

# How life style has been evaluated: a systematic review

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## ABSTRACT

The term lifestyle corresponds to the set of habits and customs that can be influenced and modified and which can contribute to promoting health. **Objective:** This study was to make a systematic review on the subject of lifestyle, what methods have been used to evaluate lifestyle, and what is considered a healthy lifestyle. **Method:** This study consisted of a systematic review on the possible methods of evaluating the lifestyle and habits of what is considered healthy lifestyle. The survey was conducted in electronic databases, national and international, LILACS, MEDLINE, PubMed, and SciELO, and free search on Google Brazil, by consulting the following descriptors: "life style" associated with "healthy. **Results:** We found 142 articles published between 1990 and 2012, 105 of which did not meet the established criteria, 28 were considered eligible and were included in the study, 10 used randomized and pseudo-randomized samples, and 17 were not randomized. Among the articles selected, there were four proposals to validate lifestyle-assessment instruments, and one systematic review. The instruments used were not very reliable for assessing lifestyle, and their methods were not responsive. **Conclusion:** These studies demonstrate the importance of a healthy lifestyle and that it be started early and continued throughout life; they define the main actions related to a healthy lifestyle as well as control of metabolic parameters, physical activities, and healthy eating, but the lifestyle-evaluation instruments are still poor in responsiveness.

**Keywords:** Lifestyle, Questionnaires, Evaluation

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## INTRODUCTION

According to the World Health Organization,<sup>1</sup> lifestyle is “the set of habits and customs that are influenced, modified, encouraged, or inhibited by the prolonged process of socialization. These habits and customs include the use of substances such as alcohol, tobacco, coffee or tea, dietary habits, and exercise.”

In this way, a lifestyle corresponds to the usual set of actions that reflect the attitudes, values, and opportunities of people. These actions have a large influence on an individual’s general health and quality of life.<sup>2</sup>

Some studies have demonstrated that applying lifestyle changes without pharmacotherapy can decrease the risk factors for cardiovascular diseases.<sup>3,4</sup> Others have demonstrated that 10 days of changing life habits and adopting a low-energy low-fat diet, living in a stress-free environment, and practicing a small amount of physical exercise can significantly reduce the serum cholesterol, blood glucose, and blood pressure in individuals older than 50 years.<sup>5,6</sup>

In large urban centers and most industrialized areas, one can observe significant changes in conditions and in the life style of the population with negative impacts on their health. These changes have occurred due to new production and consumption patterns, to technological advances, to inadequate public policies, and to the development model based on the logic of the market, which is characterized by competitiveness and by the concentration of income. This maintains the growth of inequality and social helplessness, unemployment, poverty, family disintegration, and violence.<sup>7</sup>

Within this context, this lifestyle should be observed, since due to cultural and social issues, this can be harmful to health, contributing to morbidity and mortality. In particular, the lifestyle that promotes an excessively caloric diet, sedentarism, the consumption of alcohol and tobacco, and inappropriate working conditions may present potential health risks due to constant overload and wear.<sup>7-9</sup>

In recent decades, the effects of individual behavior on health have been established. Although there is positive evidence of health related to lifestyle and physical activity, it can be seen that great portion of the population does not follow a suitable

life style. The rates of physical inactivity are high and degenerative chronic diseases are still the main cause of death.<sup>5,10,11</sup>

Physical activity and eating habits are two elements in lifestyle that play a significant role in promoting health and preventing illness.<sup>6</sup> Other lifestyle elements such as restricting tobacco smoking or alcohol drinking, having a good relationship with family and friends, practicing safe sex, controlling stress, and keeping a positive outlook on life are also important for the health and well-being. Although it seems already established that there is a relationship between lifestyle and good health, the most appropriate instruments to evaluate lifestyle have not yet been established.<sup>12-16</sup>

## OBJECTIVE

The objective of the present study was to produce a systematic review on the lifestyle theme, examining evaluation methods and what is considered a healthy lifestyle.

## METHOD

This study consisted of a systematic review of the literature, with no meta-analysis, on the possible methods to evaluate lifestyles, and what is considered a healthy lifestyle in the population with or without diagnosed illnesses.

