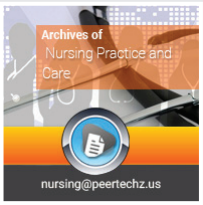
Peertechz



CLINICAL GROUP

ARCHIVES OF
Nursing Practice and Care OPEN ACCESS JOURNAL

ISSN: 2581-4265 DOI: https://dx.doi.org/10.17352/anpc

Research Article

Vital parameters in Spanish alpine skiers training at altitude and their relationship to human health

Javier Conde-Pipo[1], Ignacio Valenzuela-Barranco[2], Rafael Peñafiel[3], Maria Jose Jimenez-Casquet[1], Alejandro Lopez-Moro[1] and Miguel Mariscal-Arcas[1]*

[1]Department of Nutrition and Food Science, School of Pharmacy, The University of Granada, Campus of Cartuja s/n, 18071, Granada, Spain

[2]Cetursa Sierra Nevada, 18196 Sierra Nevada-Monachil, Granada, Spain

[3]Cardiology Department, National Institute of Health Management, Spain

Received: 18 November, 2022
Accepted: 28 November, 2022
Published: 29 November, 2022

***Corresponding author:** Miguel Mariscal-Arcas, Department of Nutrition and Food Science, School of Pharmacy, The University of Granada, Campus of Cartuja s/n, 18071, Granada, Spain, Tel: +34958243841; E-mail: mariscal@ugr.es

ORCID: https://orcid.org/0000-0001-9852-4950

Keywords: Human health; Altitude; Cardiovascular diseases; Mediterranean diet; Winter sports; Sleep

Abstract

Background: Mediterranean lifestyle has consistently been shown to reduce cardiovascular morbidity and mortality. Physical activity is beneficial to health, although it needs to be carefully studied in extreme conditions. Hypertension depends on sedentary lifestyles, stress, and bad habits such as excessive consumption of food and salt. Chronic sleep deprivation alone has been associated with cardiovascular diseases such as hypertension, diabetes, and obesity. The patient must be educated.

Aim: The main objective of this study was to evaluate parameters of non-invasive health such as blood pressure and heart rate in the federated population in winter sports in Andalusia (Spain) relating to body composition.

Methods: Cross-sectional observational study. Sample of 234 subjects currently federated in the Andalusian Federation of Winter Sports (Spain). Ages between 12-30yrs (51.6% women, 48.4% men). Subjects carried out surveys with a physical examination, blood pressure measurements, electrocardiogram performance, and parameters to assess body composition.

Results: None of the younger male subjects had hypotension or bradycardia (76.6% normotensive, 80.4% normal heart rate). None of the adults had hypotension or tachycardia (82.4% normotensive) and none of the women had bradycardia. Mean weight values (men and women) with a tendency to significance ($p = 0.064$). %Fat means of men was 19.18% (SD: 5.90) and 23.61% (SD: 8.91) for women. For systolic and diastolic tensions no differences were found by gender. There is no correlation between systolic and diastolic blood pressure with body composition or nutrient intake, however, there is a negative correlation between hours of sleep and blood pressure ($p < 0.001$).

Conclusion: %fat can inform of the risk of cardiovascular diseases. Performing intense aerobic physical exercise can cause sinus bradycardia at rest. Sleeping and having a restful and deep sleep reduces the risk of suffering from high blood pressure. Assessing blood pressure and anthropometric measurements is important to estimate the general health of children, adolescents, and adults. This is the case with alpine skiing in the south of Spain where the athlete lives in these conditions. Future works related to this population living in high-altitude conditions should be studied to see the impact of altitude on the health and sporting performance of acclimatized people.

Citation: Conde-Pipo J, Valenzuela-Barranco I, Peñafiel R, Jimenez-Casquet MJ, Lopez-Moro A, et al. (2022) The Effect of Tai Chi on quality of life in seniors. Arch Nurs Pract Care 8(1): 035-040. DOI: https://dx.doi.org/10.17352/anpc.000063

