

Factors associated with breakfasting in users of a public health service

Fatores associados à realização do café da manhã em serviço público de saúde

Patrícia Pinheiro de FREITAS¹
Raquel de Deus MENDONÇA¹
Aline Cristine Souza LOPES²

ABSTRACT

Objective

This study identified the sociodemographic, lifestyle, dietary and anthropometric factors of users of a public health promotion service who have breakfast regularly.

Methods

This cross-sectional study included all users aged 20 years or more who joined the service between March 2007 and December 2010. Their socioeconomic and anthropometric data, dietary habits and health status were investigated. Statistical treatment included the Chi-square, Mann-Whitney, Fisher's exact and Student's *t* tests and Poisson regression analysis ($p < 0.05$).

Results

Most of the participants (87.1%, $n=528$) breakfasted often, especially those aged 48.5 years or more ($p=0.041$). Poisson regression analysis showed association between breakfasting often and not smoking (PR=1.45, 95%CI: 1.10-1.91), having a greater number of daily meals (PR=1.15, 95%CI: 1.06-1.25), appropriate intake of deep-fried foods (PR=1.12, 95%CI: 1.01-1.25), lower fat intake (PR=0.78, 95%CI: 0.68-0.89) and smaller prevalence of excess weight (PR=0.85, 95%CI: 0.78-0.92).

Conclusion

The positive relationship found between breakfasting often and not smoking, appropriate food and nutrient intakes and a healthier body weight shows the need of emphasizing this meal in health services as a simple and doable health promotion strategy that helps to prevent and control chronic diseases.

Indexing terms: Health promotion. Lifestyle. Nutrition. Obesity. Public health.

¹ Nutricionistas, Universidade Federal de Minas Gerais, Escola de Enfermagem, Grupo de Pesquisa de Intervenções em Nutrição. Belo Horizonte, MG, Brasil.

² Universidade Federal de Minas Gerais, Escola de Enfermagem, Programa de Pós-Graduação em Enfermagem. Av. Alfredo Balena, 190, Sala 420, Santa Efigênia, 30130-100, Belo Horizonte, MG, Brasil. Correspondence to/Correspondência para: ACS LOPES. E-mail: <aline@enf.ufmg.br>.

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RESUMO

Objetivo

Identificar os fatores sociodemográficos, de estilo de vida, dietéticos e antropométricos relacionados à realização do café da manhã entre os ingressos de serviço público de Promoção à Saúde.

Métodos

Estudo transversal com todos os usuários, com 20 anos ou mais, que ingressaram no serviço no período de março de 2007 a dezembro de 2010. Investigaram-se dados socioeconômicos, hábitos alimentares, perfil antropométrico e de saúde. Realizaram-se os testes Qui-quadrado, Mann Whitney, Exato de Fisher e t de Student, e análise de regressão de Poisson ($p < 0,05$).

Resultados

Dos participantes ($n=528$), 87,1% realizavam frequentemente o café da manhã, sendo mais prevalente entre aqueles com 48,5 anos ou mais ($p=0,041$). A análise de regressão de Poisson revelou associação entre a realização frequente do café da manhã com o hábito de não fumar ($RP=1,45$; $IC95\%:1,10-1,91$); maior número de refeições diárias ($RP=1,15$; $IC95\%:1,06-1,25$); consumo adequado de frituras ($RP=1,12$; $IC95\%:1,01-1,25$); menor ingestão de lipídios na dieta ($RP=0,78$; $IC95\%:0,68-0,89$) e menor prevalência de excesso de peso ($RP=0,85$; $IC95\%:0,78-0,92$).

Conclusão

A relação positiva encontrada entre o consumo do café da manhã com o não tabagismo, ingestão adequada de alimentos e nutrientes, e um peso mais saudável, denota a necessidade de se enfatizar esta refeição, enquanto estratégia simples e factível de aconselhamento de promoção da saúde, de forma a contribuir para a prevenção e o controle de doenças crônicas em serviços de saúde.

Termos de indexação: Promoção da saúde. Estilo de vida. Nutrição. Obesidade. Saúde pública.

INTRODUCTION

Breakfast, defined as the first meal of the day, should respond for 25% of the daily energy intake¹. However, recent lifestyle changes, lack of time and eating away from home have promoted new eating behaviors that contribute to skipping breakfast².

