

Spina Bifida: Endocrine Abnormalities: Focus on Obesity

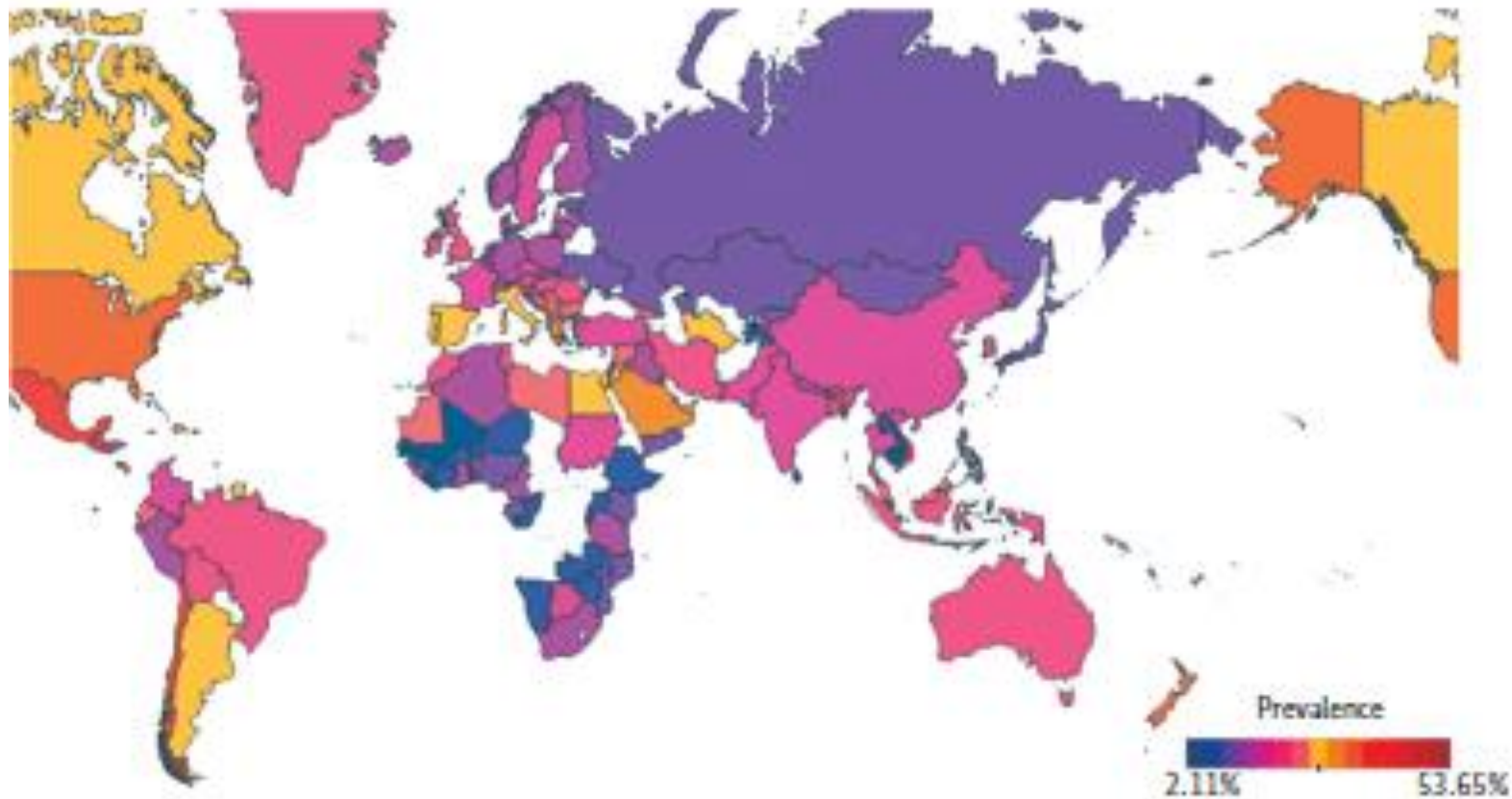
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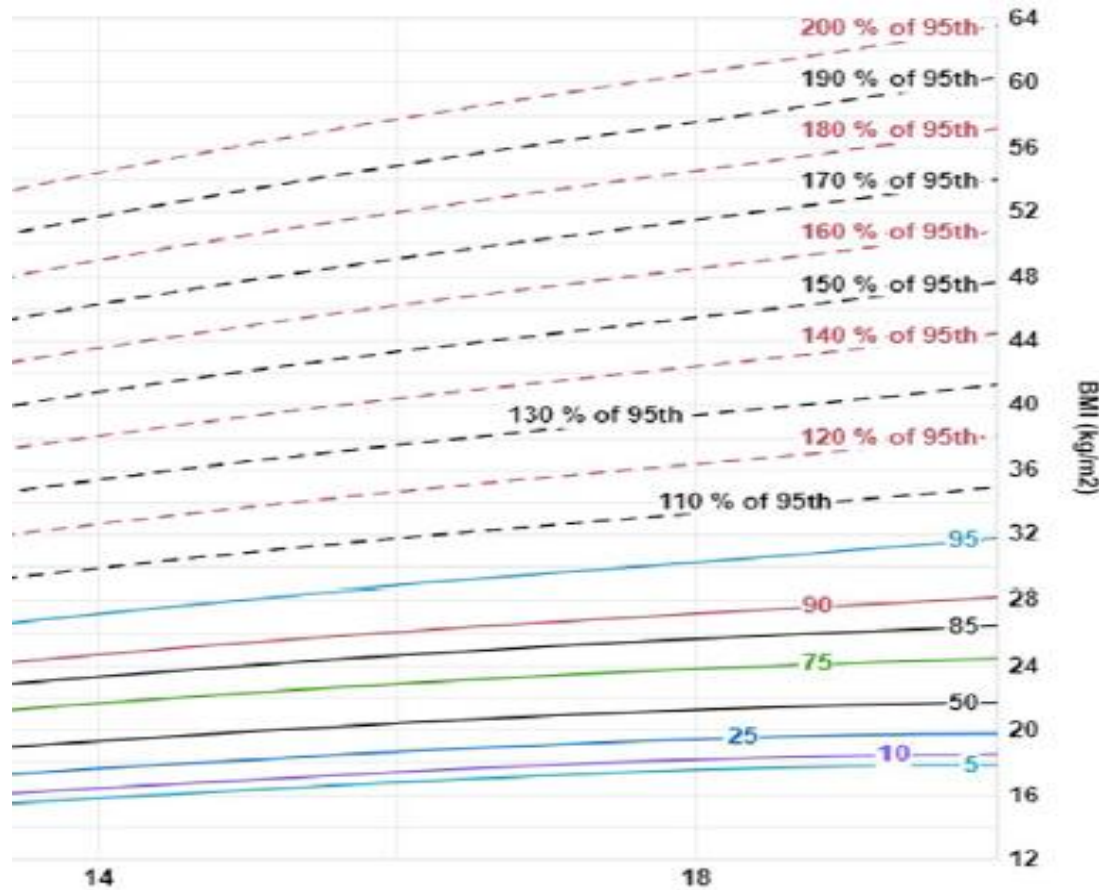
Outline

