

# Quality of life of smokers and its correlation with smoke load

*Qualidade de vida de tabagistas e sua correlação com a carga tabagística*

*Calidad de vida de los consumidores de tabaco y su correlación con la carga de tabacos*

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**ABSTRACT** | Smoking is considered a chronic disease and one of the leading causes of preventable death in the world. The quality of life is an important measure of health impact and its correlation with nicotine dependence levels and smoking is unclear. We evaluated the quality of life of smokers and its correlation with smoke load and the nicotine dependence level. Smokers of both sexes and with no diagnosis of clinical diseases were included in this study. We evaluated their quality of life and level of nicotine dependence through questionnaires. The sample consisted of 48 individuals, 27 women and 21 men. There was a negative correlation between vitality and the amount of years these individuals have smoked ( $p=0.009$ ;  $r=-0.27$ ), as well as the general health condition and pack/years ( $p=0.02$ ;  $r=-0.23$ ), and the current amount of cigarettes consumed per day ( $p=0.006$ ;  $r=-0.29$ ). We can also observe a negative correlation between functional capacity and the Fagerström questionnaire score ( $p=0.004$ ;  $r=-0.3$ ). We concluded that the smoke load and the nicotine dependence levels were related to worse quality of life indices of the smoking population.

**Keywords** | Tobacco Use Disorder; Quality of Life; Dependency Substance-related Disorders.

**RESUMO** | O tabagismo é considerado uma doença crônica e uma das principais causas de mortes evitáveis no mundo. A qualidade de vida é uma importante medida de impacto na saúde e em sua relação com os níveis de dependência de nicotina e de carga tabagística, os quais ainda não estão totalmente esclarecidos. Avaliou-se a qualidade de vida de tabagistas e sua correlação com a carga tabagística

e com o nível de dependência nicotínica. Foram incluídos, neste estudo, tabagistas de ambos os sexos e sem doenças clínicas diagnosticadas. Posteriormente, foi realizada avaliação da qualidade de vida e nível de dependência nicotínica por meio de questionários. A amostra foi constituída por 48 indivíduos. Houve correlação negativa entre a vitalidade e a quantidade de anos em que estes indivíduos fumaram ( $p=0,009$ ;  $r=-0,27$ ), assim como o estado geral de saúde e anos/maço ( $p=0,02$ ;  $r=-0,23$ ) e quantidade de cigarros consumidos por dia atualmente ( $p=0,006$ ;  $r=-0,29$ ). É possível observar correlação negativa entre capacidade funcional e a pontuação do questionário de Fagerström ( $p=0,004$ ;  $r=-0,3$ ). Concluiu-se que a carga tabagística e o grau de dependência de nicotina apresentaram relação com piores índices de qualidade de vida da população tabagista.

**Descritores** | Tabagismo; Qualidade de Vida; Transtornos Relacionados ao Uso de Substâncias.

**RESUMEN** | El tabaquismo es considerado una enfermedad crónica y una de las principales causas de muertes evitables en el mundo. La cualidad de vida es una importante medida de impacto en la salud y en su relación con los niveles de dependencia de nicotina y de carga de tabacos, los cuales todavía no están totalmente aclarados. Se evaluó la cualidad de vida de consumidores de tabaco y su correlación con la carga de tabacos y con el nivel de dependencia nicotínica. Fueron incluídos, en este estudio, consumidores de tabacos de ambos sexos y sin enfermedades clínicas diagnosticadas. Posteriormente, fue realizada la evaluación de la cualidad

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de vida y el nivel de dependencia nicotínica por medio de cuestionarios. La muestra fue constituida por 48 individuos. Hubo correlación negativa entre la vitalidad y la cantidad de años en que estos individuos fumaron ( $p=0,009$ ;  $r=-0,27$ ), así como el estado general de salud y años/cajetilla ( $p=0,02$ ;  $r=-0,23$ ) y la cantidad de cigarrillos consumidos al día actualmente ( $p=0,006$ ;  $r=-0,29$ ). Es posible observar

correlación negativa entre la capacidad funcional y el puntaje del cuestionario de Fagerström ( $p=0,004$ ;  $r=-0,3$ ). Se concluyó que la carga de tabacos y el grado de dependencia de nicotina presentaron relación con los peores índices de calidad de vida de la población consumidora de tabacos.

**Palabras clave** | Tabaquismo; Calidad de Vida; Trastornos Relacionados con Sustancias.

## INTRODUCTION

Tobacco use disorder is considered a chronic disease and one of the leading causes of preventable death in the world<sup>1</sup>. It corresponds to a serious public health problem, since it represents a severe risk factor for cancer, cardiovascular diseases, respiratory diseases, and other health problems<sup>2,3</sup>. In addition, tobacco consumption has a direct effect on quality of life<sup>4</sup>.

