Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

Effect of Green Tea Extract in Conjunction with Exercise Prices of Training on Anaerobic Performances in College Students' Outcomes

Qiping Mao[1], Napatsawan Thanaphonganan[2]

Abstract

To evaluate the effects of various interventions on anaerobic power, fatigue index, and overall performance in college students. Participants were 30 college students aged 18-22 years from Sichuan Vocational College of Health. Their height, weight, and anaerobic capacity were measured using the running-based anaerobic sprint test (RAST). We divided the students into three groups of 10 participants each, consisting of 3 males and 7 females, based on their RAST test scores. Group 1 received a placebo (500 mg) combined with 4 weeks of athletic training; Group 2 received a single dose of 500 mg of green tea extract with exercise; and Group 3 received 500 mg of green tea extract combined with 4 weeks of athletic training. Before-and-after-experimental data research designs were compared using a t-test analysis, while differences between groups were assessed. The results showed that statistically significant were not differences in anaerobic capacity for Group 1, while Group 2 displayed significant improvements in anaerobic capacity and mean power among female students ($p<.05$). Group 3: students' exercise training on anaerobic power, fatigue index, and mean power variables are differences, significant for both male and female students ($p<.05$). Confirmation of the effect of green tea extract in conjunction with exercise prices of training on anaerobic performance in college students' outcomes between each paired-group using one-way ANOVA, the results revealed that the four variables are differences, significant in anaerobic power, average power, and fatigue index across the groups, and Group 3 indicating the most notable improvements. Suggestions that, combining green tea extract with prolonged athletic training significantly improves anaerobic capacity, particularly in female participants. These results highlight the potential benefits of green tea extract in enhancing athletic performance, warranting further research to explore its long-term effects and optimize exercise interventions.

Keywords: *Green Tea Extract, Anaerobic Capacity, Exercise Performance, Exercise Fatigue, And Before-And-After-Research Designs.*

Introduction

People who are generally healthy are energetic, productive, and have a sharp mind. They are also able to maintain their health by practicing preventative care and not letting illness or injury get in their way. Here are some habits that can help people maintain good health: *Exercise*: Regular exercise can help them build fitness, manage their weight, and lower their risk of serious illnesses. It can also improve their mental health and relieve stress. *Eat a balanced diet:* A balanced diet provides the vitamins and minerals people need to stay healthy. *Practice good sleep hygiene:* Getting enough sleep (7–8 hours per night) regularly can improve their mood, memory, and cognitive performance. Good sleep hygiene practices can also help prevent sleep problems and disorders; *Stop smoking:* Quitting smoking can improve your health status, enhance your quality of life, and reduce your risk of premature death; Maintain healthy brain function: A healthy brain allows you to think, make good decisions, and perform daily tasks. It also helps you maintain good mental health and prevent cognitive decline; *Maintain bone health:* Bones are important for movement, and protecting vital organs. When bones become weaker and less dense, they are at an increased risk of breaking, which is called osteoporosis (World Health Organization, 2018).

Exercise is an essential part of a healthy lifestyle. Not only does regular exercise help to maintain overall fitness and manage your weight, but it can also lower the risk of many life-threatening conditions. People who exercise regularly are likely to live longer and enjoy a better quality of life. In fact, studies have shown that being physically unfit is just as dangerous as smoking in terms of lowering life expectancy. Regular exercise also improves mental and emotional health. The chemicals and hormones released in the brain

[1] Master Student at the Department of Health and Sports Science, Faculty of Education, Mahasarakham University, Maha Sarakham, 44000, Thailand, Email: 564841387@qq.com

[2] Instructor and Researcher at the Department of Health and Sports Science, Faculty of Education, Mahasarakham University, Maha Sarakham, 44000, Thailand, Email: napatsawan.t@msu.ac.th, (Corresponding Author)

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

through exercise can help deal with stress and promote happiness. General exercise has multiple health benefits but can also be used as part of your mucus clearance routine and will help to improve lung function and fitness. The powerful combination of cardiovascular exercise and strength training can help a person build muscle strength and improve their heart, lung, and circulatory health (Sissons, 2020).

Children must regularly exercise to develop muscle and bone strength and help posture, fitness, and lung function. All types of exercise should be encouraged. Trampolines are particularly effective in helping to clear mucus. All these health benefits are the reasons, why many people or children are encouraged to exercise. However, many people think exercise is too expensive, or takes too much time. As little as half an hour of moderate activity every day, such as brisk walking, can be enough to improve health and fitness (The American Academy of Pediatrics, 2024). There are many ways to exercise, and it is possible to find something to suit any kind of lifestyle. The CDC recommends that children and adolescents ages 6 to 17 get at least 60 minutes of moderate-to-vigorous physical activity daily. Children's activities include walking, running, climbing, push-ups, jumping, and organized sports. Children should also try to reduce the large amount of time they spend, such as sitting or lying down (Centers for Disease Control and Prevention, 2022).

Regular exercise is important for children to develop muscle and bone strength, and to help with posture, fitness, and lung function: *Bone and muscle strength*: Exercise helps children develop strong bones and muscles. It also helps maintain bone strength as children age; *Heart and lung health*: Exercise helps children develop healthy hearts and lungs; Weight management: Exercise can help children maintain a healthy body weight; *Flexibility*: Exercise can help children become more flexible. *Coordination and strength*: Exercise can help children improve their coordination and strength; *Mental health*: Exercise can help reduce symptoms of anxiety and depression; *Reduced risk of disease*: Exercise can reduce the risk of developing health conditions such as heart disease, cancer, type 2 diabetes, high blood pressure, and osteoporosis. Understanding the extensive benefits of exercise for children empowers parents, caregivers, educators, and healthcare professionals to prioritize physical activity in children's daily routines. Most experts advise that children engage in some form of physical activity daily, whether structured or unstructured. Regular exercise offers a multitude of benefits. Regular physical activity contributes to a child's physical development and promotes overall well-being. It may help if parents and caregivers can encourage them in active play, playground activities, and sports where possible. Trusted Source for Children, it can impact their physical, mental, and emotional well-being (Sherrell, 2023).

