SARCOPENIA AND PROTEIN

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Let Food be
Thy Medicine
&
Medicine be
Thy Food
- Hippocrates

Eating Smart

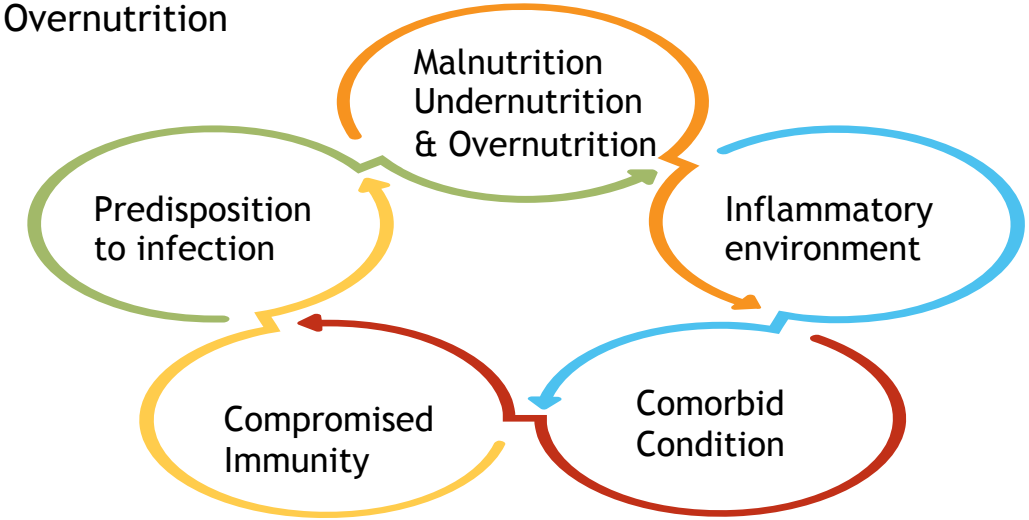
Eating healthy does not mean eating less

Healthy eating does not involve following latest *diet trends*

Nutritional requirements vary across all age groups

Nutritional intake & dietary patterns are directly linked with metabolic abnormalities

Inappropriate eating practices leads to Malnutrition: Undernutrition and Overnutrition



Hidden Contributors to the Inflammatory state

- Malnutrition & Micronutrient deficiencies - Imbalance in Diets
- Inadequate & Irregular sleep patterns
- Sedentary lifestyle
- Comorbid chronic health conditions
- Chronic Stress - underlying depression
- Environmental Pollution

Philip C.Calder et al (2020); Optimal Nutritional Status for a Well-Functioning Immune System is an Important Factor to Protect Against Viral Infections; Preprints

Why is Metabolic Health Important?

Metabolic Phenotypes

Although many different definitions are used for metabolic health, insulin resistance is regarded as the core pathophysiology

BMI <25 kg/m2 and <2 metabolic risk factor

Metabolically Healthy Non-Obese (MHNO)

Metabolically Healthy, Obese (MHO)

Lower degree of IR , <2 metabolic risk factors or favourable metabolic profiles even in patients with BMI >25kg/m^2

Higher degree of IR & adiposity , >2 metabolic risk factors even in patients with BMI <25kg/m^2

Metabolically Unhealthy, Non-Obese (MUHNO)

