

**102 - ESTADO CARDIO RESPIRATORIO Y NIVELES DE ACTIVIDAD FISICA EN ESTUDIANTES FUMADORES Y NO FUMADORES PERTENECIENTES A LA ESCUELA DE SALUD DE LA UNIVERSIDAD CATOLICA DE TEMUCO, CHILE**

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**Introduction:**

Smoking is considered a chronic disease, due to addiction to nicotine, Chile is the country of America with the highest prevalence of tobacco consumption, by 2010 the number of smokers over 15 years reaches 44.2% in men and the 37.1% in ladies, smoking an average of 10.4 cigarettes per day, specifically in the Araucanía region, of the total population, 32.4% of the inhabitants are an active part of these figures (MINSAL, 2014). There are precedents that point to a greater number of current smokers, which increase equitably with their level of education, the higher, the higher the percentage of smokers, reaching 50.3% (IRALA, 2003).

The transport of oxygen (O<sub>2</sub>) by hemoglobin (a carrier protein of O<sub>2</sub> belonging to and abundant in the blood) is hampered by the existence of carbon monoxide (CO) in red blood cells (monoxide produced by the combustion of tobacco), which causes vasoconstriction of the coronary arteries by local release of prostaglandins, vasopressins and catecholamine (FADRAGA, CABREZA & SANZ, 2005). The transport of oxygen (O<sub>2</sub>) by hemoglobin (a carrier protein of O<sub>2</sub> belonging to and abundant in the blood) is hampered by the existence of carbon monoxide (CO) in red blood cells (monoxide produced by the combustion of tobacco), which causes vasoconstriction of the coronary arteries by local release of prostaglandins, vasopressins and catecholamine (FADRAGA, CABREZA & SANZ, 2005).

The O<sub>2</sub> consumed by the individual at rest is equivalent to 3.5 ml of O<sub>2</sub> per kg. Body weight and minute (ml / kg / min) this is the value equivalent to a MET, which estimates the energy expenditure that the body needs to maintain its vital functions, the higher the energy demand the O<sub>2</sub> consumption also increases. Recent studies indicate that this physiological marker is not only related to morbidity and mortality due to cardiovascular disease, but also to quality of life and mental health. (SECHHI & GARCIA, 2013). The O<sub>2</sub> needs to be absorbed in the lungs and then transported through the blood to the cells (LOPEZ & FERNANDEZ, 2006), this process may be limited since the CO present in the bloodstream due to tobacco consumption and contamination environmental impair the correct transit of O<sub>2</sub>, generating a vasoconstriction, which does not allow the O<sub>2</sub> to be distributed correctly in the different cells of the body that need it. This level of transport of O<sub>2</sub> will be measured based on Vo<sub>2</sub> Max, which is defined as the maximum amount of O<sub>2</sub> that the body can absorb, transport and consume for a quantity of time, this is expressed in ml / min or relative to the weight of the subject (ml / kg / min) (LOPEZ, DEPAZ & GARRATCHEA, 2006).

"Physical activity is a behavior that causes an expenditure of energy proportional to its intensity, this is known as energy expenditure" (CHICHARRO, DE PAZ, GARRATCHEA, 2006). This energy expenditure can be measured through direct or indirect calorimetry, in this case the last one will be used. "The amount of heat produced by the oxidation of a nutrient is proportional to the oxygen consumed. The determination of the O<sub>2</sub> used allows to know the heat that would produce and therefore the associated energy expenditure, hence the name of indirect calorimetry" (MATAIX, 2005).

According to the WHO, a sedentary person is considered when he consumes less than 4 MET per day in his leisure activities, the MET is the subject's energy consumption under resting conditions. The intensity of MET in sedentary people is less than that of an individual accustomed to physical exercise, since in resting conditions the metabolism of the athlete keeps the body working optimally in the consumption of energy substrates that are ingested daily, consuming the energy reserves continuously. To perform the oxidation of these substrates the metabolism of a sedentary requires more physical effort to achieve its use due to the different pathologies that make it difficult for the O<sub>2</sub> to enter the cell to initiate the processes of energy use (BUHING, ETAL.2009).

The physical condition is defined as the ability of people to perform activities or physical exercises, which in turn require the participation of different functions that must work in coordination to obtain better responses to stimuli, these functions can be musculoskeletal, psycho-neurological and cardio-respiratory, among others. (RUIZ, ESPAÑA, & CUENCA, 2011). Within the set of physical capabilities that determine the level of physical fitness of the subject is the "Resistance", which involves the cardio-respiratory system and the musculoskeletal system, fundamental systems that condition both that level and the health of the individual. (VALBUENA, 2009).