Introduction

The benefits of an active lifestyle are well-known and include a reduced risk of numerous non-communicable diseases. [1]. Cardiovascular diseases are the main cause of morbidity and mortality in the world [2]. Having a good diet and carrying out physical activity, thus avoiding a sedentary lifestyle, would reduce the prevalence of suffering from this type of disease. Getting to change lifestyles would mean that up to 40% of premature deaths from cardiovascular disease could decrease [3]. In this case, the Mediterranean lifestyle (the Mediterranean Diet (MD)) has been consistently shown to reduce cardiovascular morbidity and mortality. These improvements coincide with the reduction in death from cardiovascular disease with physical activity (PA) and smoking cessation. The MD emphasizes the abundance of plant-based foods such as virgin olive oil as the main source of fat, limited dairy products, the consumption of moderate amounts of fish, poultry, and wine, low amounts of red meat and fresh fruit, per day, in accordance with the recommendations of the European Society of Cardiology (ESC) for the distribution of energy in the diet [4] The consumption of olive oil helps prevent cardiovascular diseases, its mechanism of action is due to the presence of phenolic compounds, powerful antioxidants.

Training in extreme and hypoxic conditions (> 2000 m altitude) changes nutritional needs, having an acclimatization effect. There is evidence that the body composition of athletes who are exposed to altitude can change significantly after training since there is a slight reduction in body mass due to fluid loss. However, the most important changes are attributed to the chronic lack of oxygen that initiates many physiological and cardiovascular changes [5].

Arterial hypertension is an affectation that results from the lifestyle, among other risk factors, of western societies, since overeating, excessive consumption of salt, sedentary life, and stress contribute to its development.

The limit for a subject to be considered hypertensive must be greater than 130/80 mmHg. Knowledge of the risk factors of arterial hypertension is key to its prevention, management, and control.

Primary prevention is a strategy aimed at the high-risk group. To be successful, the patient must be educated and taught lifestyle modifications [6,7]. In addition, there are certain non-modifiable factors such as family history, sex (being male is a risk factor for pathologies of ischemic origin and arterial hypertension), and race (the black race is the one with the highest incidence) [8-10]. Thus, hypertension is the result of a multifactorial process that implies that prevention through education and modification of the patient's lifestyle continues to be a challenge for the staff and preach healthy habits for a healthy life.

In 2010, an article was published showing that between 1% to 5% of children and adolescents worldwide suffer from high blood pressure [10] Overweight and obesity predispose to high blood pressure, but the level of risk depends particularly on the excess of adipose tissue and its distribution. The body composition of boys and girls aged 6 to 16 years should be considered very important for the diagnosis of cardiovascular prevention [11]. In North American children between 6-11yrs, the prevalence of obesity has tripled from 4% to 13% [12]. In Spain similar data are shown in children from 6 to 12yrs [13]. There is multiple evidence showing that being overweight or obese in childhood increases the risk of obesity in adulthood and as age increases, obesity progressively increases as well. Likewise, several studies have evaluated long-term mortality and morbidity of the fat percentage in the childhood and youth stage associated with excess mortality in adulthood [14].

Therefore, it should be noted that obese children have a predominance of isolated systolic hypertension, in addition, the risk of hypertension in children increases as a function of body mass index (BMI) [15]. Chronic sleep deprivation alone has been independently associated with cardiovascular diseases such as hypertension, diabetes, and obesity [16]. Therefore, it should be considered important to rest adequately daily in addition to maintaining a good diet and daily life habits to achieve good health.

It is, therefore, necessary to study people exposed to extreme and hypoxic conditions who, due to major changes in chronic oxygen deprivation and physiological and cardiovascular changes, have their needs modified. The main objective of this study was to evaluate non-invasive basic health parameters such as blood pressure and heart rate in a federated population in winter sports in Andalusia, relating them to body composition parameters such as weight, BMI, height, and fat percentage. As partial objectives we propose to analyze the state of cardiovascular health associated with training at altitude and extreme environmental conditions and to know the relationship between body composition parameters with blood pressure measurement, considering sex and age.

Materials and methods

Design and subjects

A cross-sectional observational study project was carried out. The Andalusian Federation of Winter Sports (Spain) collaborated on the project with the Department of Nutrition and Food Science of the University of Granada (Spain). According to the data of The Spanish Federation of Winter Sports about winter sport population residents in Andalusia (Spain), was estimated that a sample size of at least 107 participants would be sufficient under the conditions of α=0.05, and two-sided confidence interval=90%. The sample was composed of 234 subjects who were federated during the study in the Andalusian Federation of Winter Sports with ages between 12 and 30yrs (Young persons: 12-17yrs, Adults: 18-30yrs). 51.6% of the subjects were women and 48.4% were men. The inclusion criteria were: a) the signing of the voluntary consent to collaborate with the research study. b) Being a federated competitor in some winter sports discipline at that time. Those who were not federated competitors in the Andalusian Federation of Winter Sports or who did not want to be part of the project voluntarily were excluded from the research study.

