameters	**Before treatment on Zero– day**
Utsaha Hani (less enthusiasm)	2
Sweda Adikyata (excessive sweat)	2
Ayase Swasa (dyspnea on exertion)	2
Nidradhikya (excessive sleep)	2
Alpa vyayama (less physical activity)	2
Anga Gourava (heaviness)	2
Anga Sithilatha (flabbiness of body)	2
Gatra Sada (fatigue)	2

(Score: Presence of symptom=2, any improvement=1, Absence of symptom=0)

The patient was 160 cm tall and weighed 92.8 kg prior to therapy. BMI stood at 36.25 kg/m2. Midarm circumference on both the right and left measured 30 cm. Mid-thigh circumference on both the right and left measured 47 cm. Waist circumference was measured to be 118 cm, while the abdomen's circumference at the umbilicus measurement was 120 cm. (Shown in Table 5).

Table 5: Anthropometric Measurements

Anthropometric Measurements on the Zero-day	
Weight (kg)	92.8

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Height (cm)	160
Body Mass Index (BMI) (kgm2)	36.25
Mid Arm Circumference (cm)	Rt-30 Lt-30
Mid-thigh Circumference (cm)	Rt-47 Lt-47
Abdominal Circumference at Umbilicus (cm)	120
Waist Circumference (cm)	118

Before starting therapy, the patient's total body fat was analyzed using a Karada scan. The results showed that the patient had a total fat percentage of 40.4%, visceral fat of 27%, a body age of 67 years, subcutaneous whole-body fat of 32.8%, trunk region fat of 30.2%, arms of 41.3%, and legs of 42.5%. (Shown in Table 6).

Table 6: Karada Scan Fat Analysis

Karada Scan Fat Analysis on Zero-day	
Total Fat	40.4
Visceral Fat	27
Body Age	67
Subcutaneous Whole-Body Fat	32.8
Trunk	30.2
Arms	41.3
Legs	42.5

Diagnosis Assessment: Objective data, such as changes in serum insulin levels, anthropometric measurements, Karada fat analysis, and subjective parameters were used to make the assessment.

Therapeutic Intervention: Based on the involved Dosha and Dushya, the patient's treatment was designed. A one-month diet and lifestyle modification treatment plan were suggested to the patient considering their dietary history, lifestyle, and the pathya ahara that is indicated for sthaulya in the Ayurveda classics. The patient was told to perform 12 rounds of Surya Namaskar in the

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morning half hour. She was told to eat only twice a day, at set intervals throughout the month: from 10 to 11 in the morning and from 7 to 8 in the evening. The patient was instructed to eat Jowar roti with Mudg daal or Kullatha daal, Navane rice (if necessary) in the morning, Bottle gourd or Pointed gourd or Drumstick, Spring onion or Amaranthus, Methi Bhaji or Snake gourd sabzi with Jowar roti in the evening. Black tea or green tea should be consumed in between the meals and buttermilk once a day in the afternoon was advised. (Shown in Table 7).

Table 7: Treatment Plan

Days	7:00 to 7:30 am	8.00 am	Pratham Bhojan (10 am – 11 am)	1.00 pm	6:00 to 6:30 pm	Dwitiya Bhojan (7 pm – 8 pm)
MON	12 Surya Namaskar	Green tea /Black tea	2 Jowar Roti +Mudg daal +Navane rice	Buttermilk 150 ml	Brisk walking	2 Jowar roti +Bottle guard sabzi
TUE	12 Surya namaskar	Green tea /Black tea	2 Jowar Roti +Kullatha daal +Navane rice	Buttermilk 150 ml	Brisk walking	2 Jowar roti +Pointed guard sabzi
WED	12 Surya namaskar	Green tea /Black tea	2 Jowar Roti +Mudg daal +Navane rice	Buttermilk 150 ml	Brisk walking	2 Jowar roti +Drum stick sabzi
THU	12 Surya namaskar	Green tea /Black tea	2 Jowar Roti +Kullatha daal +Navane rice	Buttermilk 150 ml	Brisk walking	2 Jowar roti +Spring onion sabzi
FRI	12 Surya namaskar	Green tea /Black tea	2 Jowar Roti +Mudg daal +Navane rice	Buttermilk 150 ml	Brisk walking	2 Jowar roti + Amaranthus bhaji
SAT	12 Surya namaskar	Green tea /Black tea	2 Jowar Roti +Kullathadaal +Navane rice	Buttermilk 150 ml	Brisk walking	2 Jowar roti + Methi bhaji
SUN	12 Surya namaskar	Green tea /Black tea	2 Jowar Roti +Mudg daal +Navane rice	Buttermilk 150 ml	Brisk walking	2 Jowar roti + Snake guard Bhaji

