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Education for health, dietary habits, nutritional status and indicators of metabolic risk

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Abstract

Introduction: A low level of functional education is a risk factor for lower levels of health literacy which in turn is considered to be a mediator in health results, currently representing an issue of interest in research on the management of the individual's state of health. Objectives: To determine the effects of literacy on health through the mediation of dietary habits on nutritional status - Body Mass Index (BMI) and indicators of metabolic risk – Abdominal Perimeter (AP), Neck Circumference (NC), Capillary glycaemia. Methods: Descriptive study carried out on an objective sample of 508 Portuguese citizens (52.2% males and 47.8% females) with an average age of 44.48 years. The Questionário Europeu de Literacia em Saúde (HLS-EU-PT) (Nunes & Sorensen, 2013) (The European Questionnaire on Health Literacy) was applied and the dietary habits were assessed and the BMI, AP, NC and glycaemic levels were established.

Results: The majority of participants (73.62%) were shown to have a health literacy deficit.

The effect of the interaction between health literacy and dietary habits has a direct effect on abdominal perimeter and on neck circumference, although it is not found to be associated with variation in BMI.

Conclusion: Differences in the level of health literacy were consistently associated with an increase in metabolic and cardiovascular risk. It is accepted that health literacy may affect disparities in indicators for the state of health. Priorities for future action to promote behaviours leading to the observation of healthy lifestyles including health literacy programmes.

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Keywords: Health Literacy, metabollic risk

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1. Introduction

Health literacy (HL), can be defined as an "*awareness of the person, who is a learner and active in developing their capabilities of understanding, management and investment favourably towards promoting health*" (Saboga-Nunes, 2014; Sorensen et al, 2012).

Health literacy is linked to the level of education and requires the people's knowledge, motivation and skills. In short, it is the capacity to grasp, understand and invest intellectually and favourably to promoting health. Only in this way can they make decisions about their health, disease prevention and health promotion (Sorensen et al, 2012).

Being able to manage lifestyles and health conditions implies empowering individuals, enabling them to make, among other things, appropriate food choices, this requires individuals to have at their disposal information on health and the potential to use it correctly. It also means understanding medical advice and actively participating with professionals in the process of creating health. In any health promotion programme, health literacy is an essential variable so that actions are efficient and effective (Sorensen et al, 2012; Saboga-Nunes, 2014; Cunha et al, 2014).

Educating individuals is an important factor in terms of individual and public health, hence the importance of functional literacy (Luís, 2010). Schools can promote health education which includes nutrition education, (Keskea, Gursel, & Alagul, 2012).

People with low education levels are more likely to have poor health as adults. This is why health professionals are seeking to promote their health and prevent disease by changing and adapting their lifestyles to healthier ones. For this, it is crucial to enhance the literacy levels of communities in order to improve their ability to make healthier life choices.

Health literacy can significantly influence nutritional and metabolic status, as has been identified in several studies as an indicator of health outcomes (Cunha et al, 2014).

Considering the magnitude of information available today on promoting health and the prevention/treatment of diseases, it is necessary to provide high-level health literacy to individuals so they can access the right information (Aydına, Kayaa & Turanb, 2015).

In this context, the central question outlined in this study was:

What is the effect of literacy levels on health through the mediation of dietary habits on nutritional status and on metabolic risk?

Following the line above, the following aims were outlined: 1.To evaluate the effects of literacy on health and dietary habits;2.To determine the effects of health literacy through the mediation of dietary habits on nutritional status - Body Mass Index (BMI) and indicators of metabolic risk – Abdominal Perimeter (AP), Neck Circumference (NC), Capillary glycaemia.

2. Methods

Descriptive study carried out on an objective sample of 508 Portuguese citizens (52.2% males and 47.8% females) with an average age of 44.48 years.

The *Questionário Europeu de Literacia em Saúde* (HLS-EU-PT) (Saboga-Nunes & Sorensen, 2013) (The European Questionnaire on Health Literacy) was applied and the dietary habits were assessed and the BMI, AP, NC and glycaemia levels were established.

3. Results

3.1. Dietary Habits and Health Parameters

Excessive consumption of salt (quantities greater than 5 grams of sodium chloride per day) was found in 49.4% with only 28.3% with a lower daily consumption. The consumption of sugar was adequate in 92.9% of participants, while the majority consumed aromatic teas (73.6%) and spices (59.6%).

Abdominal Perimeter - 191 individuals (37.6%), 148 females and 43 males had an AP greater than 88 and 102 centimetres respectively.

- Neck Circumference - 136 participants, 36 males and 100 females had NC values greater than or equal to 39.5 and 36.5 cm respectively;

Excess weight – 41.1% had increased risk with 135 males and 74 females with a PCP greater than or equal to 37 and 34 cm respectively. Calculation of the BMI showed that 37.4% had normal weight while the majority (62.6%) had excess weight with 45.28% pre-obesity and 12.99% with level I obesity, 3.74% with level II obesity and 0.59% with level III obesity.

Glycaemia – 92.1% had levels below or equal to 199 mg/dl and 7.9% (40 persons) had levels of glycaemia greater than or equal to 200 mg/dl.

