SYSTEMATIC REVIEW PROTOCOL FOR ANIMAL INTERVENTION STUDIES

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Item #	Section/Subsection/Item	Description	Check for approval
	A. General		
1.	Title of the review	Effect of High Intensity Interval Training on the body composition of obese rodents: a systematic review with meta-analysis	
2.	Authors (names, affiliations, contributions)	**Ana Flávia Sordi,** Department of Physiological Sciences, State University of Maringá, Brazil. **Julia Pedrosa Furlan**, Department of Physiological Sciences, State University of Maringá, Brazil. **Debora Alves Guariglia,** Department of Physical Education, Estacio de Sa University, Brazil **Sidney Barnabé Peres**, Department of Physiological Sciences, State University of Maringá, Brazil	
3.	Other contributors (names, affiliations, contributions)		
4.	Contact person + e-mail address	Ana Flávia Sordi: anaflaviasordi@gmail.com	
5.	Funding sources/sponsors	None	
6.	Conflicts of interest	None	
7.	Date and location of protocol registration		
8.	Registration number (if applicable)		
9.	Stage of review at time of registration		
	B. Objectives		
	Background		
10.	What is already known about this disease/model/intervention? Why is it important to do this review?	Despite the benefits that an active lifestyle is capable to provide on the individuals, the sedentary behavior and obesity levels have been growing to an alarming pattern. In order to stimulate the adhesion to physical activity and decrease mortality rates by all causes, small and efficient doses of physical activity started to be recommended by the public health care system, because it seems to be more adequate to physically inactive people. In this regard, high-intensity interval training started to gain more attention from researchers, because it generates higher levels of energy consumption than moderate intensity workouts, resulting in positive effects on body composition. High-intensity interval training (HIIT) consists in short and intense workout sessions interspersed with low recovering periods or rest. HIIT's main appeal is that this type of training is performed in a short period of time and can influence acute and chronic physiological responses, and result in cardiorespiratory adaptations on both anaerobic and aerobic metabolism, and the neuromuscular system. The literary collection that comprehends HIIT and body composition is, however, still	

		limited, because the lack of uniformity of samples from different studies, training protocols and evaluation methods of the body composition hamper concrete conclusions about the subject. Therefore, in order to improve the comprehension of HIIT's effect on body composition, it seems interesting to perform a systematic review in order to point out researches with more accurate results on the effects of HIIT on body mass and body composition.	
	Research question		
11.	Specify the disease/health problem of interest	Obesity and sedentary behaviour	
12.	Specify the population/species studied	Animals genetically obese or diet-induced to obesity and submitted to high intensity interval training	
13.	Specify the intervention/exposure	High-intensity interval training	
14.	Specify the control population	Untrained groups and submitted to other methods of training	
15.	Specify the outcome measures	Outcomes related directly with body composition (body weight, total body mass, fat and lean mass, adipocytes, inguinal fat, epididymal, visceral) of diet-induced and genetically obese rodents	
16.	State your research question (based on items 11-15)	What are the influences of high-intensity interval training on the body composition of obese rodents?	
	C. Methods		
	Search and study identification		
17.	Identify literature databases to to search (*e.g.* Pubmed, Embase, Web of science)	X MEDLINE via PubMed X Web of Science ☐ SCOPUS X EMBASE X Other, namely: Scielo and SCIENCE DIRECT ☐ Specific journal(s), namely:	
18.	Define electronic search strategies (*e.g.* use the step by step search guide[15] and animal search filters[20, 21])	When available, please add a supplementary file containing your search strategy: [insert file name]	
19.	Identify other sources for study identification	X Reference lists of included studies ☐ Books X Reference lists of relevant reviews ☐ Conference proceedings, namely: ☐ Contacting authors/ organisations, namely: ☐ Other, namely:	
20.	Define search strategy for these other sources	**Strategy for Scielo:** ((HIIT) OR (HIT) OR (HIIE) OR (high-intensity interval) OR (interval training) OR (sprint-interval training) OR (sprint repeted) OR (sprint training) OR ("very-heavy e exhaustive exercise) OR (heavy intensity exercise)) AND ((fat) OR (adipose) OR (body composition) OR (body composition) OR (adiposity)) AND ((animal s) OR (mice) OR (rats)) **Strategy for SCIENCE DIRECT:** (((HIIT) OR (HIT) OR (HIIE) OR (high-intensity interval) OR (interval training) OR (sprint-interval training) OR (sprint	

