# Alterations of inflammatory biomarkers and MicroRNAs levels in overweight/obese adolescents

**Fengyang Huang**[1], Malinalli Brianza-Padilla[2,3], Herlinda Bonilla-Jaime[4], Santiago Villafaña Rauda[5], Rodrigo Romero-Nava[1], Blanca Estela del-Río-Navarro[6], Fausto Sánchez-Muñoz[3]

*1 Laboratorio de Investigación en Farmacología, Hospital Infantil de México Federico Gómez (HIMFG), México; 2 Posgrado en Biologia Experimental, División de Ciencias Biológicas y de la Salud, Universidad Autonoma, Mexico; 3 Departamento de Inmunología, Instituto Nacional de Cardiologia Ignacio Chavez, Mexico; 4 Biologia de la Reproducción, Universidad Autonoma, Mexico; 5 Escuela Nacional de Medicina y Homeopatía- Instituto Politécnico Nacional, México; 6 Departamento de Alergía, HIMFG, México*

## Background

MicroRNAs play important regulatory roles in cholesterol homeostasis and endothelial dysfunction.

## Objective

To characterize endothelial dysfunction markers and the miRNAs miR-33a-5p, miR-223-3p and miR-126-3p levels in serum from lean and overweight/obese adolescents.

## Methods

79 overweight and obese adolescents aged 13.0±2.0 years and 28 normal weight adolescents aged 13.4±2.0 years were recruited. The concentrations of inflammatory biomarkers (sE, sICAM-1, PAI-1, and fibrinogen) were measured by ELISA and the serum relative expression of miRNAs (miR-223-3p, miR-33a-5p, and miR-126-3p) were determined by real-time quantitative PCR.

## Results

**Table 1. General characteristics in adolescents.**

| | Control | Obese/ Overweight | P |
|---|---|---|---|
| **F/M** | 14/14 | 33/46 | 0.096 |
| **Tanner 1/2/3/4/5** | 3/13/6/5/1 | 7/36/27/7/2 | 0.195 |
| **Weight (kg)** | 45.6±9.3 | 70.1±14.9 | <0.001 |
| **Age (yrs)** | 13.7±2.0 | 13.3±2.0 | 0.335 |
| **Height (mm)** | 154.3±10.5 | 156.3±9.2 | 0.366 |
| **Z-score** | -0.11±0.56 | 1.89±0.38 | <0.001 |
| **BMI percentil** | 46.3±20.0 | 96.1±3.4 | <0.001 |
| **HR (beats/min)** | 75.6±4.1 | 96.1±3.4 | 0.468 |
| **SBP (mmHg)** | 98.0±8.0 | 104.5±6.0 | <0.001 |
| **DBP (mmHg)** | 63.2±5.5 | 70.3±6.6 | <0.001 |
| **Triglycerides (mg/dL)** | 86.1±44.5 | 128.3±64.8 | 0.002 |
| **Total Cholesterol (mg/dL)** | 167.8±38.5 | 155.5±35.7 | 0.128 |
| **Glucose(mg/dL)** | 84.6±8.6 | 86.1±8.2 | 0.431 |
| **HDL (mg/dL)** | 59.0±10.8 | 48.8±13.9 | 0.001 |
| **Insulin (mIU/L)** | 6.0±3.3 | 24.0±28.8 | 0.001 |
| **HOMA-IR** | 1.26±0.72 | 5.15±6.19 | 0.001 |

**Mean±SD**

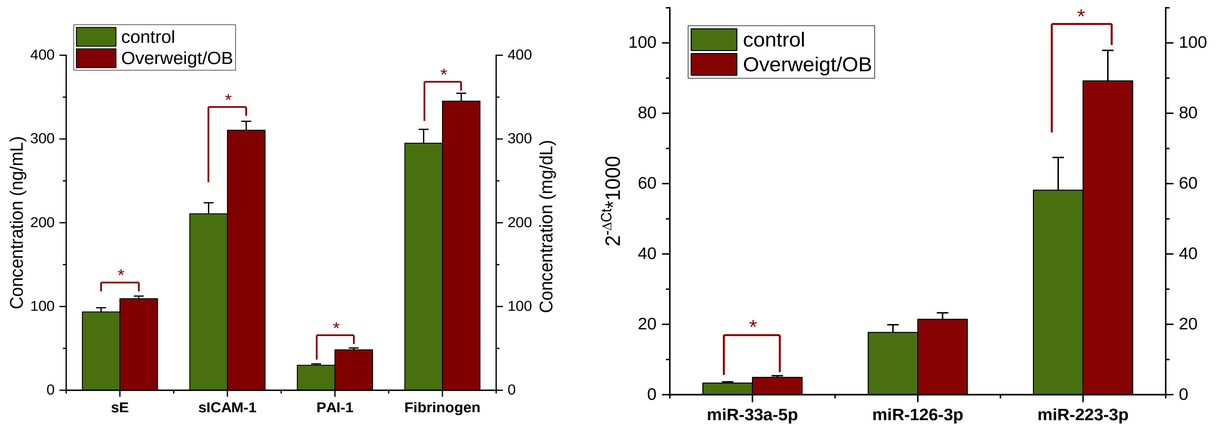


**Figure 1. The levels of inflammatory biomarkers and miRNAs in adolescents. Mean±SE, *p≤0.01**

**Table 2. Correlation of miRNAs with anthropometrics, metabolic profile, HOMA and inflammatory markers.**

| | | Age | Weight | BMI | Insulin | HOMA-IR | PAI-1 |
|---|---|---|---|---|---|---|---|
| **miR-223-3p** | **Rho** | 0.249 | 0.357 | 0.324 | 0.301 | 0.29 | 0.196 |
| | **p** | 0.005 | <0.001 | <0.001 | 0.001 | 0.001 | 0.021 |
| | | **HDL** | **sICAM-1** | | | | |
| **miR-33a-5p** | **Rho** | -0.163 | 0.205 | | | | |
| | **p** | 0.050 | 0.020 | | | | |
| | | **Age** | **Triglycerides** | | | | |
| **miR-126-3p** | **Rho** | 0.211 | 0.232 | | | | |
| | **p** | 0.014 | 0.008 | | | | |

## Conclusion

- ✓ **The present study showed upregulation of miR-33a-5p and miR-223-3p related to cholesterol homeostasis and adipose tissue inflammation in overweight and obese adolescents.**
- ✓ **Correlation among miRNAs, age, obesity, metabolic profile, and endothelial dysfunction biomarkers supported the use of some miRNAs from serum samples as potential predictive tool for obesity.**