Citation: Conde-Pipo J, Valenzuela-Barranco I, Peñafiel R, Jimenez-Casquet MJ, Lopez-Moro A, et al. (2022) The Effect of Tai Chi on quality of life in seniors. Arch Nurs Pract Care 8(1): 035-040. DOI: https://dx.doi.org/10.17352/anpc.000063

Questionnaire

Informed consent was administrated. Personal and sports data collection, Food Frequency Questionnaire (FFQ), 3 days 24-hour recall (R24h) and sports recall (R24h-activities), hydration questionnaire, perception survey on healthy eating, and American Heart Association survey.

Anthropometry

Scale, Height Rod, Holtain LTD Tape Measure, and Holtain LTD Skinfold Caliper.

Electrocardiograph

2 methods were used to perform electrocardiograms, for the non-technician ones, a Mortara Eli 150c electrocardiograph was used. Two Holter eMotion Faros devices.

Tensiometer OMRON brand digital tensiometer

Softwares: Software Kubios and eMotion Faros (through these 2 programs it was possible to collect Holter data to observe 24 hours of cardiac function). SPSS vs 25.0 (Statistical program to create databases of FFQ and R24h), Microsoft Excel (For the creation of the 24-hour reminder database), Microsoft Word (For the writing and editing of the work report), and Dropbox (To share the data corresponding to each specialty).

The design of the different surveys was carried out over 5 weeks. This survey consisted of Informed consent explaining the protocol to be followed and the authorization of the legal guardians if the participant was a minor. This consent was authorized by the Ethics Committee of the IBS of Granada (Spain) and the University of Granada (Spain) (ref. 1162/CEIH/2020) and complies with the Helsinki regulations. Personal and sports data of the respondent: assigned code, name, surnames, address, contact data, date of birth, age, sex, marital status, level of studies, job occupation, sports modality, sports level, time of the season, and club to which they belonged.

Food frequency questionnaire: Long list of foods normally consumed in the Spanish population where the individual had to indicate the frequency with which they ate food during the year.

24-hour recall of nutrition (R24h) hydration and physical activity: Food eaten throughout the day is collected (3 days), taking into account place, time, drink, and type of drink and quantities of each ingredient. For physical activity, the type of exercise performed, hours of rest, and sleep, thus indicating duration in time. Perception survey on healthy eating: Qualitative questionnaire to assess athletes' awareness of healthy eating. Including the sections, on healthy characteristics of the diet, quality of cooking, nutritional situation, feelings generated by food, perception of energetic foods, and other suggestions.

Survey of the American heart association: To know the cardiopathological medical history, 10 questions were asked that included (ischemic heart disease, cardiac disability or involvement, hypertension or chest pain due to exertion) of the participants, as well as the family history that indicates a risk of cardiac pathology (premature death).

Fieldwork phase: 1. Performing a 12-lead electrocardiogram, subsequently reviewed by the cardiologist who collaborated with the project, measuring the blood pressure and heart rate of the study subjects. Assessing as hypotension below 90/60mmHg and hypertension above 140/90mmHg. Heart rate has also been assessed, data that has been coded as Normal heart rate (60-100 beats per minute), bradycardia below 60 beats per minute at rest, and tachycardia more than 100 beats per minute at rest. 2. Anthropometric assessment: Body weight, height, perimeter, skinfolds (bicipital, tricipital, subscapular, suprailiac, abdominal, thigh, leg), and estimation of body composition by anthropometry. 3. Determination of Resting Energy Expenditure (REE). 4. Determination of Total Energy Expenditure (TEE).

Statistical analysis

SPSS version 25.0 (IBM. Chicago. IL) was used for the statistical analysis. A descriptive analysis was conducted to calculate percentages, means, standard deviations (SD), medians, and maximum and minimum values. For comparisons between groups of categorical variables, Student's t-test and Chi-squared test were used. In the case of bivariate correlations, Pearson's rho correlation coefficient was used. All reported p-values were based on the two-tailed test, and the level of statistical significance for all tests was set at 95%.