Skipping breakfast has been observed in different life cycles and 14 to 30% of all adults do it³. Although the frequency of breakfasting increases with age, it is the most neglected meal among adults when compared with lunch and supper^{3,4}. Its nutritional composition has also been affected, being limited to pure coffee or milk and coffee, and bread. Brazilians still habitually consume butter or margarine but the consumption of fruits is rare⁵. Alves & Boog⁴ found that 30% of their sample did not breakfast and only 13% had a complete breakfast, that is, one with body-regulating foods such as fruits and calcium sources.

Many factors have been associated with skipping breakfast, such as smoking, consumption of alcoholic beverages, physical inactivity, low education level and being male⁶. Moreover, there is lack of time and hunger, and the desire to diet and lose weight. Skipping breakfast to eat small snacks later may lead to a higher intake of carbohydrates and fats, and consequently, of calories⁷.

Individuals who breakfast present a higher intake of healthier foods, such as milk, fruits, vegetables and grains, instead of foods high in calories, fats and sugar⁸. Hence, breakfast has been associated with positive health effects^{6,9}, such as increased satiety, smaller daily energy intake, better glycemic control¹⁰, lower risk of gaining weight^{3,6,7} and visceral fat⁹, and lower risk of weight-related comorbidities, such as hypertension, diabetes *Mellitus* and cardiovascular diseases^{7,10}.

Despite the importance of breakfast to health, there is little information in the Brazilian

literature about this meal, and it is not offered in health services. Nevertheless, according to the country's public policies, primary healthcare is the main location for the development of health-promoting and disease-preventing and -controlling actions¹¹. In this sense, the objective of this study was to identify the sociodemographic, lifestyle, dietary and anthropometric factors of users of a public health-promotion service according to breakfasting frequency.

METHODS

A cross-sectional study was done from March 2007 to December 2010 with all users aged 20 years or more of a health-promotion service of *Belo Horizonte, Minas Gerais*, called *Academia da Cidade* (city gym). The city gyms provided regular physical activity and nutritional advice to individuals aged 18 years or more living in city areas of high social vulnerability¹².

The data were collected by a pretested questionnaire¹³. The questionnaire was adapted to the reality of the city gyms. Some questions were changed and some were added, such as questions that investigate the use of medications. The questionnaire was administered by dietitians and trained trainee dietitians and collected sociodemographic data (gender, age, job, number of individuals in household, household income per capita and education level); dietary habits (mastication quality, snacking between meals, drinking while eating main meals, intake of chicken skin and visible fat in meat, per capita intake of salt, vegetable oil and sugar), health profile (reported diseases, perceived body image, use of medications and smoking status), food intake data and anthropometric data¹³.

Food intake was investigated by a 24 hour recall (R24) associated with a qualitative Food Frequency Questionnaire (FFQ) with a list of 30 foods covering the last six months¹³. This study selected eleven foods for analysis according to the plausibility reported in the literature^{4,5,8}. The consumption of some foods was 100% adequate, so they were excluded from the analysis.

Fruit and vegetable intake adequacies were determined by the World Health Organization (WHO)¹⁴. The intake adequacies of salt, sugar, oil, water, milk and dairy products, sandwich cookies, sweets, deep-fried foods, sodas and powdered drink mixes were determined by the Food Guide for the Brazilian Population (*Guia Alimentar para a População Brasileira*)¹⁵.

The data collected by the R24 was analyzed by the software Diet Win® Professional version 2.0. Measurements in cooking units were converted to grams using a specific table. Food composition was analyzed by different food composition tables, preparation recipes and food labels, when necessary¹³.

The study nutrients were calories, carbohydrates, proteins, fats, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, cholesterol, calcium, iron, zinc, sodium, fibers and vitamins A, D, E, C and B₁₂. Energy and macronutrient intakes were classified as recommended by the Institute of Medicine (IOM)¹⁶ according to gender and age. Micronutrient intakes were classified as inadequate, adequate or excessive according to the IOM recommendations¹⁷ and fatty acid and cholesterol intakes were classified according to the WHO's recommendations¹⁴.

Weight, height, Waist Circumference (WC) and Hip Circumference (HC) were collected as recommended by the WHO¹⁸ for determining nutritional status.