The research was made on domestic and international electronic data bases: *Literatura Latino-Americana e do Caribe em Ciências da Saúde*, (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), PubMed, Scientific Electronic Library Online (SciELO), and free research on the Academic Google. The searches were made consulting the following descriptors: in English- “Life style” associated with “healthy,” in Portuguese “estilo de vida” and “estilo de vida saudável,” and in Spanish- “estilo de vida saludable.” The research had no date limit.

The present study included articles that clearly showed their method of evaluating lifestyle in healthy individuals or individuals with chronic diseases, studies that reached scores higher than five on the PEDro<sup>17</sup> scale, and articles whose primary outcome were lifestyle. Descriptive articles, case studies, and specialized opinion articles were excluded.

Those articles identified by the search strategy were evaluated independently and blindly by four researchers (authors), rigorously following the inclusion and exclusion criteria, lifestyle-evaluation methods, intervention- and lifestyle-evaluation studies, studies that characterized the target population (children, adolescents, and adults), types of study referred to by the author, and language (Portuguese, English, and Spanish). Such strategies were used to guarantee to track the largest number of studies and the best selection of works that involved the theme being studied.

To preserve the relevance of the study in question, the PEDro<sup>17</sup> scale was applied to each selected article. The PEDro scale was developed to be employed in clinical trials. This scale is currently one of the most used worldwide, for it evaluates the validity of the studies. The PEDro<sup>17</sup> scale allows a total score of ten points. A score of one to zero can be attributed for each criterion shown in the scale. “The score was only attributed when a criterion was clearly met. If there were a possibility of a criterion not being met, that criterion was not scored.” The PEDro score uses the following evaluation criteria: 1) specific eligibility criteria; 2) randomization between groups; 3) blind allocation; 4) the groups having similar prognostic indicators; 5) double blind; 6) blind therapists; 7) blind assistants; 8) dropouts less than 15%; 9) treatment or at least the intention to treat; 10) statistical comparison between the two groups studied; 11) the study provides scoring and variability for at least one key result. Each criterion is worth one point, except for the first criterion.

Initially, the researchers were trained to standardize the methodological application, which consisted of discussing the PEDro scale items and summarizing the articles; two researchers (authors) applied the scale independently and any disagreements between them were solved by discussing and reaching a consensus. The articles that obtained a score equal to or greater than five on the scale were considered as having high methodological quality.

The COSMIN<sup>18</sup> checklist was used to qualify the methods used to evaluate life style. This is an instrument recommended for use in systematic reviews for it contains measuring properties. It is possible to perform global calculations such as indices of methodological qualities per study with a measuring property. The COSMIN contains

nine boxes and can obtain a methodological quality score per box, the lowest classification of any item in a box is considered for analysis. For example, if for one item in a reliability study, the 'reliability' box is checked as poor, the methodological quality of the reliability study is classified as poor. The interpretability box and the generalization boxes are used mainly as a form to extract data. There are recommendations to use the interpretability box to extract all the information on the questions of interpretability described in this box (for example, normal score, ceiling effect, important minimum change) from the instruments in study from the articles included. Figure 1 shows the flowchart of the article selection.

## RESULTS

There were 142 articles found published between 1990 and 2012 that reported on the healthy lifestyle theme. Of those, 114 did not meet the established criteria and 28 were considered acceptable and were included for reading of the full text; from these, 10 had a randomized sample, while one had a pseudo-randomized and 17 had no randomized sample. Eight articles had a score higher than five points in the PEDro scale and

were included for the final analysis; among these, three were prospective, three were longitudinal, and two were cross-sectional as shown in Table 1.

Another 12 articles were for a secondary analysis due to a score lower than or equal to five points on the PEDro scale.<sup>17</sup> Among the articles selected, three proposed to validate instruments to evaluate lifestyle and one was a systematic review on the theme. One was a summary, and nine scored very low in the PEDro scale.

Table 2 shows the qualification of the articles found on the validation of instruments to validate lifestyle, with the three instruments shown. There are different forms to evaluate lifestyle, Both et al.<sup>22</sup> evaluated the perceived lifestyle, Hernandez et al.<sup>10</sup> evaluated the profile of the individual lifestyle, and Rodriguez Añez et al.<sup>5</sup> evaluated and classified the lifestyle of the individual. However, when the value of their applicability was tested, they all showed to have failed in their purpose.