- Childhood obesity: prevalence
- Obesity in children with Spina bifida
 - Why is this a problem?
- Treatment of childhood obesity
 - AAP recommendations
 - Pharmacological options
- Treatment of obesity in children with spina bifida: special considerations
- Summary

Worldwide Prevalence in Childhood Obesity



Obesity Classification



Class 1: BMI <120% of 95th percentile
Class II: 120%-140% of 95th percentile
Class III: ≥140% of 95th percentile

Obesity rates among spina bifida

- 29%-50% among children
- 34%-64% among adolescents and young adults
- Cause:
 - Non-ambulatory status and sedentary lifestyle (physical activity and fitness rates are 20%-30% lower than general population)
 - Neuroendocrine disturbance
- Among non ambulatory children, obesity rates become higher than general population during preschool years

Table I. Spina Bifida characteristics and obesity prevalence based on 203 observations.

	Overall		Female		Male	
	(%)		(%)		(%)	
	<i>n</i>	Obese	<i>n</i>	Obese	<i>n</i>	Obese
Age¹						
All ages	203	23	112	28	91	18
6–11 years	34	18	23	22	11	9
12–19 years	75	8	43	9	32	6
> 20 years	94	37*	46	48*	48	27*

Adverse Health Consequence

Decubitus ulcers

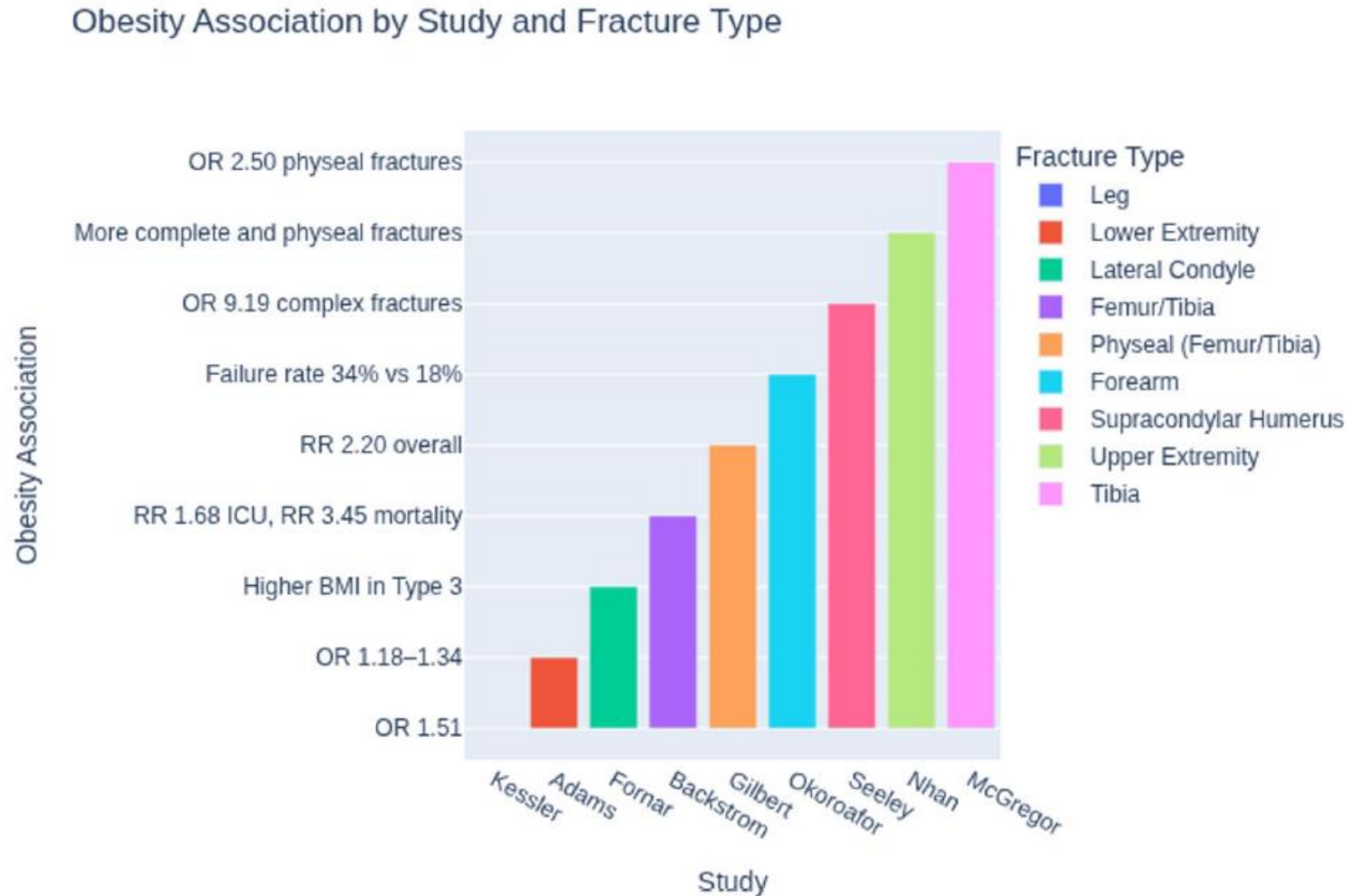
Gastro-esophageal reflux

Metabolic syndrome

Reduced mobility and independence

Depression

Fractures in Obese children



Aly et al., Archives of Orthopedic Surgery, 2026

Obesity Measurement Caveats

BMI : weight/height^2

Height measurement

- Contractures
- Ambulatory status

Underestimate obesity status

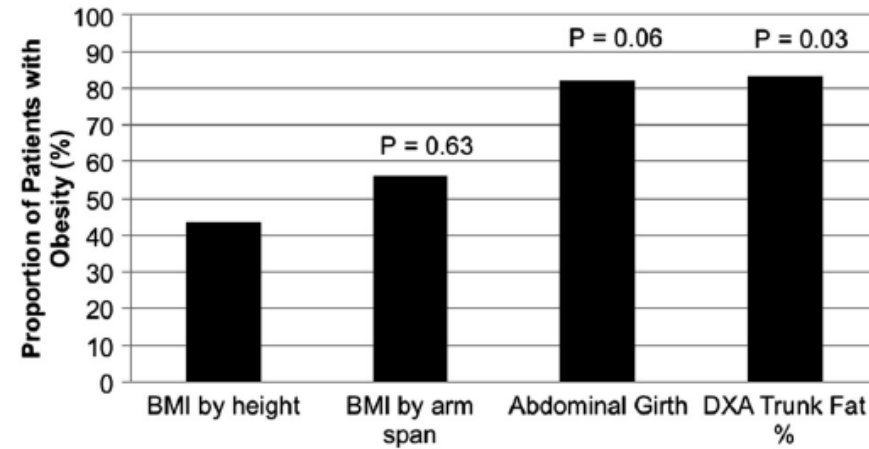


Figure 1 Reclassification of obesity using different anthropometric measures. Obesity was defined using BMI (by height or arm span), abdominal girth and DXA trunk fat percent as described in the manuscript. Classification by abdominal girth and trunk fat percentage resulted in a significantly increased rate of obesity. Statistical significance relative to conventional BMI (by height) was calculated using McNemar test. BMI, body mass index (kg/m²). DXA, dual X-ray absorptiometry.

