

## **Centre of Excellence for Research and Clinical services in Madhumeha (Diabetes mellitus)**

Central Ayurveda Research institute is recognized as Centre of Excellence for Research and Clinical services in Madhumeha (Diabetes mellitus) by Ministry of AYUSH. The total fund sanctioned is Rs.7,24,80,400/- for a duration of three years of which Rs.2,88,00,000/- was released as first instalment in March 2021. The scheme got initiated in April 2021. An extension of 1 year was sanctioned to reach the first year targets due to Covid pandemic. The total expenditure by the end of financial year 2021-22 is as below under different heads.

<b>Sub-heads</b>	<b>Total sanctioned in Rs.</b>	<b>Total expenditure in Rs.</b>	<b>Balance in Rs.</b>
Salary	8304800.00	3607047.00	4697753.00
Non-recurring	18010000.00	17672422.00	337578.00
Recurring	2485200.00	1080090.50	1405109.50
<b>Total</b>	<b>28800000.00</b>	<b>22359559.50</b>	<b>6440440.50</b>

Under the Scheme, Ministry of AYUSH has given the following deliverables to be achieved during the first year.

1. Developing Ayurveda guideline for prevention and management of Madhumeha.
2. Validation of Ayurveda approaches for diabetes
3. Prevention and management of Diabetes with multi-speciality approach
4. Development of anti-diabetic formulations and food recipes through scientific validation
5. Development of IEC materials
6. Conduction of camps for Diabetic patients
7. Trainings to public and students on prevention and management of diabetes
8. E-Healthcare initiatives for the prevention and management of diabetes
9. Technical collaborations with institutes for research studies
10. NABL and NABH accreditation

An expert advisory committee has been constituted to supervise and guide through the functioning of the Centre of excellence. The committee comprises of experts from various fields such as Ayurveda, Modern Medicine, Pharmacology, Drug development, Food technology, Research and Bio-Statistics. The committee meets as per need to steer the activities under the scheme. The functioning of the Centre of excellence can be broadly put under the heads of Clinical services; Academic, training and outreach activities and Research activities.

## Clinical services

Under the scheme, a specialized OPD for patients of Madhumeha is made functional since 22<sup>nd</sup> July 2021. The patients are provided with free consultation, medicines and laboratory investigations. The specialized OPD has catered to 617 diabetic patients and 1445 follow-up visits in this year offering Ayurveda and Yoga therapies totalling up to 2062 visits during the year 2021-22.. 345 patients have had free laboratory investigations under the scheme.

Department	Male	Female	Total
OPD New patients	380	237	617
No of OPD Follow-up visits	918	527	1445
Total patients attending OPD	1298	764	2062

Free yoga classes are conducted regularly in Yoga Hall, CARI Hospital, Bengaluru from September 2021 around 24 patients have been registered till date. Classes are conducted under the guidance of professional Yoga teachers. A specialized Yoga module for Diabetes has been developed and is being instructed to patients of Diabetes on a regular basis. Additionally, Yoga camps have been conducted at different venues near the hospital reaching out to 50 patients of Diabetes. A month long online yoga class based on Common yoga protocol was conducted to mark International Yoga day 2021 from 21<sup>st</sup> May to 21<sup>st</sup> June 2021 attended by more than 200 participants.

An extensive and detailed data is being collected from all the patients attending the special diabetes OPD under CoE. The data is being digitally managed using e-formats. Socio-demographic characteristics, family history of diabetes, Lab investigation parameters, anthropometric measurements, life style factors, Symptomatology and treatment details are all saved in digital forms.

A risk assessment module is developed with Clinical and statistical inputs, which includes classical Ayurvedic understanding of Diabetes aetiology and symptomatology. The scoring is being developed using statistical tools, machine learning and artificial intelligence from the collected data.

## Academic, training and outreach activities

Diabetes health camps are held within a 10-kilometer radius of the Central Ayurveda Research Institute, to screen patients for diabetes and diabetic-related issues, provide health-related education, doctor consultation, distribute medicines to treat diabetic and pre-diabetic diseases and refer patients to the hospital for further follow-ups as needed. These camps are based on excellent diabetes care and awareness concepts, allowing the general population to learn how to manage their diabetes. Patients are motivated and supported by peers and devoted experts. From February 2022 to March 2022, 7 Medical camps were conducted under CoE. Of which, 2 were in apartments, 1 at Anganwadi, 1 at old age home, 1 at the police station, 1 at Sericulture institute, and 1 at Gram panchayat. The total beneficiaries from all the camps were 210.

