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In-vitro Screening for of Alcohalic and Hydroalcohalic Extracts of *Ayurvedic* Medicinal Plants for the management of hyperlipidemia

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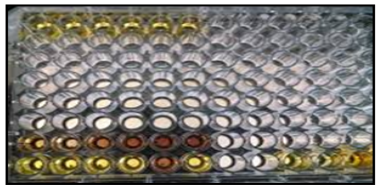
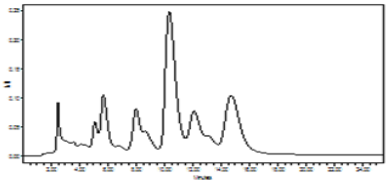
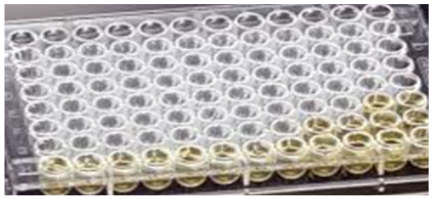


Screening of anti-lipase



HPLC fingerprinting

Semi-prep or Prep HPLC isolation



Dereplication

Structure elucidation by spectroscopy

Defeat Obesity

Abstract

Background: In *Ayurveda*, obesity is regarded as '*Medoroga*', a disorder of lipid metabolism. Hyperlipidemia is one of the causes of Obesity. It is a condition when abnormally high levels of lipids (fatty substances) are found in the blood.

Aim: The objective of the present study is to explore pancreatic lipase inhibitory activity of plants used in Indian system of medicine i.e. *Ayurveda*.

Method: In the present study, thirty one '*Lekhenya'* plants were selected from the *Ayurveda*. Air-dried and finely powdered 31 plant material (2.0 g) were extracted with ethanol and hydro-alcohol (50:50; v/v) (3 × 10 ml) using cold percolation. The inhibition of pancreatic lipase activity of different plant extracts and orlistat (positive control) measured *'in-vitro'* lipase activity using the spectrophotometric assay.

