

# Correlation between Quality of Life Related Variables and Body Mass Index in Biology Students

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## Abstract

**Background:** To determine the association between the Quality of Life (QoL) related variables and Body Mass Index (BMI) of the students in a biology course of a Federal Educational Institution of Brazil.

**Methods:** The QoL variables and BMI analysis was evaluated in 28 students of Full Degree in Biology course from the Federal Institute of Pará, separated in two groups: Female; n=21, 23.2 ± 3.3 years old and Male; n=7, 26.5 ± 4.4 years old. The values of weight and height to identify BMI and to assessment QoL by SF-36 questionnaire were used. The data obtained were subjected to statistical procedures, descriptive, and inferential statistics with the Pearson correlation test according to the normality of the data.

**Results:** The analysis identified high positive correlation between the variables of QoL related to Male group: Physical Health vs. Total score ( $r=0.91$ ,  $p=0.004$ ), Mental Health vs. Total score ( $r=0.93$ ,  $p=0.002$ ), and in Female group: Physical Health vs. Total score ( $r=0.89$ ,  $p<0.0001$ ), Mental Health vs. Total score ( $r=0.92$ ,  $p<0.0001$ ). In addition, to correlations: Physical Health vs. Mental ( $r=0.68$ ,  $p=0.0006$ ) in the Female group and also a negative correlation between BMI vs. Physical Health ( $r=-0.81$ ,  $p=0.027$ ) in Male group.

**Conclusion:** In this study, we found correlations between measures of BMI and physical health in men. In addition, correlations between QoL variables for both men as for women were verified.

**Keywords:** Body mass index; Quality of life; Mental health; Student health services

## Introduction

The researches on quality of life (QoL) increased from the 50's, when the United Nations began to take an active interest in measuring QoL levels in different worldwide communities [1].

The concept of QoL according to the World Health Organization (WHO) [2] is defined as a complex variable, since it covers many aspects of human life such as health, social, physical and emotional aspects, and negative changes in these aspects can cause modifications in QoL such as: adoption of sedentary and of poor diet behaviors [2,3]. The university entrance can cause these changes, because young people are creating new social relations and adopt new behaviors from university life, these situations can make this group vulnerable circumstances that increase risk factors for health problems [4].

For Dias [5] university students face multiple stressors factors, such as: need for academic performance, the increased need by academic success, conflict with parents and the worries about the future, changes that may negatively alter the QoL of these individuals.

In this context, measures of weight and height are necessary for calculating the Body Mass Index (BMI), which is of great importance to evaluate the nutritional and health aspects [6], which can also impact the QoL of different groups [7].

Among the different diagnostic tools used to assess QoL in different groups of subjects, one can highlight the SF-36 Questionnaire [8-10], what is generic instrument developed in the late 1980's in the United States, being translated and validated for Brazilians with cultural adaptation [8].

The SF-36 is used for population studies and their general

and specific items gathering multiple aspects of health, including behavioral function, pain, stress and well-being, objective and subjective evaluations and self-assessment of general health status [8,11], since BMI is a measure commonly used in scientific studies of different population groups for primary classification of health state [12].

A review study conducted at Catholic Dom Bosco University confirms that this was the most cited instrument in research on QoL, being found in 50% of studies [13]. In another study conducted in Spain, Vilagut et al. [14] showed that the SF-36 was also the most used instrument in researches QoL in this territory.

The literature shows that negative health behaviors more prevalent in male university students that are: insufficient consumption of fruits and vegetables, smoking and excessive alcohol consumption. And, lower levels of physical activity during leisure time were higher in older women, who also had greater difficulty-relationships with colleagues [15]. With that, is there an association between QoL variables and BMI of university students?

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The studies cited above demonstrate the necessity of studies demonstrating associations between health related-variables of this population, which may account for the present study.

Therefore, this study aimed to determine the association between QoL variables and BMI of the students in a Biology course of a Federal Educational Institution of Brazil.

## Material and Methods

### Participants

38 students' volunteers were selected by academic record in the first year of Full Degree in Biology from the Federal Institute of Education, Science and Technology of Pará/Brazil, Campus Tucuruí. The inclusion criterion for participation was being regularly enrolled student in biology course and excluded absent students, that not participating for the data collection day.

After analyzing the inclusion and exclusion criteria, 10 students were excluded. The sample consisted of 28 participants, including 21 females (n=21; 23.2 ± 3.3 years old) and 7 males (n =7; 26.5 ± 4.4 years old) belonging to the Full Degree in Biological Sciences course, defined as a non-randomized sample. And, data were collected in October 2012.