Treatment

AAP Recommendation

Executive Summary: Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity

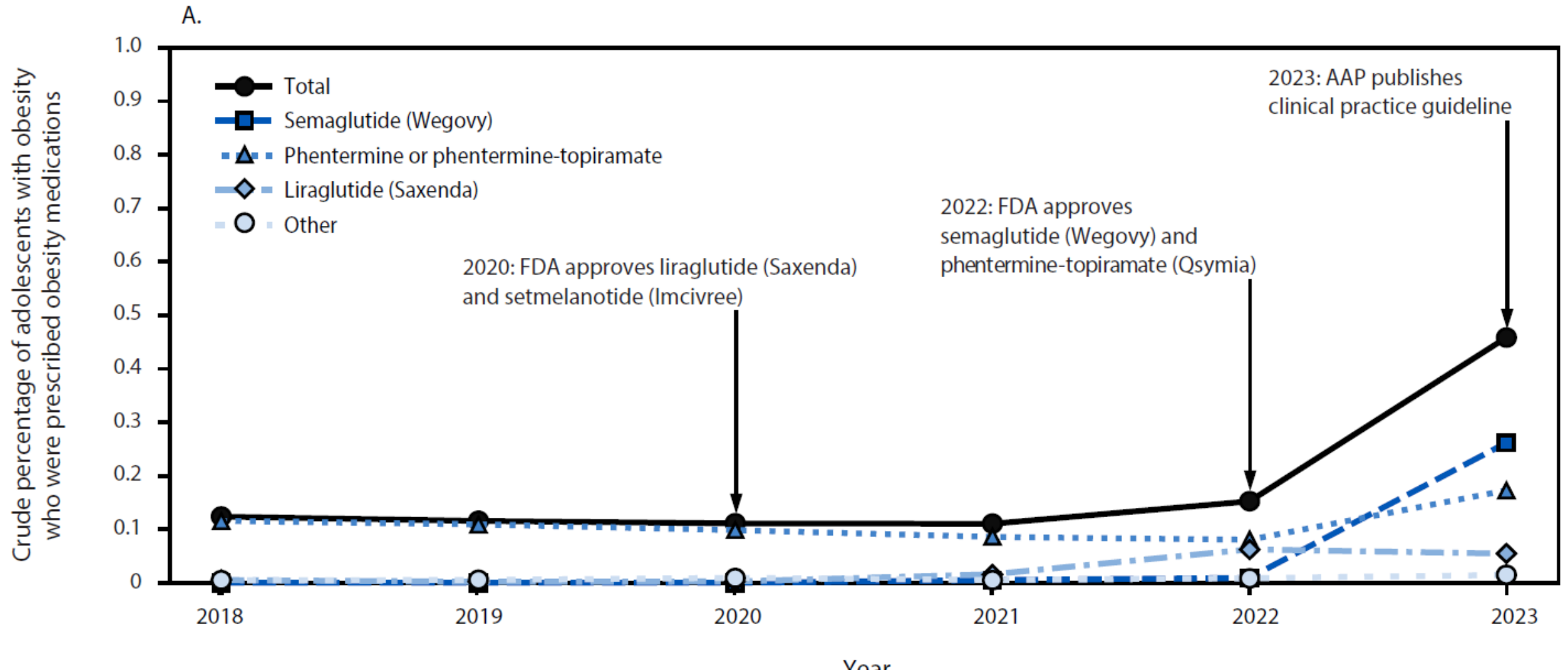
Lifestyle modification

26 or more contact hours

Face to face, family-based,
multicomponent treatment

3–12-month period

Anti-Obesity Medications



FDA approved medications

- Orlistat
 - ≥ 12 years of age
 - Mechanism of action
 - Inhibits pancreatic and gastric lipase
 - Decreases lipid absorption
 - Side effects
 - GI symptoms-abdominal pain oily stools