"The frequency of the use of instruments used to evaluate lifestyle was analyzed and, among the 12 articles in the present study, three used a "self-applied questionnaire", two used the "Individual Lifestyle Profile" (ILP) by Nahas, Barros, and Francalacci,<sup>2</sup> and the others, only once. Although

the instruments are validated, there is no evidence in any of them qualifying them with certainty as the gold standard to evaluate lifestyle, the quality results of the instruments evaluated via COSMIN showed that they were qualitatively poor, especially in reference to responsiveness and methodological quality, as shown in Table 3.

Table 4 shows the main concepts of a healthy lifestyle manifested by the authors, with the concept from the World Health Organization (WHO) being the most used.

## DISCUSSION

Among the main results of the present study, a few important topics deserve to be highlighted. The first is shown by the authors about the consensus that some attitudes are necessary to maintain a healthy life style such as: balanced nutrition, the practice of regular physical exercise, avoiding smoking and drinking, maintaining control of body weight, cholesterol, and blood pressure, and of having appropriate rest and psychological balance. The second is that there are instruments to evaluate lifestyle, although many authors prefer to evaluate it with self-applied questionnaires. Finally, the reliability of the existing instruments is still under question.

To reach the objective of the present study, a careful search was conducted in the main bastions of scientific literature in the health area, which made it possible to track the studies on healthy lifestyle. Later, a detailed analysis was made by blinded evaluators on the relevance of those articles, applying a methodological quality scale and verifying the primary outcome of the article.

The instruments developed to control lifestyle are based on questionnaires and forms, which individuals fill in and are scored. The most-used questionnaires are: "Fantastic Lifestyle" developed by Rodriguez Añez Añez et al.<sup>5</sup> "Individual Lifestyle Profile" (ILP) by Nahas, Barros & Francalacci,<sup>2</sup> and the self-applied questionnaires.<sup>10</sup> However, most instruments used tried to approach the aspects related to individual parameters of lifestyle more than the socio-environmental parameters related to work, environment, housing, leisure, and education, characterizing the lack of a more complete and objective "gold standard" method.