Recommendations limiting screen time to one hour or less per day for children ages 2 to 5. Some benefits of physical activity for brain health happen right after a session of moderate-to-vigorous physical activity. Benefits include improved thinking or cognition for children 6 to 13 and reduced short-term feelings of anxiety for adults. Regular physical activity can help keep your thinking, learning, and judgment skills sharp as children age. It can also reduce their risk of depression and anxiety and help them sleep better (The American Academy of Pediatrics, 2024). Exercise can help a person age well. This may not seem important now, but their body will thank you later. Regular exercise improves the quality of life: and the ability to enjoy things: as someone gets older, it can improve brain health and reduce the chance of getting Alzheimer's (a brain disease that causes memory loss). Exercising can help prevent falls and injuries from falls (Gavin, 2023).

Physical activity is good for children in many ways. Benefits include improved academic performance, brain health, muscular fitness, heart and lung health, cardiometabolic health, long-term health, and bone strength, measures of a healthy weight impact benefits include improving attention and memory, Reducing the risk of depression, building strong muscles and endurance, improving blood pressure and aerobic fitness, helping maintain normal blood sugar levels, sometimes called cardiometabolic health, reducing the risk of several chronic diseases, including type 2 diabetes and obesity, strengthens bones, and helps regulate body weight and reduce body fat. physical activity includes walking, running, dancing, swimming, yoga, and gardening. People should also do strength training exercises for all major muscle groups at least twice weekly. If people haven't exercised for some time, or have medical conditions or concerns, they should speak to their doctor first (Physical Activity Guidelines for Americans, 2024).

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

Benefits of exercise, such as Weight management: Can help you maintain a healthy weight or lose weight; reduced risk of disease: can lower the risk of heart disease, stroke, diabetes, and some cancers; improved cholesterol: can improve people cholesterol levels; lower blood pressure: can lower their blood pressure; reduced stress: can help calm their body and brain, and reduce stress hormones; improved mood: can improve their mood, motivation, memory, and concentration; increased energy: can increase their energy levels; prolonged life: can prolong their life. Adults get 150 minutes of moderate-intensity physical activity per week. This could be 30 minutes a day for five days weekly, or 22 minutes daily. Three parts to a balanced exercise routine: aerobic exercise, strength training, and flexibility activities. A balanced exercise routine is important for overall health and fitness. Each component plays a crucial role, and neglecting any one aspect can lead to imbalances and increased injury risk (Food and Fitness Pro, 2023).

In addition to aerobic activity, people should also do muscle-strengthening activities at least twice a week. This can include exercises that work all the major muscle groups, such as your legs, hips, back, abdomen, chest, shoulders, and arms. Aerobic exercise encourages people to take deep breaths: football, rugby, swimming, and running. It may help to try other activities that concentrate on breathing techniques and balance such as tai chi and yoga. If people can't get out, then get a Nintendo Wii; they are great exercise for all families. Effect of green tea extract in conjunction with exercise training on anaerobic performance of college students. Aerobic exercises are a great way to improve cardiovascular health by making people's hearts stronger and more efficient at delivering oxygenated blood throughout the body.

Foods' nutrition and energy drinks to support athletes: As is known to all, tea has a long history in China. The Tang and Song dynasties developed important stages in the tea industry in ancient China. There is a saying that "flourished in Tang and flourished in Song"(Rui, 2020). Tea is one of the world's top three carbonated beverages. Tea-producing regions have formed different identities of tea cultures based on their unique natural weather conditions. Cultural teas have certain health care, pharmacological, and other beneficial effects, and moderate drinking of a cup of tea has been beneficial to human health for a long time (Khan & Mukhtar, 2014) H. (2014). There are more than 60 tea-producing in the world countries and regions, and the drinking population exceeds 2 billion in this era (Bermúdez et al., 2024).

The chemical ingredients produced by mixing tea treatments relate to the unique taste and quality of the tea's health benefits. The tea's health benefits are in large part due to its bioactive compounds, such as polyphenols, alkaloids, pigments, and free amino acids. The main ingredients in green tea extract are tea polyphenols and caffeine. Tea polyphenols have many health functions, such as antioxidant, anti-inflammatory, hypoglycemic, lipid-lowering, prevention of senile dementia, prevention of arteriosclerosis, and anti-tumor. (Tang et al., 2019). Although green tea is a popular drink consumed daily by millions of people around the world. Previous studies have shown that some polyphenol compounds from green tea possess anticancer activities. Especially, Epigallocatechin-3-Galatea (EGCG) is the most effective antioxidant in tea, with anti-inflammatory, antioxidant, cancer prevention, regulation of glycolipid metabolism and other effects, and explored their structure-activity relationship. The effect of the 10 polyphenol compounds on the proliferation of HCT-116 and SW-480 human colorectal cancer cells was evaluated using an MTS assay. Cell cycle distribution and apoptotic effects were analyzed by flow cytometry after staining with propidium iodide (PI)/RNase or annexin V/PI (Du et al., 2012).

Caffeine can enhance cerebral cortex excitability, relieve and eliminate body fatigue, and improve sleep quality. the effects caffeine has on cognitive and physical function, since most real-world activities require complex decision making, motor processing and movement. Caffeine exerts its effects by blocking adenosine receptors. Following low (~40 mg or ~0.5 mg kg−1) to moderate (~300 mg or 4 mg kg−1) caffeine doses, alertness, vigilance, attention, reaction time and attention improve, but less consistent effects are observed on memory and higher-order executive function, such as judgment and decision making. Effects on physical performance on a vast array of physical performance metrics such as time-to-exhaustion, time-trial, muscle strength and endurance, and high-intensity sprints typical of team sports are evident following doses that exceed about 200 mg (~3 mg kg−1) (. (Meng Yang, 2020), and improve sleep quality (McLellan, Caldwell & Lieberman, 2016). Both sleep loss and daily caffeine intake can induce changes in grey matter (GM). Caffeine is frequently used to combat sleepiness and impaired performance

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

caused by insufficient sleep. It is unclear: whether daily use of caffeine could prevent or exacerbate the GM alterations induced by 5-day sleep restriction; and the potential impact on GM plasticity depends on individual differences in the availability of adenosine receptors, which are involved in mediating effects of caffeine on sleep and waking function (Lin et al., 2024).