Camp No.	Date	Male	Female	Total
1	19.02.2022	15	12	27
2	26.02.2022	9	37	46
3	09.03.2022	28	16	44
4	15.03.2022	11	06	17
5	20.03.2022	16	15	31
6	21.03.2022	05	17	22
7	30.03.2022	23	0	23
<b>Total</b>		107	103	210

3 training programmes were conducted for general public to raise awareness about Diabetes, diet in Diabetes and Yoga for Diabetes. One training programme has been conducted to students from Sushrutha Ayurvedic Medical College, Bengaluru regarding Research methodology, Biostatistics and Comprehensive management of Diabetes mellitus which was attended by 46 students of Final year BAMS.

Sl. No	Name of the workshop/seminar	Date	Resource person	Remarks
1.	Awareness program for general public  Yoga awareness program for general public on Importance of yoga in general health. Held at CARI, Hospital	31/08/2021	Dr. Monica.K.P	Attended by 50 people
2.	Training and Diabetes awareness programme for members of Stree shakti sangha at Vajarahalli Anganawadi	28/02/2022	Dr. Kavya N	Attended by 100 people
3.	Training and Diabetes awareness programme for inmates of Matruchaya trust old age home	31/03/2022	Dr. Nivedita BM	Attended by 26 members
4.	Ayurveda student training programme Hands-on training provided to students regarding Research methodology, Biostatistics and Comprehensive management of diabetes mellitus	16/03/2022	Dr. Kavya N Ms. Anagha Jenu Ms. Shilpashree AT Dr. Monica KP	Attended by 46 students of Sushrutha Ayurveda Medical College, Bengaluru

Under the Centre of excellence scheme a static website has been developed for the promotion and introducing e-healthcare initiatives, compliant with the Digital India programme, to reach out to wider populations. The Institute's website is ready for cloud hosting by NIC, security audit is in process for obtaining VAPT certificate. Website domain [www.cari.gov.in](http://www.cari.gov.in) has been approved and is awaiting domain registration. Website hosting will be taken up shortly. A brief video of the Institute has been created for further enhancement of digital presence of the institute and for wider outreach.

### **Research activities**

The research activities under the CoE are being carried out under different sub-heads.

**Drug development:** The Centre of Excellence is mandated with selection of 2 potential drug formulations for conduct of Clinical trials. An exhaustive literature survey was carried out in order to list out the formulations which have been mentioned in chikitsa of Prameha. 657 total formulations were compiled from 18 different treatises of Ayurveda. After a thorough scrutiny and expert opinion, 4 formulations have been shortlisted as potential candidates for further testing. The four formulations thus selected are manufactured at Central Ayurveda Research Institute, Jhansi, and their quality control analysis has been done. Preclinical and clinical study protocols are drafted and are under scrutiny. Potential collaborators for conduct of Pre-clinical animal studies to determine safety, toxicity and biological activities of the selected formulations are being communicated.

**Chemistry:** Drug standardisation research unit has been upgraded with procurement of advanced instruments and equipments such as HPTLC. The phytochemical analysis of different drugs are being carried out facilitating standardisation and quality control of drugs for further processing. The unit also accepts samples from students and researchers for standardisation and drug analysis.

**Food development:** Developing SoP's for ready to eat/cook anti-diabetic food supplements/meal replacements is also mandated to the institute under the CoE scheme. Literary review of different food preparations in Diabetes has been carried out and discussions held with scientists of Food technology for development of Ready to eat / cook anti-diabetic food preparations, based on the literature survey and Ayurveda principles of pathya ahara. 2 preparations are under consideration.

**Development of Protocol and IEC materials:** A comprehensive guideline for Ayurveda management of Diabetes mellitus and treatment protocol has been drafted based on detailed literature research and the draft is under scrutiny.

The below 4 IEC materials have been developed under CoE scheme and are being distributed to public at CARI Hospital, camps and other outreach programmes..