Health should be seen as an object of intervention that makes it possible to im-

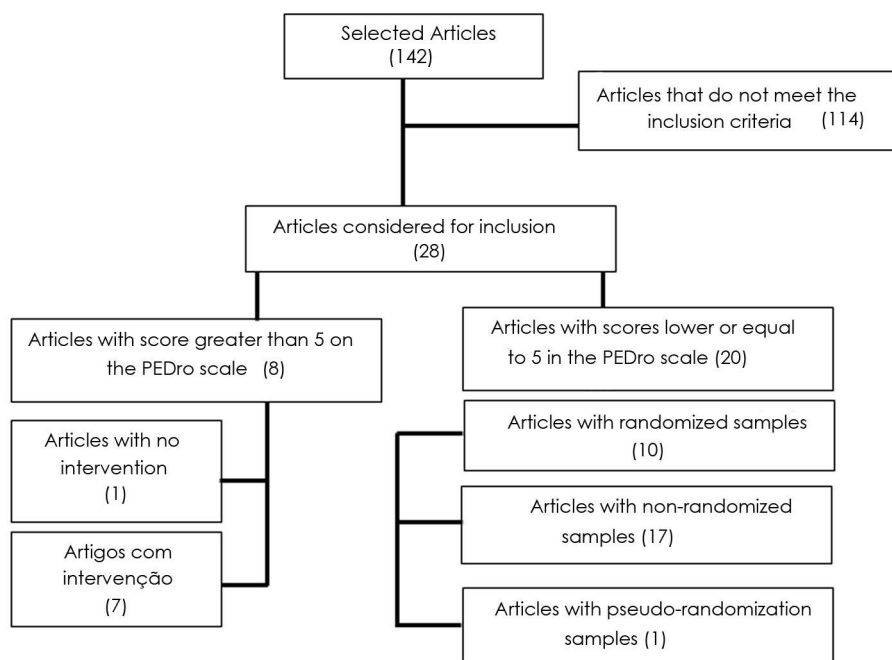


Figure 1. Organogram of the sample of articles selected for systematic review

**Table 1.** Description of articles that scored higher than five in the PEDro scale

Author and year of publication	PEDro	Location	Type of study	Descriptors	Follow-up	Sample (N)	Evaluation method
Mohebbi et al. <sup>13</sup> 2009	6	-	Cross-sectional study	lifestyle, hypoadiponectinemia, insulin, resistance	-	33	Breslow's LifeStyle Index
Fernandes et al. <sup>8</sup> 2009	7	Fortaleza (Brazil)	Prospective study	Professors; college education; life style	3 months	76	Fantastic lifestyle questionnaire
Tuomilehto et al. <sup>9</sup> 2001	7	Helsinki	Longitudinal study	-	3.2 years	522	self-applied questionnaire
Ferreira et al. <sup>19</sup> 2011	6	São Paulo (Brazil)	Cross-sectional study	lifestyle, Adventists, eating frequency	-	244	self-applied questionnaire
Ornish et al. <sup>20</sup> 1998	9	California	Prospective, controlled randomized	lifestyle, coronary heart disease	1 year	210	vegetarian diet, physical activity, non-smoker, stress
Kromhout et al. <sup>4</sup> 2002	8	Michigan	Prospective	coronary health, lifestyle	-	304	exercises 30 min/day, unprocessed foods, rich in carbohydrates and fibers, low fat content, animal protein, sugar and salt
Vesfold Heartcare Study Group <sup>21</sup> 2003	10	USA	Longitudinal	coronary heart, lifestyle	-	197	low fat diet, regular physical activity, non-smoker
Slaviček et al. <sup>3</sup> 2001	8	Prague	Longitudinal	lifestyle; lacto-ovo-vegetarians; seventh-day Adventists	-	1.349	NEW START

Legend: min.- minutes

**Table 2.** Description of articles on the Brazilian validation of lifestyle questionnaires

Objective	Location	Protocol	Sample	Outcome	Conclusion
To analyze the validity of the instrument	Both et al. <sup>22</sup> 2008 Florianópolis	The instrument was submitted to psychometric evaluation and includes the "Individual Lifestyle Profile," by Nahas, Barros, and Francalacci, which is composed of 15 questions divided uniformly into five components.	1,606 professors	quantitative factorial analysis	In general, the results found indicate that the "Individual Lifestyle Profile" scale has reasonable psychometric measures and, therefore, is reliable to evaluate the lifestyle of people who present characteristics similar to the participants in this study.
To translate and validate the "Fantastic LifeStyle" questionnaire	Rodriguez Añez et al. <sup>5</sup> 2008 Florianópolis and Curitiba	The process of translation and adaptation involved four stages: 1) translation; 2) correction and semantic adaptation by specialists in the field (judges); 3) evaluation of clarity of content; and 4) evaluation by sample of target population	62 individuals	Quantitative	It fulfils the criteria for internal and external consistency, great discriminating capacity, suitable to evaluate the lifestyle of young adults
Sought to verify the psychometric characteristics of the Individual Lifestyle Profile instrument	Hernandez et al. <sup>10</sup> 2007 Porto Alegre	The ILP by Nahas, Barros, and Francalacci was used. It is an instrument with 15 items subdivided equally into five fields: Nutrition, Physical Activity, Preventative Behavior, Relationships, and Stress Controls.	168 individuals	Quantitative factorial analysis	The validity of the measurement concept is compromised and the reliability of the instrument was beneath what was expected.