The main objective of physical training is the stimulation of energy production systems. The activities can be classified, depending on the intensity and duration of the effort, in anaerobic, aerobic or mixed. The energy production systems are adenosine triphosphate (ATP) - phosphocreatine (CP), lactic acid and aerobic system, they usually operate simultaneously during physical activity, however, their contribution to the total energy for an exercise basically depends on its duration and intensity. An activation of muscle glucose transport was observed during physical exercise, conditioned by a greater activity of GLUT-4, promoting the use of glucose and improvement of insulin sensitivity in a global way. (MORENO, 1997).

The main objective is to identify if there are significant differences in the oxygen transport capacity at blood level, consumption of energy substrates and cardiac response to exercise in sedentary smoking students versus non-smoking students of the nutrition career of the Catholic University of Temuco.

**Material and method.**

The subjects are students of the nutrition career of the Catholic University of Temuco, 110 subjects being a total population of 150 students, granting a confidence percentage of 95% and a margin of error corresponding to 5%. The International Physical Activity Questionnaire (Ipaq) is applied to evaluate the physical activities carried out within the last 7 days in

MET-minute / week, categorizing the results as low, moderate and high.

In order to know the physical state of the subjects, the RUFFIER test is used, which observes the cardiac resistance to the effort and the cardiac recovery capacity. The instrument to measure the volume of oxygen (Vo2 Max) is the Fisher test, which delivers the volume of oxygen that carries the blood in ml / kg / min. Through a formula that develops the variables of gender, body weight (Pc), time of completion of the race of 2,400 meters. And the heart rate (Fc) 10 seconds after the test.

**Results**

The number of women studied is 97 (88.2%) and 13 men (11.8%), the average age of the subjects is 20.4 years of age and the number of active smokers is 27 Subjects ( 24.5%).

Table I: Results of the Ipaq survey:

Ipaq	
Low	14
Moderate	63
High	33

The 33 subjects (30%) who maintain "constant" vigorous activities will be excluded from the sedentary condition, therefore the remaining 77 subjects (60%) will be considered as sedentary by maintaining an expenditure of less than 3000 Met-min / week .

Table II: Results of the Ruffier test:

Ruffier	
Excellent	0
Good	16
Medium	46
Insufficient	34
Bad	14

The results show a standard deviation corresponding to 4.44%, providing a limited variance for the analysis of the results, from which it is clear that 16 subjects (14.6%) have a good physical condition, 46 subjects (41.8%) have an average physical condition, while 48 subjects (43.6%) demonstrate an insufficient or bad physical condition, in this research the results of 14.6% of the subjects are considered positive and the remaining 85.4% as negatives.

Table III. Fisher's test according to Gender:

Fisher (Masculino) MI/Kg/l		Fisher (Femenino) MI/Kg/l	
Excellent	0	Excellent	0
Good	0	Good	0
Medium	0	Medium	0
Regular	0	Regular	1
Very Low	13	Very Low	96

The results show a standard deviation corresponding to 4.69%, providing a limited variance for the analysis of the results, of which only one of the subjects studied differs (0.9%) presenting a regular physical condition, however not escapes from being pigeonholed as a Vo2 Max low. In the production of the results of this test, gender gives a variation in the development of the formula, which in this case generated greater relevance since the results had a demarcated tendency.

**Discussion.**

With respect to the proposed hypothesis, the present results provide scenarios that favor the development of the selected tests, since the sedentary lifestyle reaches 60% of the students, using less than 3000 Met-min / week. In addition, the results of the physical condition test (Fisher) present an interesting variation of results, however, only 14.6% of the subjects present a good condition, figures that accompany the proposition that tobacco would impair physical performance compared to the percentage of active smokers that reached 24.5%.

Regarding the most relevant aspect of the research, it was not possible to identify significant differences in the Vo2 Max and consumption of energy substrates of the subjects, demonstrating that more than tobacco consumption, the sedentary lifestyle is even more relevant in terms of performance of the subjects within the test, popularly there are many casual athletes who have a performance above the average, who actively use tobacco and yet are able to excel in their different disciplines, which also strengthens the position that the prevalence of the genetic factor It is too relevant when it comes to taking advantage of the energy present in our body, being unaffected by external agents that can diminish their physical capacities.