### Protocols

**Anthropometric evaluation:** For determining body mass and height, a vertical stadiometer fixed in an anthropometric scale mechanics Welmy®, model 110-CH (Brazil), with maximum capacity of 150 kg and nearest ranges of 100 g was used. All anthropometric measurements were performed according to the requirements of International Standards for Anthropometric Assessment [16]. To determine your Body Mass Index (BMI) was used values of body mass and height established by the following equation [2].

$$[BMI = \text{weight (kg)} / \text{height (m)}^2]$$

**Quality of life evaluation:** To determine the QoL of volunteers, the questionnaire SF-36 (Medical Outcomes Study 36-Item Health Survey), which is considered a generic instrument that covers many health concepts, was used. Although developed in the United States, it is used all over the world, having been translated and validated in more than 15 countries [17].

In 36 questions, the questionnaire SF-36 assesses the QoL based on eight areas: physical functioning, role physical, bodily pain, general health, vitality, social, emotional, and mental health. The analysis culminates in three final variables, named: physical health (PH), mental health (MH) and QoL total score, ranging from 0 (lowest score) to 100 (highest score) points [8].

The study followed all the criteria for participation in research with humans, where volunteers signed an informed consent form prior to data collection according to the recommendations of the Helsinki Declaration [18] and resolution 196/96 of the National Health of Brazil [19].

### Statistical Analysis

The Statistical analysis was performed using the software BioEstat® 5.0. After it a descriptive statistics with mean and standard deviation was used. Subsequently, the Shapiro-Wilk to verify the normality and for inferential analysis to investigate the correlation between variables (bi-variables), the Linear Pearson correlation tests were used. For eligibility of statistical hypotheses was considered the  $p \leq 0.05$  with

an alpha error ( $\alpha$ ) of 5% for acceptance or rejection of the hypothesis.

## Results

The table 1 presents the mean and standard deviations values for the variables: age, height, weight and BMI of the female and male students groups in this study, showing significant differences ( $p < 0.05$ ) between groups for anthropometric variables, BMI, QoL total score and MH.

## Discussion

The BMI is still one of the measures of body composition used in several studies related to the general population, although it has some limitations, such as the classification of excess fat or obesity in patients who have large muscle mass [6,20]. The relevance of the index is in the classification of individuals to general health stages in different age, such as: underweight, normal weight, overweight (pre-obesity) and obesity for adults in the 20 to 60 years (Department of Health Government of the Brazil) [21], shown in table 4.

According to table 4, that is a reference for BMI of Department Health Government of the Brazil above cited, it was found that groups of this research are classified into normal weight for female (BMI=21.5 ± 3.17) and of overweight in the male (BMI=26.2 ± 2.3), with this values shown in table 1.

To the study of Petribú et al. [22] the scientific community has shown concern for the health of university students and for this reason has been studying issues related anthropometric variables and QoL of this student population. Still on the use of BMI in population studies, this BMI often associated with measures of QoL [10] and the association between the variables may indicate an increase or decrease in the risk of health problems in individuals [23-26].

This study showed a high negative correlation ( $r = -0.81$ ,  $p = 0.02$ ) between BMI and PH for the male group of university students. Table 1 shows significant differences ( $p < 0.05$ ) for BMI data favorable to males, and this can explain the negative correlation between BMI and physical health in this group. However, our results should also be viewed with caution, especially because of the small sample and of selection not randomized of this group.

The concern with PH in males may be exacerbated if one considers the fact that the physical symptoms are the main complaint of university freshmen, as is the case in our sample [27] and, with advancing academic life, the physical activity level of the university tends to decrease as opposed to intellectual activity [28].

Variables	Female Group, n=21		Male Group, n=7		p-value
	Mean	SD	Mean	SD	
Age (Years)	23.28	3.37	26.57	4.42	0,07
Mass (kg)	55.24	10.11	75.15	10.31	0,001
Height (m)	1.59	0.06	1.66	0.05	0,020
BMI (kg/m <sup>2</sup> )	21.54	3.17	26.89	2.31	0,0004
PH (Score)	68.5	14.0	75.9	7.5	0,090
MH (Score)	66.1	15.2	78.1	8.6	0,018
QoL Total (Score)	69.5	14.0	80.6	7.4	0,014

Legends: SD= Standard Deviation; BMI= Body Mass Index; QoL= Quality of Life; PH=Physical Health; MH= Mental Health.

**Table 1:** Description of the variables for the groups. Presents the mean and standard deviations values for the variables: age, height, weight and BMI of the female and male students groups in this study, showing significant differences ( $p < 0.05$ ) between groups for anthropometric variables, BMI, QoL total score and MH.

Female Group, n=21			
Variables	r-Pearson	p-value	CI-95%
BMI (kg/m <sup>2</sup> ) vs. MH (Score)	0.216	0.347	-0.24–0.59
BMI (kg/m <sup>2</sup> ) vs. PH (Score)	-0.025	0.913	-0.45–0.41
BMI (kg/m <sup>2</sup> ) vs. QoL Total (Score)	0.095	0.680	-0.35–0.51
PH (Score) vs. MH (Score)	<b>0.683</b>	<b>0.0006</b>	0.36–0.86
PH (Score) vs. QoL Total (Score)	<b>0.899</b>	<b>&lt;0.0001</b>	0.76–0.96
MH (Score) vs. QoL Total (Score)	<b>0.925</b>	<b>&lt;0.0001</b>	0.82–0.97

Legends: BMI=Body Mass Index; MH=Mental Health; PH=Physical Health; QoL Total=Total Health; CI=Confidence Interval.