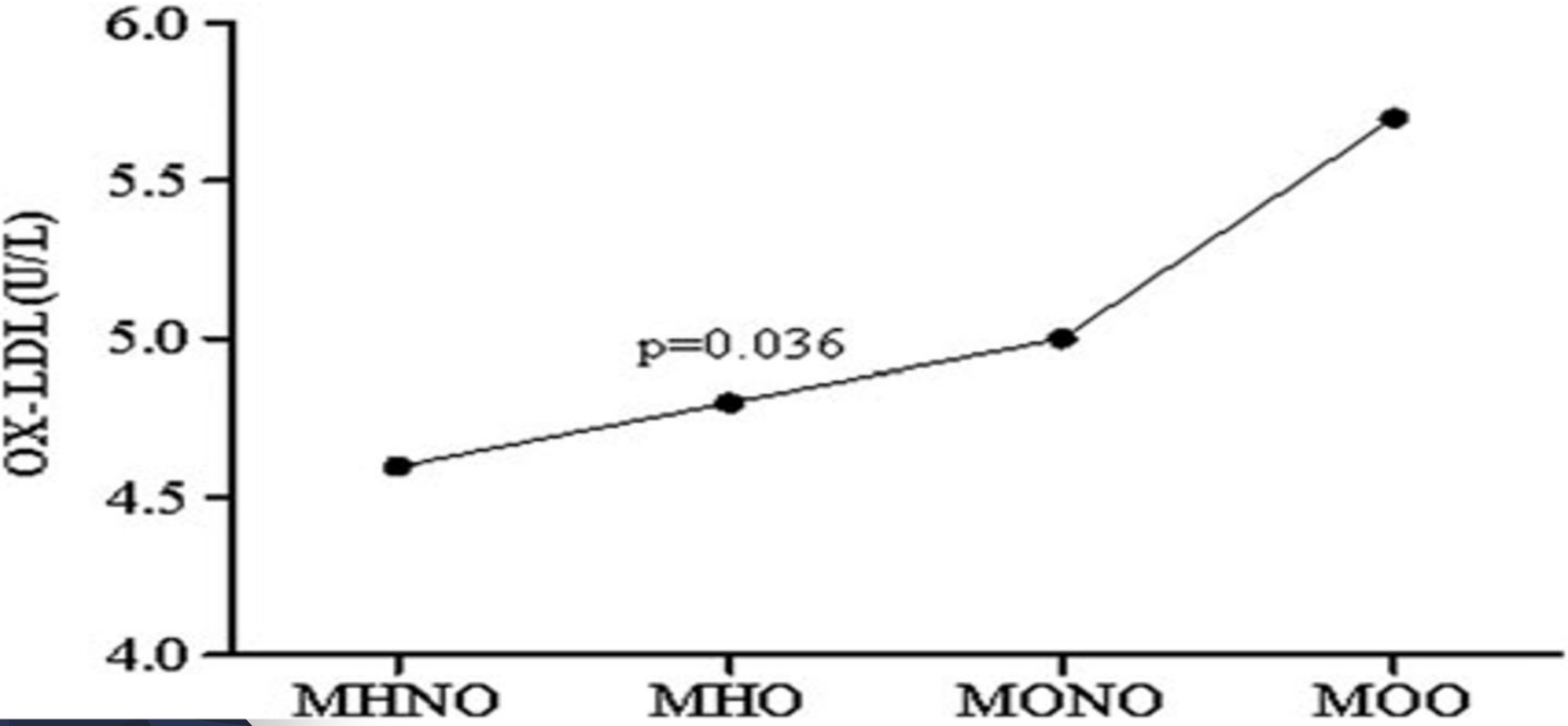
Metabolically Unhealthy, Obese (MUHO)

Higher degree of IR & metabolic abnormalities >2 metabolic risk factors in patients with BMI >25kg/m^2

The phenotypes are usually identified using surrogate markers of insulin resistance, the number of metabolic syndrome components, the amount of visceral fat, or the composition of cardiovascular risk factors.

Lee Et Al. Changes In Metabolic Health Status Over Time And Risk Of Developing Type 2 Diabetes. Medicine.2015, Metabolic Health And Weight: Understanding Metabolically Unhealthy Normal Weight Or Metabolically Healthy Obese Patients. METABOLISMCLINICALANDEXPERIMENTAL65(2016)73-80. **Indulekha Et Al.** Metabolic Obesity, Adipocytokines, And Inflammatory Markers In Asian Indians—cures-124

Inflammatory Markers & Metabolic Health



Indulekha et al. Metabolic Obesity, Adipocytokines, and Inflammatory Markers in Asian Indians—CURES-124. DIABETES TECHNOLOGY & THERAPEUTICS Volume 17, Number 2, 2015.

WHAT IS SARCOPENIA

"*A syndrome characterized by a **progressive and general loss** of skeletal **muscle mass and strength** with an increased risk of adverse disability, frailty and poor quality of life*"

WHAT IS SARCOPENIC OBESITY

*"Sarcopenic obesity is a new class of obesity in older adults in which **low skeletal muscle mass** is coupled with high levels of **adiposity". It is unfortunate - now we see it in Young Adults of India***

Ref: EWGSOP2, 2019, Janice.L.Atkins et al, 2019

TYPES OF SARCOPENIA

PRIMARY SARCOPENIA

- Found in geriatrics
- Loss of muscle mass and/or function and strength
- Multifactorial pathogenesis.

SECONDARY SARCOPENIA

- Patients in any age group, including younger patients
- Muscle wasting, loss of strength, and/or function
- Specific underlying cause.

