



Ayurceuticals: Potential for R&D in Global Healthcare

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ICMR Centre of Product Development

MUMBAI



Kasturba Health Society-Medical Research Center

An Integrated Vision and Endeavour for Biomedical Research



Faculty & staff of MRC-KHS with Shree Dhirubhai Mehta and Dr. Ashok Vaidya

The Indian Practitioner 2016; 69: 27-30

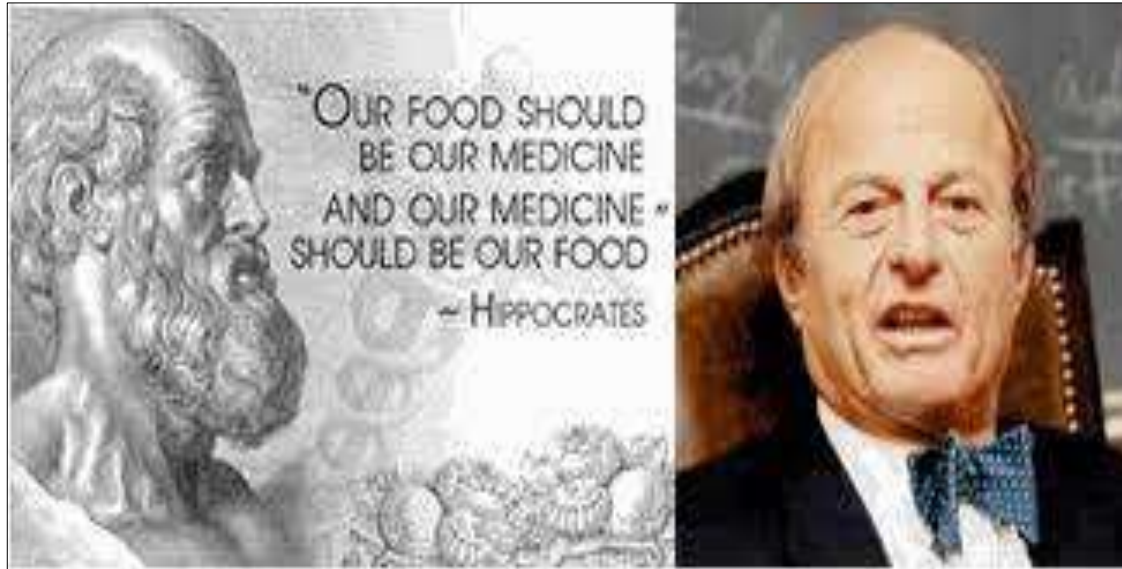
23.8.2022

PFNDAI-Amway Seminar

Ayurceuticals: Structure of the Presentation

- Genesis, Definition & Scope of Ayurceuticals
- Bharat: A rich heritage of Ayurveda Health Wisdom
- *Aahar to Aushadha*: Pleiotropic activity & R&D Paths
- Seasonal Health Foods and Value as Ayurceuticals
- Dietary individualization during Illness & Convalescence
- Ayurceuticals: Health-Promotion, Preventive and Therapeutic
- Global Impact of unique Ayurceuticals on R&D

Genesis of Nutraceuticals



Stephen De Felice -1989 coined the term Nutraceutic The figure taken from *An insight on Nutraceutic* by Niyati Borkar

De Felice is the founder and chairman of the Foundation for Innovation in Medicine, a non-profit organization established in 1976 to accelerate medical discovery by establishing a more productive clinical research community.

Genesis of Ayurceuticals

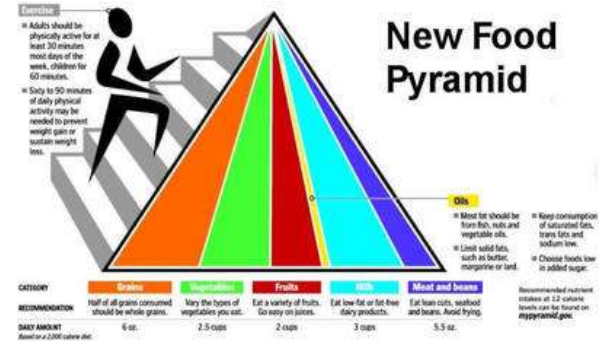


**Lifetime Achievement Award to Dr. Ashok Vaidya, KHS-MRC
at 5th Nutraceutical Summit, 2009 New Delhi,
Ayurceuticals synergizing with Nutraceutical for the wellness of society.**

“Cooking is an art. Diet is a culture. Nutrition is a science”

SHEEL (School Health Education and Enlightened Living Program)

Dr. Rama Vaidya



Definition of Nutraceuticals & Ayurceuticals

“Nutraceuticals are industry-business which combine pharmaceutical dosage forms to the nutritional supplements with health claims.”

“Ayurceuticals are AUS- based, culture-specific food supplements, which have quality, safety and activity for the defined indications.”*

AUS: Ayurvedic, Unani & Siddha



Ayurceuticals: Definition and Scope for R&D



Ayurceuticals:

It is a **subset of the universe** of *Food Supplements* (FSSAI), are products with documented quality, safety and efficacy, based on the principles and practice of Ayurveda, Unani and Siddha, with Consensual and Congruent Validity of Nutra-Ayurveda.

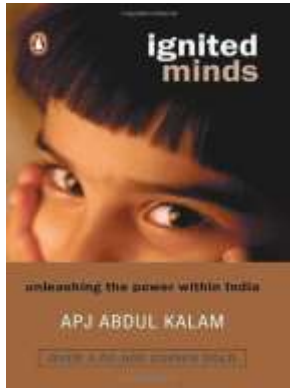
The Scope of R&D in Ayurceuticals:

The scope for R&D in *Ayurceuticals* is immense, in view of the vast therapeutic clinical usage of Ayurvedic drugs in India. However, presently, as the local and global markets, are humongous, **the current focus is more on a rapid product development than basic R&D.**

