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BACKGROUND & OBJECTIVES

- The etiopathogenesis of childhood obesity is related to genetic and environmental factors. Among which, not only caloric intake or physical activity have an important influence, also the circadian rhythms, particularly, healthy sleep.
- The objectives of this study were:
 - To analyze the different patterns and duration of sleep, eating habits, schedule meals, time allocated to physical activity and screen time of children and adolescents with obesity.
 - To evaluate its possible relationship with anthropometric variables and body composition.

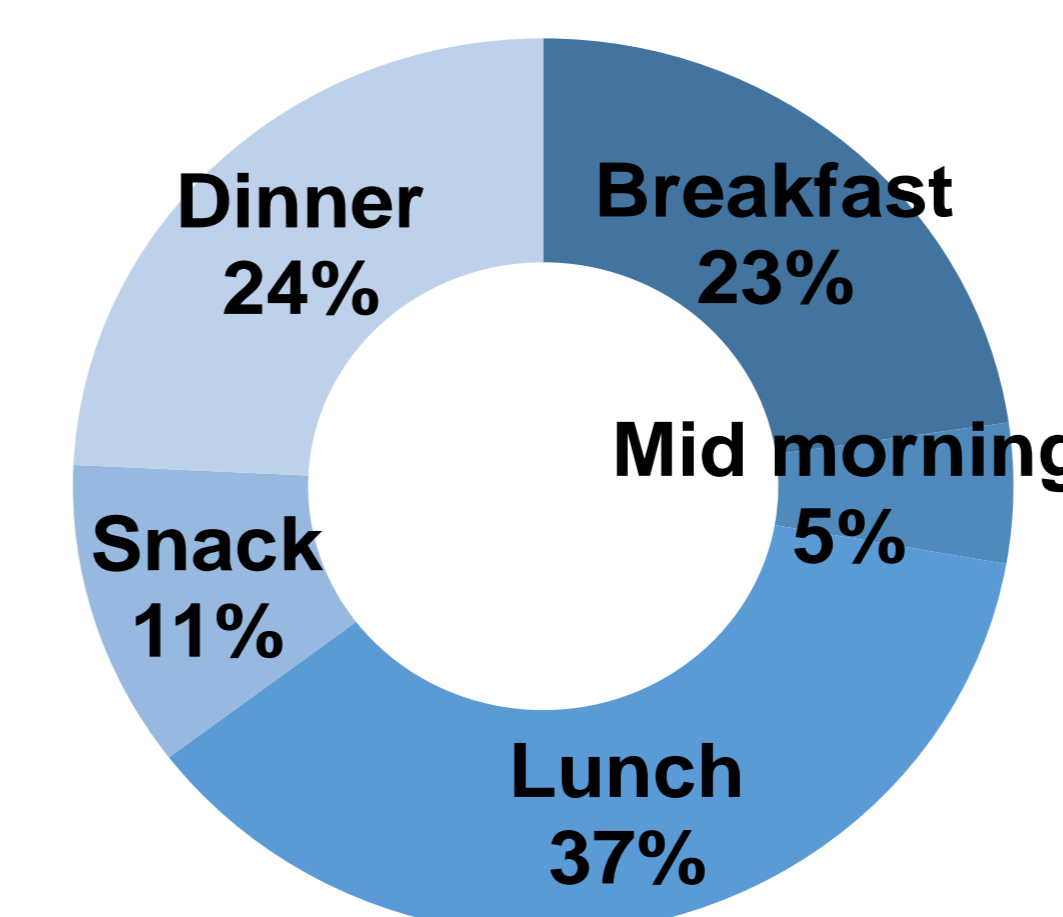
MATERIAL AND METHODS

- Descriptive Study carried out throughout 2018.
- Inclusion criteria: children 6-18 years-old with body mass index (BMI) >2 SDS according to reference tables without another pathology.
- The variables collected were: age, sex, race, weight, height, waist, BMI (Z-Score), fat mass by bioimpedance. Sleep patterns (bedtime and getting up, naps), physical activity (hours and intensity), feeding (habits, three-day nutritional registry, frequency of consumption), time of screens and lifestyle questionnaires were also collected.
- Statistical analysis was performed using the SPSS software package, version 19.