Ref: SWAG-SARCO-2022

PREVALENCE

SARCOPENIA

(>80 y)

15.2%

SARCOPENIC OBESITY

(>80 y)

10-15%

SARCOPENIA

≥ 65 y

17.5%

50% **44%**

(>80 y)

SARCOPENIC OBESITY

≥ 65 y

5.4% - 6.3%

Ref: 1. SWAG-SARCO-2022, 2. Ramesh Pal, SO-CUBES,2021

ETIOLOGY OF SARCOPENIA

Endocrine

Corticosteroids, abnormal thyroid function, Insulin Resistance

Disuse

Immobility, Physical Inactivity

Age related

Primary Sarcopenia

Sub Optimal Nutrition Malabsorption

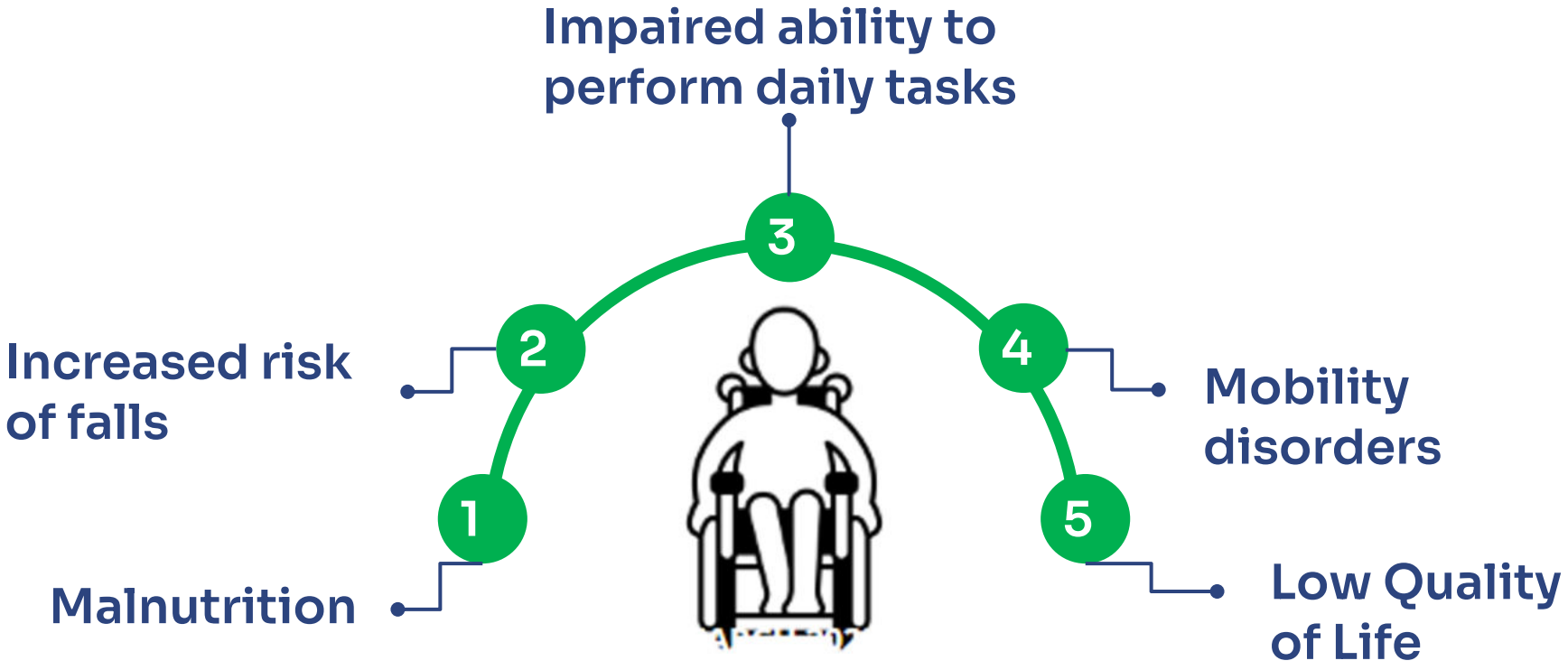
Neuro- generative Disease

Motor Neuron loss

Cachexia

Ref: Roberto Cannataro et al, 2021

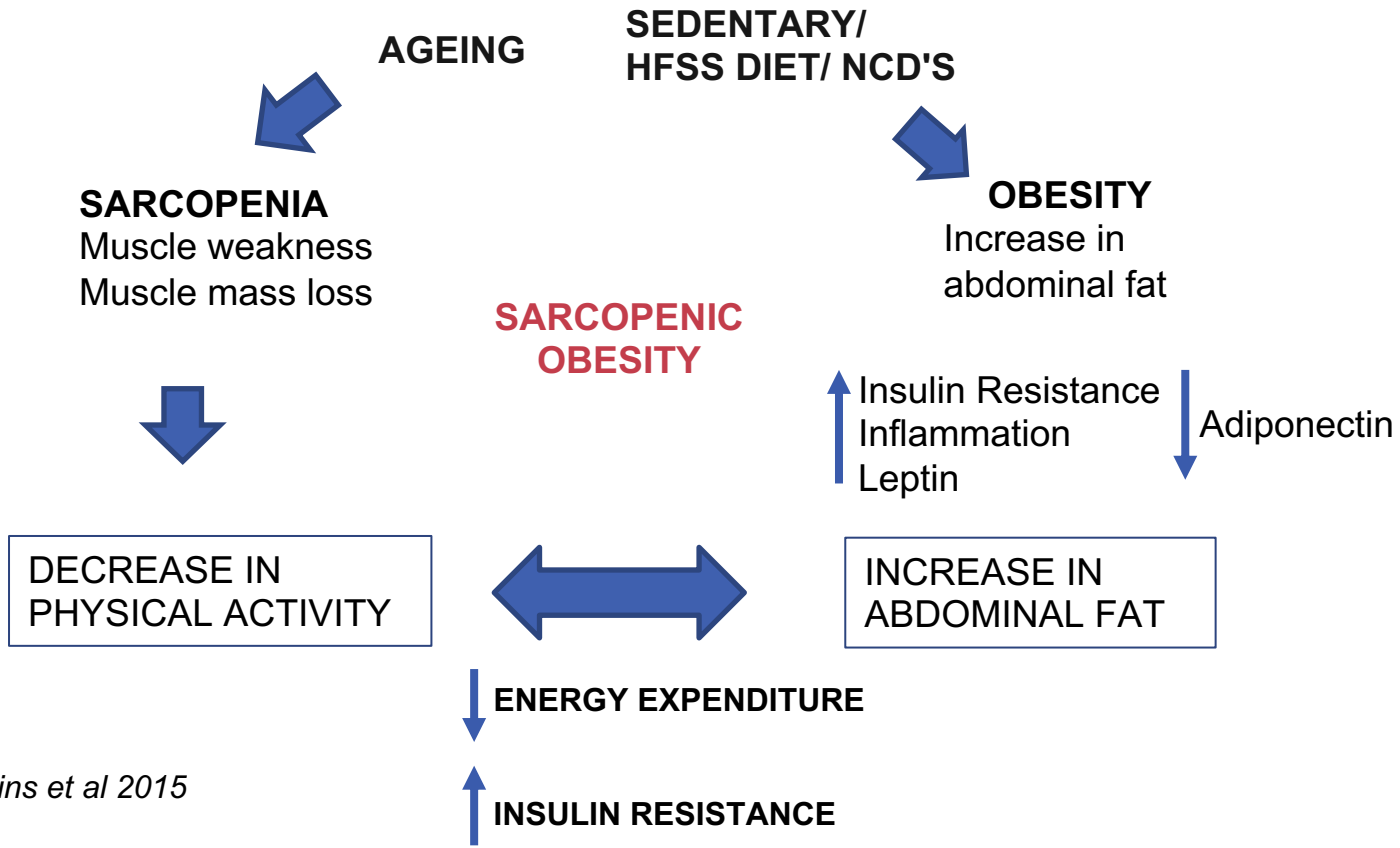
COMPLICATIONS DUE TO SARCOPENIA



Sarcopenia associated complications can lead to increased risk of mortality

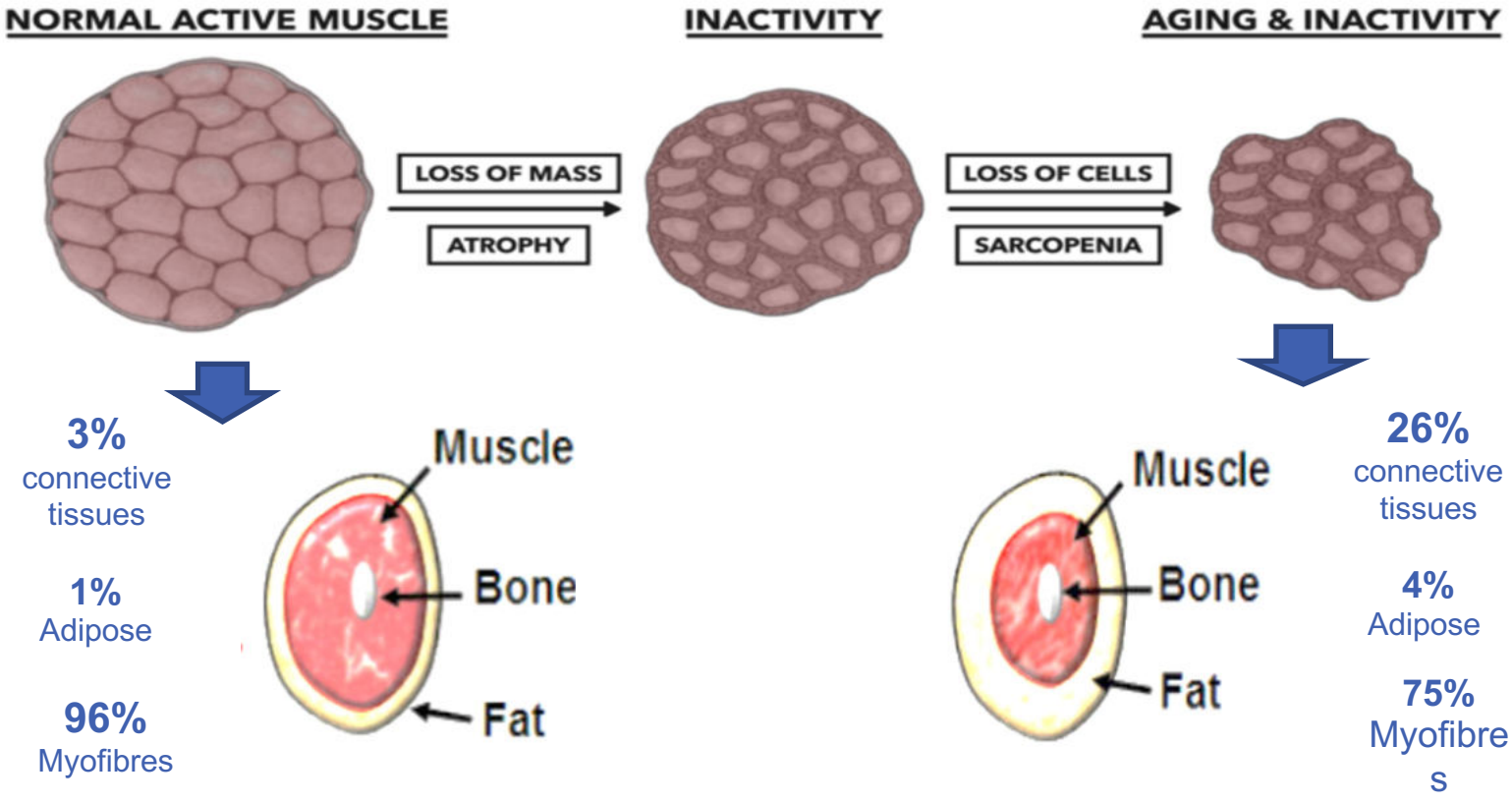
Ref: Janice Atkins et al 2015

PROGRESSION OF SARCOPENIC OBESITY



Ref: Janice Atkins et al 2015