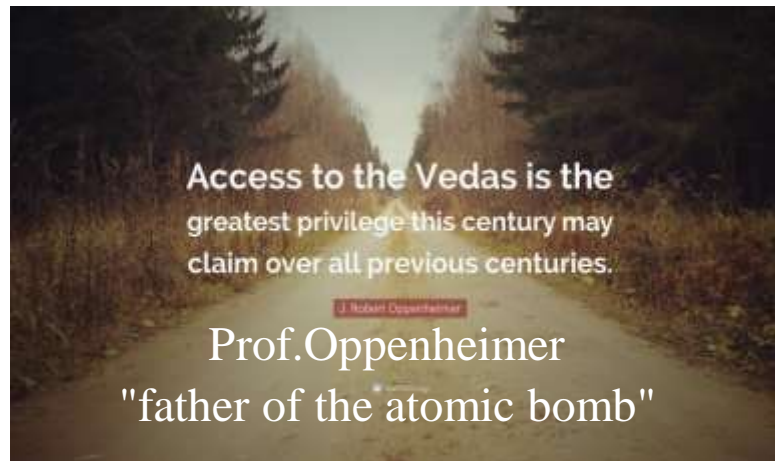
The unmet global needs of the health-care are **health of pregnant women**, health of the elderly, **metabolic & degenerative diseases**, healthy development of children, and complementary therapy in **cancer**, allergy, stress, viral diseases and immune disorders.

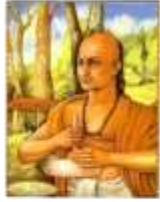
Global Knowledge Society

Integral Knowledge for Development



“Knowledge has always been a prime mover of prosperity and power...In the twenty-first century, a new society is emerging where knowledge is the primary production resource instead of capital and labour. Efficient utilization of this existing knowledge base can create wealth for us in the form of better health, education and other indicators of progress.... Whether a nation qualifies as a knowledge society is judged by how effectively it deals with knowledge creation and knowledge deployment.” --**Dr. APJ Abdul Kalam, “Ignited Minds” (2002)**





The Health Wisdom of Bharat



“औषधिनां परां प्राप्तिं कश्चिद्वेदितुमर्हति ।

योगज्ञस्तस्य रूपज्ञस्तासां तत्त्वविदुच्यते । । चरक सू।

“Only a few understand medicines thoroughly; one who knows their identity, characteristics and combinations of usage is called an expert on drugs.”

“बहुकल्पं बहुगुणं संपन्नं योग्यमौषधम् । । वाग्भट्ट

“One with a potential for multiple formulations and usage, with multiple good properties and potency is called appropriately drug.”

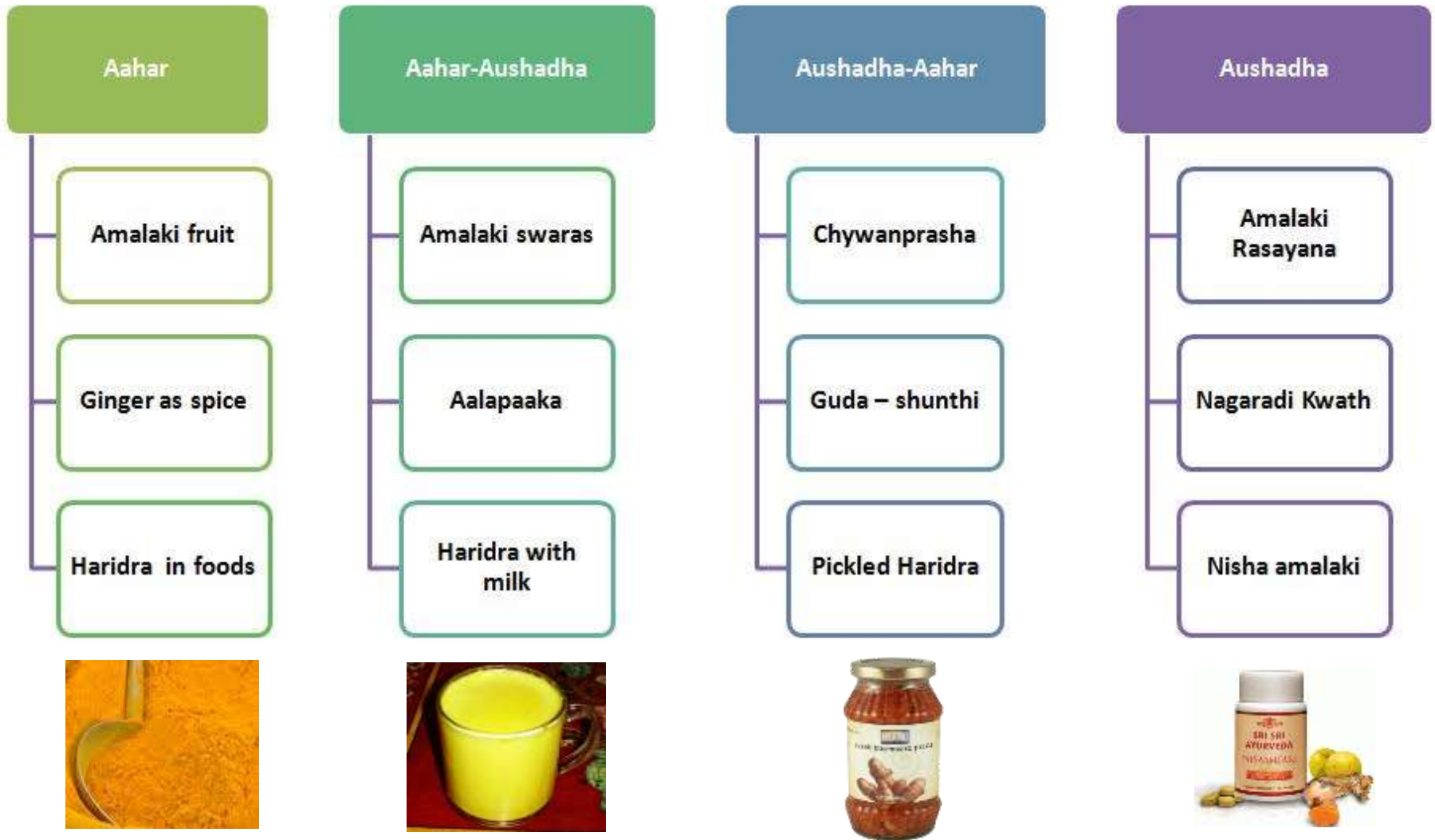
हिताहितं सुखदुःखसमायुस्तस्य हिताहितम् ।

मानं च तच्च यत्रोक्तमायुर्वेदः स उच्यते ॥

- च. सू. 1 41

“Wherein the beneficial and adverse influences leading to a healthy or a diseased life and their respective modalities - helpful or harmful - are described and measured-that is called Ayurveda.”