 - Fecal urgency, incontinence
 - Effect:
 - -2.61 Kg after 1 year

FDA approved medications

- Phentermine
 - Age : ≥ 16 years
 - Short term use of 3 mo duration
 - Mechanism of action
 - Norepinephrine reuptake inhibitor
 - Inhibits hypothalamic catecholamine
 - Side effects
 - HR and BP elevation
 - GI symptoms
 - Effect
 - 4.1% reduction in BMI
 - 3.2 Kg reduction

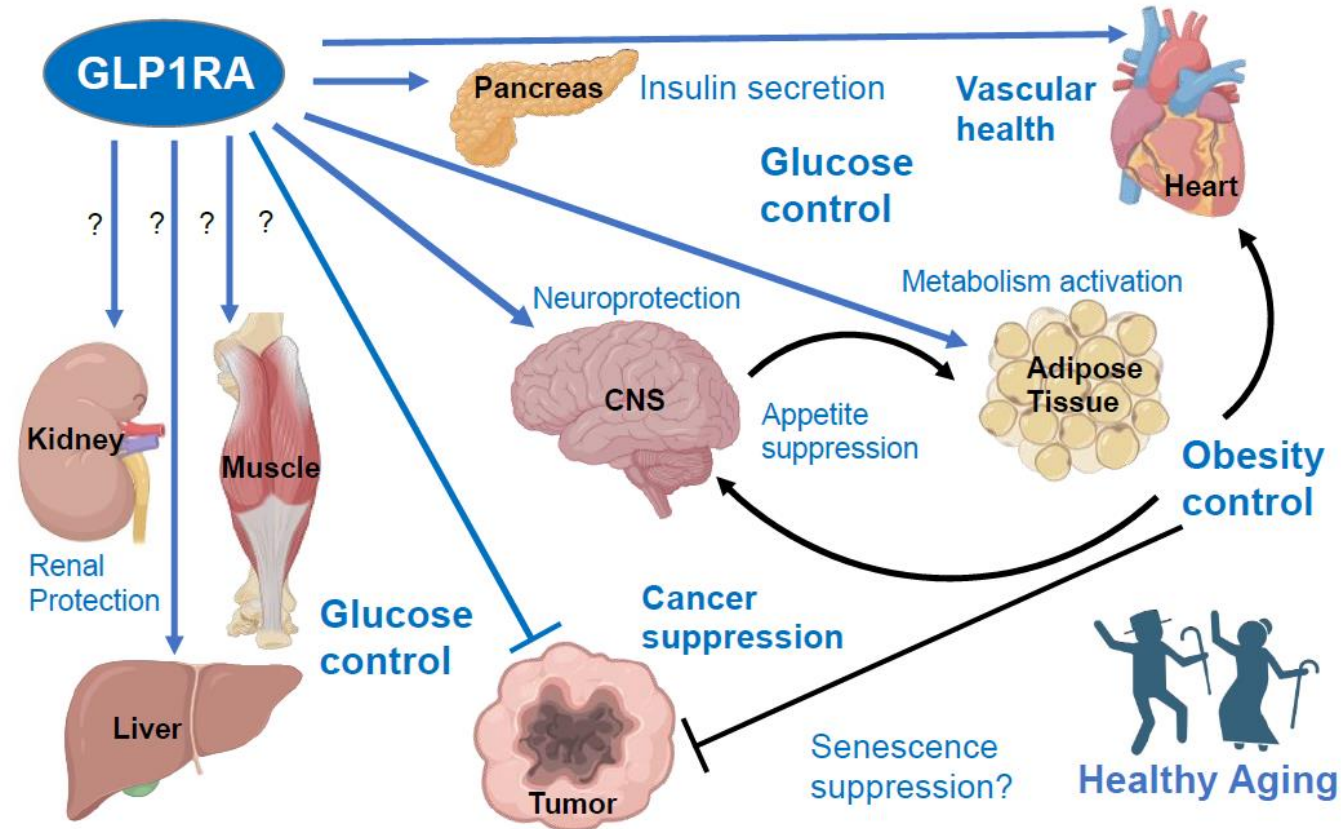
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FDA approved medications