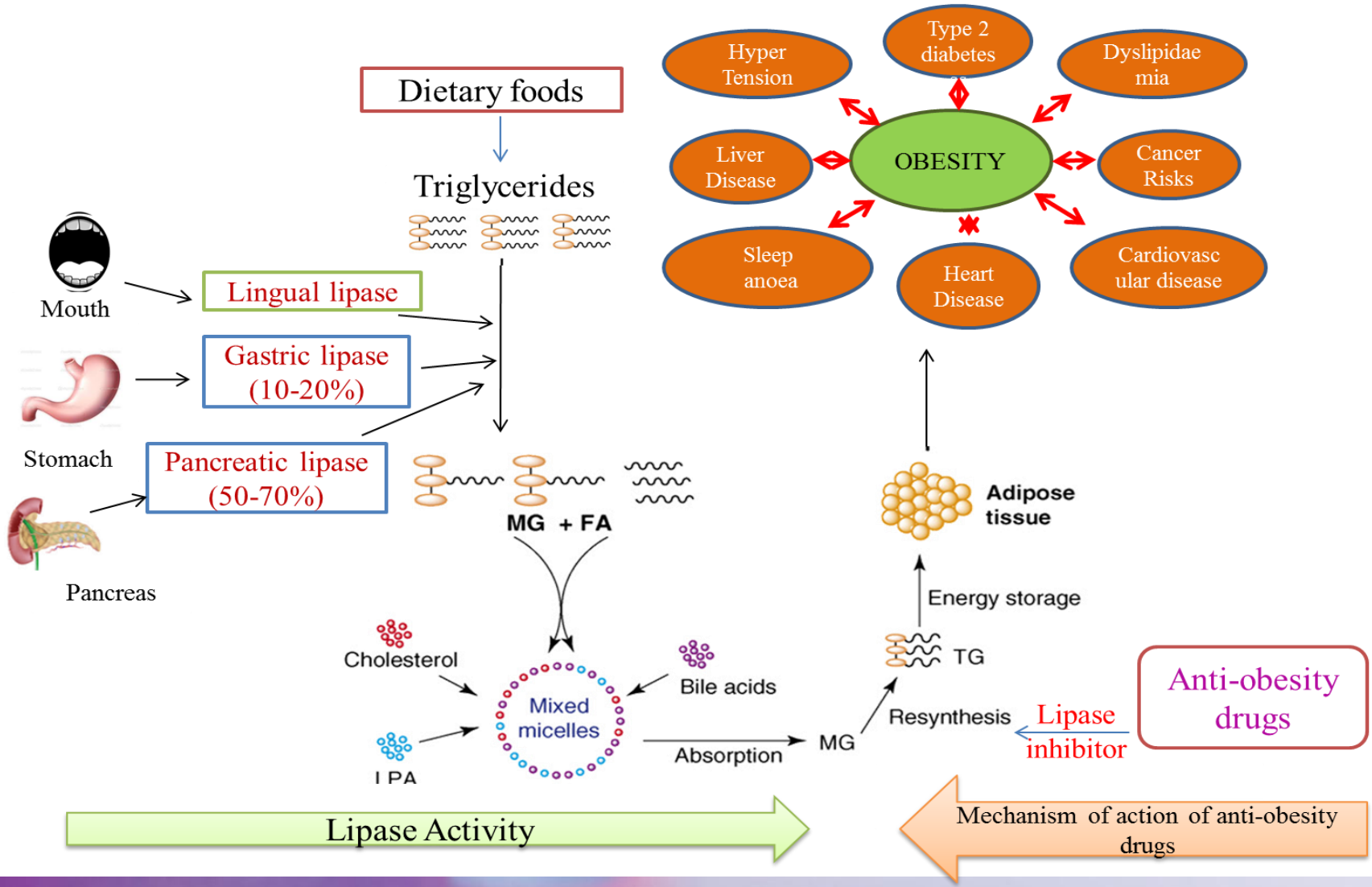
Results : *In-vitro* lipase inhibition assay showed that six plants are *Sterosperum servolides* (Roxb.) D.C, *Prunus cerasoides* D. Don, *Murraya koenigii* L., *Putranjiva roxburghii* Wall., *Andrographis paniculata* (Burm. f.) Wall. ex Nees, *Ocimum scantum* linn exhibit IC_{50} value less than 100 (µg/ml) lipase inhibition activity.

Conclusion: The study indicates lipase inhibition potential of *Ayurvedic* plants, may be useful for the management of obesity which correlate with ethanopharmacological data on the use of these plants in Indian traditional medicines.

Introduction

- Obesity is considered one of the significant global health problems. In *Ayurveda*, obesity is regarded as '*medoroga'* a disorder of '*meda dhatu.'*
- The excess fat accumulated in the body and high levels of lipids in the blood is primarily responsible for obesity. Commonly referred to as hyperlipidemia.
- Lipase enzyme secreted through the pancreas plays a critical role in the digestion of dietary food (triglycerides into monoglycerides and free fatty acids).
- Orlistat is a synthetic drug analogue of lipstanin which inhibit the lipase inhibition activity. The adverse effects associated with modern synthetic drugs are demanding for the search of a new lipase inhibitor.
- Various *Lekhenya* plants were selected from the *Ayurveda*, which recommended for lowering the lipid level in blood.
- The previous finding has opened the possibility of phytochemical exploration of *Ayurvedic* plants for possible PL inhibitor for the management of obesity.