The Spectrum of Aahara Aushadha



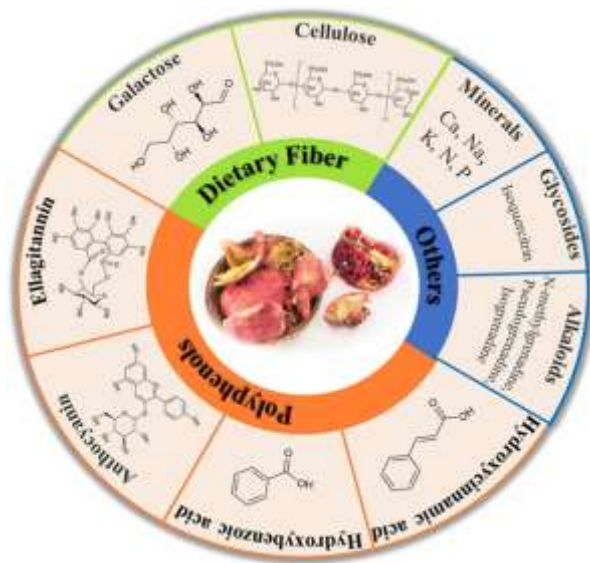
Ayurvedic indications for Dadim



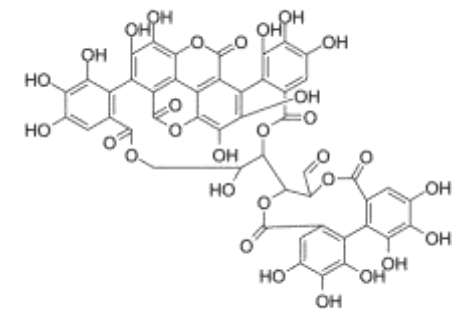
आमयिक प्रयोग :

- (१) अतिसार, संग्रहणीवर डाळिंबाच्या फळाची साल ताकात उगाळून २० ग्रॅम प्रमाणात द्यावी.
- (२) संग्रहणीवर कच्च्या डाळिंबाचा रस त्यात मायफळ, सुंठ व लवंगा उगाळून मध घालून द्यावा.
- (३) दाडिमादिघृत हृद्रोग, गुल्म, अर्श, ग्रहणी व पांडुरोगावर वापरावे.

Pomegranate peel: bioactive compounds and health benefits



punicalagin



Yaxian MO, Jiaqi Ma, Wentao Gao et al.

Pomegranate **Peel** as a Source of **Bioactive Compounds**: A Mini Review on Their **Physiological Functions**
Frontiers in Nutrition 2022 Jun 9;9:887113. doi: 10.3389/fnut.2022.887113

Systematic reviews and meta-analysis of effects of *Punica granatum L* on a spectrum of Non Communicable Diseases (NCDS)

Lucas Fornari Laurindo et al.

Pomegranate (*Punica granatum L.*) and **Metabolic Syndrome Risk Factors** and Outcomes:
A Systematic Review of Clinical Studies
Nutrients 2022, 14, 1665

Asgary, S.; Karimi, R.; Joshi, T.; Kilpatrick, et al.

Effect of pomegranate juice on **vascular adhesion factors**: A systematic review and meta-analysis.
Phytomedicine. 2021, 80, 153359

Wong, T.L.; Strandberg, K.R.; Croley, et al.

Pomegranate bioactive constituents target multiple oncogenic and oncosuppressive signaling for **cancer prevention and intervention**.
Semin. Cancer Biol. 2021, 73, 265–293.

Marius Alexandru Moga

Pharmacological and Therapeutic Properties of *Punica granatum* Phytochemicals:
Possible Roles in Breast Cancer
Molecules 2021, 26, 1054. <https://doi.org/10.3390/molecules26041054>

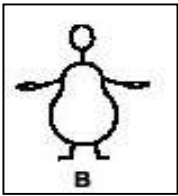
International Diabetes Federation (IDF) definition Metabolic Syndrome



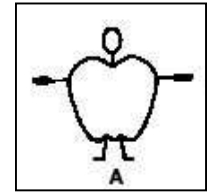
Central obesity (waist circumference > 80cm in females)

With any two of the following

- ❖ TG : > 150 mg/dL or specific treatment for this lipid abnormality
- ❖ HDL cholesterol: < 50 mg/dL in females, or specific treatment for ↓ HDL
- ❖ BP: systolic > 130 or diastolic > 85 mm Hg, or antihypertensive treatment
- ❖ FPG > 100 mg/dL), or previously diagnosed type 2 diabetes
- ❖ OGTT (optional) – to identify IGT



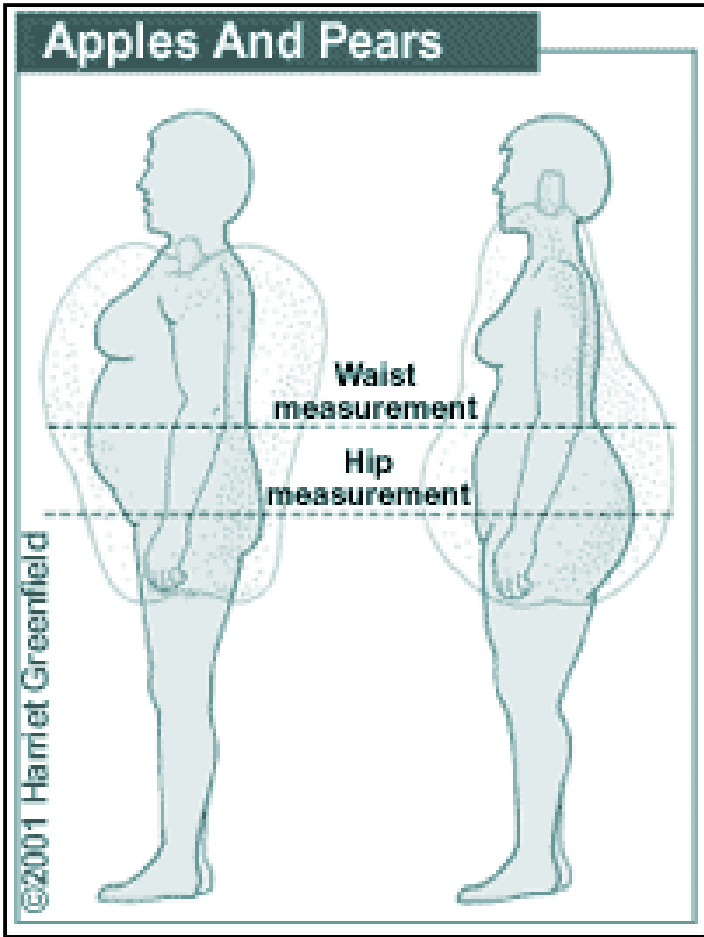
Metabolic Syndrome : Maitreyi Data



(n = 152/357 42.6%)