Metabolic risk was shown to be associated with health literacy with participants with insufficient health literacy having a larger abdominal perimeter (PA x^2= 101.65; p=.000), greater neck perimeter (PCP x^2= 10.34; p =.016), a worse nutritional status greater BMI (Kruskal Wallis, x^2=78.09; p=.000) and higher glycaemia (Mean Rank OM =337.22). On the other hand, a higher level of health literacy was associated with lower levels of glycaemia (Mean Rank OM=171.42; x^2=112.038; p=.000).

3.2. Health literacy

Values for Health literacy (HL) ranged between 0.00 and 48.94, with a mean of 26.88 (SD=9.45). Men have a higher HL (=29.19 ±7.85 SD) compared to women in each of the dimensions and the overall value (=24.35 ± 10.37 SD; t=5.88; p=.000). In scoring by level the trend remains, with males scoring a higher level of HL than females (Chi-square test x2 =47.748; p=.000).

Through the Vital Sign Test (VST), only a minority (19.3%) has adequate literacy and 32% have limited literacy.

Multiple linear regression between health literacy, dietary and nutritional habits and BMI, waist circumference and neck circumference

The predictive value of the independent variables (health literacy and dietary and nutritional habits) relative to the dependent variable (BMI) was tested by linear regression. We thus found that there is a statistically significant difference between health literacy and BMI (p=.000). There is also a positive correlation between the variables (r=.353) and 12.4% of the variance explanatory, meaning that the influence of health literacy on BMI is low (Table1).

Table 1. Multiple linear regression between health literacy, dietary and nutritional habits and BMI, waist circumference and neck circumference.

Dependent Variable: BMI						
r=0.353						
r2=0.124						
Adjusted R2=0.121						
Standard error of the estimate=3.89						
F=35.837						
P=0.000						
Regression Summary						
Independent Variables	Standardised Coefficient	Regression Coefficient	R2 Increment	t	p	
Constant	30.617	0.353	0.124		0.000	
Health literacy	-0.35			8.339	0.000	
Analysis of Variance						
Source	Sum of Squares	gl	Average of squares		F	p
Regression	1088.715	2	544.357			
Residual	7670.784	505	15.190		35.837	0.000
Total	8759.499	507				

The predictive value of the independent variables (health literacy and dietary and nutritional habits) over the dependent variable (waist circumference) was tested by linear regression. We thus found that there are no statistically

significant differences between health literacy and waist circumference (p=.000). There is also a positive correlation between the variables (r=.374) and 13.6% of the variance explanatory, reflecting that the influence of health literacy on waist circumference is low (Table 2).

Table 2. Multiple linear regression between health literacy, dietary and nutritional habits and waist circumference.

Dependent Variable: waist circumference					
r=0.374					
r2=0.140					
Adjusted R2=0.136					
Standard error of the estimate=11.699					
F=41.028					
P=0.000					
Regression Summary					
Independent Variables	Standardised Coefficient	Regression Coefficient	R2 Increment	t	p
Constant	105.345	0.374	0.140	67.222	0.000
Health literacy	-0.353			-8.447	0.00
Analysis of Variance					
Source	Sum of Squares	gl	Average of squares	F	p
Regression	11231.127	2	5615.563		
Residual	69120.140	505	136.872	41.028	0.000
Total	80351.267	507			

The predictive value of the independent variables (health literacy and dietary and nutritional habits) over the dependent variable (neck circumference) was tested by linear regression. We thus found no statistically significant differences between health literacy and neck circumference (p=.057). From Table 3 we can consider that the variables literacy and dietary and nutritional habits are not predictive of neck circumference. We also note that there is a positive correlation between the variables (r=.106) and 1.1% of the explanatory variance, which means that the influence of literacy on neck circumference is negligible (Table 3).

Table 3. Multiple linear regression between health literacy, dietary and nutritional habits and neck circumference.

Dependent Variable: neck circumference					
r=0.106					
r2=0.011					
Adjusted R2=0.007					
Standard error of the estimate=2.76					
F=2.879					
P=0.057					
Regression Summary					
Independent Variables	Standardised Coefficient	Regression Coefficient	R2 Increment	t	p
Constant	37.172	0.106	0.011	100.186	0.000
Health literacy	-0.107	-2.399	0.017		
Analysis of Variance					

Source	Sum of Squares	gl	Average of squares	F	p
Regression	44.169	2	22.084		
Residual	3874.423	505	7.672	2.879	0.057
Total	3918.592	507			

Standardised estimates of the adjusted regression model between: the independent variable, health literacy and the mediating variable, dietary habits and the dependent variables, BMI, abdominal perimeter and neck circumference.

To estimate the coefficients for the nutritional status causal model (overall) it was necessary to adjust the following regression models which were designated by structural equations.