Results

Different classical characteristics of Sthaulya were observed, and grade was assigned, according to Ayurvedic classics. Prior to therapy, grade2 was given and Utsaha Hani (less enthusiasm), Sweda Adhikya (excessive sweat), Ayase Swasa (dyspnoea on exertion), Nidra Adhikkya

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(Excessive sleep), Alpa Vyayama (less physical activity), Anga Gaurav (heaviness), Anga Ahithilatha (flabbiness of body), and Gatra Sada (fatigue) were all present. Utsaha Hani (less enthusiasm), Nidradhikya (excessive sleep), and Gatra Sada (fatigue) were not present in the patient following treatment. Improvement was noted, Swedadhikya (excessive sweat), Ayase Awasa (dyspnea on exertion), Alpa Vyayama (less physical activity), Anga Gaurav (heaviness), and Anga Shithilatha (flabbiness of body) were lowered, and grade1 was instituted. (Shown in Table 8).

Table 8: various features of obesity had been considered and grading was given.

Grading of Obesity		
Subjective Parameters	**Before treatment (Zero-day)**	**After treatment (30th day)**
Utsaha Hani (Less enthusiasm)	2	0
Sweda Adikyata (excessive sweat)	2	1
Ayase Swasa (Dyspnea on exertion)	2	1
Nidradhikya (Excessive sleep)	2	0
Alpa vyayama (Less physical activity)	2	1
Anga Gourava (heaviness)	2	1
Anga Sithilatha (flabbiness of body)	2	1
Gatra Sada (fatigue)	2	0

(Score: Presence of symptom=2, any improvement=1, Absence of symptom=0).

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The patient was 160 cm tall and weighed 92.8 kg prior to therapy. BMI stood at 36.25 kg/m2. The mid-arm circumference on both the right and left measured 30 cm. Mid-thigh circumference on both the right and left measured 47 cm. The waist circumference was measured to be 118 cm, while the abdomen's circumference at the umbilicus measurement was 120 cm. After treatment, the Patient's weight was 86.9 kg and height was 160 cm. BMI stood at 33.94 kg/m2. The mid-arm circumference on both the right and left measured 27 cm. The mid-thigh circumference on both the right and left measured 44 cm. Waist circumference was measured to be 115 cm, while the abdomen's circumference at the umbilicus measurement was 117 cm. (Shown in Table 9)

Table 9: Anthropometric Measurements Before and After Treatment.

Anthropometric Measurements	**Zero-day**	**30th day**
Weight	92.8 kg	86.9 kg
Height	160 cm	160 cm
Body Mass Index (BMI)	36.25 kg/m2	33.94 kg/m2
Mid Arm Circumference	Rt-30 cm Lt-30 cm	Rt-27 cm Lt-27 cm
Mid-thigh Circumference	Rt-47 cm Lt-47 cm	Rt-44 cm Lt-44 cm
Abdominal Circumference at Umbilicus	120 cm	117 cm
Waist Circumference	118 cm	115 cm

By using a Karada scan, the total fat of the patient was analyzed both before and after treatment. Before the treatments, the patient's total fat was 40.4%, visceral fat was 27%, his or her body age was 67, subcutaneous whole-body fat was 32.8%, and it was 30.2% in the trunk area. Her arms and legs were also 41.3% and 42.5% fat, respectively. After therapy, the body's overall fat percentage was 37.5%, visceral fat was 20.5%, the patient's age was 63, subcutaneous whole-body fat was 25.7%, and it was 24.3% in the trunk area. Her arms and legs were also 34.6% and 35.4% fat, respectively (Shown in Table 10).

Table 10: Karada scans Fat Analysis.

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Fat Analysis	Zero-day	30th day
Total Fat	40.4	37.5
Visceral Fat	27	20.5
Body Age	67	63
Subcutaneous Whole-Body Fat	32.8	25.7
Trunk	30.2	24.3
Arms	41.3	34.6
Legs	42.5	35.4

Investigations:

Serum Insulin before treatment	24.54 u/ml (Zero-day)
Serum Insulin after treatment.	05.51 u/ml (30th day)

Discussion and Conclusion

Role of Kala (Time)