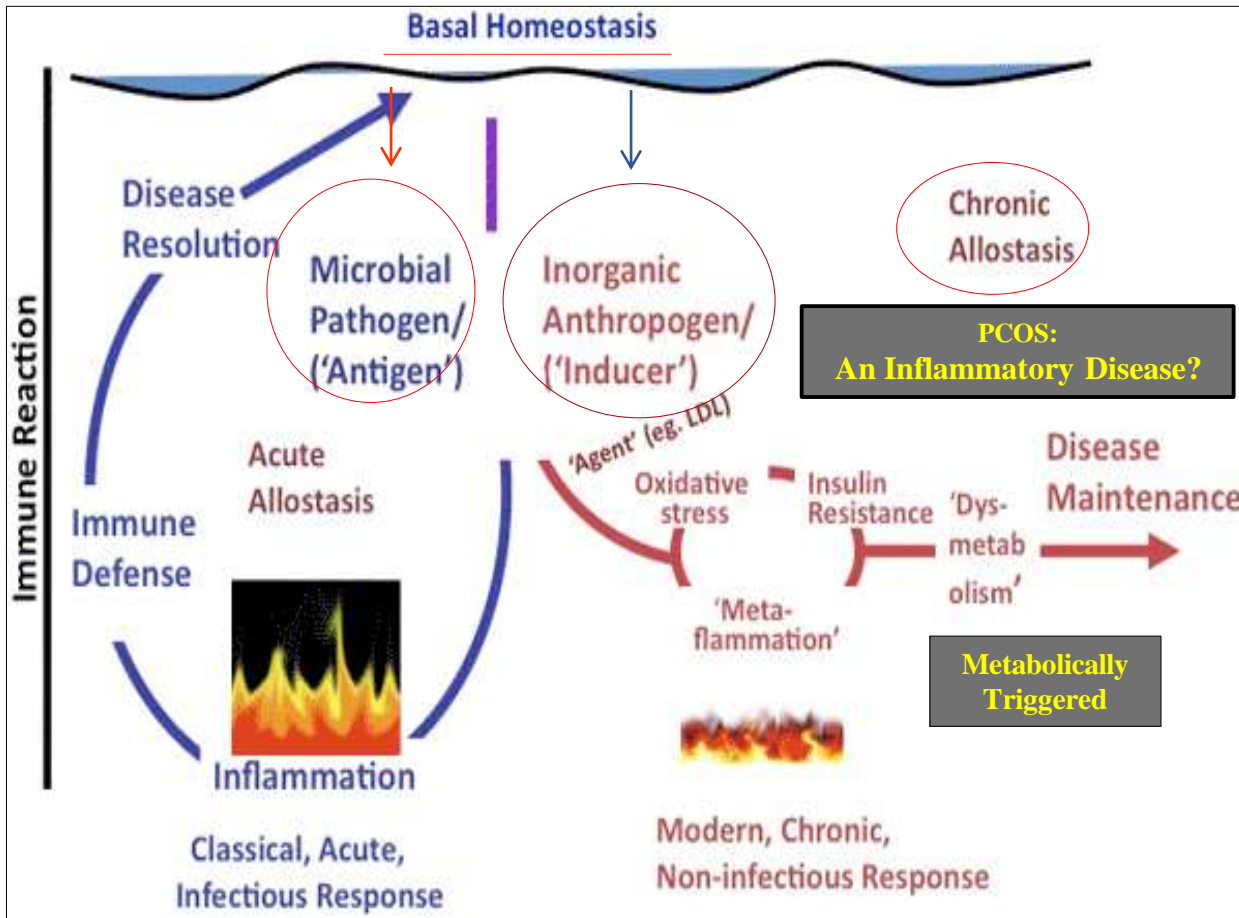
Central Obesity	Number	Percentage
WC > 80	283/357	79.3
Hypertension	144/345	41.3
↑ TG	80/357	22.4
↓ HDL	172/357	48.2
IFG/IGT/Kn.DM/New DM	57/357	15.2

Waist Circumference (WC) & BMI Correlation



BMI categories (kg/m ²)	WC (cm)	
	Mean	Range
< 20	70.14	64 – 69
20 – 23	76.38	65 – 90
23.1 – 25	82.92	71 – 97
25.1 – 30	89.58	71 – 106
> 30	100.03	83 – 123

Low Grade Systemic and Chronic Inflammation and an “anthropogen-based etiology”



Classical inflammation



“Raging Fire”

“Meta Inflammation”



“Smoldering Fire”

Egger G.

In Search of a Germ Theory Equivalent for Chronic Disease.

Prev Chronic Dis 2012;9:110301.

Shringi MS, Vaidya RA, Vaidya AB et al.

Insulin Resistance in PCOS:A study of 90 patients.