- Phentermine-topiramate
 - Age $\geq$ 12 years
 - Mechanism of action:
 - Topiramate: augments GABA activity and blocks glutamate receptors
 - Side effect:
 - Cognitive dysfunction
 - Metabolic acidosis
 - Effect
 - -10.44% to -8.11 % change in BMI

GLP1 Receptor agonist



GLP1-RA

Age $\geq$ 12 years

Contraindicated

- Family history of medullary carcinoma of thyroid
- Pregnancy

Side effects

- Nausea, vomiting
- Abdominal pain
- Injection reaction
- Discontinue if active gall bladder or pancreatic disease

GLP1 receptor agonist approved for use in children

- Obesity
 - Liraglutide
 - Semaglutide
- Type 2 diabetes
 - Dulaglutide
 - Liraglutide
 - tirzepatide

Medication	FDA Approval	BMI reduction
Liraglutide	2020 (12 +)	5%-9%
Semaglutide	2022 (12+)	16.1%
Tirzepatide	2026	18%-22%

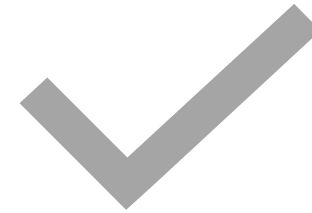
GLP1-RA: Liraglutide



Liraglutide

Daily injection

Start at 0.6 mg daily and increase weekly (1.2 mg, 1.8 mg, 2.4 mg) to a max dose of 3mg daily as tolerated



Minimum reduction of 5% seen in 43.3% at week 56 compared to 18.5% in placebo



GLP1-RA: Semaglutide

- Semaglutide
 - Weekly injection
 - Start at 0.25 mg weekly
 - Titrate dose monthly (0.5 mg, 1mg, 1.7 mg) to max dose of 2.4 mg
 - Achieved -17.7% mean weight loss

Musculoskeletal health with GLP1

- Adults with Semaglutide
 - Lost mean of 15.3 kg at 68 weeks
 - Fat mass reductions of 8.3 kg (62%)
 - Lean mass reductions of 5.3 Kg (38%)
 - Skeletal muscle loss accounted for 20% of total weight loss
- Without resistance training muscle loss accounts for
 - 10-15% of weight loss in women
 - 20-25% in men
- **No data in children**