Acharya Charaka's significant Ahara parinamkara bhavas is Kala (time). With time digestion improves and the vital function of Kalavat bhojan is to keep Agni (digestive fire) activated.[6] In Ayurveda the langhan digests apakvaanna first, followed by dosha and lastly dhatus. [7] According to Acharya Bhavprakash, a person should eat a meal in the morning and in the evening, nothing should be consumed in between the two meals.[8] Proper time should be maintained between meals to allow the body to digest and absorb the food. It is compatible with autophagy, a method for clearing out cellular debris that has accumulated over time. There are two basic types of fat in the body: Fatty acids, are a type of free fat that is used as fuel in the bloodstream. Triglycerides, which are a kind of fat that is stored and kept in fat cells. Triglycerides get "locked" inside the fat cell because they are unable to pass through cell walls and they can only be released after being stored inside by being converted into fatty acids. Therefore, if the objective is to lose weight, we must lessen the quantity of fat that is permanently deposited as triglycerides in the fat cells. Our bodies receive a set amount of time between meals as a result of Dwikala bhojan, and during this time, they burn stored triglycerides for energy. Here, blood insulin can be used as a biomarker since it lowers triglycerides by promoting the activity of lipoprotein lipase, which breaks down triglycerides into fatty acids and glycerol.[9]

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Role of Pathya Ahara

Ahara's Dravya and other qualities, such as vatahara, medahara, lekhana, and others, correct medadhatu agni and aid to lessen the heightened meda dhatu. One of the main factors contributing to samprapti of sthoulya is medadhatu. As pathya for the prevention and treatment of sthaulya,

Mudga, Kullatha, and Yava are listed in the Ayurveda scriptures. [10][11]

Role of Tikta, Katu and Kashaya Rasa

By analyzing the ahara in the rasa (taste), it is evident that medoroga is suggested by katu (pungent) rasa, which reduces the kapha, kleda, and meda by virtue of its laghu, ushna, and ruksha (ruksha) guna.[12] Ruksha and laghu guna, together with kledahara and medososhana characteristics, are also present in tikta (bitter) rasa.[13] Because of its laghu and ruksha guna, kashaya (astringent) rasa balances the pitta and kapha dosha and dries out the kleda and meda.[14,15] As a result, the Sthaulya indicates tikta, katu, and kashaya rasa.

Role of Vyayama

Dinacharya includes vyayama (exercise) to maintain positive health. As exercise affects fat metabolism, it is encouraged to exercise regularly to combat obesity. Exercise causes an increase in the mobilization of fatty acids from adipose tissues, which are then transferred to the mitochondria of the muscle for oxidation. Some research has proven to promote lipid lipoprotein profiles (e.g., lowered triglyceride levels, increased HDL level, and decreased LDL levels) as well as body composition (e.g., through reduced abdominal adiposity and improved weight control).[16] As it results in the lightness of the body, improved digestion, meda kshaya (fat reduction), and increased productivity.

Conclusion

The population who is obese has hopes due to the discovery of Dwikala Bhojan combined with Pathya Ahara which is useful in reducing Sthaulya. For the long-term effectiveness of treating Sthaulya, more research and scientific evidence with extended follow-up is required.

Declaration of patient consent

The patient has given his approval for the authors to report the case and other clinical information in the journal, the authors declare that they have gotten patient consent forms.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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REPORT

NAME : MISS NIKITA SHIRAGANNAVAR (19Y/F)
REF. BY : DR RUDDRI
TEST ASKED : hsCRP,INSULIN (F)

SAMPLE COLLECTED AT :
(5900038990),KLE AYURVEDA HOSPITAL,Main Road Near Nath Pai Circle Shahapur, Belagavi, Karnataka, India,590003

TEST NAME	TECHNOLOGY	VALUE	UNITS
INSULIN - FASTING	**C.L.I.A**	**24.54**	**µU/mL**

Reference Range :-

1.9-23 µU/mL

Clinical Significance

Type I (Insulin dependent: "Juvenile") diabetes is due to a destruction of the beta cells, with a consequence of absolute lack of insulin. In type II (Non insulin-dependent: "Maturity onset") diabetes, insulin resistance may play an important role; However after several years of evolution, beta-cells failure may occur, leading to a relative insulinopenia requiring, in some cases, insulin administration. Insulin resistance is associated with high circulation levels of the hormone.

For diagnostic purpose, results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

Specifications:

Precision: Intra Assay (%CV): 4.20 %, Inter Assay (%CV): 5.60%; Sensitivity: 0.03 µU/mL

External quality control program participation:

College Of American Pathologists: Insulin Survey (Ing): Cap Number: 7193855-01

Kit validation references:

Howanitz PJ, Howanitz JH, Henry JB. Carbohydrates.Clinical Diagnosis and Management by Laboratory Methods 1991 ;172-182.edited by Henry JB, Philadelphia, W.B Saunders Company.

Please correlate with clinical conditions.
Method:- One step Immunoenzymatic (Sandwich) assay.