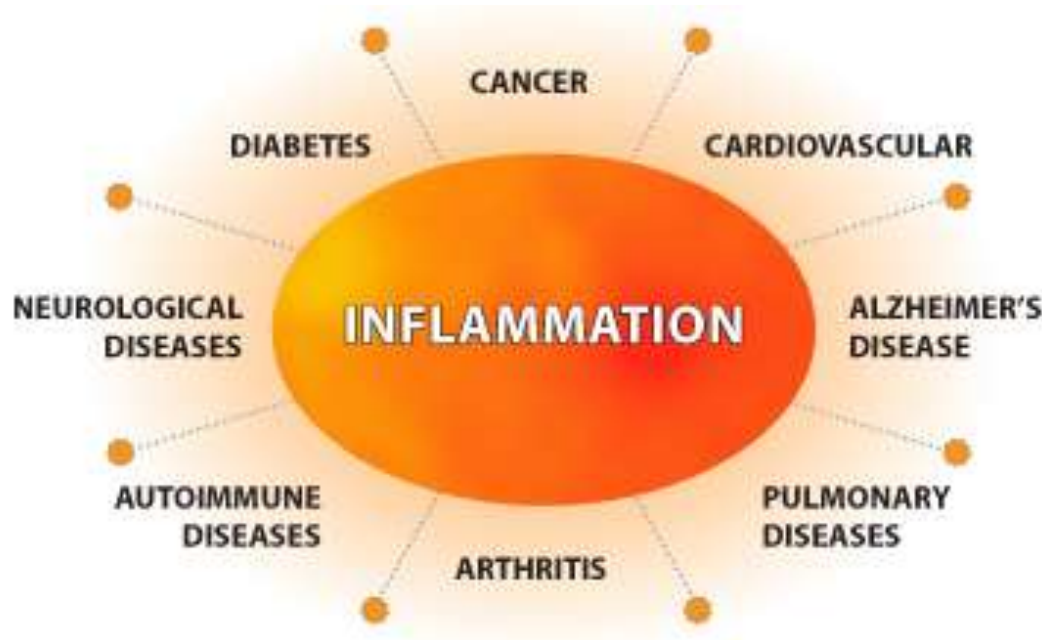
Indian J Endocr Metab. 2003;1:19-23

Mertia P, Agashe S, Rege N , Vaidya R

Polycystic Ovary Syndrome and Leucocytosis

The Indian Practitioner 2014;67:485

Smoldering Inflammation: Central to Chronic Diseases



Cachexia:

(From chronic inflammation)

70-80% lean body mass

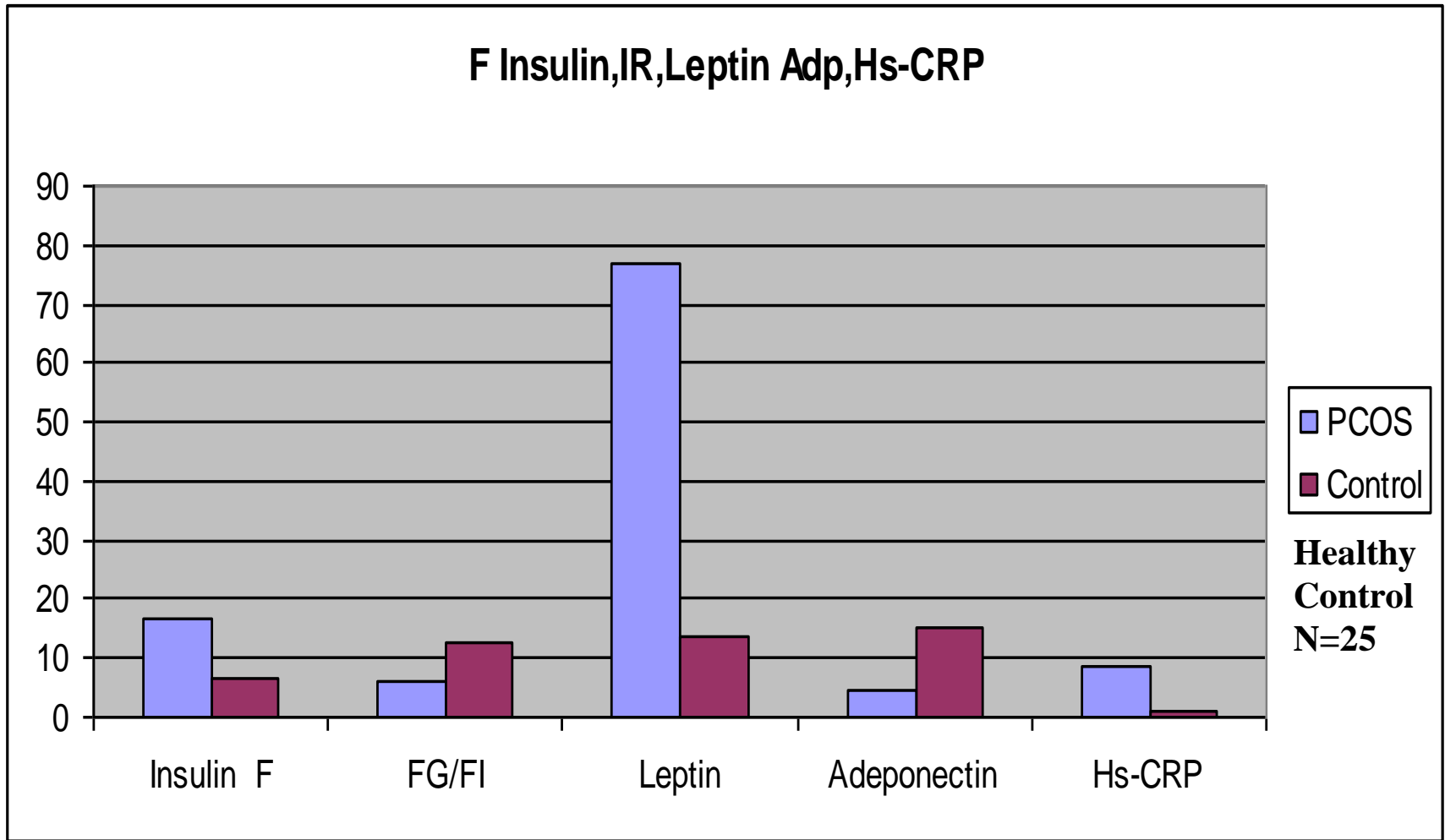
20-30% body fat

Cachexia-related metabolic changes:

- Hepatic acute-phase protein synthesis
- Increased skeletal muscle breakdown
- Negative nitrogen balance
- Increased lipolysis
- Hyperinsulinemia
- Increased gluconeogenesis

Wallace JI, Schwartz RS. Epidemiology of weight loss in humans with special reference to wasting in the elderly. *International Journal of Cardiology*. 2002/9 2002;85(1):15-21.