Results

Of the younger subjects, none of the males had hypotension or bradycardia. 76.6% were normotensive. 4.3% had tachycardia. 80.4% had a normal heart rate. Of the adults, none of the subjects had hypotension or tachycardia. 82.4% were normotensive. None of the women had bradycardia (Table 1).

The mean weight values between men and women are different although there is only a tendency to significance (p = 0.064). The same is true for BMI. The fat percentage between men and women does show statistically significant differences, with the lowest mean fat value for men with a mean of 19.18% (SD: 5.90) as opposed to 23.61% (SD: 8.91) for women. For both systolic and diastolic tensions no statistically, significant differences were found when comparing the mean values by gender (Table 2).

There is no correlation between systolic and diastolic blood pressure with body composition variables or nutrient intakes related to cardiovascular factors. However, there is a negative

Table 1: Description of cardiovascular parameters by age groups.

	Young persons (%)			Adults (%)			X^2	p
	Men	Women	Total	Men	Women	Total		
Hypotension	0,00	11,50	6,40	0,00	0,00	0,00	5,936	0,051
Normotension	95,20	61,50	76,60	80,00	85,70	82,40		
Bradycardia	0,00	4,00	2,20	10,00	0,00	5,90	3,083	0,379
Tachycardia	4,80	4,00	0,00	0,00	0,00	0,00		
Normal Heart Rate	95,20	68,00	80,40	70,00	85,70	76,50		

Citation: Conde-Pipo J, Valenzuela-Barranco I, Peñafiel R, Jimenez-Casquet MJ, Lopez-Moro A, et al. (2022) The Effect of Tai Chi on quality of life in seniors. Arch Nurs Pract Care 8(1): 035-040. DOI: https://dx.doi.org/10.17352/anpc.000063

Table 2: Body composition and blood pressure variables description.

	Men				Women				Total				p*
	mean	SD	minimum	maximum	mean	SD	minimum	maximum	mean	SD	minimum	maximum	
Weight (kg)	48,06	21,37	16,40	84,90	44,20	16,76	14,00	75,30	46,08	19,03	14,00	84,90	0,064
BMI (kg/m²)	19,89	4,30	13,95	27,41	19,10	3,69	13,89	29,79	19,48	3,98	13,89	29,79	0,075
Aged (yrs)	16,87	12,10	4,00	50,00	18,06	14,48	3,00	61,00	17,48	13,29	3,00	61,00	0,594
% Fat	19,18	5,90	10,36	33,12	23,61	8,91	9,71	44,87	21,55	7,91	9,71	44,87	0,025
Systolic tension (mmHg)	115,50	18,70	83,00	180,00	104,90	14,20	71,00	132,00	110,70	17,49	71,00	180,00	0,359
Dyastolic tension (mmHg)	73,54	13,81	45,00	103,00	71,00	12,70	43,00	97,00	72,40	13,20	43,00	103,00	0,811

* t-tests for the comparison of variables by gender

correlation with a significance value of $p < 0.001$ between reported hours of sleep and blood pressure (Tables 3,4).

Discussion

Given the results of the present study, in this sample, it is characteristic to point out that, of the subjects of legal age, none suffered from hypotension. Unlike the minors, of whom only 11.5% of the women had hypotension and 4% bradycardia, this may be associated with the fact that female hormones play an important role in cardiovascular pathophysiology, which leads to women being protected against cardiovascular diseases [17]. In the case of older men, 10% have sinus bradycardia at rest, since the population is an athlete, it can be associated with the type of exercise they perform, and the stage of training in which they are [18]. None of the participants had hypertension. In the case of minors, the prevalence of pediatric hypertension is between 7% - 10%, with evidence that one of the determining factors of this is obesity, none of our participants was obese, this could determine what to add as growth and development parameter to blood pressure would be quite interesting [19]. The variables that measure fat accumulation were at normal levels. Given that obesity is associated as a variable of cardiovascular risk, it can be concluded that the assessment of fat is a simple measurement to obtain in primary care capable of discriminating the subject at cardiovascular risk. Assessing blood pressure and anthropometric measurements is important to estimate the general health of children, adolescents, and adults. In the present study, no statistically significant correlation was identified between systolic blood pressure and diastolic blood pressure with anthropometric measurements. No statistically significant differences were found between anthropometric measurements and blood pressure classification by sex. It is important to highlight that, between both sexes, the fat percentage was higher in women, in this case, there are controversies between studies of the distribution of body fat about sex. Some studies claim that there would be no difference between gender and their distribution of fat [20]. While others show that there is a tendency for greater fat concentration in the trunk in men and a greater accumulation of fat in the upper extremity in women. [21]. In the present study, a correlation is found between the hours that the population declares to sleep and blood pressure. Thus, suffering from sleep disorders such as insomnia is associated with hypertensive patients [22]. Maintaining a good state of psychological factors (stress and anger) and sleeping, managing to lower blood pressure levels [23].