PROGRESSION OF SARCOPENIC OBESITY



NUTRITIONAL INTERVENTION

Hypo- Caloric Diet: 20-25kcal/kg/day

High Protein :1.2-1.8 g/kg IBW /d 

- Good Quality Proteins (9 essential Amino Acids)
- Leucine rich foods (5-6g /Meal)
- Protein sourced from Cereals : Legumes: Milk (3:1:2.5) 

Fibre : 35-40g/day 

Good Quality Fats; Rich in MUFA & PUFA , **Nuts** (15-20% En 

Increased consumption of **Millets** 

Cross-sectional study in Indian Adolescents and Young Adults (2020 - 2021)

Prevalence of Hyperinsulinemia and Insulin Resistance: A Cross-Sectional Study of Adolescents and Young Adults in Mumbai, India

To explore snacking patterns and its association with body composition in adolescents and young adults, aged 16–25 years in Mumbai, India.

Jagmeet Madan[1], Sharvari Desai[2], Panchali Moitra[1], Sheryl Salis[1], Rekha Battalwar[1], Soumik Kalita[1], Ajay Phatak[2], Shobha Udipi[2], Rama Vaidya[2], Ashok Vaidya[2]

[1]Sir Vithaldas Thackersey College of Home Science (Autonomous), SNDT Women's University, Mumbai
[2]Kasturba Health Society's Medical Research Centre, Mumbai, India

Madan et al, 2021 Unpublished Data

METHOD

Design: Cross sectional study
Setting: Educational institutes (n=11), Mumbai, India.
Participants: Adolescents and young adults, age 16-25 years (n= 1313)

Variables

A) Anthropometry (weight, height, body fat %, visceral fat, BMI, WC, HC, WHR, W:Ht)

B) Physical examination- Blood pressure (systolic and diastolic blood pressure)

C) Biochemical Parameters : Fasting glucose and insulin, 2-h glucose and 2h stimulated insulin, HbA1C, CBC

D) Diet and nutrient intakes - Snacking Pattern- Validated snacking questionnaire

Ethical Considerations:

ISBEC ver 2, August, 2017. Informed written consent from participants and parents of participants < 18 years were obtained.