The concept of physical health is a state of well-being where the body's systems and parts function properly and a person can perform daily activities without restriction. It can be affected by many factors, including: Lifestyle: diet, physical activity, sleep, and behaviors like smoking; biology: genetics and how your body is built; and medical care: noticing and looking after any illness or injury. Physical health is important for overall well-being and can impact many aspects of life, including how you think and feel, your relationships with others, and your mood, well-being, and quality of life (Henry, 2024). Physical health is defined as the condition of people body, taking into consideration everything from the absence of disease to fitness level. Physical health is critical for overall well-being, and can be affected by: Lifestyle: diet, level of physical activity, and behaviour (for instance, smoking). Health is a relative state in which one is able to function well physically, mentally, socially, and spiritually to express the full range of one's unique potentialities within the environment in which one lives. Thus, the key role of sports nutrition in the development of youth sports (Svalastog et al., 2017).

In our annual physical tests and lectures, college students lack exercise training, especially poor anaerobic capacity, difficult recovery after exercise, resulting in poorer physical fitness. Green tea is rich in antioxidant substances, such as tea polyphenols, catechins, etc., these substances have strong antioxidant properties, can effectively remove free radicals in the body, reduce oxidative stress reaction, so as to protect the body from damage. Green tea extract can promote the synthesis of muscle protein, improve muscle mass and strength. However, exercise training can increase muscle volume and strength, and improve muscle endurance and explosive power. Therefore, this study chose green tea and its extract as the research focus to study the effects of green tea extract combined with exercise training on anaerobic capacity of college students, whether it can improve exercise performance, relieve fatigue, promote muscle recovery and improve cardiopulmonary function. To provide a scientific basis for the analysis of the efficacy of green tea extract and the development of drugs or health products to promote the anaerobic capacity of daily consumption.

Research Methodology

Mixed research methodology investigated and assessed the effect of green tea extract in conjunction with exercise training on anaerobic performances of college students at Sichuan Health and Rehabilitation Vocational College in China were compared and analyzed using experimental and quantitative data research methods.

Research Objectives

- To compare students' before and after exercise pieces of training in different three groups on anaerobic performances of their effects' outcomes.

- To compare Gender students' before and after exercise pieces of training in different three groups on anaerobic performances of their effects' outcomes.

Research Procedures

Step I: Designing the documentary data research methodology that followed variables by research objectives was reviewed.

Step II: Planning the experimental data research methodology (Table 1).

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

Table 1. Planning The Experimental Data Research Methodology

Experimental grouping	Take it with a meal after exercise	Training plan	Exercise intensity/ duration	Dependent variable	Testing method
Group 1: Intake Placebo	500 mg placebo as a generic plus 4 weeks of athletic training	Train 3 times weekly in 4 weeks.	7 programs per training session. 35-40 minutes per session	Anaerobic performance 1. Anaerobic power 2. Anaerobic capacity 3. Average power 4. Fatigue Index	RAST Tested to analyze anaerobic capacity
Group 2: Green Tea Extract capsule	500 mg Green Tea Extract plus 1 training session				
Group 3: Green Tea Extract capsule	500 mg Green Tea Extract plus 4 weeks of athletic training				

Step III: Experimental procedures: Six sets of data from 30 students were tested by RAST before the experiments were randomly divided into three groups.

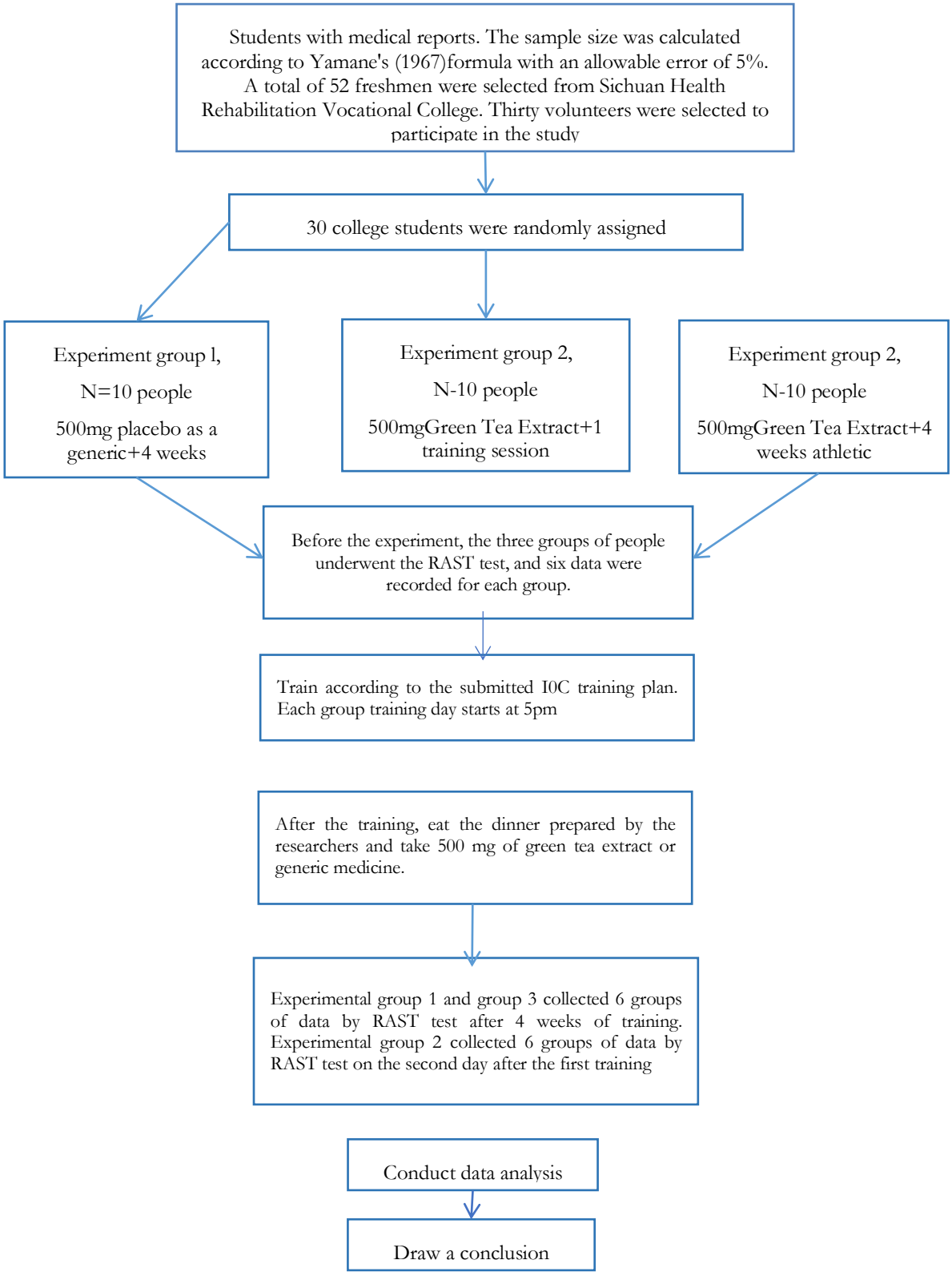
Step IV: Participants' training sessions and avoiding strenuous exercise were reported at 5 p.m. daily. Students avoided caffeinated alcohol and beverages for 24 hours and get enough sleep for 6-8 hours daily.