Hyperinsulinemia, Insulin Resistance & Adipo/cytokines in PCOS (N=43)



Pandey SN,Vaidya RA,, Agashe SV 2010

Records **screened 2458** and finally **20 studies (RCTs)** were included for (PRISMA) for systematic review

Participants N= 828 (136 PCOS, 146 Obese, 112 Diabetics, 46 ICHD and MI)

Biomarkers: BMI, TC, LDL, HDL, FBS, Insulin, HOMA IR, C-reactive protein, high-sensitivity CRP (hs-CRP), interleukin-6 (IL-6)

The results in **PCOS** showed that the pomegranate intervention improved metabolic, oxidative, hemodynamic, and inflammatory characteristics of the treated women. This study was **triple-blind**, and the sample size was calculated. **Esmaeilnezhad et al**

Studied in *in vitro*, *in vivo* and a few clinical trials. However, **it can not be offered as monotherapy.**

Requires more in-depth clinical studies through Nutra- epidemiological and Aurvedic pharmaco-epidemiological and Reverse Pharmacology.

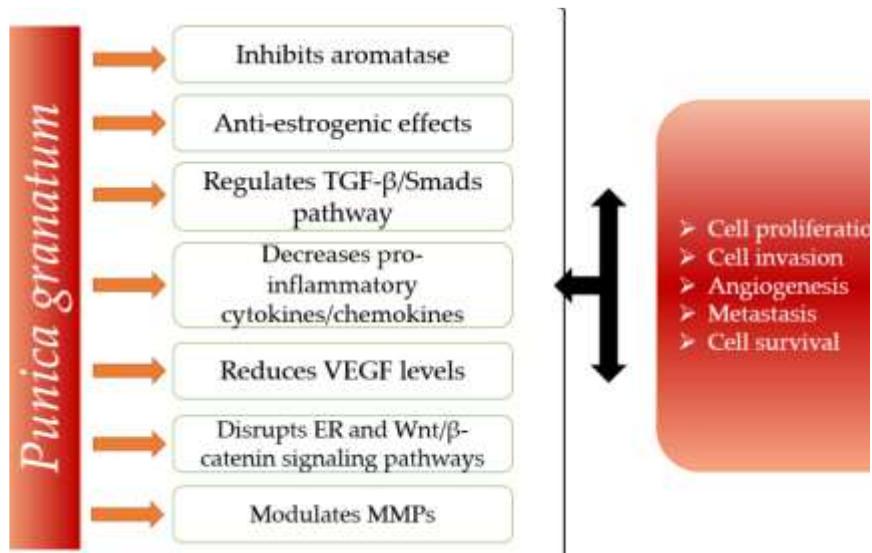
Lucas Fornari Laurindo et al.

Pomegranate (*Punica granatum* L.) and **Metabolic Syndrome Risk Factors and Outcomes:**
A Systematic Review of Clinical Studies, *Nutrients* 2022, 14, 1665

***Punica granatum* Phytochemicals: Possible Roles in Breast Cancer**

- **Selective Estrogen Receptor Modulators (SERM) properties** in Methanol extracts of pomegranate pericarp
- **Genistein** treatment induced cell cycle arrest in T47D breast cancer cells with a **low ER α /ER β ratio**, and also improved the **mitochondrial functionality**.
- **Quercetin** was shown to **decrease adriamycin (ADR) resistance** in ER+ MCF-4 ADR-resistant breast cancer cell line, in a dose-dependent manner.
- **Kaempferol**, present in the pericarp of pomegranates, might increase the concentration of the chemotherapy drug into the tumor cells, by **inhibiting the pump responsible for the drug efflux**
- **Polyphenols** are able to **inhibit the activity of 17 α -hydroxysteroid dehydrogenase** from 34% to 79%.
- Among ellagitannin-derived compounds (urolithin A, urolithin B, gallagic acid, ellagic acid, etc) **Urolithin B** exhibited the most significant **anti-aromatase activity** and inhibited the proliferation on ER+ MC7

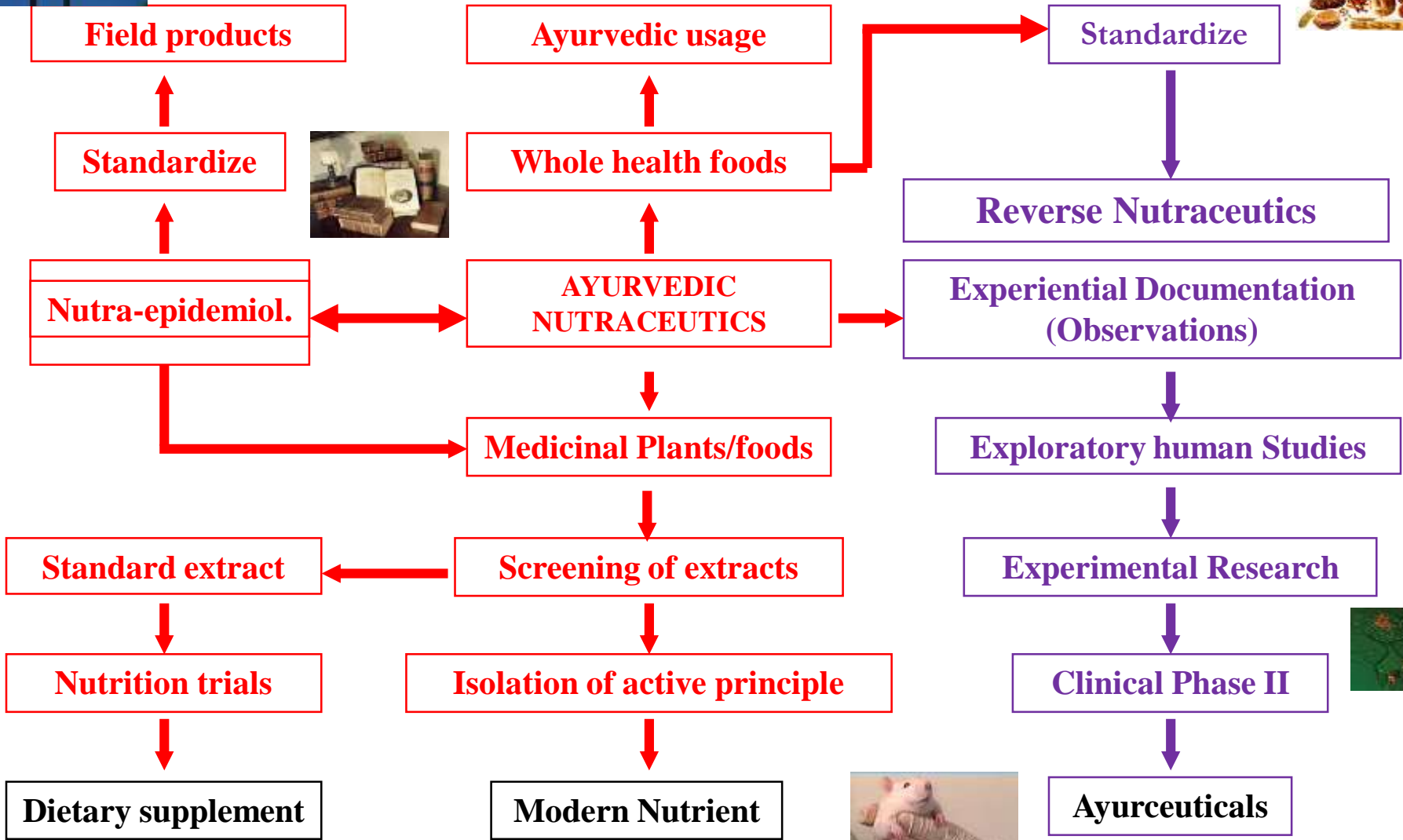
Anticancer mechanisms of *Punica granatum*