Madan et al, 2021 Unpublished Data

RESULTS

Characteristics	n (%)
Gender	
Males	457 (34.9)
Females	853 (65.1)
Age Categories	
16-19 years	724 (55.3)
20-22 years	492 (37.5)
23-25 years	94 (7.2)
Family history of diabetes	
First degree family member (parents/siblings)	287 (21.9)
Second degree family member (grandparents/ uncle/aunts)	554 (42.3)
Either first/ second degree family members	617 (47.1)
Medical history	
Known history of elevated blood pressure	19 (1.5)
Hormonal disorders (PCOS/ thyroid disorders)	58 (4.4)
Activity pattern	
Engages in physical activity > 2.5h/wk	685 (52.3)
Body weight status (n=1310)	
Underweight	310 (23.7)
Normal weight	535 (40.8)
Overweight	197 (15.0)
Obese	268 (20.5)
Central adiposity measures (n=1310)	
Waist to height ratio > 0.5	204 (15.6)

Table 1:
Demographic and body weight status of adolescents and young adults (n=1313) in the study

- The mean age of the participants was 19.4 (1.8) years
- Among 1313 participants, 65.1% were females, 55.3% belonged to the age category,16-19 years and 47.1% had either first/second degree relatives with diabetes.
- The **prevalence of overweight and obesity** were 15.0% and 20.5% respectively.

Madan et al, 2021 Unpublished Data

RESULTS

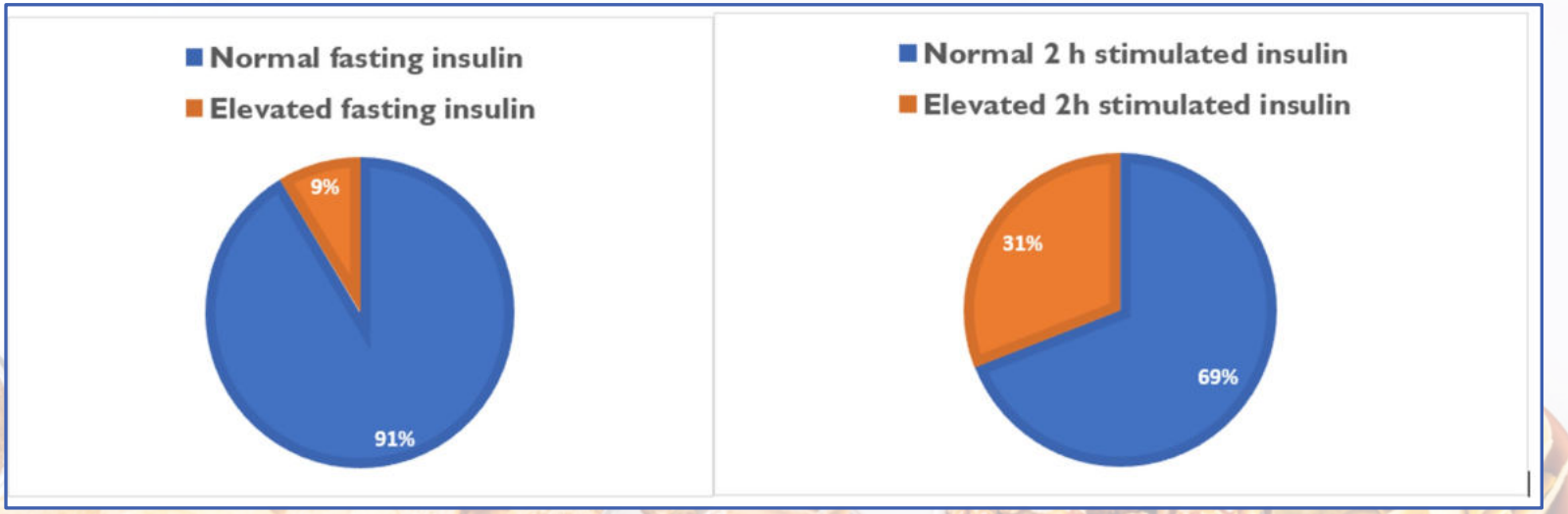


Figure 1: Proportion of participants with elevated fasting and 2h stimulated insulin levels

Among 1313 participants, 112 (8.7%) had elevated fasting insulin (**≥15** mIU/ml), and 401(31.0%) had higher than normal 2 h stimulated insulin (**≥80** mIU/ml)