Mechanism of pancreatic lipase enzyme



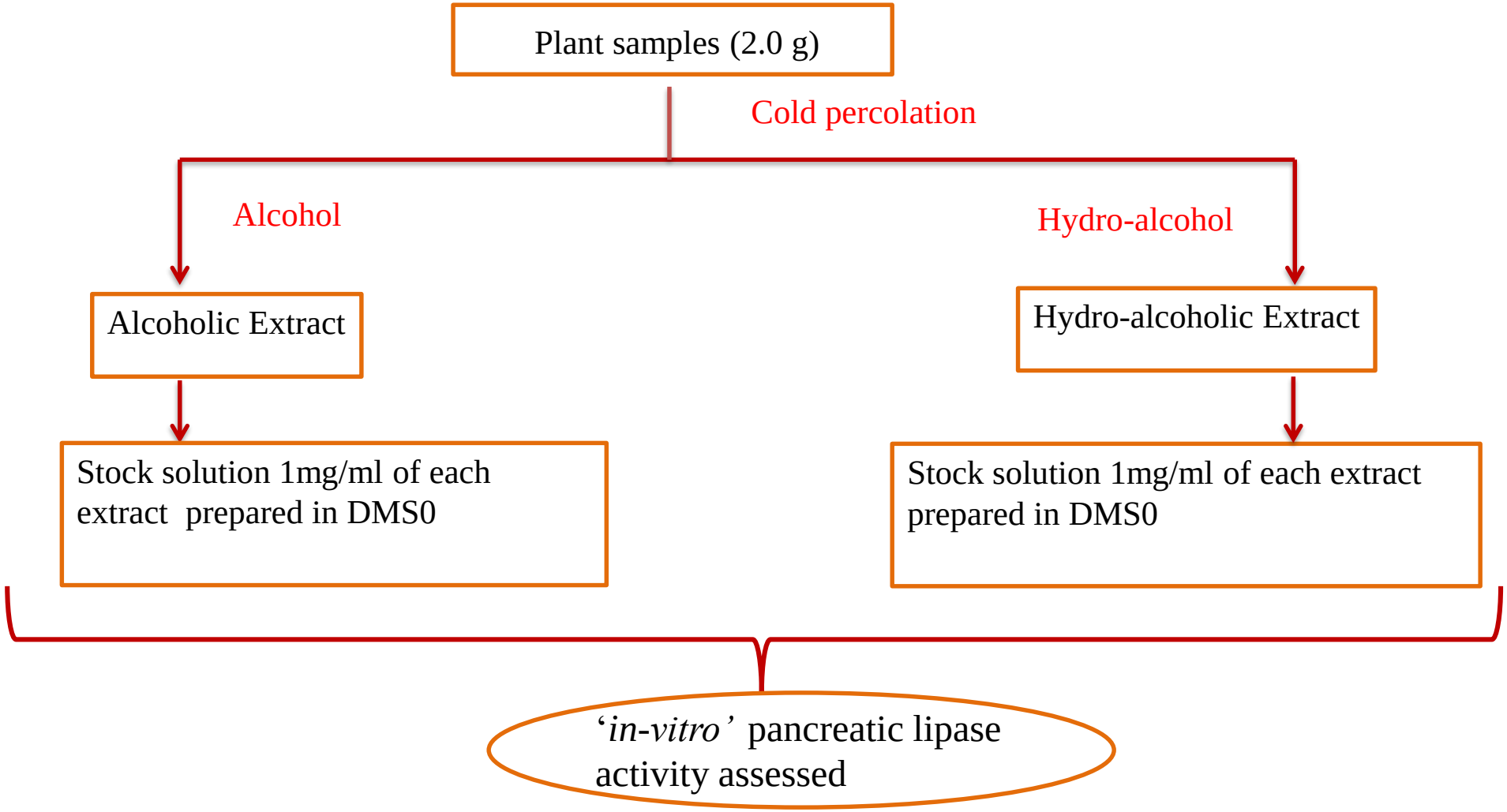
Screening of plant shows potent lipase inhibition

- The reference of Indian text i.e. *Ayurveda* was taken for the preliminary screening of plants.
- The plants which were recommended to minimize the lipid level in blood were selected for the preliminary studies.
- The plant material were collected from research farm of CIMAP, Lucknow, India. **(Table1)**.