The metabolic syndrome (MS) corresponds to the association of a series of metabolic abnormalities that determine an increased risk of cardiovascular disease and diabetes. Central obesity, hypertension, dyslipidemia, hypercaloric intake, smoking, sedentary lifestyle are frequently associated conditions (MARTINEZ, ALONSO & NOVIK, 2009). This has caused an authentic revolution in the stratification of vascular risk and has become one of the most used concepts in the area of health sciences, describes the grouping in an individual of several disorders very prevalent in the Western world, which are risk factors for cardiovascular diseases and type 2 diabetes. The two mechanisms underlying SM are abdominal adiposity and insulin resistance (BELLO, SANCHEZ, CAMPOS, BAEZ, FERNANDEZ &, 2012). With this background it is understood that smoking is a characteristic that associated with another attitude or condition harmful to health promotes low performance of people, not being the main preponderant when it comes to weighing the degrees of responsibility within the performance of the subjects in the tests applied. The sum of all the characteristics of an average university student (bad sleep, long hours sitting, poor diet, stress, etc.) favor the development of this pathology that is increasingly common in society.

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#### STATE RESPIRATORY CARDIAC AND LEVELS OF PHYSICAL ACTIVITY IN SMOKERS AND NON-SMOKING STUDENTS BELONGING TO THE HEALTH SCHOOL OF THE CATHOLIC UNIVERSITY OF TEMUCO, CHILE

Through the application of the Ipaq survey, the Ruffier test and the Fisher test are aimed at identifying significant differences in the physical state and Vo2 Max between sedentary smokers and non-smokers of the nutrition career of the Catholic University of Temuco, developing quantitative and controlled evaluations, the different variables that intervene in the final result of the investigation are broken down, covering a history of smoking, sedentary lifestyle, physical condition, energy systems and modern pathologies that affect current society.

Keywords: Ipaq, Ruffier, Fisher, Smoking, Metabolic Syndrome.

#### ÉTAT RESPIRATOIRE CARDIAQUE ET NIVEAUX D'ACTIVITÉ PHYSIQUE CHEZ LES FUMEURS ET ÉTUDIANTS NON FUMEURS APPARTENANT À L'ÉCOLE DE SANTÉ DE L'UNIVERSITÉ CATHOLIQUE DE TEMUCO, CHILE.

Grâce à l'application de l'enquête Ipaq, le test de Ruffier et le test de Fisher visaient à identifier les différences significatives d'état physique et de Vo2 Max entre fumeurs sédentaires et non-fumeurs du cours de nutrition de l'Université Catholique de Temuco, développant des évaluations quantitatives et contrôlées, les différentes variables qui interviennent dans le résultat final de l'enquête sont décomposées, couvrant une histoire de tabagisme, de sédentarité, de condition physique, de systèmes énergétiques et de pathologies modernes qui affectent la société actuelle.

Mots-clés: Ipaq, Ruffier, Fisher, tabagisme, syndrome métabolique.

#### CARDIACO RESPIRATÓRIO ESTADO E NÍVEIS DE ATIVIDADE FÍSICA EM FUMADORES E ESTUDANTES NÃO FUMANTES PERTENAMOS À ESCOLA DE SAÚDE DA UNIVERSIDADE CATÓLICA DE TEMUCO, CHILE

Através da aplicação da pesquisa da Ipaq, o teste de Ruffier e o teste de Fisher visaram identificar diferenças significativas no estado físico e Vo2 Max entre fumantes sedentários e não fumantes do curso de nutrição da Universidade Católica de Temuco, desenvolvendo avaliações quantitativas e controladas, as diferentes variáveis que intervêm no resultado final da investigação são discriminadas, cobrindo uma história de tabagismo, estilo de vida sedentário, condição física, sistemas de energia e patologias modernas que afetam a sociedade atual.

Palavras-chave: Ipaq, Ruffier, Fisher, Fumar, síndrome metabólica.

#### ESTADO CARDIO RESPIRATORIO Y NIVELES DE ACTIVIDAD FISICA EN ESTUDIANTES FUMADORES Y NO FUMADORES PERTENECIENTES A LA ESCUELA DE SALUD DE LA UNIVERSIDAD CATOLICA DE TEMUCO, CHILE

A través de la aplicación de la encuesta Ipaq, el test de Ruffier y el test de Fisher se busca identificar diferencias significativas en el estado físico y Vo2 Máx entre estudiantes sedentarios fumadores y no fumadores de la carrera de nutrición de la universidad católica de Temuco, desarrollando evaluaciones cuantitativas y controladas, se descomponen las diferentes variables que intervienen en el resultado final de la investigación, abarcando antecedentes de tabaquismo, sedentarismo, condición física, sistemas energéticos y patologías modernas que afectan a la sociedad actual.

Palabras claves: Ipaq, Ruffier, Fisher, Tabaquismo, Síndrome Metabólico