Madan et al, 2021 Unpublished Data

Table 5: **Comparison of mean anthropometric indices, glycosylated hemoglobin values and blood pressure between participants with and without hyperinsulinemia and hyperglycemia**

	Category 1 N=841	Category 2 N=395	Category 3 N=16	Category 4 N=37	p-value
Weight (kg)	55.52(12.32)	57.93(14.33)	52.23(12.97)	62.54(9.55)	0.002*
BMI (kg/m$^{2)}$	21.41(4.39)	23.00(4.77)	19.97(3.93)	25.43(4.59)	<0.001**
Waist Circumference (cm)	70.17(9.71)	73.65(11.06)	66.39(7.77)	76.64 (8.51)	<0.001**
Hip circumference (cm)	89.93(9.52)	93.11(10.30)	85.94(8.50)	96.82(8.31)	<0.001**
WHtR	0.44(0.05)	0.46(0.06)	0.41(0.04)	0.48(0.06)	<0.001**
Body fat (%)	24.20(8.84)	29.41(7.79)	23.13(7.40)	32.36(9.30)	<0.001**
Visceral Fat	3.82(3.06)	4.65(3.25)	3.15(2.77)	5.94(2.60)	<0.001**
HbA1c	5.40(0.30)	5.39(0.31)	5.37(0.24)	5.5(0.32)	0.520
Diastolic blood pressure (mmHg)	66.43(8.09)	66.86(8.02)	66.87(8.01)	71.59(9.12)	0.002*
Systolic blood pressure (mmHg)	104.84(11.25)	104.89(11.69)	106.43((11.96)	111.37(11.09)	0.007*

WHtR, Waist to Height Ratio. HbA1C, Glycosylated Hemoglobin. *p < 0.05, **p < 0.001

Category 1: normoglycemic and normo insulinemia; Category 2: hyperinsulinemia but normoglycemia
Category 3: hyperglycemia but normo insulinemia; Category 4: hyperinsulinemia and hyperglycemia

Madan et al, 2021 Unpublished Data

Effect of Almond Consumption on Glucose Metabolism, Hyperinsulinemia and Selected Markers of Inflammation: A Randomized Controlled Trial in Adolescents and Young Adults in Mumbai, India

Jagmeet Madan[1], Panchali Moitra[1], Sharvari Desai[2], Sheryl Salis[1], Rekha Battalwar[1], Soumik Kalita[1], Ajay Phatak[2], Shobha Udipi[2], Rama Vaidya[2], Ashok Vaidya[2]

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PMCID: PMC8264510
PMID: 34249987

Effect of Almond Consumption on Metabolic Risk Factors—Glucose Metabolism, Hyperinsulinemia, Selected Markers of Inflammation: A Randomized Controlled Trial in Adolescents and Young Adults

Jagmeet Madan,[1] Sharvari Desai,[1] Panchali Moitra,[1] Sheryl Salis,[2] Shubhada Agashe,[3] Rekha Battalwar,[1] Anushree Mehta,[4] Rachana Kamble,[4] Soumik Kalita,[5,*] Ajay Gajanan Phatak,[6] Shobha A. Udipi,[4,7]