The physical consequences of the tobacco use have been extensively studied, and, more recently, its effects on mental health and well-being as well<sup>5</sup>. Some cross-sectional studies have already shown impairment in the quality of life of smokers when compared with non-smokers<sup>6-8</sup>. However, the relationship between quality of life and levels of nicotine dependence and smoke load are not fully understood.

The concept of quality of life can be defined as an association between self-esteem and personal well-being, covering several aspects such as functional capacity, emotional state, social interaction etc.<sup>9</sup>. Quality of life is an important measure of health impact and is used by clinicians and researchers. In 1948, the World Health Organization defined health as not only the absence of disease or infirmity, but also the presence of physical, mental and social well-being. Hence, the use of quality of life has been reinforced as a necessary concept in the practice of health care and research<sup>10</sup>.

Considering this, the use of questionnaires that assess quality of life is a common practice in the evaluation of treatment protocols in several health specialties, including physical therapy<sup>11-13</sup>. It is common to find smokers referred, for example, to respiratory physical therapy<sup>14</sup>. However, it is important to emphasize that tobacco use disorder also affects other systems in the human body such as the cardiovascular, musculoskeletal, and neurological systems<sup>15,16</sup>.

Freire et al.<sup>17</sup> demonstrated that physical therapists present particularities and unique characteristics that can become facilitators in the smoking intervention process and, therefore, act not only in prevention, but also in the intervention of the tobacco use disorder cessation process of their patients, besides considering the condition of smoker in the evolution of physical therapeutic treatment.

Therefore, it is extremely important to demonstrate how the tobacco use disorder, as well as the smoke load and the level of nicotine dependence, can influence the quality of life. Thus, smokers may be motivated to seek better quality of life with smoking cessation, as well as gains with health in general.

## OBJECTIVE

To evaluate the quality of life of smokers, and its correlation with the smoke load and level of nicotine dependence.

## METHODOLOGY

This is a cross-sectional study in which smokers were enrolled in a smoking cessation program at the Faculdade de Ciências e Tecnologia – FCT/UNESP, Presidente Prudente campus, São Paulo, Brazil, previously described in the literature<sup>2</sup>. Individuals were evaluated before starting the cessation program.

Another study was used as a basis<sup>18</sup> to determine the sample calculation. The emotional aspect of the SF-36 questionnaire was used to determine the mean, standard deviation of 33.3, maximum error of estimate of 9.8 and level of significance of 5%, which resulted in a sample of 48 individuals for the present study.

This study was approved by the Ethics and Research Committee of this University under protocol no. 049224/2015. Those who agreed with and signed the Informed Consent Form are effectively part of the study.

The inclusion criteria comprised: smokers, men and women aged 35-60 years, who participated in the proposed smoking cessation program; individuals who did not present any physical and/or mental disease diagnosed in the initial evaluation; and no use of medication for the treatment of physical or mental comorbidities that could interfere in quality of life indexes.

On the other hand, the exclusion criterion was noncomprehension or noncooperation regarding the research procedures and methods.

### Experimental protocol

The smokers included in the smoking cessation program<sup>2</sup> were submitted to the initial evaluation, in a single moment, for general data collection, followed by quality of life assessment and, finally, nicotine dependence level through the application of questionnaires.

### Initial assessment

Evaluations were carried out through a personal and individual interview by a previously trained professional and included personal data collection (name, address, phone number, age), history of illnesses, depression and anxiety diagnosed by a physician, use of medications for such diseases and medications used in the period. In addition to collecting information on how many cigarettes the individual smoked on average and how many years and how many cigarettes they smoked per day.

Questionnaires were then applied to assess the quality of life and the level of nicotine dependence.

### Quality of life assessment

The Medical Outcomes Study 36-item Short-Form Health Survey (SF-36) consists of 36 items, encompassing eight domains: Functional capacity – corresponds to the performance of daily activities, such as ability to care for oneself, dressing, bathing and climbing stairs; physical aspects – corresponds to the impact of physical health on the performance of daily and/or professional activities; pain – corresponds to the level of pain and its impact on the performance of daily

and/or professional activities; general health status – corresponds to the subjective perception of the general state of health; vitality – corresponds to the subjective perception of vitality; social aspects – corresponds to the reflex of the condition of physical health on social activities; emotional aspects – corresponds to the reflection of emotional conditions on the performance of daily and/or professional activities; and mental health – corresponds to the scale of mood and well-being<sup>19-21</sup>.

Each domain is separately analyzed and gets a score of 0 to 100, from the worst to the best health status.

### Assessment of the level of nicotine addiction

The Fagerström Questionnaire aims to assess the severity of nicotine addiction. It is composed of six questions, with questions 1 and 4 being scored from 0 to 3 and the others from 0 to 1. The cut-off points for this questionnaire are: 0-2 – corresponds to a very low degree of nicotine dependence; 3-4 – low degree; 5 – average degree; 6-7 – high degree; and 8-10 – very high degree.