Body mass index was calculated by dividing the weight (kg) by the square of the height (m²) and classified according to age. For adults, the cut-off points proposed by the WHO¹⁸ were used and for the elderly, those proposed by the Nutrition Screening Initiative¹⁹ were used. For presentation of the data, adults and elderly were classified as underweight, normal weight and excess weight. WC and Waist-to-Hip Ratio (WHR) were classified as recommended by the WHO²⁰.

Breakfasting, the dependent variable of this study, was assessed by asking the participants how many times a week they breakfasted. For

data analysis, the variable was dichotomized into frequent breakfasting (4 times or more per week) and occasional breakfasting (less than 4 times per week). The reference category was frequent breakfasting.

Statistical analyses included the Chi-square, Mann-Whitney, Fisher's exact and Student's *t* tests. The variables with normal distribution according to the statistical Kolmogorov-Smirnov test were presented as mean and standard deviation and the remainder variables as median, minimums and maximums.

For Poisson regression analysis with robust variance, the response variable was considered frequent breakfasting. The variables with significance smaller than 0.20 or those considered relevant in the study context were tested with the response variable. The dichotomized variables were categorized as 0 and 1 and the other categorical variables were transformed into dummy variables. The variables were adjusted to the model by the backward stepwise method. The

Prevalence Ratio (PR) with a Confidence Interval of 95% (95%CI) was used as effect measure. The significance level for all tests was set at 5% ($p < 0.05$). The data were treated by the software Stata version 7.0.

This study was approved by the Research Ethics Committees of the *Universidade Federal de Minas Gerais*, under protocol number ETIC 103/2007, and of *Belo Horizonte* City Hall, under protocol number 087/2007. All participants signed a free and informed consent form after being informed about the study.

RESULTS

A total of 528 users participated in the study. Most were women with a mean age of 48.0 ± 13.0 and low per capita income. The prevalence of reported morbidities was high, especially high blood pressure and high cholesterol level (Table 1).

Table 1. Sociodemographic and health characteristics of the users of a health-promotion service of *Belo Horizonte*, according to breakfasting frequency. *Belo Horizonte* (MG), Brazil, 2010.

Variables	Breakfasting frequency			p value
	Total (n=528)	Frequent (n=460)	Occasional (n=68)	
Age (years)	48.0±13.0	48.5±12.8	45.0±14.4	0.041 ^a
Females (%)	90.7	86.9	91.3	0.229 ^b
Monthly per capita income (R\$)	333.33 (22.0;2700.00)	333.33 (22.0;2700.00)	340.00 (28.00;2250.00)	0.368 ^c
Number of people in household	4.0 (1.0;15.0)	4.0 (1.0;15.0)	3.5 (1.0;6.0)	0.650 ^c
<i>Education level</i>				
4 years or less	29.0	28.7	30.9	0.711 ^b
5 years or more	71.0	71.3	69.1	
<i>Occupation (%)</i>				
Unemployed	7.2	4.4	7.4	0.695 ^b
Retired	14.9	14.7	14.9	
Homemaker	28.8	26.5	29.1	
Other	49.1	54.4	48.4	
<i>Reported diseases (%)</i>				
High blood pressure	48.9	40.7	43.3	0.693 ^b
High cholesterol	28.7	28.7	30.0	0.831 ^b
High triglycerides	13.6	14.0	10.2	0.416 ^b
Diabetes Mellitus	8.9	6.3	9.3	0.421 ^b
Use of medications (%)	67.4	67.8	64.7	0.617 ^b
Smoker (%)	11.0	8.1	28.3	<0.001 ^b
Healthy body image (%)	31.4	14.9	29.3	0.006 ^b

Note: ^aStudent's *t* test; ^bChi-square test; ^cMann Whitney test.

Table 2. Dietary habits of users of a health-promotion service of Belo Horizonte, according to breakfasting frequency. *Belo Horizonte* (MG), Brazil, 2010.