Table 1: List of plant material collected for preliminary studies

S.No.	Plant name	Plant part
1	*Ficus racemosa* Linn.	Stem bark
2	*Ficus racemosa* Linn.	Fruit
3	*Moringa olifera* Lam.	Bark
4	*Cratavea nurela* Buch. Ham.	Bark
5	*Terminalia arjuna Roxb.* W.&A.	Bark
6	*Plumbago zeylanica* Linn.	Root
7	*Asparagus racemosus* willd.	Root
8	*Pterocarpus marsupium* Roxb.	Bark
9	*Acorus calamus* Linn.	Rhizome
10	*Achryanthes aspera* Linn.	Rhizome
11	*Termenalia chebula* Retz.	Fruit
12	*Cymbopogon citratus* DC. ex Nees	Leaves
13	*Coccinia indica* W.&A.	Leaves
14	*Piper longum* Linn.	Root
15	*Temenallia bellarica* Roxb.	Fruit
16	*Cyperus rotudenous* Linn.	Root
17	*Ocimum scantum* Linn.	Leaves
18	*Curcuma longa* Linn.	Rhizome
19	*Agele marmelos* L Correa. ex Roxb.	Fruit
20	*Andrographis paniculata* Burm. f. Wall. ex Nees	Root
21	*Cuminum cyminum* L.	Seed
22	*Cuminum nigrum* Linn.	Seed
23	*Prunus amygdalus* var. dulcis	Fruit
24	*Bellis perennis* Bell-p.	Fruit
25	*Morus alba* L.	Fruit
26	*Stereospermum suaveolens* Roxb. D.C	Bark
27	*Prunus cerasoides* D. Don	Bark
28	*Clerodendrum viscosum* Vent.	Bark
29	*Duranta erecta* L.	Bark
30	*Gardenia lucida* Roxb.	resin
31	*Mannda tinctoria* L.	Bark