~~ End of report ~~

Sample Collected on (SCT) : 27 Aug 2022 18:00
Sample Received on (SRT) : 28 Aug 2022 08:40
Report Released on (RRT) : 28 Aug 2022 13:51
Sample Type : SERUM
Labcode : 2808062392/KAR58
Barcode : AE198451

Dr Syeda Sumaiya MD(Path)
Dr Ajeet Prajapati MD(Path)

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REPORT

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REF. BY : DR RUDDRI
TEST ASKED : hsCRP,INSULIN (F)

SAMPLE COLLECTED AT :
(5900038990),KLE AYURVEDA HOSPITAL,Main Road Near Nath Pai Circle Shahapur, Belagavi, Karnataka, India,590003

TEST NAME	TECHNOLOGY	VALUE	UNITS
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Please correlate with clinical conditions.
Method:- One step Immunoenzymatic (Sandwich) assay.

~~ End of report ~~

Sample Collected on (SCT) : 11 Oct 2022 08:00
Sample Received on (SRT) : 12 Oct 2022 09:37
Report Released on (RRT) : 12 Oct 2022 13:52
Sample Type : SERUM
Labcode : 1210063609/KAR58
Barcode : Z3799087

Dr Syeda Sumaiya MD(Path)

Dr Ajeet Prajapati MD(Path)

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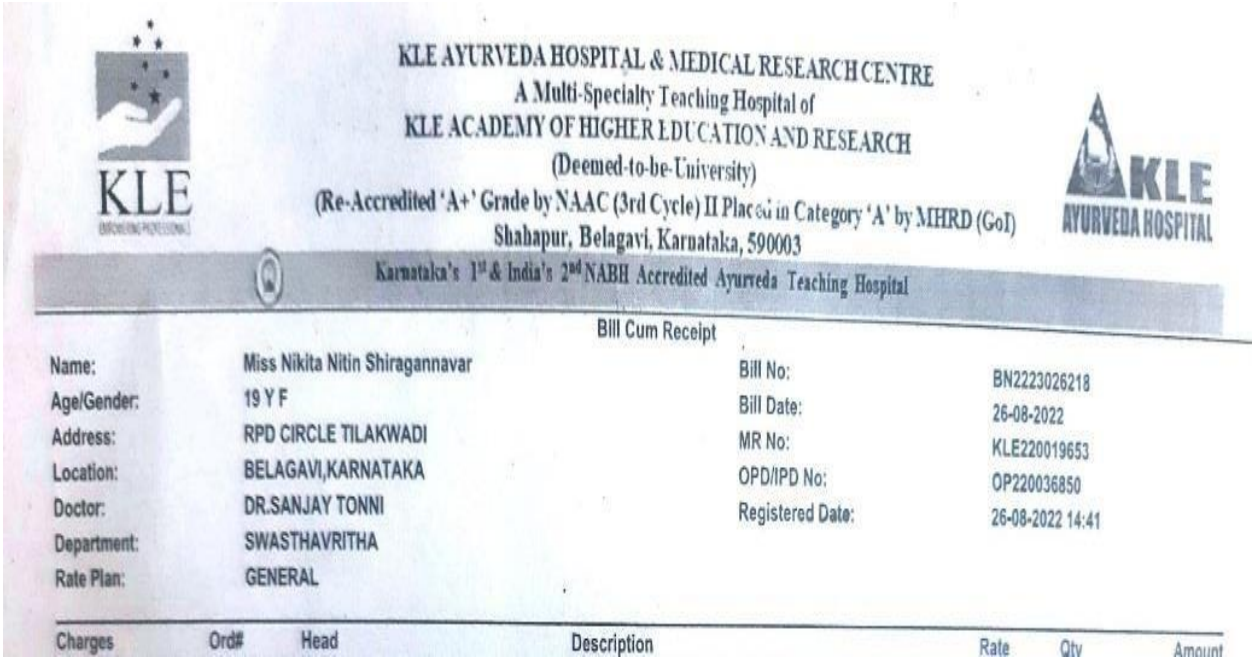

KLE AYURVEDA HOSPITAL & MEDICAL RESEARCH CENTRE
A Multi-Specialty Teaching Hospital of
KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Deemed-to-be-University)
(Re-Accredited 'A+' Grade by NAAC (3rd Cycle) II Placed in Category 'A' by MHRD (GoI)
Shahapur, Belagavi, Karnataka, 590003
Karnataka's 1st & India's 2nd NABH Accredited Ayurveda Teaching Hospital

KLE AYURVEDA HOSPITAL

Bill Cum Receipt

Name:	Miss Nikita Nitin Shiragannavar	Bill No:	BN2223026218
Age/Gender:	19 Y F	Bill Date:	26-08-2022
Address:	RPD CIRCLE TILAKWADI	MR No:	KLE220019653
Location:	BELAGAVI,KARNATAKA	OPD/IPD No:	OP220036850
Doctor:	DR.SANJAY TONNI	Registered Date:	26-08-2022 14:41
Department:	SWASTHAVRITHA		
Rate Plan:	GENERAL		

Charges	Ord#	Head	Description	Rate	Qty	Amount