Step V: Each training course of experiment groups 1 and 3 was guaranteed to be carried out in the same environment. After the 4-week training, RAST was used for testing and 6 times of data was collected.

Step VI: After taking Green Tea Extract for more exercise than 1 day. They were interviewed about their post-product symptoms such as abdominal pain, bloating, nausea, headache, etc., by a research team.

Step VII: The consistency of the results measured by running the training plan criteria was 0.93 indicating sets of movements.

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385



Step VIII: Creative the research frameworks and Data collection flowchart (Figure 1)

Figure 1. Research Frameworks and Data Collection Flowchart

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

Participants

The participants consisted of 30 College Students from the Sichuan Health and Rehabilitation Vocational College in China, who were separated into three groups; each group consisted of 3 male students and 7 female students, aged 18-22 yearly.

Group 1: Students ingested 500 mg of placebo as a generic plus four weeks of athletic training. They were instructed to take a meal after exercise. They were trained three times weekly, continuously trained, and took generic drugs for four weeks. Ensure that the amount of time and exercise weekly are equal.

Group 2: Students ingested 500 mg of Green Tea Extract capsule plus exercise Single dose. They were instructed to have a meal after exercise training. They were only trained once, and data were collected on the second day.

Group 3: Students ingested 500 mg of Green Tea Extract plus four weeks of athletic training. They were trained continually per week, three times weekly, and took the green tea extract for 4 weeks. Ensure that the amount of time and exercise weekly are equal.

Note: Data were collected after the end of week 4 for both Groups 1 and 3.

Research Instruments

Experimental Tools: Height and Weight Instrument; Digital Weighing Device; Heart Rate Monitor Model Number (Huawei Bracelet); and RAST Test Tools including Tape Measure, Two Stopwatches, Whistle, and Two Cones.

Data Collection Tools: A questionnaire, Health Assessment Recorder, Pre-Exercise Self-Assessment (PAR-Q), Perceptions, and Interview Forms after ingesting 500 gm of Green Tea Extract, Recording Speed Test (35 meters) and Scoring Report (RAST Test), RAST Tester Result Registration Form, and Anaerobic Performance.

The training program is submitted to three experts (Item Objective Congruence: IOC). The experts will analyze the validity and reliability of research instruments. The rationality and effectiveness of the training program assessed the appropriateness of the training program and rated it.

Data Analysis

Statistical significance was analyzed using average means, standard deviation, One-way Analysis of Variance for Repeated Measures: ANOVA, and *t*-test analysis for the raw data scoring from the research testers and students' perceptions of the questionnaire outcomes and interviews to their general profiles and Gender students' before and after research designs on exercise pieces of training in different three groups on anaerobic performances of their effects' outcomes.

Results

Creative mixed research methodologies were combined with documentary research, experimental research, and quantitative research methods in 30 College students at the Sichuan Health and Rehabilitation Vocational College in China who were separated into three groups. Each group consisted of 3 male students, and 7 female students, aged 18-22 yearly. The results are reported in sub-sections as follows:

General Profiles of the Participants

An average mean of age, height, and weight of the participants is reported in Table 2.

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

Table 2. Mean And Standard Deviation for The Age, Height, And Weight

Group	Age (Year)				Height (cm)				Weight (kg)			
	Male		Female		Male		Female		Male		Female	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
G.1	19.00	1.00	20.00	0.81	168.33	2.88	165.57	3.77	59.33	2.08	50.14	4.87
G.2	20.00	1.00	19.50	1.19	168.33	2.88	166.00	3.69	55.00	5.00	50.28	4.23
G.3	19.30	0.57	19.42	1.27	170.00	5.00	167.00	4.28	59.00	7.81	54.71	3.81

$N_M=3$, $N_F=7$

Experimental Variables

Participants were trained on four experimental variables, namely Anaerobic power, Anaerobic capacity, Average power, and Fatigue Index of their normal distributions. The results are reported in Table 3.

Table 3. Means and Standard Deviation for four Experimental Variables

Anaerobic Variables	Gender			
	Male		Female	
	Mean	S.D.	Mean	S.D.
Anaerobic Power	139.93	91.65	178.84	27.11
Anaerobic Capacity	212.14	31.33	111.27	21.45
Average Power	283.16	60.41	138.17	22.69
Fatigue Index	283.16	60.41	138.17	22.69

$N_M=9$, $N_F=21$

Comparisons between the Effects' Outcomes of Students' Exercise Pieces of Training on Anaerobic Performances Using Before and After Research Designs in Different Three Groups

Anaerobic training has a greater effect on anaerobic and aerobic capacity than aerobic training. However, aerobic exercise can have a positive effect on anaerobic power. The 30 College Students from the Sichuan Health and Rehabilitation Vocational College in China were administered exercise training on anaerobic performances using Before and After research designs in different three groups for four weeks and compared their effect outcomes.

Comparisons between the Effects' Outcomes of Students' Exercise Pieces of Training on Anaerobic Performances Using Before and After Research Designs in Three Groups

The effects' outcomes of students' exercise pieces of training on anaerobic performances using before and after research designs in group 1: Students ingested 500 mg of placebo as a generic plus four weeks of athletic training. They were instructed to take a meal after exercise. Group 2: Students ingested 500 mg of Green Tea Extract capsule plus exercise Single dose. They were asked to have a meal after exercise training. They were only trained once, and data were collected on the second day. Group 3: Students ingested 500 mg of Green Tea Extract plus four weeks of athletic training. They were trained continually per week, three times weekly, and took the green tea extract for 4 weeks. In most of the three groups, students were trained three times weekly, continuously trained, and took generic drugs for four weeks. Ensure that the amount of time and exercise weekly are equal. The results are reported in Table 4.