Table 3: Correlation of blood pressure, body composition, and biochemical parameters in the study population.

		Systolic Tension	Diastolic Tension
Age (yrs)	R	0,002	0,034
	P	0,985	0,791
Weight (kg)	R	0,112	0,110
	P	0,382	0,391
Height (cm)	R	0,236	0,245
	P	0,063	0,053
BMI (kg/m²)	R	0,027	0,027
	P	0,832	0,832
% Fat	R	-0,002	0,034
	P	0,985	0,793
Sodium (mg)	R	0,153	0,133
	P	0,227	0,295
Cholesterol (mg)	R	0,011	-0,023
	P	0,930	0,859
Sleep (hours)	R	-0,449	-0,479
	P	0,001	0,001

Table 4: Results were obtained in the study population with respect to the American Heart Association survey.

	Young persons (%)		Adult (%)		Total (%)	
	Yes	No	Yes	No	Yes	No
Chest pain/discomfort straining	2,60	97,40	0,00	0,00	1,70	98,30
Exertional syncope	2,60	97,40	0,00	0,00	1,70	98,30
Exertional fatigue	10,30	87,20	14,30	85,70	10,00	88,30
Prior recognition of murmur	5,10	94,90	14,30	85,70	6,70	93,30
High blood pressure	0,00	0,00	0,00	0,00	0,00	100,00
Prior restriction in sports	0,00	0,00	0,00	0,00	0,00	100,00
Cardiac tests ordered	12,80	87,20	21,40	78,60	16,90	83,10
Family premature death	0,00	0,00	0,00	0,00	0,00	100,00
Disability due to heart disease	7,70	92,30	0,00	0,00	5,00	95,00
Familial heart disease	23,10	76,90	21,40	78,60	20,00	80,00

None of the adults have experienced exertional pain or syncope. None of the subjects reported suffering from hypertension, premature family death, or previous restriction in sports. 16.9% of the total have been asked for previous cardiac tests. 6.7% reported having a heart murmur.

Citation: Conde-Pipo J, Valenzuela-Barranco I, Peñafiel R, Jimenez-Casquet MJ, Lopez-Moro A, et al. (2022) The Effect of Tai Chi on quality of life in seniors. Arch Nurs Pract Care 8(1): 035-040. DOI: https://dx.doi.org/10.17352/anpc.000063

Strengths and limitations of the study

This study has several limitations. First, the cross-sectional study limits the ability to establish a cause-effect relationship between the variables under study. Second, the data obtained regarding physical activity and nutrition were reported by the participants, so their interpretation must be performed with caution.

Conclusion

Maintaining an adequate percentage of fat can inform us of the risk of cardiovascular diseases such as hypertension or tachycardia. Performing intense aerobic physical exercise can cause sinus bradycardia at rest. Female hormones have a protective effect against cardiovascular diseases. Sleeping and having a restful and deep sleep reduces the risk of suffering from high blood pressure. Assessing blood pressure and anthropometric measurements is important to estimate the general health of children, adolescents, and adults.

Training at altitude is a very common practice in Olympic sports. Some of these sports are obliged to be practiced in high altitude conditions due to their location, regardless of the objective of the training. This is the case with alpine skiing in the south of Spain where the athlete lives in these conditions. That is why from the area of sports medicine the vital parameters that determine their health and their adaptation to the environment must be described. Future works related to this population living in high-altitude conditions should be studied to see the impact of altitude on the health and sporting performance of acclimatized people.