		repeted) OR (sprint training) OR ("very-heavy exhaustive exercise) OR (heavy intensity exercise))) and TITLE(((fat) OR (adipose) OR (body composition) OR (body composition) OR (adiposity)) and TITLE(((animals) OR (mice) OR (rats))	
	Study selection		
21.	Define screening phases (*e.g.* pre-screening based on title/abstract, full text screening, both)	Pre-screening: screening on title First phase: screening based on abstract Second phase: screening based on full text	
22.	Specify (a) the number of reviewers per screening phase and (b) how discrepancies will be resolved	All phases will be screened by two independent reviewers (AFS and JPF). Discrepancies will be resolved by contacting (DAL and SBP)	
	Define all inclusion and exclusion criteria based on:		
23.	Type of study (design)	Inclusion criteria: Experimental trials. Research strategy included only relative terms or describing the intervention, which at least one of those, were characterized as HIIT on chronic effect Exclusion criteria: Review papers, non-interventional studies, opinion papers	
24.	Type of animals/population (*e.g.* age, gender, disease model)	Inclusion criteria: Experimental rodents genetically obese and diet-induced to obesity and submitted to high intensity interval training with control group not exposed to HIIT) Exclusion criteria: Human and rodents with dysfunctions as metabolic syndrome, hypertension, and diabetes	
25.	Type of intervention (*e.g.* dosage, timing, frequency)	Inclusion criteria: Studies with chronic effects of high intensity interval training Exclusion criteria: Studies with acute sessions of training and without control group will be excluded	
26.	Outcome measures	Inclusion criteria: Body composition Exclusion criteria: N/A	
27.	Language restrictions	Inclusion criteria: All languages Exclusion criteria: N/A	
28.	Publication date restrictions	Inclusion criteria: No restriction Exclusion criteria: N/A	
29.	Other	Inclusion criteria: Exclusion criteria:	
30.	Sort and prioritize your exclusion criteria per selection phase	Selection phase: first pass based on title/abstract 1. Studies not on animals/rodents 2. Studies not on disease of interest (obese) 3. Studies without intervention of interest (high-intensity interval training) 4. Not a primary study (e.g. review or opinion paper) Selection phase: Second pass based on full text 1. No outcome related to body composition 2. Investigations with comorbidities 3. Acute sessions of high intensity interval training 4. No control group	
	Study characteristics to be extracted (for assessment of external validity, reporting quality)		
31.	Study ID (*e.g.* authors, year)	First author, title, year, journal	
32.	Study design characteristics (*e.g.*	Experimental groups	

	experimental groups, number of animals)	Number of animals per group Body composition-related outcome Mode of training intervention Duration of training intervention	
33.	Animal model characteristics (*e.g.* species, gender, disease induction)	Mice and rats Species: Sprague-Dawley, Wistar, C57BL/6 and Zucker Sex: male and female Age: 8-12 week old (in the beginning) Strain: high-fat diet or genetically obese	
34.	Intervention characteristics (*e.g.* intervention, timing, duration)	Protocols with high-intensity interval training Duration: 4-16 weeks of intervention Training: 3-5 times per week Mode: running or swimming	
35.	Outcome measures	Any outcome measure related to body composition. Specifically: body weight, adiposity index, visceral fat	
36.	Other (*e.g.* drop-outs)		
	Assessment risk of bias (internal validity) or study quality		
37.	Specify (a) the number of reviewers assessing the risk of bias/study quality in each study and (b) how discrepancies will be resolved	(a) Two independent reviewer (AFS and JPF) will assess risk of bias of included studies (b) Discrepancies will be resolved by contacting (DAL and SBP)	
38.	Define criteria to assess (a) the internal validity of included studies (*e.g.* selection, performance, detection and attrition bias) and/or (b) other study quality measures (*e.g.* reporting quality, power)	X By use of SYRCLE's Risk of Bias tool[4] ☐ By use of SYRCLE's Risk of Bias tool, adapted as follows: ☐ By use of CAMARADES' study quality checklist, e.g [22] ☐ By use of CAMARADES' study quality checklist, adapted as follows: ☐ Other criteria, namely:	
	Collection of outcome data		
39.	For each outcome measure, define the type of data to be extracted (*e.g.* continuous/dichotomous, unit of measurement)	Continuous outcomes: body composition (g), adiposity index (%), retroperitoneal fat (g), epididymal fat (g), visceral fat (g)	
40.	Methods for data extraction/retrieval (*e.g.* first extraction from graphs using a digital screen ruler, then contacting authors)	Extract data from table, text or figures For Incomplete or unavailable data respective authors will be contacted and if authors failed to respond then study will be excluded.	
41.	Specify (a) the number of reviewers extracting data and (b) how discrepancies will be resolved	(a) Twoo independent reviewer (AFS and JPF) will extract data of included studies (b) Discrepancies will be resolved by contacting (DAL and SBP)	
	Data analysis/synthesis		
42.	Specify (per outcome measure) how you are planning to combine/compare the data (*e.g.* descriptive summary, meta-analysis)	Meta-analysis and descriptive summary	
43.	Specify (per outcome measure) how it will be decided whether a meta-analysis will be performed	If data from more than three studies is homogeneous in nature then meta-analysis will be performed	
	If a meta-analysis seems feasible/sensible, specify (for each outcome measure):		

44.	The effect measure to be used (*e.g.* mean difference, standardized mean difference, risk ratio, odds ratio)	Mean difference or standard mean difference and 95% confidence interval will be used	
45.	The statistical model of analysis (*e.g.* random or fixed effects model)	Random effect model	
46.	The statistical methods to assess heterogeneity (*e.g.* I^2, Q)	I^2	
47.	Which study characteristics will be examined as potential source of heterogeneity (subgroup analysis)	Species Duration of intervention Type of intervention Type of protocols	
48.	Any sensitivity analyses you propose to perform	To be determined	
49.	Other details meta-analysis (*e.g.* correction for multiple testing, correction for multiple use of control group)	If applicable, we will perform a Bonferroni correction for testing multiple subgroups. If one or more subgroup analyses cannot be performed due to insufficient data, the p-value will be adjusted accordingly.	
50.	The method for assessment of publication bias	Funnel plots	
Final approval by (names, affiliations):		Date:	