Variables (%)	Breakfasting frequency			p value
	Total (n=528)	Frequent (n=460)	Occasional (n=68)	
<i>Chews food well</i>	72.8	61.1	47.8	0.037 ^a
<i>Consumes beverages during main meals</i>	54.0	52.7	62.7	0.126 ^a
<i>Number of meals per day</i>	4.0 (0.0;8.0)	4.0 (2.0;8.0)	3.0 (0.0;7.0)	<0.001 ^b
<i>Snacks between meals</i>	50.8	51.9	43.5	0.287 ^a
<i>Eats chicken skin</i>	65.5	66.8	55.7	0.088 ^a
<i>Eats apparent meat fat</i>	28.2	29.9	17.6	0.071 ^a
<i>Appropriate intake</i>				
Salt	58.0	57.1	63.9	0.315 ^a
Sugar	24.6	25.1	21.3	0.525 ^a
Oil	10.9	11.6	6.2	0.187 ^a
Fruits and vegetables	31.0	31.0	31.3	0.969 ^a
Water	26.6	24.7	38.8	0.015 ^a
Milk and dairy products	8.4	8.9	4.4	0.210 ^a
Sandwich cookies	95.0	95.8	89.6	0.027 ^a
Sweets	70.4	71.7	61.8	0.094 ^a
Deep-fried foods	65.5	68.4	45.6	<0.001 ^a
Soda	80.1	80.9	75.0	0.258 ^a
Powdered drink mixes	51.6	52.5	45.6	0.286 ^a
<i>Weekly intake of alcoholic beverages</i>	18.9	17.4	29.4	0.018 ^a

Note: ^aChi-square test; ^bMann Whitney test.

Table 3. Nutrient and calorie intake of the users of a health-promotion service of *Belo Horizonte*, according to breakfasting frequency. *Belo Horizonte* (MG), Brazil, 2010.

Variables	Total (n=528)	Breakfasting frequency		p value
		Frequent (n=460)	Occasional (n=68)	
Calories (kcal)	1671.0 (324.0;6254.0)	1676.0 (324.0;5432.0)	1578.0 (519.0;6254.0)	0.227 ^a
Carbohydrates (%)	49.8±10.4	50.3±10.0	46.4±12.6	0.004 ^b
Proteins (%)	14.0 (2.7;68.5)	13.8 (2.7;68.5)	14.2 (4.7;32.8)	0.633 ^a
Lipids (%)	33.9±9.7	34.5±9.7	37.2±9.9	0.033 ^b
Saturated fatty acids (%)	9.5 (1.0;43.2)	9.4 (1.0;43.2)	9.7 (1.7;28.7)	0.821 ^a
Monounsaturated fatty acids (%)	9.0 (0.3;40.4)	8.9 (0.3;24.7)	9.8 (1.9;40.4)	0.049 ^a
Polyunsaturated fatty acids (%)	10.5 (1.8;31.9)	10.5 (1.8;31.9)	10.0 (3.0;24.2)	0.370 ^a
Cholesterol (mg)	164.2 (0.0;1383.3)	160.3 (0.0;1097.4)	179.2 (0.0;1383.3)	0.274 ^a
Calcium (mg)	344.0 (0.0;3506.6)	335.2 (0.0;3506.6)	261.7 (11.2;1195.6)	0.001 ^a
Sodium (g)	3.4 (0.2;47.6)	3.5 (0.5;34.6)	3.2 (0.2;9.9)	0.241 ^a
Vitamin D (mcg)	1.5 (0.0;388.6)	1.5 (0.0;388.6)	0.8 (1.0;42.2)	0.036 ^a
Iron (mg)	6.7 (0.6;84.7)	6.7 (0.6;84.7)	6.9 (1.1;37.8)	0.667 ^a
Zinc (mg)	6.5 (0.3;73.6)	6.6 (0.3;73.6)	6.4 (1.6;35.2)	0.704 ^a
Vitamin A (mcg)	466.2(0.0;29276.7)	479.1 (0.0;23053.7)	409.4 (1.3;29276.7)	0.506 ^a
Vitamin E (mg)	27.9 (0.0;108.1)	27.9 (0.0;108.1)	28.7 (3.6;84.2)	0.947 ^a
Vitamin C (mg)	48.2 (0.2;3600.5)	49.3 (0.2;3600.5)	36.8 (0.3;1204.4)	0.261 ^a
Vitamin B ₁₂ (mcg)	1.3 (0.0;216.0)	1.4 (0.0;169.0)	1.3 (0.0;216.0)	0.498 ^a
Fibers (g)	16.8 (0.4;68.7)	17.4 (0.5;68.7)	15.0 (0.4;53.0)	0.097 ^a

Note: ^aMann Whitney test; ^bStudent's t test.

