Epigenetic Basis of Low Body Mass at Birth and Sarcopenia in Old Age

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1. Introduction

Sarcopenia is a progressive skeletal muscle disorder characterised by rapid loss of muscle mass and strength, and physical performance [1,2]. It brings along severe adverse health consequences such as deteriorated mobility, frailty, falls, increased morbidity and mortality, and accordingly, has a negative impact on quality of life [1,2,3]. The prevalence of sarcopenia has wide range due to age group considerations, ethnicities, and sarcopenia classification (Figure 1). Thus, sarcopenia has become a global public health concern that should be prioritised by researchers and practitioners.

Recent research has focused on the factors that impact fetal growth and development in response to the prenatal environment and have later-life permanent consequences [4]. It is critical to look into the early stages of muscle growth and alterations in order to better understand age-related muscular diseases like sarcopenia [5]. Improving and promoting healthy early life behaviours during pregnancy and infancy; identifying intrauterine exposures and early-life predictors may provide the opportunity to prevent later-life diseases, therefore decrease the burden of health and well-being services [6].

Aims and Objectives: In this study, we aim to investigate the role of low birth weight as a possible determinant in early sarcopenia onset based on epigenetic regulation, expand the knowledge and perspective on its contribution to the underlying mechanism and other known determinants.

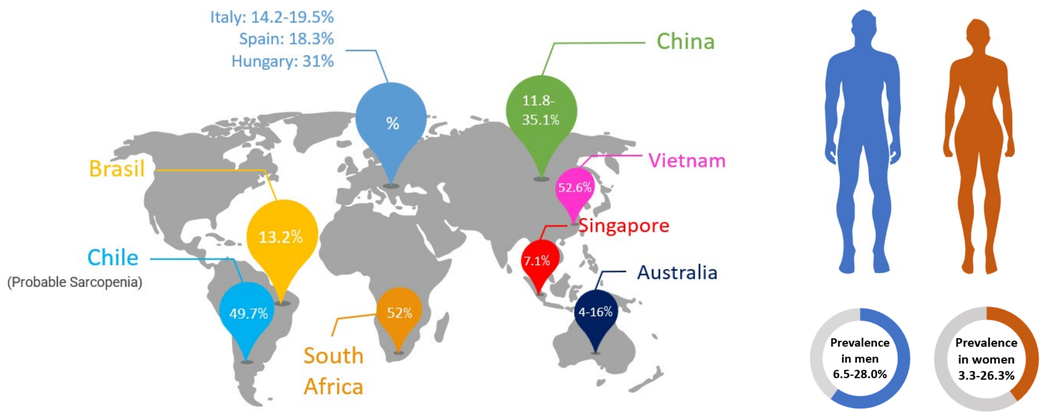


Figure 1. Prevalence of Sarcopenia

2. Methodology

Sample collection

Blood samples will be collected for each research participants who will be recruited in Padova University Hospital (Ospedale Giustinianeo).

Clinical examination

Anthropometric measurements (height, weight (kg), waist circumference (cm), blood pressure, heart rate variability etc.) will be collected.

Basic biochemistry, inflammatory markers

Total cholesterol, triglycerides, glycemia, insulin, analysis of inflammatory markers, and creatinine will be performed.

DNA methylation age

Telomere length

Aging measurement

DNA will be extracted from whole blood, DNA samples will be quantified and checked. Methylation levels and telomer length will be determined.