Table 4. Means, Standard Deviation, T-Test, And Probability (*P*-Value) Of Gender For Each Group

Group 1			
Anaerobic Variables	Exercise Training	Gender	
		Male	Female

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

		Mean	S.D.	t-test	p	Mean	S.D.	t-test	p
Anaerobic Power	Before After	310.97 337.81	30.78 25.26	3.02	.058	185.80 182.19	28.80 31.66	-0.71	.557
Anaerobic Capacity	Before After	268.75 217.10	30.86 22.67	-3.14	.088	104.48 110.97	13.61 18.13	0.96	.408
Average Power	Before After	215.81 273.34	54.21 43.04	4.44*	.048	137.14 142.37	20.34 24.57	0.87	.525
Fatigue Index	Before After	5.69 6.15	2.18 2.75	1.19	.355	1.76 1.56	0.52 0.62	0.89	.407
Group 2									
Anaerobic Power	Before After	359.45 361.44	72.59 70.85	0.18	.831	173.55 179.69	22.23 22.68	0.61	.603
Anaerobic Capacity	Before After	193.07 191.40	40.46 40.57	-0.34	.781	112.47 122.57	21.40 22.03	1.08	.365
Average Power	Before After	252.08 253.93	40.41 41.10	0.13	.903	137.77 148.21	18.73 24.99	3.17*	.019
Fatigue Index	Before After	3.48 4.08	2.15 2.74	0.37	.746	1.31 1.27	0.56 0.28	0.16	.880
Group 3									
Anaerobic Power	Before After	458.12 522.38	77.92 70.33	4.91*	.032	177.16 220.08	32.13 28.42	5.36*	.013
Anaerobic Capacity	Before After	242.52 252.09	28.98 30.42	1.81	.207	116.46 125.63	28.45 23.60	1.38	.341
Average Power	Before After	338.03 381.44	61.56 40.09	2.84	.081	139.61 147.72	30.78 25.26	3.23*	.018
Fatigue Index	Before After	3.48 4.98	2.15 1.72	2.21	.058	2.28 3.11	0.35 0.29	6.80***	.000

*N_M=3, N_F=7 (for each group), *p<.05, **p<.01, ***p<.001*

The results, as given in Table 4, are statistically significant and indicate that either some pair simple t-tests are differentiated or not differentiated for all on Anaerobic Power, Anaerobic Capacity, Average Power, and Fatigue Index for male and female students in three groups of their effects' outcomes of exercise pieces of training on anaerobic performances using before-and-after research designs.

Comparisons between the Effects' Outcomes of Students' Exercise Pieces of Training on Anaerobic Performances Using Before-and-After Research Designs in Totalized Three Groups

On the other hand, the purpose of this study was to compare the results of an anaerobic endurance training program using different ratios of training time and rest time on the performance of their Anaerobic Power, Anaerobic Capacity, Average Power, and Fatigue Index development in college students in three groups. The results in Table 5 reported that the 30 students' outcomes of their Anaerobic Power, Anaerobic Capacity, Average Power, and Fatigue Index may be confirmed.

Table 5. Means, Standard Deviation, T-Test, and Probability (*P*-Value) of Gender for Three Group

Anaerobic Variables	Exercise Training	Gender							
		Male				Female			
		Mean	S.D.	t-test	p-value	Mean	S.D.	t-test	p-value
Anaerobic Power	Before After	339.85 365.58	91.35 98.15	2.27*	.036	163.83 182.31	26.01 33.92	2.66*	.015
Anaerobic Capacity	Before After	297.13 303.46	62.94 79.01	1.89	.095	133.31 140.19	25.84 27.41	3.26**	.004

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

Average Power	Before After	236.44 245.85	42.83 44.05	1.25	.309	117.38 126.89	21.64 23.16	2.62*	.016
Fatigue Index	Before After	1.65 4.09	0.59 2.34	2.95*	.019	1.45 1.65	0.50 0.56	1.24	.228

*N_M=9, N_F=21, *p<.05, **p<.01, ***p<.001*

Table 5 shows that two of four variables are differences with Before-and-After research designs, significant in Anaerobic Power, and Fatigue Index in male students, and three of four variables are differences significant in Anaerobic Power, Anaerobic Capacity, and Average Power variables that affect outcomes of students' exercise pieces of training on anaerobic performances after the four weeks of their experiments.

Comparisons between the Effects' Outcomes of Students' Exercise Pieces of Training on Anaerobic Performances After the Four Weeks of their Experiments in Three Groups

In statistics: A one-way ANOVA Bonferroni test was used to compare the data after the three groups of experiments after a week's scheduled exercise training project in four weeks for different Gender of students. Designing the multiple comparisons was repeated and analyzed if the statistical significance was differentiated by t-test analysis.

Table 6: Shows The SS, Df, MS, F-Test, And P-Value of Students' Exercise Pieces of Training on Anaerobic Performances After the Four Weeks of Their Experiments in Three Groups

Male Students' Exercise Training After Four Weeks for Three Groups						
Variable	Group's Relation	The sum of Square (SS)	Df	Mean of Square (MS)	F-test	*p*-value
Anaerobic Power	Between Groups	59706.36	2.00	29853.18	7.08*	.022
	Within Groups	25283.48	6.00	4213.91		
	Total	84989.84	8.00	413.96		
Anaerobic Capacity	Between Groups	2820.22	2.00	1410.11	0.93	.451
	Within Groups	9150.79	6.00	1525.13		
	Total	11971.01	8.00			
Average Power	Between Groups	28426.50	2.00	14213.25	8.37	0.014*
	Within Groups	10184.73	6.00	1697.46		
	Total	38611.23	8.00			
Fatigue Index	Between Groups	32.52	2.00	16.26	9.76	0.011*
	Within Groups	9.99	6.00	1.67		
	Total	42.51	8.00			
Female Students' Exercise Training After Four Weeks for Three Groups						
Anaerobic Power	Between Groups	59706.36	2.00	29853.18	7.08	0.02*
	Within Groups	25283.48	6.00	4213.91		
	Total	84989.84	8.00			
Anaerobic Capacity	Between Groups	2820.22	2.00	1410.11	0.93	0.45
	Within Groups	9150.79	6.00	1525.13		
	Total	11971.01	8.00			
Average Power	Between Groups	28426.50	2.00	14213.25	8.37	0.01*
	Within Groups	10184.73	6.00	1697.46		
	Total	38611.23	8.00			
Fatigue Index	Between Groups	32.52	2.00	16.26	9.76	0.01*
	Within Groups	9.99	6.00	1.67		
	Total	42.51	8.00			

*N_M=9, N_F=21, *p<.05, **p<.01, ***p<.001*

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

Table 6 shows the data after the experiment for the three groups of boys. Creative One-way (ANOVA) Bonferroni test was used. The results showed that the males' anaerobic power. average power. fatigue index variables; and the anaerobic power, and fatigue index variables in three groups of females after the experiment were correlations, significant with F-test analysis.