Preparation of Extract



Methodology

Preparation of Sample
Plant extract = 1mg/ml

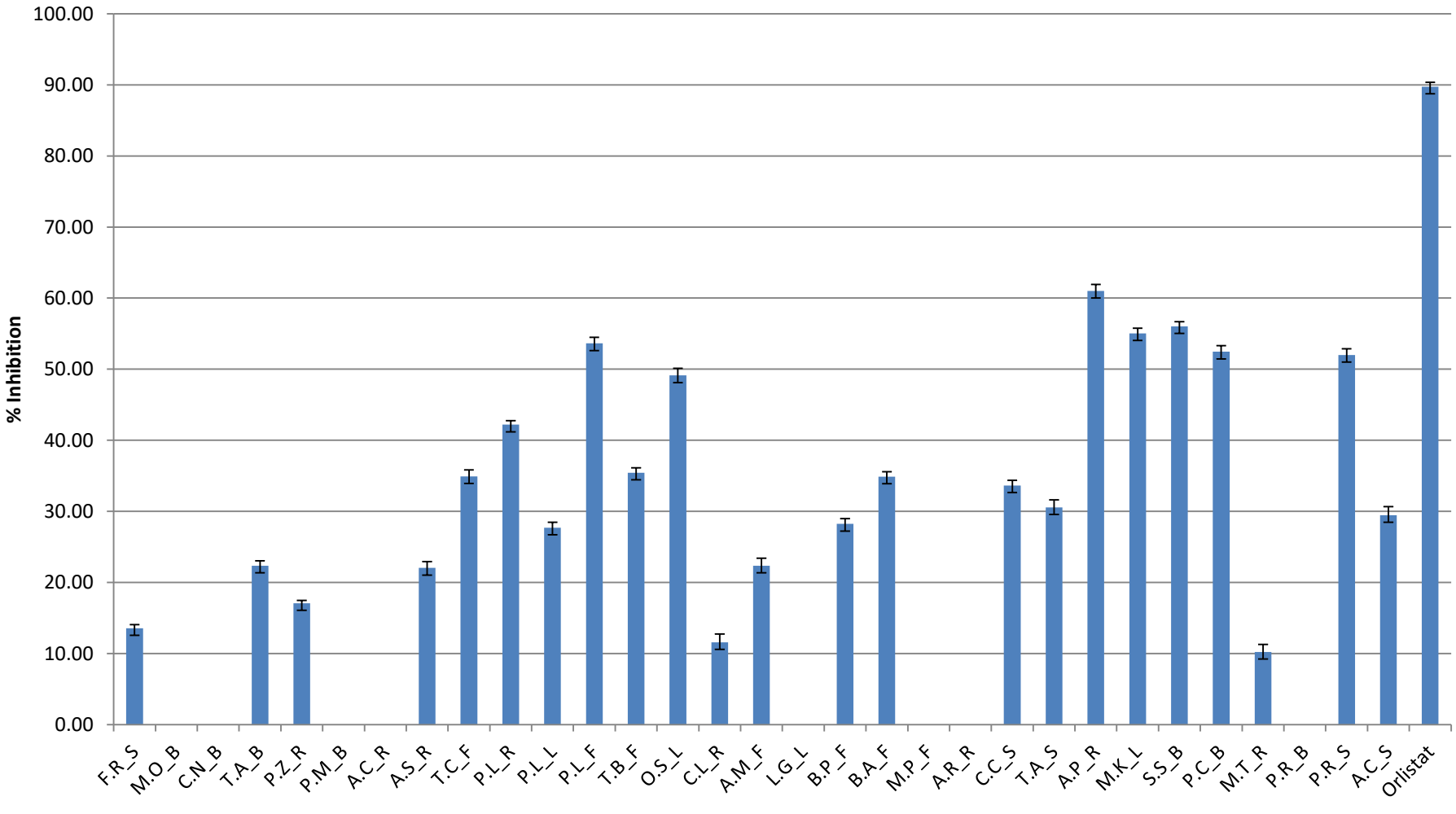
Preparation of Buffer

Reaction mixture (Sample + Substrate + Enzyme)

Incubation at 37ºC at 30 min and stop the reaction with tri-sodium citrate

Relative fluoroscence unit (RFU) on 355 (Exitation) & 460(Emission) nm in fluorometrical microplate reader