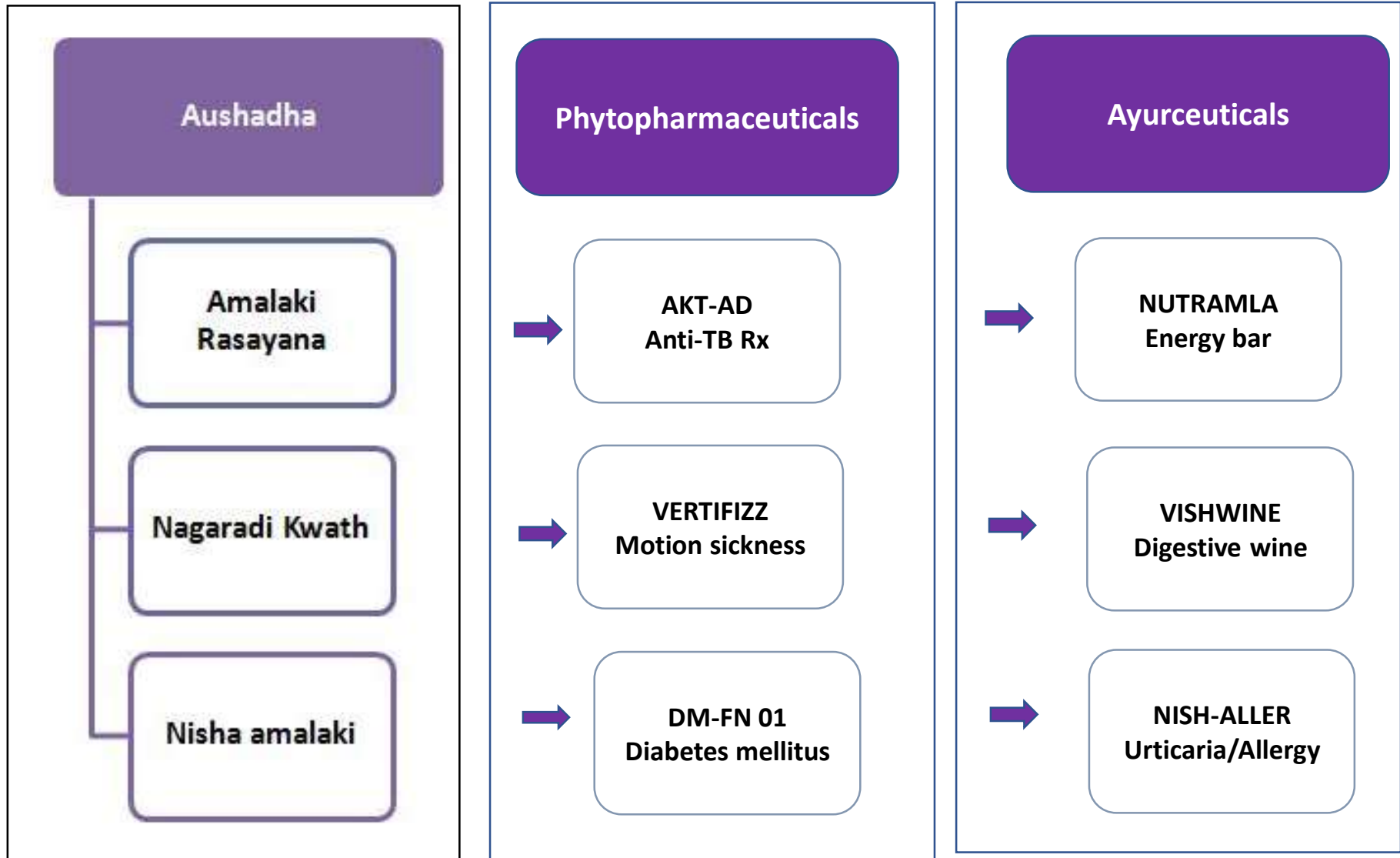
- Regarding the **anti-estrogenic effects**, fermented pomegranates juice inhibited the growth of ER+ MCF-7 and ER- MB-MDA-231 breast cancer cell lines.
- It also inhibited the **estrogenic activity** of 17--estradiol by 55%.
- In ER+ MCF-7 breast cancer cells, pomegranate seed oil also inhibited the **invasion process and induced apoptosis** in ER- MDA-MB-435 metastatic human breast cancer cells.
- Pomegranate emulsion induced **anti-proliferative and pro-apoptotic effects** in tumoral cells cultures



R&D Paths from Ayurveda



Reverse Nutraceuticals



Use of *KATLU*-A traditional food by Gujarati new mothers:- A study of Three Generations

Master of Science
In
Dietetics & Food Service Management



SUBMITTED BY
NEETA RAVAL
ENROLLMENT NO.075477364

GUIDED BY
Dr. SHOBHA UDIPI
S.N.D.T.UNIVERSITY, MUMBAI

CO-GUIDED BY
Dr. RAMA VAIDYA
KASTURBA REASERCH CENTER, MUMBAI



N=211(Generation I=79, Generation II= 77, Generation III= 55)