Confirmations on the double-blind, randomized, placebo (PL)-controlled (Group 1). The two 4-week treatment periods (during which half of the subjects received GTE and the other half PL, and vice versa) were separated by a 4-week washout period. The duration of the washout period was selected based on the results. A pairwise comparison of the differences in Anaerobic Power, Anaerobic Capacity, Average Power, and Fatigue Index variables in three experimental groups. The results are reported in Table 7.

Table 7. A Pairwise Comparison of The Differences In Anaerobic Power, Anaerobic Capacity, Average Power, and Fatigue Index Variables In Three Experimental Groups

Variables	Group No.	Mean	Male Student					
			The 1st Group		The 2nd Group		The 3rd Group	
			Mean diff.	t-test	Mean diff.	t-test	Mean diff.	t-test
Anaerobic Power	The 1st Group	339.81						
	The 2nd Group	361.44	-21.63	4.38*				
	The 3rd Group	522.38	-182.58	9.28***	-160.94	8.37***		
Average Power	The 1st Group	272.34						
	The 2nd Group	259.93	19.41	3.54				
	The 3rd Group	381.66	-108.32	6.01**	-127.35	7.25**		
Fatigue Index	The 1st Group	3.18						
	The 2nd Group	4.37	-1.19					
	The 3rd Group	7.67	-4.40	7.36***	-3.30	3.42**		
			Female Student					
Anaerobic Power	The 1st Group	182.19						
	The 2nd Group	179.68	2.50	3.02				
	The 3rd Group	220.08	-37.89	4.78*	-40.42	4.91*		
Fatigue Index	The 1st Group	1.55						
	The 2nd Group	1.26	0.29	0.65				
	The 3rd Group	2.11	-4.35	7.70***	-0.84	1.96		

*N_M=3, N_F=7 (for each group), *p<.05, **p<.01, ***p<.001*

Table 7 indicates the effects of a short-term (4-week), green tea extract (GTE) supplementation in combination with strength training on selected blood markers of oxidative stress and muscular damage after a short-term exercise in previously untrained humans in terms of Anaerobic Power, Anaerobic Capacity, Average Power, and Fatigue Index of sports players, significantly.

Discussions

Research on the intake of fruit juice substances from green tea extract in conjunction with exercise pieces of training on anaerobic performances in college students' outcomes on four variables are not affected on the Anaerobic Power, Anaerobic Capacity, Average Power, and Fatigue Index variables in three experimental groups in four weeks. There was no significant difference between the control group before and after the experiment, which increased the credibility of the effect of green tea extract in the experimental group. Green tea extract combined with exercise training significantly improves anaerobic capacity (da Silva

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

et al., 2018) and reduces exercise fatigue (Jincai & Hailu, 2016; Ping & Weitao, 2010) in college students, especially male students. The stability of the control group further supports this finding and validates the experimental design.

Gender differences may contribute to variances in the potential protective effects of tea against cognitive impairment in the humans. With regard to male participants, the percentage of green tea consumption was higher in the normal control group than female. Regarding female participants across every age group, the results indicated that tea consumption failed to significantly decrease the risk of green tea extract in conjunction with exercise prices of training on anaerobic performance in males and females' outcomes on gender or age groups. Green tea consumption showed a protective effect against variables of their bodies in males but not in females (Xu et al., 2018).

After ingesting 500 mg of green tea extract for four consecutive weeks on exercise training: The recommended dose is 250–500 mg a day, and it's best taken with food. Amounts above this may be toxic. Plus, people with diabetes or those taking certain medications should speak with a healthcare professional before taking any amount of green tea extract. Generally, Green tea is one of the most commonly consumed teas in the world. Green tea extract is its concentrated form, with just one capsule containing the same amount of active ingredients as an average cup of green tea. Green tea extract has many potential health benefits, including *Heart Health*: Green tea extract may help lower the risk of heart disease, heart failure, hypertension, and ischemic stroke; *Blood Pressure and Cholesterol*: Green tea extract may help improve blood pressure and cholesterol levels; *Weight Loss*: Green tea extract may help with weight loss by increasing energy expenditure during workouts and while resting. *Skin Health*: Green tea extract may help reduce acne and improve the appearance of aging skin; *Oral Health*: Green tea extract may improve oral health by raising the pH levels in the mouth, breaking down bacteria, and lowering saliva acidity (Semeco & Northrop, 2023).

The health benefits of green tea extract are mostly due to its high antioxidant content. Green tea extract increases the human body's antioxidant capacity (the activity of the human body's antioxidant enzymes) and protects against oxidative stress (Lowe, Gana, & Rahman, 2015). This, in turn, may prevent associated health concerns. Oxidative stress increases fat buildup in your blood, which promotes inflammation in your arteries and leads to high blood pressure. The antioxidants in green tea extract can decrease inflammation and help reduce blood pressure. They can also inhibit fat absorption in cells, helping reduce blood fat levels (Bogdanski et al., 2012). This protection can help reduce brain damage that could lead to mental decline and brain diseases like Parkinson's, Alzheimer's, and dementia. The green tea extract group showed an increase in brain function and improved task performance, compared with the placebo group. Green tea extract is rich in catechins, and it contains a decent amount of caffeine. Interestingly, it seems that this combination of ingredients is responsible for green tea extract's modest weight loss properties (Rains, Agarwal, & Maki, 2011).