RESULTS

Table 3 : Mean change in anthropometry measurements in AG and CG at end line

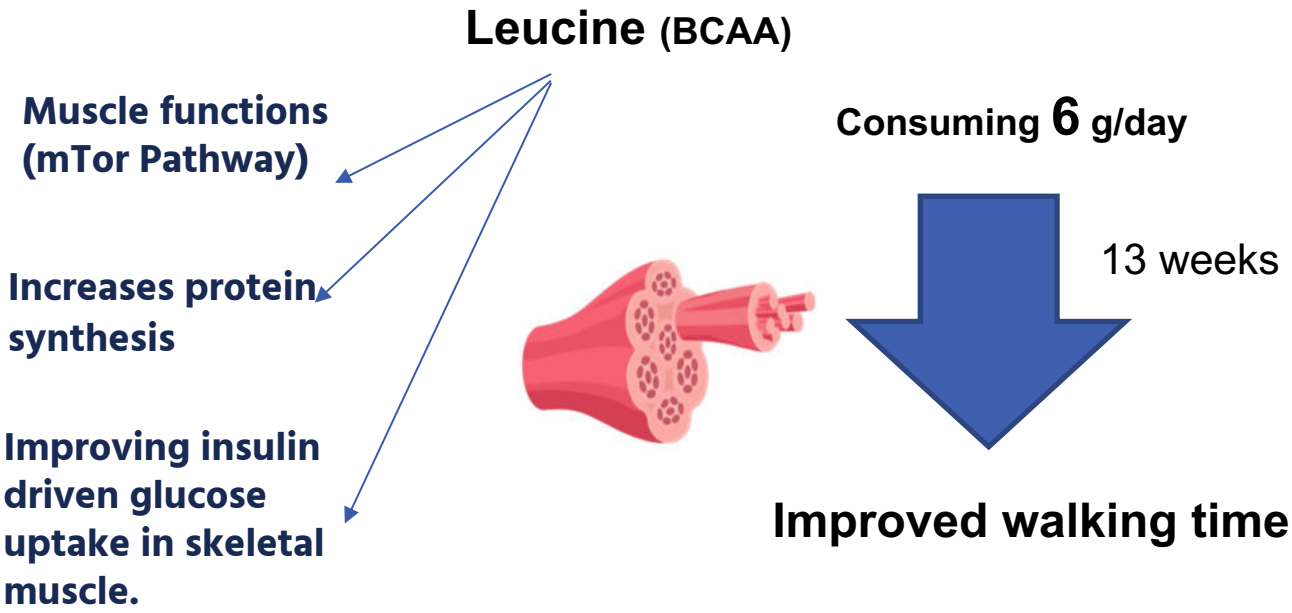
Anthropometric Measurements	Almonds Group(n=107) Mean (SD) (95%CI)	Control Group (n=112) Mean (SD) (95%CI)	p value
Weight (kg)	0.92 ±1.65 (0.60,1.24)	0.52 ±4.17 (-0.25,1.30)	0.35
BMI (kg/m²)	0.35 ±0.66 (0.22,0.47)	0.19 ±1.77 (-0.13,0.53)	0.40
Waist Hip Ratio	0.01 ±0.05 (0.00,0.02)	0.00 ±0.0 (-0.00,0.10)	0.11
Waist to Ht Ratio	0.01 ±0.03 (0.00,0.01)	0.01 ±0.03 (0.00,0.01)	0.94
Percent Body Fat	0.87 ±2.12 (0.46,1.27)	3.26 ±18.07 (-0.12,6.64)	0.17
Visceral Fat	0.11 ±0.94 (-0.07,0.29)	0.12±1.08 (-0.08,0.34)	0.91

RESULTS

Table 4 : Mean change in lipid and inflammatory markers in subgroups of AG and CG that reported improvement in body fat percent at end line

Variables	Almond Group (n=28)	Control Group (n=35)	p value
TC	-11.80± 26.44	6.61±19.1	0.002
LDL-c	-8.75±25.60	6.1±19.11	0.011
Hs-CRP	-1.41±7.20 (-35.0-8.96)	0.33±5.6 (-8.1-26.4)	0.283
Adiponectin	-0.13±1.24 (-2.56-2.31)	0.54±1.59 (-2.08-4.09)	0.074
Leptin	1.16±4.57 (-5.89- 10.81)	-0.33±3.55 (-12.81- 8.0)	0.148
IL-6	-79.50 ±277.70 (-835.6- 225.12)	5.15±66.27 (-316.3-133.8)	0.086
TNF-alpha	-1.15±42.02 (-91.63- 110.310	-0.71±14.61 (-73.3- 28.9)	0.955

LEUCINE IS ESSENTIAL FOR MUSCLE DEVELOPMENT



Ref: Martínez-Arnau et al 2020

TABLE 1: LEUCINE CONTENT OF COMMON FOODS

Product name	Leucine content (g per 100g)
Maize, dry	12.24
Jowar	12
Milk, whole, Cow	10.66
Mango, ripe (Neelam)	9.19
Spinach	8.70
Bajra	8.52
Field bean, white	8.48

Product name	Leucine content (g per 100g)
Soya bean, brown	8.27
Pepper, black	8.25
Banana, ripe, robusta	8.23
Field beans, tender, lean	8.20
Onion, stalk	8.05
Amaranth leaves, green	8.04

Ref: ICMR-IFCT, 2017

TAKE HOME MESSAGES

1

Maintain Energy Balance

2

Daily Protein intake 1.2-1.8g/kg/bw

3

Daily Leucine intake 5-6g per meal

4

Resistance exercise 2 X week

5

Reduced Sedentary lifestyle

Ref: Rogeri et al, 2021

NO SINGLE FOOD is **SUPER FOOD** & **NO SINGLE NUTRIENT** is a **MAGIC NUTRIENT**

A **BALANCE** of **MACRONUTRIENTS & MICRONUTRIENTS** is the key

- Dietary Diversity Score
- Nutrient Adequacy Score
- Dietary Phytochemical Index Score

Any Questions?

Any Queries, please write to

www.drjagmeetmadan.com