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A Comprehensive, Multidisciplinary, Personalized, Lifestyle Intervention Program is Associated with Increased Leukocyte Telomere Length in Children and Adolescents with Overweight and Obesity

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12 MONTHS PARTICIPATION IN A MULTIDISCIPLINARY TEAM STRUCTURED LIFESTYLE INTERVENTION PROGRAM, LEADS TO LEUKOCYTE TELOMERE LENGTH (LTL) INCREASE IN CHILDREN, IRRESPECTIVE OF GENDER, PUBERTAL STATUS, OR THE PRESENCE OF OVERWEIGHT OR OBESITY

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BACKGROUND

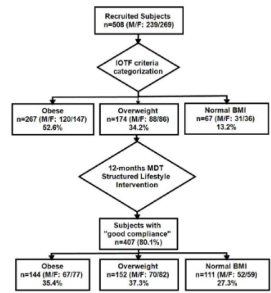
Leukocyte telomere length (LTL) is a robust marker of biological aging and is associated with obesity and cardiometabolic risk factors even in childhood and adolescence.

AIM

Aim of this prospective study was to assess the effect of a structured, comprehensive, multidisciplinary, personalized, lifestyle intervention program of healthy diet and physical exercise on LTL of overweight and obese children and adolescents according to their success at losing weight, their gender and pubertal status.

MATERIALS & METHODS

- 508 children and adolescents (age: 10.14yrs ± 0.13yrs)
- 239 males, 269 females; 282 prepubertal, 226 pubertal).
- Obese (n=267, 52.6%), overweight (n=174, 34.2%) or of normal BMI (n=67, 13.2%) according to the IOTF cut-off points
- Studied prospectively for one year.
- Followed an individualized dietary, exercise, and psychological support program with frequent clinical and laboratory evaluations.
- LTL were measured with quantitative real-time PCR and telomeric restriction fragments (TRF) method at the beginning and following 12 months intervention.
- Success of the intervention was assessed by employing two criteria: 1. The change (improvement) of IOTF category and 2. The change of BMI z-score by 0.6.
- Secondary measures were metabolic and hormonal parameters that are known to change in obesity.



CONCLUSIONS

- Implementing an individualized lifestyle intervention program in childhood for 1 year, leads to an increase of LTL independent of gender, pubertal status or success at weight loss.
- Given that LTL increased and especially independently of success at weight loss provides an additional argument on the importance of adopting a healthy lifestyle.
- Further long-term RCTs are required to assess potential associations of LTL in childhood with a favorable metabolic profile and decreased cardiovascular morbidity later in life and potentially longevity

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RESULTS

Following 12 months intervention we found:

- Significant decrease of BMI z-score (1.72±0.06; P<0.01).
 - In 193 subjects (47.42%) IOTF category improved
 - In 175 subjects (42.99%) BMI z-score decreased by 0.6.
- LTL increased significantly, in all patients
 - LTLbaseline: 1.35±0.01,
 - LTL12 months: 1.41±0.01, P<0.01)
- LTL increase was independent of gender, pubertal status or BMI.

Least circumference was the best positive predictor of LTL at initial assessment

LTL measurements and the respective comparisons at baseline and at 12 months follow-up of successful at weight loss subjects. Subjects were considered successful at weight loss, either if the respective BMI z-score decreased more than 0.6 at 12 months follow-up (A), or if the respective IOTF category (normal weight, overweight and obese) improved by one or more categories (B).						
Table 3A	YES (n=193)		P _{between timepoints}	No (n=214)		P _{between timepoints}
	Initial assessment	Annual assessment		Initial assessment	Annual assessment	
LTL	1.35±0.02	1.41±0.02*	<0.01	1.37±0.02	1.43±0.02*	<0.01

Table 3B	YES (n=175)		P _{between timepoints}	No (n=232)		P _{between timepoints}
	Initial assessment	Annual assessment		Initial assessment	Annual assessment	
LTL	1.33±0.02	1.40±0.02*	<0.01	1.38±0.02	1.43±0.02*	<0.01

All results are presented as mean±SE. All measured variables were compared by employing repeated-measures ANOVA. Significant main effects were revealed by the LSD post-hoc test. Statistical significance was set at (P<0.05), while strong significance

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Background/Aim: Leucocyte telomere length (LTL) is a robust marker of biological aging and is associated with obesity and cardiometabolic risk factors even in childhood and adolescence. The aim of the present study was to assess the effect of a structured, comprehensive, multidisciplinary, personalized, lifestyle intervention program of healthy diet and physical exercise on LTL in children and adolescents with overweight and obese.

Materials and Methods: Five hundred ($n = 508$) children and adolescents (239 males, 269 females; 282 prepubertal, 226 pubertal), aged 10.14 ± 0.13 years were recruited to participate in the study. Participants were classified as obese ($n = 267$, 52.6%), overweight ($n = 174$, 34.2%) or of normal BMI ($n = 67$, 13.2%) according to the IOTF cut-off points and were studied prospectively for one year. All subjects followed a structured, comprehensive, multidisciplinary, personalized, lifestyle intervention program of healthy diet and physical exercise, with frequent clinical and laboratory evaluation. LTL was measured using quantitative real-time PCR and telomeric restriction fragments (TRF) at the beginning of the study and following 12 months of intervention. In addition, success of the intervention was assessed by employing two criteria: i) The change (improvement) of IOTF category, and ii) The change of BMI z-score by 0,6. Secondary measures were metabolic and hormonal parameters that are known to change in obesity.

Results: Following 12 months of intervention, there was a significant decrease of BMI z-score (1.72 ± 0.06 ; $P < 0.01$). In 193 subjects (47.42%) the IOTF category improved, while in 175 subjects (42.99%) the BMI z-score decreased by 0.6. In all subjects, LTL increased significantly after 1 year of the lifestyle interventions (LTL_{baseline}: 1.35 ± 0.01 , LTL_{12 months}: 1.41 ± 0.01 , $P < 0.01$), irrespective of gender, pubertal status or BMI. Waist circumference was the best negative predictor of LTL at initial assessment. The implementation of the lifestyle interventions also resulted in a significant improvement in clinical (BMI, BMI z-score and waist to height ratio) and body composition indices of obesity, inflammatory markers, hepatic enzymes, HbA1C, QUICKI index, and lipid profile in all participants.

Conclusion: Our findings suggest that a comprehensive, multidisciplinary, personalized, lifestyle intervention program is associated with increased LTL in children and adolescents with overweight and obesity. Furthermore, the increase in LTL may be associated with a favorable metabolic profile and decreased morbidity later in life.