Green tea extract may aid weight loss by increasing the number of calories your body burns through a process called thermogenesis. However, the effect is modest, and it's unclear whether green tea catechins or caffeine are responsible. High doses of green tea extract are toxic and may lead to serious liver damage. The catechins in green tea extract may also help reduce inflammation caused by some liver diseases, such as nonalcoholic fatty liver disease (NAFLD) (Pezeshki et al., 2016). Trusted Source. Green tea extract seems to help improve liver function by decreasing inflammation and oxidative stress. Green tea extract has been shown to help maintain cell health. It may even help prevent some types of cancer, though more research is needed. It found that the likelihood of developing cancer was 3% for those receiving green tea compared with 30% for the control group (Bettuzzi et al., 2006).

Moreover, both supplements and the topical application of green tea extract seem to help prevent skin conditions like loss of skin elasticity, inflammation, premature aging, and cancer caused by exposure to UV rays. Interestingly enough, adding green tea extract to cosmetic products has been shown to benefit the skin by providing a moisturizing effect (Gianeti et al., 2013). In this research study, focused on green tea extract seems to be helpful in exercise, whether it's by improving exercise performance or enhancing recovery. While exercise has many health benefits, it's known to produce oxidative stress and damage cells in the body. Antioxidants, like green tea catechins, can reduce cellular damage and delay muscle fatigue. In

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

fact, a study involving 35 male students showed that green tea extract combined with strength training for 4 weeks enhanced the body's antioxidant protection. Green tea extract has been shown to increase insulin sensitivity and blood sugar tolerance, all while decreasing hemoglobin A1C and blood sugar levels (Jówko et al., 2011). The recommended dosage of green tea extract is between 250–500 mg per day. This amount can be obtained from 3–5 cups of green tea, or about 1.2 liters. Finally, it's best to take green tea extract with food. Both exceeding the recommended dose and taking it on an empty stomach may cause serious liver damage.

Conclusion

Mixed research combined with documentary data research methodology was reviewed on green tea extract in conjunction with exercise pieces of training on anaerobic performances, the experimental data research methods with average means of independent and dependent variables between groups were compared, and statistically significant was used to analyze using before-and-after-research designs that calculated with quantitative data research method. Administration to the participants of 30 Sophomore College Students at the Sichuan Health and Rehabilitation Vocational College in China were separated into three groups; each group consisted of 3 male and 7 female students, aged 18-22 yearly. Group 1: Students ingested 500 mg of placebo as a generic plus four weeks of athletic training. They were instructed to take a meal after exercise. Group 2: Students ingested 500 mg of Green Tea Extract capsule plus exercise Single dose. They were to have a meal after exercise training. They were only trained once, and data were collected on the second day. Group 3: Students ingested 500 mg of Green Tea Extract plus four weeks of athletic training. They were trained continually per week, three times weekly, and took the green tea extract for 4 weeks. Students in three groups were ensured that the amount of time and exercise weekly were equal.

The purposes of this study were to compare students' before and after exercise pieces of training in differences three different groups on anaerobic performances of their effects' outcomes, and the Genderes of students' before and after exercise pieces of training in differences three different groups on anaerobic performances of their effects' outcomes were assessed and compared on four variables, such as *Anaerobic Power, Anaerobic Capacity, Average Power,* and *Fatigue Index* variables. The results revealed that male and female students who intake 500 green tea extracts for 4 consecutive weeks indicate that most of their exercise training on anaerobic performances' effect outcomes are higher anaerobic power and fatigue index than the control group with a significance at the level .05, differently. Students who took placebo substances plus their exercise training, and other group students who took the green tea capsules plus their exercise in four weeks had no different effects or outcomes on their bodies in terms of before-and-after experiments using t-test analysis.

Suggestions that green tea extract also seems to benefit exercise performance. One study found that 14 men who actively engaged in physical activity and consumed green tea extract for 4 weeks increased their running distance by 10.9%. Green tea extract increases antioxidant protection against oxidative damage caused by exercise. This translates to better exercise performance and recovery. Although, this study found no significant effect of some resting variables on body composition. The recommended dose is 250–500 mg, taken with food haven

effect in conjunction with exercise training on anaerobic performances in college students' outcomes, significantly.

Acknowledgment

I extend my deepest gratitude to my supervisor, Assist. Prof. Dr. Napatsawan Thanaphonganan, for her unwavering support and insightful critiques throughout my research journey. Her deep commitment to academic excellence and meticulous attention to detail have significantly shaped this dissertation.

My appreciation also goes to the Department of Health and Sports Science, Faculty of Education, Mahasarakham University, Maha Sarakham, Thailand, whose resources and assistance have been invaluable. I would also like to acknowledge my peers for their camaraderie and the stimulating discussions that

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

inspired me throughout my academic journey. Their collective wisdom and encouragement have been a cornerstone of my research experience.

Finally, my sincere thanks to the technical staff whose expertise in managing laboratory equipment was crucial for my experiments. Their patience and readiness to assist at all times have left a profound impact on the completion of my project.

References

Bermúdez, S., Voora, V., Larrea, C., & Luna, E. (2024). Global market report: Tea prices and sustainability. International Institute for Sustainable Development. https://www.iisd.org/publications/report/2024-global-market-report-tea

Bettuzzi, S., Brausi, M., Rizzi, F., Castagnetti, G., Peracchia, G., Corti, A. (2006). Chemoprevention of human prostate cancer by oral administration of green tea catechins in volunteers with high-grade prostate intraepithelial neoplasia: a preliminary report from a one-year proof-of-principle study. Cancer Research, 66(2):1234-1240. DOI: 10.1158/0008-5472.CAN-05-1145.

Bogdanski, P., Suliburska, J., Szulinska, M., Stepien, M., Pupek-Musialik, D., Jablecka, A. (2012). Green tea extract reduces blood pressure, inflammatory biomarkers, and oxidative stress and improves parameters associated with insulin resistance in obese, hypertensive patients. Nutrition Research, 32(6): 421-7. DOI: 10.1016/j.nutres.2012.05.007.