Horizons of the Process of Integration Widened with Nutrition Science and Culinary Expertise at KHS-MRC



**Dr. Shobha Udipi and Dr. Ashok Vaidya in dialogue with
Dr. Rama Vaidya, Dr. Amonkar and Dr. Ashwinikumar Raut**

**Triple domains of
Ayurveda, Conventional Medicine and Nutrition Science
have come together to build a strong foundation for evolving IANHC.**

Traditional medicinal plant based Ladoo Preparation for New Mothers



**KATLU standardized Preparations
(Cookies and Bars) at MRC-KHS
16th October 2018**



JAAPE KE LADDU





Katla Laddu / Batrisa

30 medicinal herbs with Ghee and Jaggery

- Ardrak /Shunthi (*Zingiber officinalis*)



- Shatavari (*Asparagus racemosus*)



- Pippali (*Piper longum*)

- Lendi Pimpali (*Piper longum*)

- Gokharu (*Tribulus terrestris*)

- Marich (*Piper nigrum*)

- Kali Musali (*Curculigo orchides*)



- Jayphal (*Myristica fragrance*)

- Ashwagandha (*Withania somnifera*)

- Methi -Fenugreek seeds (*Trigonella foenum – graecum*)



- Dalchini (*Cinnamon zylanicum*)

- Suvadana - Dill seeds (*Peucedanum gravelona*)



- Kruancha beej (*Mucuna prurines*)

- Gonda (Tragacanth Gum) (*Astragalus*)



- Tamalapatra (*Cinnamonum tamala*)

- Bala (*Sida cordifolia*)

- Lavang (*Syzgium aromaticus*)

- Haridra (*Curcuma longa*)

- Shatapushpa (*Foeniculum vulgare*)

- Chopchini (*Smilax china*)

- Narikel (Coconut) (*Cocos nucifera*)

- Nagkeshara (*Musa ferra*)

- Jeera (*Cuminum cyminum*)

- Dhanyak (*Coriendrum sativum*)

- Brihat Ela (*Ammomum subulatum Pennel*)

- Tejpatra (*Xanthoxylum chava*)

- Ajmoda (*Trachyspermum ammi*)

- Vidarikanda (*Pureria tuberosa*)

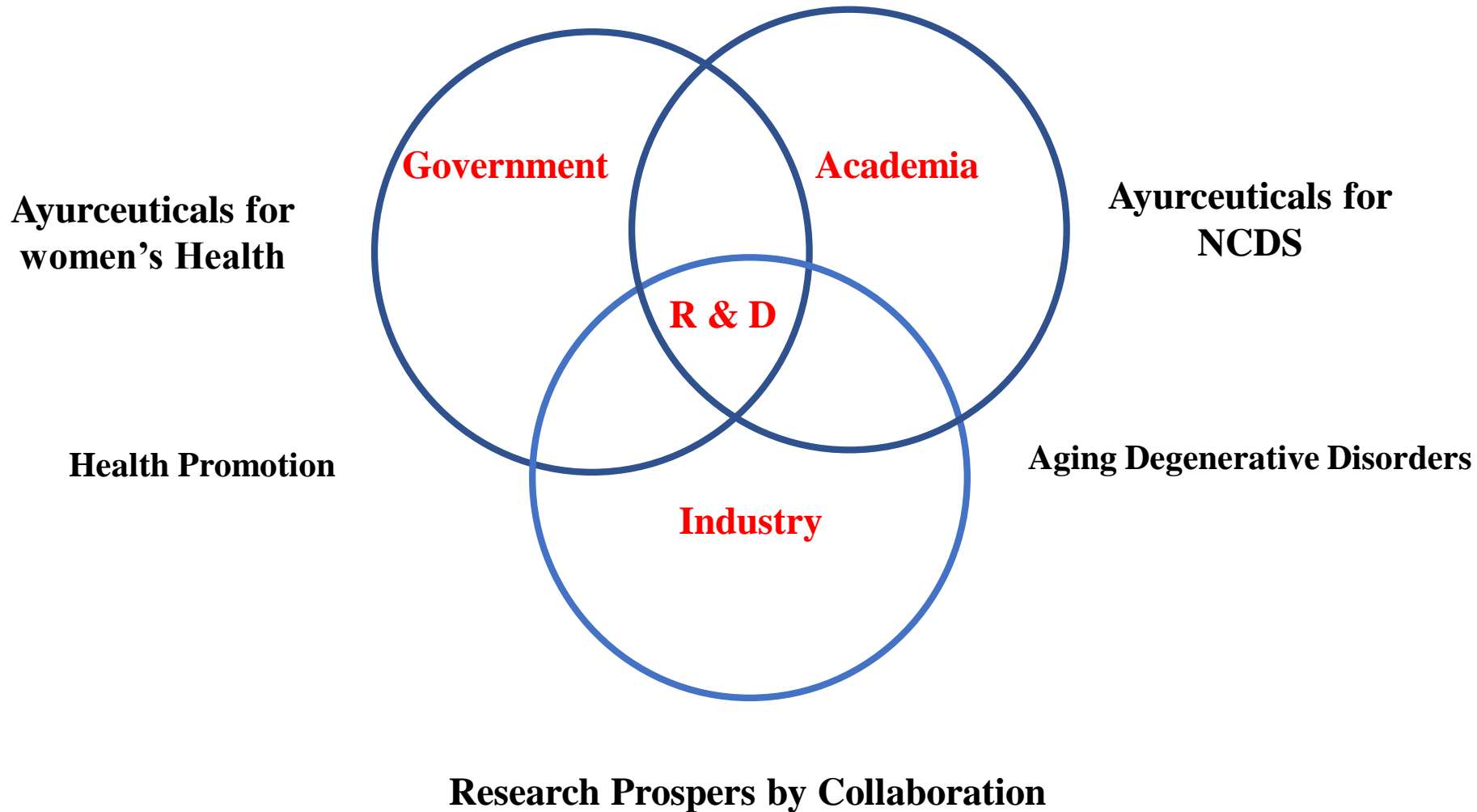
- Isapgol (*Plantago ovata*)

- Gorakhamundi (*Sheranthus indicus*)

- Chavak (*Piper chaba*)



Trilateral Quest and Impact for Ayurceuticals : Collaborative Domains & Stake Holders





Thank you