Most of the users (87.1%) breakfasted frequently, the median being 7.0 (0.0;7.0) days a week.

Individuals who breakfasted frequently were older ($p=0.041$), often nonsmokers ($p<0.001$), and had better perceived body image ($p=0.006$) (Table 1). Additionally, they had more meals per day ($p<0.001$), reported chewing foods well ($p=0.037$), and consumed less deep-fried foods ($p<0.001$), sandwich cookies ($p=0.027$) and alcoholic beverages - less than once a week ($p=0.018$). On the other hand, their water intake was inadequate ($p=0.015$) (Table 2).

The nutrients related to breakfasting frequently were carbohydrates ($p=0.004$), fats ($p=0.033$), calcium ($p=0.001$) and vitamin D ($p=0.036$) (Table 3). Adequate nutrient intake was associated with inadequate carbohydrate intake ($p=0.017$) and adequate vitamin B₁₂ intake ($p<0.001$) (Data not shown).

Analysis of anthropometric characteristics showed that those who breakfasted frequently had lower median weight ($p=0.007$), and lower risk of developing metabolic disorders according to WC ($p=0.020$) (Table 4).

Once the model was adjusted by Poisson's multivariate analysis, associations were found between breakfasting frequently (four or more times per week) and not smoking, having five or more meals a day, appropriate consumption of deep-fried foods, lower fat intake and lower prevalence of excess weight (Table 5).

DISCUSSION

The prevalence of breakfasting frequently was high and positively associated with appropriate food and nutrient intakes, which have a positive repercussion on the body weight. It is noteworthy that this study was done in a public health service, which shows the importance of knowing the dietary profile and associated factors of its users to improve the number of health-promotion actions.

The prevalence of breakfasting was similar to those found by other studies, which varied from 25.2% to 95.0%^{4,6-9,21,22}. Although skipping breakfast was unusual, it may lead to nutritional deficiencies and increase the intake of energy-dense foods, favoring the development of diseases^{8,10,23}.

Table 4. Nutritional status of users of a health-promotion service of *Belo Horizonte*, according to breakfasting frequency. *Belo Horizonte* (MG), 2010.

Variables	Total (n=528)	Breakfasting frequency		p value
		Frequent (n=460)	Occasional (n=68)	
Weight (kg)	69.5 (39.1;146.8)	68.8 (39.1;146.8)	73.8 (46.0;118.5)	0.007 ^a
BMI (kg/m ²)	28.0 (14.9;62.1)	27.9 (14.9;62.1)	28.7 (18.9;52.0)	0.168 ^a
<i>Nutritional status (%)</i>				
Underweight	1.9	2.2	0.0	
Normal weight	27.8	28.7	21.2	0.181 ^b
Excess weight	70.3	69.0	78.8	
<i>Waist circumference (cm)</i>	86.8±12.0	86.4±12.5	89.6±12.5	0.046 ^c
No risk	32.6	33.3	27.3	
High risk	27.2	28.4	18.2	0.020 ^d
Very high risk	40.2	38.3	54.5	
<i>Waist-to-hip ratio</i>	0.83 (0.65;1.74)	0.83 (0.65;1.48)	0.84 (0.69;1.74)	0.376 ^a
No risk	54.7	55.4	50.0	
Very high risk	45.3	44.6	50.0	0.415 ^d

Note: ^aMann Whitney test; ^bFisher's exact test; ^cStudent's t test; ^dChi-square test.
BMI: Body Mass Index.

Table 5. Poisson regression analysis for frequent breakfasting according to the characteristics of users of a health-promotion service of Belo Horizonte (MG), 2010.