- ಮಧುಮೇಹ ನಿಯಂತ್ರಣ ಹಾಗೂ ನಿರ್ವಹಣೆಗೆ ಸಮಗ್ರ ಸೂತ್ರ (Prevention and Management of Diabetes mellitus)
- ಸಾಮಾನ್ಯ ಯೋಗ ಕೈಪಿಡಿ (Common Yoga Protocol)

- ಆಹಾರ ಸೇವನೆಯ ಮುಖ್ಯ ನಿಯಮಗಳು(Regimens to be followed during food consumption)
- ಟೈಪ್ -೨ ಮಧುಮೇಹದ ಬಗ್ಗೆ ಮುಖ್ಯ ಸಂಗತಿಗಳು(Important facts about Type-2 Diabetes mellitus)

**Technical collaborations:** Technical collaborations for conduct of various research activities is also done under CoE. A MoU has been signed with Indian Institute of Science, Bengaluru. The MoU with Centre for Incubation, Innovation, Research Consultancy (CIIRC), Jyothi Institute of Technology, Bengaluru is under legal vetting. Networking with the below organisations for potential technical collaborations is in progress.

For patient influx and clinical trials

- NIMHANS, Bengaluru
- Bangalore Medical College and Research Institute, Bengaluru
- CHC Kaggalipura

For Pre-clinical studies

- IRSHA, Bharati Vidyapeeth, Pune
- Govt Veterinary college, Nagpur
- MDRF, Chennai

For Food technology:

- NIN, Hyderabad

### **Upgradation of the Institute through CoE**

The following laboratory instruments were purchased under CoE scheme and installed for pathology diagnostics and investigations

1. Urine analyzer.
2. ERBA Biochemistry Analyser.
3. ERBA- 5part Hematology Analyser.
4. RBAA Advance Four Chanel Coag. Analyser.
5. Erba HB-Vario analyser.
6. Hormone analyzer Finecare Instruments.
7. Blood Tube Mixer.
8. Chemicals, reagents and other lab consumables necessary for the functioning of all the above instruments.

Infrastructural development of the laboratory includes the following

1. Purchase of Phlebotomy Chair.
2. Aluminum partition work.
3. Installation of laboratory taps.
4. Construction of slabs.

## SMPU

- Magnus trinocular microscope was procured for drug studies.
- Herbal garden of the institute (with anti-diabetic plants) was upgraded with layouts and pavements using paver stones.
- Ensured irrigation facility has brought in by expanding pipeline system.

## HPTLC and DSRU

- High performance Thin Layer Chromatography was installed along with other necessary equipment like Nitrogen gas generator, computer, printer and UPS system for the drug analysis and standardization.
- Aluminum partition and window sealing were done in HPTLC unit to protect the equipment from dust and moist. Laboratory water taps were also installed.
- Chemicals, reagents and other lab consumables were purchased for the conduction of analysis in HPTLC and DSRU units.

## Hospital services

- Ambulance and its necessary accessories were purchased for the transportation of patients as well as to use it as a mobile clinic for the conduction of Diabetes camps under CoE scheme.
- Unlimited power supply was installed for power backup which covers the entire hospital building (OPDs, Pharmacy, Pathology Lab, Yoga-hall, Marma and Shalya Units, Panchakarma unit, IPD)

## Publications

Sl. No	Title	Journal	Authors	Status
1.	Yava (Barley): A Potential Dietary Component for Management of Metabolic Disorders w.s.r. to Diabetes Mellitus	Journal of Ayurveda and Integrative Medicine	1. Kavya N 2. Amulya Kannan 3. Monica K P 4. Sulochana Bhat	Under Revision
2.	Ayurveda Single drug therapy for Prameha in Nighantu Sahitya-A review	Annals of Ayurvedic medicine	1. Monica K P 2. Kavya N 3. Raghavendra Naik 4. Amulya Kannan 5. Sulochana Bhat	Under review
3.	Literary review on formulations for Prameha management from various Ayurveda	Journal of Drug Research in Ayurvedic Sciences	1. Amulya Kannan 2. Raghavendra Naik	Under review

	treatises		3. Kavya N 4. Monica KP 5. Sulochana Bhat	
4.	ĀmalakīSvarasa ( <i>Phyllanthus emblica</i> ) – A Potential Single Drug Intervention in Management OfPrameha (Diabetes Mellitus): A Case Study	International Journal of Research in Ayurveda and Pharmacy	1. Amulya Kannan 2. Kavya N 3. Nivedita BM 4. Monica KP 5. Sulochana Bhat	<b>Communicated</b>