Challenges

Weight loss versus muscle loss: potential loss of bone strength



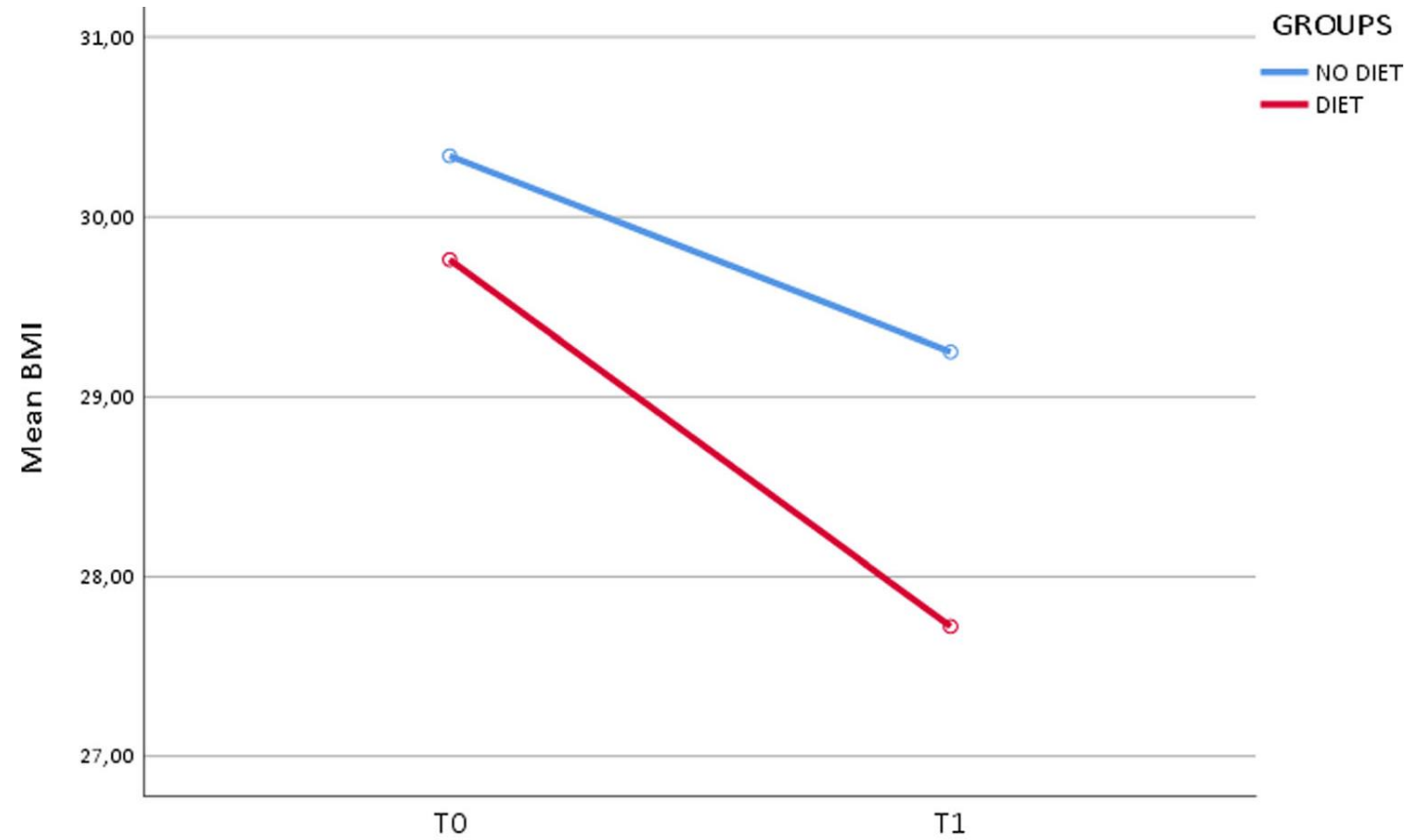
Nutrition requirement, micronutrient loss



Lack of Medicaid coverage

Treatment of Obesity in children with Spina Bifida

TREATMENT



Child's Nervous System (2020) 36:1515–1520

Spina Bifida Guideline

Nutrition, metabolic syndrome, and obesity: Guidelines for the care of people with spina bifida

Journal of Pediatric Rehabilitation Medicine: An Interdisciplinary Approach 13 (2020) 637–653
DOI 10.3233/PRM-200753
IOS Press

Summary of the Guideline

Early screening

Monitor for other features of
obesity

Dietary education

Discuss impact on bone health
with low levels of physical activity

<http://www.nchpad.org>

Treatment Considerations

Musculoskeletal
health

Other endocrine
disorders

Multidisciplinary skeletal safeguarding protocol



Summary for children with Spina Bifida

Talk to doctor at each stage about good diet, increasing fiber intake

Consider looking at other measures of adiposity

Maximize ability for physical activity

Referral to dietician should be considered early on

Rule out endocrine cause of weight gain

Screen for eating disorder

Weight loss medication:
• Musculoskeletal health?



Thank you