Author contributions

MJJ-C, RP, IV-B, ALM, JC-P, and MM-A designed the study and wrote the protocol; MJJ-C and IV-B recruited the participants; IV-B, ALM, and JC-P collected data; RP, JC-P, and MM-A conducted the statistical analysis; MJJ-C, RP, IV-B, ALM, JC-P, and MM-A wrote the first draft of the manuscript, and all authors commented on previous versions of the manuscript. All authors (MJJ-C, RP, IV-B, ALM, JC-P, and MM-A) read and approved the final manuscript. All authors have read and agreed to the published version of the manuscript.

Funding

This study was funded by FEDER-ISCIII PI14/01040 by the Counselling of Economic Transformation, Industry, Knowledge and Universities-Junta de Andalucía (P18-RT-4247) and by The High Council for Sports (CSD), Spanish Ministry of Culture and Sport (RED GENDASH "Gender and Data Science in Sports and Health" Ref. 02/UPR/21), (RED RDFD "Functional Sports Dynamometry" Ref.06/UPB/22).

Institutional review board statement

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of the IBS-Granada (Spain) and the University of Granada (Spain) (ref. 1162/CEIH/2020).

Informed consent statement

Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper if applicable.

Data availability statement

There are restrictions on the availability of data for this trial, due to the signed consent agreements around data sharing, which only allow access to external researchers for studies following the project's purposes. Requestors wishing to access the trial data used in this study can make a request to mariscal@ugr.es.

Acknowledgment

The authors especially thank the participants for their enthusiastic collaboration and the personnel for outstanding support and exceptional effort.

Consent to publish (Ethics)

The results and writing of this manuscript followed the Committee on Publication Ethics (COPE) guidelines on how to deal with potential acts of misconduct, maintain the integrity of the research and its presentation following the rules of good scientific practice, the trust in the journal, the professionalism of scientific authorship, and the entire scientific endeavor.

References

1. Arribas JMB, Saavedra M, Villalba NPC. The Spanish Strategy for Nutrition, Physical Activity and the Prevention of Obesity (NAOS Strategy). Rev Esp Salud Publica. 2007 Oct; 81(5):443-449.

2. de Lorgeril M, Salen P, Martin JL, Monjaud I, Delaye J, Mamelle N. Mediterranean diet, traditional risk factors, and the rate of cardiovascular complications after myocardial infarction: final report of the Lyon Diet Heart Study. Circulation. 1999 Feb 16;99(6):779-85. doi: 10.1161/01.cir.99.6.779. PMID: 9989963.

3. Schroeder SA. Shattuck Lecture. We can do better--improving the health of the American people. N Engl J Med. 2007 Sep 20;357(12):1221-8. doi: 10.1056/NEJMsa073350. PMID: 17881753.

4. American Heart Association Nutrition Committee, Lichtenstein AH, Appel LJ, Brands M, Carnethon M, Daniels S, Franch HA, Franklin B, Kris-Etherton P, Harris WS, Howard B, Karanja N, Lefevre M, Rudel L, Sacks F, Van Horn L, Winston M, Wylie-Rosett J. Diet and lifestyle recommendations revision 2006: a scientific statement from the American Heart Association Nutrition Committee. Circulation. 2006 Jul 4;114(1):82-96. doi: 10.1161/CIRCULATIONAHA.106.176158. Epub 2006 Jun 19. Erratum in: Circulation. 2006 Dec 5;114(23):e629. Erratum in: Circulation. 2006 Jul 4;114(1):e27. PMID: 16785338.

5. Macdonald JH, Oliver SJ, Hillyer K, Sanders S, Smith Z, Williams C, Yates D, Ginnever H, Scanlon E, Roberts E, Murphy D, Lawley J, Chichester E. Body composition at high altitude: a randomized placebo-controlled trial of dietary carbohydrate supplementation. Am J Clin Nutr. 2009 Nov;90(5):1193-202. doi: 10.3945/ajcn.2009.28075. Epub 2009 Sep 30. PMID: 19793859.

6. Sociedad Española de Cardiología. https://secardiologia.es/blog/rec/9052-guias-de-hipertension-aha-acc-2017-donde-estan-los-limites.2019.