Centers for Disease Control and Prevention. (2022). Benefits of physical activity. CDC: Physical Activity Basics. Phttps://www.cdc.gov/physical-activity-basics/benefits/index.html

da Silva, W., Machado, A. S.., Souza, M. A., Mello-Carpes, P. B., Carpes, F. P. (2018). Effect of green tea extract supplementation on exercise-induced delayed onset muscle soreness and muscular damage. Physiological Behavior, 194: 77-82. DOI: 10.1016/j.physbeh.2018.05.00

Du, G. J., Zhang, Z., Wen, X. D., Yu, C., Calway, T., Yuan, C. S., & Wang, C. Z. (2012). Epigallocatechin Gallate (EGCG) Is the most effective cancer chemo preventive polyphenol in green tea. Nutrients, 4(11): 1679–1691. DOI: 10.3390/nu4111679

Food and Fitness Pro. (2023). Three components to well-balanced workouts. https://foodandfitnesspro.com/three-components-to-well-balanced-workouts/

Gavin, M. L. (2023). Why exercise is wise? Nemours Teen Health. https://kidshealth.org/en/teens/exercise-wise.html

Gianeti, M. D., Mercurio, D. G., Patricia, M. B. G., Campos, M. (2013). The use of green tea extract in cosmetic formulations: Not only an antioxidant active ingredient. Dermatologic Therapy, 26(3): 267-71. DOI: 10.1111/j.1529-8019.2013.01552.x.

Henry, D. (2024). Health & Wellness: Physical health. H. C. Hofheimer II Library, Virginia Wesleyan University. January 11. https://guides.vwu.edu/c.php?g=20994&p=122669

Jincai, Z., & Hailu, Z. (2016). Effects of green tea polyphenols on anaerobic exercise fatigue. Fujian Tea, 38(04): 29-30.

Jówko, E., Sacharuk, J., Balasińska, B., Ostaszewski, P., Charmas, M., Charmas, R. (2011). Green tea extract supplementation gives protection against exercise-induced oxidative damage in healthy men. Nutrition Research, 31(11): 813-21. DOI: 10.1016/j.nutres.2011.09.020.

Khan, N., & Mukhtar, H. (2014). Tea and health: Studies in humans. Current Pharmaceutical Design, 19(34): 6141–6147. DOI: 10.2174/1381612811319340008

Lin, Y. S., Lange, D., Baur, M. D., Foerges, A., Chu, C., Li, C., Elmenhorst, E. M., Neumaier, B., Bauer, A., Aeschbach, D., Landolt, H. P., & Elmenhorst, D. (2024). Repeated caffeine intake suppresses cerebral grey matter responses to chronic sleep restriction in an A1 adenosine receptor-dependent manner: a double-blind randomized controlled study with PET-MRI. Scientific Reports, 14: 12724.

Lowe, G. M., Gana, K., Rahman, K. (2015). Dietary supplementation with green tea extract promotes enhanced human leukocyte activity. Journal of Integrative and Complementary Medicine, 12(4): 277-82. DOI: 10.1515/jcim-2014-0042.

McLellan, M. T., Caldwell, A. J., & Lieberman, R. H. (2016). A review of caffeine's effects on cognitive, physical and occupational performance. Neuroscience & Biobehavioral Reviews, 71: 294-312. https://doi.org/10.1016/j.neubiorev.2016.09.001

Pezeshki, A., Safi, S., Feizi, A., Askari, G., Karami, F. (2016). The effect of green tea extract supplementation on liver enzymes in patients with nonalcoholic fatty liver disease. International Journal of Preventive Medicine, 7: 28. DOI: 10.4103/2008-7802.173051.

Physical Activity Guidelines for Americans (2nd edition). (2024). Health benefits of physical activity for children. CDC: Physical Activity Basics. https://www.cdc.gov/physical-activity-basics/health-benefits/children.html

Ping, Q., & Weitao, Z. (2010). Effects of green tea extract on anaerobic exercise fatigue. Journal of Physical Education, 17(09): 101-106.

Primary Ciliary Dyskinesia (PCD) Supports the United Kingdom. Healthy lifestyle: Section Exercise. The Centers for Disease Control and Prevention. https://pcdsupport.org.uk/about-pcd/management/healthy-lifestyle

Rains, T. M., Agarwal, S., Maki, K. C. (2011). Antiobesity effects of green tea catechins: a mechanistic review. Journal of Nutritional Biochemistry, 22(1): 1-7. DOI: 10.1016/j.jnutbio.2010.06.006.

Rui, L. (2020). The historical status of tea in ancient Chinese foreign relations. The Frontiers of Society, Science and Technology, 2(4): 60-62. DOI:10.25236/FSST.2020.020416

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 7568 – 7582
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5385

Semeco, A., Northrop, A. (2023). 10 Benefits of green tea extract. Health Line. May 31. https://www.healthline.com/nutrition/10-benefits-of-green-tea-extract

Sherrell, Z. (2023). What to know about exercise and children? Medical News Today. July 12. https://www.medicalnewstoday.com/articles/exercise-and-children

Sissons, B. (2020). What are the best exercises for overall health and fitness? Medical News Today. December 22. https://www.medicalnewstoday.com/articles/best-exercises

Svalastog, L. A., Donev, D., Kristoffersen, N. J., Gajović, S. (2017). Concepts and definitions of health and health-related values in the knowledge landscapes of the digital society. Croatian Medical Journal, 58(6): 431–435. DOI: 10.3325/cmj.2017.58.431

Tang, G. Y., Xiao Meng, X., Gan, R. Y., Zhao, C. N., Liu, Q., Feng, Y. B., Li, S., Wei, X. L., Atanasov, G. A., Corke, H., & Li, H. B. (2019). Health functions and related molecular mechanisms of tea components: An updated review. International Journal of Molecular Sciences, 20(24): 6196; https://doi.org/10.3390/ijms20246196

The American Academy of Pediatrics. (2024). Vaccination Recommendations by the AAP. Dedicated to the Health of All Children. https://www.aap.org/en/patient-care/immunizations/vaccination-recommendations-by-the-aap/

World Health Organization. (2018). More active people for a healthier world. Global Action Plan on Physical Activity 2018-2030. https://iris.who.int/bitstream/handle/10665/272722/9789241514187-eng.pdf?

Xu, H., Wang, Y., Yuan, Y., Zhang, X., Zuo, X., Cui, L., Liu, Y., Chen, W., Su, N., Wang, H., Yan, F., Li, X., Wang, T., Xiao, S. (2018). Gender differences in the protective effects of green tea against amnestic mild cognitive impairment in the elderly Han population. Neuropsychiatric Disease and Treatment, 4: 1795–1801. DOI: 10.2147/NDT.S165618.