### Statistical analysis

Data were analyzed using the GraphPad Prism statistical software. For the analysis of normality of the data the Shapiro Wilk test was used. The Pearson or Spearman tests were used to analyze the correlation between quality of life, smoke load and nicotine dependence, according to the normality of the data. The level of significance was of 5%.

## RESULTS

The sample consisted of 48 individuals, 27 women and 21 men. Table 1 shows the characterization of smokers according to: age, weight, height, BMI, number of cigarettes consumed per day, number of years of smoking, years/pack, currently number of cigarettes consumed per day and score on the Fagerström questionnaire.

Table 2 shows the score of the eight domains of the SF-36 Quality of Life Questionnaire expressed as mean and standard deviation and their respective confidence intervals.

Table 3 shows the correlation values between the eight domains of the SF-36 Quality of Life Questionnaire and some variables related to the smoke

load of the individuals participating in the study, such as: number of cigarettes consumed per day, quantity of years of smoking, years/pack and currently number of cigarettes consumed per day.

We may observe a negative correlation ( $r=-0.27$ ,  $p=0.009$ ) between the vitality and the number of years that these individuals smoked, that is, the greater the number of years of smoking, the less vitality. In addition, we may observe the general health status and years/pack ( $r=-0.23$ ,  $p=0.02$ ) and number of cigarettes consumed per day currently ( $r=-0.29$ ,  $p=0.006$ ).

Table 4 shows the correlation values between the eight domains of the SF-36 Quality of Life Questionnaire and the Fagerström questionnaire score, which assesses the level of nicotine dependence. We can observe a negative correlation between functional capacity and the questionnaire score ( $r=-0.30$ ,  $p=0.004$ ), that is, the higher the nicotine dependence, the lower the functional capacity. We also observe a negative correlation ( $r=-0.21$ ,  $p=0.04$ ) between pain and the questionnaire score, that is, the higher the pain, the lower the questionnaire score.

Table 5 shows the correlation values between the eight domains of the SF-36 Quality of Life Questionnaire and the age of individuals of the sample. We may observe a statistically significant correlation in only one domain, the social aspect ( $r=0.21$ ,  $p=0.04$ ). This shows that the lower the age, the better the individuals' perception of the social aspect.

Table 1. Sample characterization. Data expressed as mean and standard deviation.

	Mean±SD
Age (years)	46,05±6,87
Weight (kg)	70,78±15,28
Height (m)	1,64±0,090
BMI (kg/m <sup>2</sup> )	26,10±4,60
Cigarettes/day	20,42±11,39
Years of Smoking	28,09±8,86
Years/pack	28,90±19,20
Cigarette/nowadays	20,75±11,98
Fagerström (points)	6,03±2,39

Kg: Kilograms; m: meters; BMI: Body Mass Index

Table 2. Score of SF-36 domains of smoker individuals. Data expressed as mean, standard deviation and 95% confidence interval

	Mean±SD	CI
Functional capacity	75,23±24,21	70,10 – 80,36
Physical aspect	69,89±39,24	61,57 – 78,20
Pain	58,78±26,72	53,09 – 64,48
General health status	61,55±23,33	56,60 – 66,49
Mental health	63,84±24,38	58,64 – 69,03
Vitality	56,42±27,31	50,63 – 62,21
Social aspect	77,27±27,11	71,53 – 83,02
Emotional aspect	72,72±37,33	64,81 – 80,63

Table 3. Correlation between the domains of quality of life and variables of the smoke load

	Cigarettes/day		Years of Smoking		Years/pack		Cigarette/nowadays	
	r	p	r	p	r	p	r	p
Functional capacity	-0,11	0,30	-0,10	0,34	-0,15	0,14	-0,13	0,21
Physical aspect	0,13	0,22	-0,06	0,56	0,06	0,53	-0,03	0,77
Pain	-0,03	0,77	-0,11	0,28	-0,08	0,44	-0,17	0,11
General health status	-0,18	0,08	-0,19	0,07	-0,23	0,02*	-0,29	0,006*
Mental health	0,09	0,36	0,01	0,88	0,08	0,44	-0,03	0,76
Vitality	-0,02	0,85	-0,27	0,009*	-0,13	0,20	-0,04	0,68
Social aspect	0,02	0,83	-0,12	0,24	-0,01	0,90	-0,08	0,43
Emotional aspect	0,16	0,11	-0,09	0,37	0,14	0,19	0,11	0,29

Table 4. Correlation between the domains of quality of life and Fagerström Questionnaire Score