**Table 2:** Correlation between bi-variables of the female group. Table 2 shows the correlations between BMI, MH, PH and Total Score QoL. The results showed high positive correlation for the female group between the following variables: PH vs. Total Score QoL and MH vs. Total Score QoL. And addition showed moderate correlation between PH vs. MH variables.

Male Group, n=7			
Variables	r-Pearson	p-value	CI-95%
BMI (kg/m <sup>2</sup> ) vs. MH (Score)	-0.412	0.357	-0.89–0.49
BMI (kg/m <sup>2</sup> ) vs. PH (Score)	<b>-0.810</b>	<b>0.027</b>	-0.97– -0.15
BMI (kg/m <sup>2</sup> ) vs. QoL Total (Score)	-0.620	0.137	-0.94–0.25
PH (Score) vs. MH (Score)	0.726	0.064	-0.06–0.96
PH (Score) vs. QoL Total (Score)	<b>0.913</b>	<b>0.004</b>	0.51–0.99
MH (Score) vs. QoL Total (Score)	<b>0.934</b>	<b>0.002</b>	0.61–0.99

Legends: BMI=Body Mass Index; MH=Mental Health; PH=Physical Health; QoL Total=Total Health; CI=Confidence Interval.

**Table 3:** Correlation between bi-variables of the male group. Table 3 also shows a high correlation between variables: BMI vs. PH (negative correlation); PH vs. QoL Total Score and MH vs. QoL Total score (positives correlations) for the men group.

BMI (kg/m <sup>2</sup> )	Classification
<18.5	Underweight
18.5–24.99	Normal
25–29.99	Overweight
>30	Obesity

**Table 4:** Presents the classification for the BMI.

In a similar study, conducted by Kakeshita [29] and Almeida [30] a significant association ( $p < 0.05$ ) was identified between BMI and self-perceived body image for the male sample, and this variable is considered by Almeida et al. [30] as an essential requirement for PH.

However, in a research conducted by Cieslak et al. [31], with young athletes, there was a significant moderate correlation between QoL and BMI ( $r = 0.5$ ,  $p = 0.001$ ) in the female sample, but in the male group no significant correlations were verified. The author [31] complements that research should be analyzed with caution, because it has limitations such as sample design of non-randomized subjects.

In addition, was observed in the present study a moderate significant correlation ( $r = 0.683$ ,  $p = 0.0006$ ) between PH vs. MH in the female sample of university students (Table 2). Andrade and Monteiro [32], who also found a moderate correlation between MH and PH ( $r = -0.55$ ,  $p = 0.0001$ ), however the correlation is negative and in a group of official maintenance-hospital. Although the study by Andrade and Monteiro [32] has been carried out with official maintenance-hospital and negative correlation, the assessment tool (SF-36) was equally used in this present study.

In the analysis of the correlation between domains: PH, MH and QoL Total, there was a high significant correlation in the female group (Table 2) and in male group (Table 3) presented in this present study. French et al. [33] to analyze gender differences in relation to life events and physical wellness and psychological, have noted that women

presented the general health scores associated with positive events of physical wellness and psychological.

Other studies [34] which examined a group of 98 university students of both genders, with  $25.8 \pm 7.72$  years of age, identifying a correlation between PH vs. total health scores ( $r = 0.74$ ,  $p = 0.01$ ) and, Souza and Carvalho [13], who investigated a sample of 256 nursing students and also found an association between these variables, but these students were in the final year of the course. It is worth noting that students in this present study were evaluated in the first year of the course.

Macedo et al. [35] also showed a correlation between PH vs. total health score by analyzing a group of 69 university students of both genres. Alves et al. [36] also found significant associations between PH vs. total health with a group of 170 university students of both genres.

Different studies have shown that moderate physical activity contributes to the improvement of humor, cognition and anxiety state, which is reflected in the MH and consequently on the QoL of individuals [37]. In addition, contributions are also found to PH in practice these moderate activities, regardless of age [38].

Although, the QoL of university students was considered good, Calais et al. [27] assert that lifelong academic, initial symptoms refer to physical problems and after are psychological symptoms.

The works cited above reinforce the findings of this study, showing that both the physical and MH is directly related to QoL. This may reveal a need for greater attention by official education institutions regarding the needs of leisure spaces, a healthy diet and psychological counseling when needed for this population, because the tendency is to decrease the QoL with advancing age [39].

Finally, further studies with a larger sample, randomized selection, and evaluation of other variables such as diet and sleep time are recommended.

## Conclusion

In the present study, we found high statistical correlations between measures of BMI and PH in men. In addition, high significant correlations between QoL related variables both for male as for female university students.

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