RESULTS

- We included 90 obesity patients (61.1% girls and 38.9% boys) with the following data (mean \pm SD): 12.7 \pm 2.9 years of age, BMI (Z-Score) of 3.2 \pm 1.2 SDS and waist (Z-Score) of 2.4 \pm 0.8 SDS. Girls had a percentage of fat mass of 40.3 \pm 5.9% and boys of 37.5 \pm 7.3%.
- The mean caloric daily intake was 1.641 \pm 304 Kcal (20 \pm 4.2% proteins, 49 \pm 4.3% carbohydrates and 31 \pm 6.4% lipids).
- 46% consumed more than 10% of daily caloric intake as simple carbohydrates (sugars). 19% ate \leq 3 meals per day, 72% had snacks between meals, 66% ate watching TV and 63.3% ate with anxiety.
- No correlation was observed between degree of obesity and total consumed Kcal per day, macronutrients percentage and with numbers of meals per day.

Caloric intake and meal schedule



Breakfast: 8.8 \pm 1.8 am.
 Mid morning: 11.5 \pm 0.7 am.
 Lunch: 2.5 \pm 0.7 pm.
 Snacks: 5.8 \pm 1 pm.
 Dinner: 9.3 \pm 1.4 pm.

Vegetables	Group 1 Daily	Group 2 Weekly	Group 3 Monthly	ANOVA (p)	Post Hoc
IMC z-Score (SDS)	2.76 (0.99)	3.63 (1.13)	3.89 (1.19)	0.031	1-3*
Fat mass (%)	36.55 (6.09)	40.17 (5.46)	42.82 (9.88)	0.011	1-2* 1-3*

* <0,05

- The obesity degree has a negative correlation with kilocalories in breakfast ($r=-0.229$, $p<0.05$) and a positive correlation with kilocalories in dinner ($r=0.214$, $p<0.05$).
- Obesity was associated with later time to eat snack ($r=0.265$, $p<0.05$), dinner ($r=0.20$, $p<0.05$) and average caloric daily intake ($r=0.32$, $p<0.01$).
- In the consumption frequency questionnaire, only vegetables intake was negatively correlated with BMI and percentage of fat mass ($p<0.05$)

- The average sleep time was 9 \pm 1 hours per day (8.5 \pm 1.2 hours on school days and 10.2 \pm 1.1 hours on weekend).
- We observed a positive correlation between degree of obesity (IMC and fat mass) and sleep hours during the weekend ($p<0.01$), especially in patients with higher difference of sleep hours during weekend compared to working days ($p<0.001$).
- The average of screen time exposure was 2.1 \pm 1.6 hours per day during school days and 4 \pm 2.3 hours per day on weekend days. Therefore, this takes 18.7 \pm 2 hours screen time exposure per week.
- The mean of physical activity was 2.1 \pm 1 hours per week at school and 1.9 \pm 2.1 hours in extracurricular activity. 46.5% did not practice any sport out of P.E.

Activity degree	Group1 Active	Group2 Medium	Group 3 Sedentary	p	
				ANOVA	Post Hoc
Fat mass %	36.7 (4.9)	37.1 (5.7)	40.5 (6)	0.04	1-3*

* <0,05

Sleeping hours difference between weekend and working days	Group 1 < 1 hours	Group 2 1-2.5 hours	Group 3 >2.5 hours	p	
				ANOVA	Post Hoc
IMC Z-Score SDS	2.6 (0.7)	3.2 (1.1)	3.7 (1.4)	0.04	1-3**
Fat mass %	36.7 (6)	39.3 (6.2)	42.1 (6.8)	0.013	1-3**

** <0,01

- A negative correlation was observed between physical activity and screen time exposure ($r=-0.24$, $p<0.05$). In addition, physical activity presented a negative correlation with children with higher difference sleep hours between weekend and school days ($r=-0.25$, $p<0.05$).
- Most active children have lower fat mass % than sedentary children ($p<0.05$)

CONCLUSION

Treatment and prevention of childhood obesity should include not only strategies about total caloric intake and promoting physical activity but also **advices about healthy food, meal schedule, caloric distribution throughout the day and healthy sleep habits.**