	Fagerström	
	r	p
Functional capacity	-0,30	0,004*
Physical aspect	-0,15	0,16
Pain	-0,21	0,04*
General health status	-0,17	0,09
Mental health	-0,16	0,11
Vitality	-0,13	0,20
Social aspect	-0,10	0,31
Emotional aspect	-0,03	0,76

Table 5. Correlation between the domains of quality of life and age

	Age	
	r	p
Functional capacity	-0,01	0,92
Physical aspect	-0,04	0,70
Pain	-0,09	0,39
General health status	-0,05	0,62
Mental health	0,03	0,75
Vitality	-0,20	0,06
Social aspect	-0,21	0,04*
Emotional aspect	0,03	0,73

## DISCUSSION

Our study demonstrates that the smoke load correlates with worse index of quality of life in this population. Individuals with high smoke load, that is, those who smoke more cigarettes per day, smoke for many years and have a high value of pack/years, present lower scores in some domains of quality of life such as vitality and general health status.

Regarding the degree of nicotine dependence, we could observe in that the individuals who presented greater dependence also presented worse functional capacity. This behavior can be attributed to the fact that release of carbon monoxide (CO) occurs during the combustion of the cigarette. CO has affinity for hemoglobin in the blood, which carries oxygen to all tissues in the body. Therefore, chronic CO intoxication resulting from prolonged exposure may cause cumulative toxic effects such as headache, fatigue, dizziness, nausea, respiratory diseases, cardiac ischemia, heart disease, and even decreased physical capacity<sup>22-24</sup>.

When assessing quality of life compared with the severity of tobacco dependence of non-smokers, former smokers, mild smokers (consumption of less than 15 cigarettes per day), moderate smokers (consumption of 15-24 cigarettes per day) and severe smokers/ (greater than 25 cigarettes/day), moderate and severe smokers' impairments were observed in all SF-36 dimensions when compared with non-smokers. Even mild smokers presented reduced scores when compared with non-smokers. The general health and vitality domains were more involved in severe smokers than in the moderate group<sup>25</sup>. These findings corroborate our study, although the latter did not classify cigarette smokers per day, the average number of cigarettes consumed per day was  $20.75 \pm 11.98$ . But another study<sup>26</sup> showed that severe smokers presented greater impairment in quality of life in all domains when compared with mild and moderate ones, since it was found that the presence of a compromise in quality of life, in relation to the field of general health status, is associated with a higher annual consumption of cigarettes<sup>18</sup>. This is due to the fact that smoking causes several physical changes such as loss of pulmonary function and reduction of bone mass<sup>27</sup>.

Another finding of our study was regarding the pain domain. We observed that individuals who presented higher scores in the Fagerström questionnaire, that is, greater nicotine dependence, also presented a worse pain score. That is, the greater the degree of addiction to nicotine, the greater the levels of pain. Smokers present higher pain intensity when compared with non-smokers, especially cancer patients<sup>28</sup>. Proportionally, an inverse relationship is also established between the intensity of pain and the number of years without smoking, thus, it was observed that smoking cessation is associated with reduction of pain over time. The specific mechanism between smoking and pain is still unknown and probably multifactorial<sup>28-30</sup>. However, tobacco use disorder is associated with the development and progression of various pain-causing diseases such as rheumatoid arthritis and musculoskeletal pain (for example, low back pain)<sup>31,32</sup>. These findings on the presence of pain associated with smoking are very important to increase the degree of motivation of the individuals and assist them in smoking cessation.

In addition, besides the smoke load and the degree of nicotine dependence presenting a direct impact on the quality of life, we can infer that tobacco use disorder alone results in worsening of the quality of life, since, in relation to the values of normality for the Brazilian

population of the SF-36 questionnaire<sup>33</sup>, smokers had lower scores in seven of the eight domains evaluated.

We also observed that age correlates with the domain of the social aspect, that is, individuals who were older also presented reduced scores regarding the social aspect. This finding was already expected, since in the study by Laguardia et al.<sup>33</sup> all domains of quality of life had a reduction in their scores as the age group increased. This reduction in the social aspect score may be related to the aging process, which can be accompanied by several health problems, both physical and mental, usually caused by the presence of chronic diseases<sup>34</sup>, which may lead to social isolation. This, in turn, can hinder the cessation process and reduce the motivational degree of these individuals, directly reflecting on quality of life.

Thus, it is important to evaluate the impact that tobacco use disorder presents on the quality of life of these individuals, in order to increase their motivational level for smoking cessation and the search for better life and health conditions. In addition, the recognition of the influence of smoking on the quality of life reported by patients undergoing treatment in the various health areas, including physical therapy, should be considered in the evolution and therapeutic prognosis.

## CONCLUSION

Smoke load and level of nicotine dependence are related to the poorer quality of life in smokers, with no diagnosed clinical diseases, in terms of vitality, general health status and functional capacity. In addition, advanced age interferes in the social aspect of this population, although correlations scarce.

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