Screening of lipase-inhibitory activity in 31 Ethanolic extracts



Screening of lipase-inhibitory activity in 31 Hydroalcohalic extracts

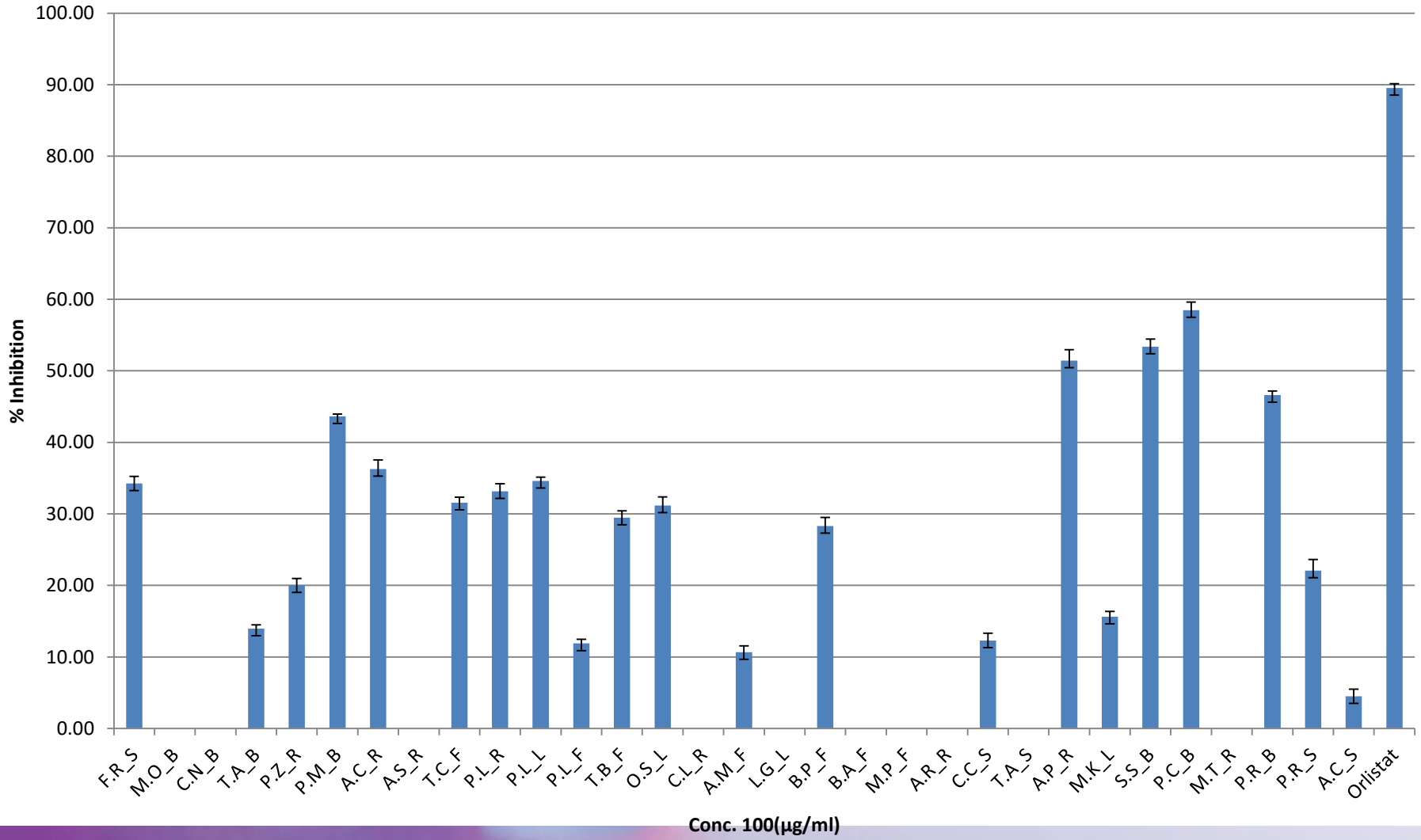


Table 2: Plant showed 50% inhibition in Lipase inhibitory

S.No.	Plant	Ethanolic Extract	Hydro alcoholic Extract
1.	*Andrographis paniculata* (Rt.)	+	-
2.	*Stereospermum suaveolens* (Roxb.) D.C (StBk.)	+	+
3.	*Termenalia arjuna* (StBk.)	+	-
4.	*Prunus cerasoides* D. Don (Rt.)	+	+
5.	*Pterocarpus marsupium* (StBk.)	-	+
6.	*Murraya koenigii* (L.)	+	-
7.	*Ocimum scantum* (Lf.)	+	-
8.	*Piper longum* (Rt.)	+	-
9.	*Garcinia combogia* (StBk.)	+	-

*(+) more than 50%; (-) Less than 50%

RESULT-

- The thirty one plants selected by taking reference from *Ayurveda* to screen pancreatic lipase inhibition potential.

- The lipase inhibitory activity of extracts (Alchoholic and Hydro-alchoholic) of the selected plants were determined according to the reported method.

- *In-vitro* lipase inhibition assay data showed that some plants gave better results as it was observed more than 50% enzyme inhibition in under listed plants **(Table 2)** and these can be considered as potent and others are least potent.

- From these plants some will be selected for further processing and isolation of compounds, according to their lipase inhibitory properties.

CONCLUSION

The study indicates lipase inhibition potential of *Ayurvedic* plants, may be useful for the management of obesity which correlate with Ethanobotanical data on the use of these plants in Indian folklore.

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ACKNOWLEDGEMENT

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