Statistical analysis

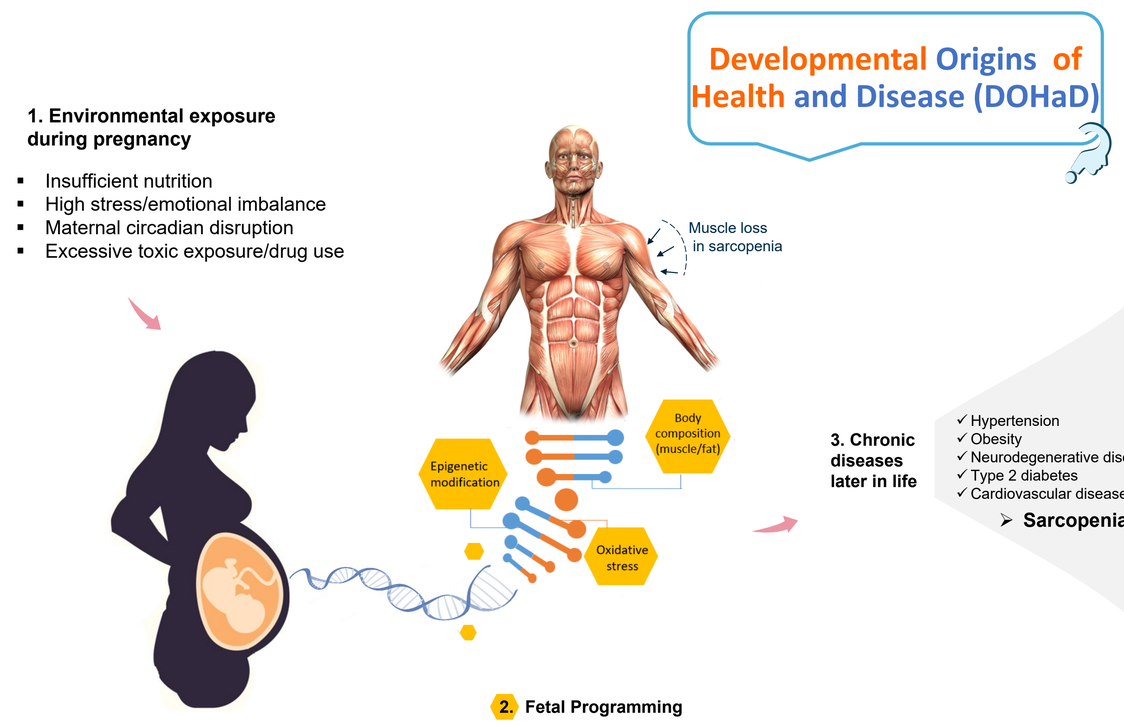
Descriptive statistics, baseline characteristics and subgroup analysis of the research will be presented between the case and control participants.

The association between low body mass at birth and sarcopenia later in life through epigenetic perspective

3. Discussion

- The World Health Organization (WHO) defines low birth weight as less than 2500 g and highlights it as a critical public health issue [7]. Low birth weight is often triggered by intrauterine exposures and associated with chronic disease in adult life according to the Developmental origins of health and disease (DOHaD) theory.
- The concept of "DOHaD" focuses on body size at birth, fetal origins of diseases and early life exposure effects on the risk of metabolic disease in adulthood [8].
- Low birth weight is associated with decreased muscle mass, strength [9] and lean body mass [10] in adult life.
- Moreover, DOHaD considers that early adiposity and body composition programming prepares the fetal epigenome for the postnatal era [11]. When there is a mismatch between the prenatal and postnatal environments, infants with low birth weight have a higher fat percentage and lower lean body mass, leading to increased risk of metabolic disorders later in life [11,12].
- In the light of these knowledge, low birth weight can be regarded as a marker of the intrauterine conditions [12], and the effects of prenatal exposures on muscle morphology and adipose tissue formation may be the link between low birth weight and sarcopenia [10].

"Epigenetic basis of low birth weight and sarcopenia later in life"



The Dutch Famine

Affecting women in the first trimester a higher prevalence of coronary heart disease, raised lipids and obesity in the offspring.

1944-45

Fetal programming

Prof. David Barker proposed the association between adverse fetal environment and chronic disease later in life. (Barker hypothesis)

1980s

DOHaD Theory

Fetal adaptations to scarcity (leading to low birthweight) become maladaptive when those are later exposed to an environment of plenty. (Mismatch theory)

2007

05

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Pharmacological Sciences

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 101034319 and from the European Union - NextGenerationEU

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