7. Kavey RE, Daniels SR, Flynn JT. Management of high blood pressure in children and adolescents. Cardiol Clin. 2010 Nov;28(4):597-607. doi: 10.1016/j.ccl.2010.07.004. PMID: 20937444.

Citation: Conde-Pipo J, Valenzuela-Barranco I, Peñafiel R, Jimenez-Casquet MJ, Lopez-Moro A, et al. (2022) The Effect of Tai Chi on quality of life in seniors. Arch Nurs Pract Care 8(1): 035-040. DOI: https://dx.doi.org/10.17352/anpc.000063

8. Marrodán Serrano MD, Cabañas Armesilla MD, Carmenate Moreno MM, González-Montero de Espinosa M, López-Ejeda N, Martínez Álvarez JR, Prado Martínez C, Romero-Collazos JF. Association between adiposity and blood pressure levels between the ages of 6 and 16 years. Analysis in a student population from Madrid, Spain. Rev Esp Cardiol (Engl Ed). 2013 Feb;66(2):110-5. doi: 10.1016/j.rec.2012.08.007. Epub 2012 Dec 5. PMID: 24775384.

9. Robles BH. Risk factors for arterial hypertension. Arch Cardiol Mex. 2001 Jan-Mar;71 Suppl 1:S208-10. Spanish. PMID: 11565336.

10. Balaguer VI. Strategies in the control of coronary risk factors in primary and secondary prevention. Department of Cardiology. Santa Creu i Sant Pau Hospital. Barcelona. Spanish Journal of Cardiology. 1998; 1(supplement): 30-35.

11. González C. Hypertension Clinic. Mexico, Updated Medical Editions. 1997; 119-162.

12. US Department of Health and Human Services. Centers for Disease Control and Prevention. National Center for Health Statistics. National Health and Nutrition Examination Survey. CDC Grown Charts: United Status (accessed 2001 June, 4). Available in http: //www. cdc. gov/ nchs/ about/ major/ nhanes/ growth charts/ bmiage. txt.) published data.

13. Paidos epidemiological study on nutrition and childhood obesity paidos 84, Madrid: Gráficas Jomagar. 1985.

14. Maffeis C, Tatò L. Long-term effects of childhood obesity on morbidity and mortality. Horm Res. 2001;55 Suppl 1:42-5. doi: 10.1159/000063462. PMID: 11408761.

15. Pons MR, Mérida M, Vega CS, Nieto VG, Padilla CV. High blood pressure and obesity. BSCP Can Ped. 2005;29(2).

16. Buxton OM, Marcelli E. Short and long sleep are positively associated with obesity, diabetes, hypertension, and cardiovascular disease among adults in the United States. Soc Sci Med. 2010 Sep;71(5):1027-36. doi: 10.1016/j.socscimed.2010.05.041. Epub 2010 Jun 16. PMID: 20621406.

17. Franco Y, Mendoza-Fernández V, Cristina L. Mecanismos de acción de los efectos protectores de los estrógenos sobre el sistema cardiovascular. Rev Fac Med UNAM. 2003; 101-8.

18. Peidro RM. Cardiología del deporte. Rev Argent Cardiol. 2003; 126-137.

19. Ramirez J. Normal pressure and arterial hypertension in children and adolescents. Argentine archives of pediatrics. 2006; 193-195.

20. Idelmis RP, Sotolongo G, Gámez CAP. El índice cintura-talla como variable de acumulación de grasa para valorar riesgo cardiovascular. Revista Cubana de Medicina Militar. 2013; 444-450.

21. Oliveira Cl. Relationship of adiposity indicators with risk factors for cardiovascular disease in overweight adolescents [disertación de master]. Rio de Janeiro (rj): Federal University of Rio de Janeiro; 1999.

22. Surama GP. Sleep disorders associated with arterial hypertension. Journal of medical sciences of Pinar del Río. 2009; 90-99.

23. Blanca B, Paula SH. Comparison of two programs for the management of essential arterial hypertension. 2010; 195-220.

Citation: Conde-Pipo J, Valenzuela-Barranco I, Peñafiel R, Jimenez-Casquet MJ, Lopez-Moro A, et al. (2022) The Effect of Tai Chi on quality of life in seniors. Arch Nurs Pract Care 8(1): 035-040. DOI: https://dx.doi.org/10.17352/anpc.000063