A structural equation between the independent variable, health literacy and the mediating variable, dietary habits and the dependent variables, BMI, abdominal perimeter and neck circumference

Nutritional Status = level of health literacy + dietary habits + BMI + e1 (error associated to manifest variable)

Nutritional Status = level of health literacy + dietary habits + abdominal perimeter + e2 (error associated to manifest variable)

Nutritional Status = level of health literacy + dietary habits + neck circumference + e3 (error associated to manifest variable)

Figure 1 shows that the level of health literacy has a direct effect of -0.34 (level of health literacy coefficient for BMI). That is, for each standard deviation on the level of health literacy, the body mass index (BMI) varies by -0.34 standard deviations in direct effect and an indirect effect mediated by dietary habits of 0.16 (coefficient of the track between the level of health literacy and dietary habits) which when multiplied by 0.00 (coefficient of the track between the level of health literacy and BMI) is translated into an indirect effect of 0.00 i.e., it is not a mediator for BMI. The sum of the direct and indirect effects is -0.34 [(-0.34)+(0.00)]. It is hypothetically causal between the level of health literacy and BMI.

The level of health literacy has a direct effect of -0.35 and an indirect effect of (0.16x -0.08) =-0.0128 on the abdominal perimeter. The sum of the direct and indirect effects is therefore -0.3628 between the level of health literacy and abdominal perimeter.

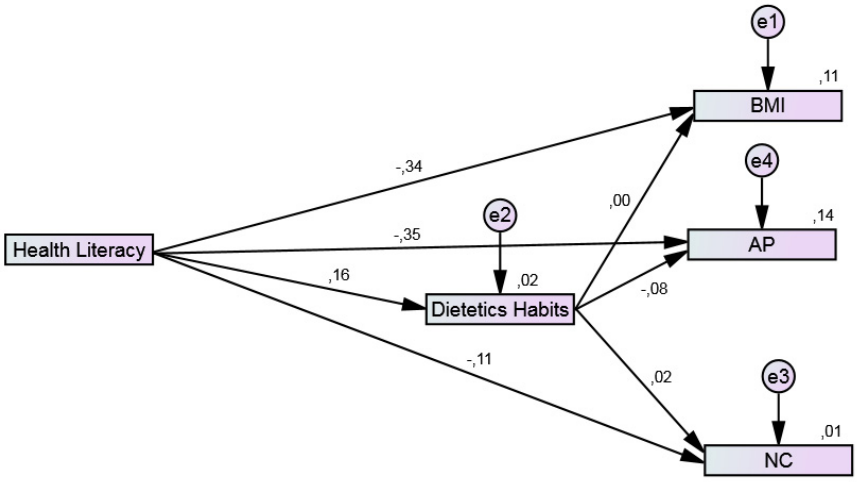

Figure 1- Path diagram: Standardised estimates of the adjusted regression model between the independent variable, health literacy and the mediating variable, dietary habits and the dependent variables, BMI, abdominal perimeter and neck circumference.

Health literacy also has a direct effect of -0.11 and an indirect effect of (0.16 x 0.02) =-0.0032, which translates into a total effect of -0.1068 on neck circumference.

It is therefore accepted, that the greater the level of health literacy, the better the dietary habits, the lower the BMI, the abdominal perimeter and the neck circumference, and metabolic risk is lower.

On the other hand, the effect of the interaction between health literacy and dietary habits is not associated with variations in BMI.

4. Discussion

Given that an increase in health literacy represents a decrease in BMI values, we may infer that better health literacy also corresponds to better nutritional status.

These results contradict those of another study, in which only 3.2% of individuals have an inappropriate level of health literacy, 5.6% have a borderline level and 91.2 % have an adequate level (Coimbra, Correia, Peixoto, & Pereira, 2014). Despite these differences, those who have an inadequate level of health literacy had a higher BMI, and participants with an excellent literacy level had a lower BMI. This is also documented in other research, (Santos, 2010; Sharif I & Blank, 2010; Cunha et al, 2013) which indicated there was a significant negative correlation between health literacy and BMI.

People with excess weight can benefit from HL to control and reduce their weight load. Low HL was identified as a risk factor for various diseases, such as obesity. Appropriate levels of HL appear to result in improvements to health and a higher quality of life. On the other hand, lower levels of HL are associated with poorer health and even higher mortality (Santos, 2010).

As guidelines for practice, we suggest training health professionals in strategies for promoting literacy for health and adherence to monitoring metabolic state. It is further suggested to integrate the less literate, and socially vulnerable and education people in research-action programmes to support active lifestyles, enabling them to effectively manage their nutritional status.

With regard to lines of future research, there is a need for more comprehensive research to clarify the strength of the relationship between H L, dietary habits and metabolic state.

5. Conclusions

The study shows that in the sample of Portuguese participants, literacy for health was associated with BMI, that is, the participants with better literacy, possessed a more suitable body mass index.

Favorable factors for the metabolic state are the eating habits because they proved to be BMI mediators, AP and NC, can influence the health outcomes.

The results show the importance of promoting health literacy in order to sustain more appropriate clinical care plans to meet people's real needs. It is therefore important to identify the predictors of nutritional and metabolic state, enhancing the benefits of health literacy in monitoring and controlling health so as to reduce costs and achieve gains in health and quality of life.

Considering these results for monitoring and preventive intervention proves to be a window of opportunity for promoting health, with great relevance and timeliness in public health.

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