Variables	Frequent breakfasting - RP (IC 95%)	p value ^a
<i>Smoker</i>		
Yes	1.0	
No	1.45 (1.10;1.91)	0.008
<i>Number of daily meals</i>		
<5 meals	1.0	
≥5 meals	1.15 (1.06;1.25)	<0.001
<i>Intake of deep-fried foods</i>		
Inappropriate	1.0	
Appropriate	1.12 (1.01;1.25)	0.034
<i>Fat intake</i>		
Low	1.0	
Appropriate	0.82 (0.73;0.93)	0.002
High	0.78 (0.68;0.89)	<0.001
<i>Nutritional status</i>		
Underweight	1.0	
Normal weight	0.89 (0.80;1.00)	0.057
Excess weight	0.85 (0.78;0.92)	<0.001

Note: ^aPoisson regression.

Adjusted by age. Model adjustment: Goodness of fit=1.00.

There are only a few studies that approach the factors associated with skipping breakfast. In general, they report a positive association between breakfasting and healthy lifestyles, such as not smoking, being physically active, controlling body weight and avoiding alcoholic beverages^{3,6,7,10,24}.

In agreement with other studies^{6,7,10}, the present study found an association between not smoking and breakfasting frequently. Smoking may reduce appetite in the morning and encourage the smoker to skip this meal⁷.

Individuals who reported breakfasting frequently had more meals per day and appropriate intakes of deep-fried foods and fats. Making smaller meals, including breakfast, is mentioned in the literature as a way to avoid eating too much, which helps to control weight and avoid excess weight-associated comorbidities^{9,10,25}.

The greater intake adequacy of deep-fried foods and fats by those who breakfast frequently may indicate a healthier diet, that is, lower

consumption of deep-fried foods and high-fat foods. Additionally, the literature has evidenced the replacement of this meal by unhealthy, high-fat snacks, such as processed cookies and chips^{8,21}. Thus, breakfasting may contribute to appropriate nutrient intake, consequently promoting health and preventing disease, and accordingly, it is related to healthier behaviors that impact food choices²¹.

A possible consequence of the beneficial health effects of breakfasting is the lower body weight of those who breakfast frequently. This meal has also been associated with less visceral fat and higher percentage of lean mass^{9,24}. It is known that reduction of body weight and fat percentage is important for the prevention and control of diseases, especially cardiovascular diseases and glucose intolerance, and, consequently, diabetes *Mellitus*^{9,24,26}. Corroborating these findings, Pereira *et al.*¹⁰ observed better blood glucose control in people who breakfasted frequently.

Knowing the breakfasting frequency and associated factors of users of the Unified Healthcare System (*Sistema Único de Saúde - SUS*) may allow the development of more effective health actions for the population. Furthermore, such initiatives corroborate Brazilian health policies, such as the National Food and Nutrition Policy (*Política Nacional de Promoção da Saúde - PNAM*)¹¹ and the Health Promotion Policy²⁷, which strongly indicate that appropriate health and nutrition are the paths to good health.

The cross-sectional design of this study prevents an assessment of causality among the variables, such as the relationship between breakfasting and lower body weight. However, the type of study done meets the proposed objectives.

Data analysis must consider the occurrence of answer bias, since those who join a health-promotion service are probably willing to change their food habits, and so may report breakfasting more often. Still, the information analyzed herein was obtained as soon as these individuals joined the service, before any interventions were done, so minimizing the occurrence of biases.

Regarding the use of only one R24, one must consider its advantages when compared with other methods, such as the possibility of using it in health services and the fact that it records the consumption of a high variety of foods, since it is an open instrument. Notwithstanding, the collected information may be affected by the individual's recording skill and a single R24 may not reflect the individual's food habits²⁸. Given these limitations, this study associated the R24 with the qualitative FFQ, and a relatively high number of individuals were studied, which improves method quality.

The present study found a positive association between breakfasting frequently and healthy life habits. This finding suggests that promoting breakfasting may contribute to the prevention and control of non-communicable chronic diseases and disorders, and to improving health and quality of life, given its relationship

with smaller smoking prevalence, appropriate nutrient and food intakes and smaller body weight. The results found by the present study may help professionals working in primary healthcare and health service managers to develop and implement actions that promote breakfasting as a simple and easy strategy for health promotion, and may encourage researchers to perform more studies on the theme.

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CONTRIBUTORS

PP FREITAS contributed substantially to study conception and planning, data analysis and interpretation, and manuscript writing. RD MENDONÇA contributed to data analysis and interpretation and critically reviewed the manuscript. ACS LOPES Contributed to study conception and planning, data interpretation and critical review of the manuscript.

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