**Table 3.** Result for the quality of instruments evaluated via COSMIN

Author and year of publication	Responsiveness	Reproducibility	Validity	Type of instrument to evaluate life style
Fernandes et al. <sup>8</sup> 2009	Reasonable	Reasonable	Good	"Fantastic Lifestyle" and "ANEP" questionnaires
Rodriguez Añez et al. <sup>5</sup> 2008	Poor	Not applicable	Not applicable	"Canadian Physical Activity Fitness & Lifestyle Appraisal"
Sardinha et al. <sup>23</sup> 2003	Not applicable	Not applicable	Not applicable	Habitual Physical Activities Questionnaire
Pereira et al. <sup>24</sup> 2007	Poor	Poor	Poor	Self-applied questionnaire
Tuomilehto et al. <sup>9</sup> 2001	Poor	Poor	Poor	Self-applied questionnaire
Both et al. <sup>22</sup> 2008	Reasonable	Good	Good	"Individual Lifestyle Profile" (ILP) questionnaire by Nahas, Barros, and Francalacci
Mohebbi et al. <sup>13</sup> 2009	Reasonable	Good	Not applicable	Breslow's lifestyle index
Feitosa et al. <sup>11</sup> 2011	Poor	Poor	Poor	Form based on inquiries used by the National Cancer Institute and by the Prevention and Vigilance Program
Azevedo Junior et al. <sup>25</sup> 2006	Poor	Poor	Poor	Self-applied questionnaire
Ferreira et al. <sup>19</sup> 2011	Poor	Poor	Poor	Self-applied questionnaire
Both et al. <sup>22</sup> 2008	Poor	Poor	Poor	"Quality of life at work evaluation scale"
Hernandez et al. <sup>10</sup> 2007	Reasonable	Reasonable	Good	Individual Lifestyle Profile (ILP) by Nahas, Barros, and Francalacci derived from the Pentacle Welfare model

**Table 4.** Concept of lifestyle according to the authors that scored higher than six points on the PEDro scale

Authors	Score in the PEDro scale	Type of study	Concept of life style
Mohebbi et al. <sup>13</sup> 2009	6	Cross-sectional study	Lifestyle consists mainly of an increase in physical activity and improvements in the diet
Fernandes et al. <sup>8</sup> 2009	7	Prospective study	Way of life based on identifiable standards of behavior, which are determined by the interaction of roles between the personal characteristics, social interactions, and socio-economic and environmental life conditions.
Tuomilehto et al. <sup>9</sup> 2001	7	Longitudinal study	Health life habits capable of preventing and reducing the aggravation of illnesses such as diabetes
Ferreira et al. <sup>19</sup> 2011	6	Cross-sectional study	
Ornish et al. <sup>20</sup> 1998	9	Randomized controlled prospective	A healthy life style includes not smoking, not consuming alcohol, performing moderate to vigorous physical activities for 30 minutes a day, and maintaining a maximum BMI of 25 kg/m <sup>2</sup>
Kromhout et al. <sup>6</sup> 2002	8	Prospective	A healthy lifestyle was defined as not smoking, consuming at the most half of a glass of alcoholic beverage per day, performing moderate to vigorous physical activity for 30 minutes a day and maintaining a maximum BMI of 25 kg/m <sup>2</sup>
Vestfold Heartcare Study Group <sup>21</sup> 2003	10	Longitudinal	Adaptations made in the behavior of the individual that provide better quality of life
Slaviček et al. <sup>3</sup> 2001	8	Longitudinal	Acrostic "NEW START" (Nutrition, Exercise, Water, Sunlight, Temperance, Fresh Air, Rest, Trust in God)

Legend: BMI - body mass index, kg - kilograms, m - meter

prove the life of an individual. An appropriate life style contributes to maintaining a healthy body and an active mind and, for this, preventative orientations and actions are needed such as: avoiding substances noxious to the organism, good nutrition, weight control, recreation, and regular exercises. These actions should be developed early and should continue through life.<sup>26-28</sup>

The health of individuals has been getting worse over recent decades<sup>7</sup> and this is associated with a globalized lifestyle and the acquisition of customs that include bad nutrition such as fast-food, a sedentary lifestyle, and an irregular stressful routine with decaying health, making individuals more prone to develop cardiovascular and pulmonary problems, among other things. Diseases leading to some 50% of the deaths in the world such as cancer, stroke, and pulmonary diseases can be avoided or at least have their incidence reduced by changes in lifestyle.<sup>29-31</sup> However, better instruments to assess these conditions related to lifestyle are still necessary.<sup>19,29,32-35</sup>

A study is necessary that determines what a healthy lifestyle is and what methods can be used to evaluate and quantify the possibilities of preventing some diseases. This is the factor that motivated the present systematic review. The contribution of this revision is in the gathering of articles related to lifestyle, highlighting the most significant points on how to maintain a healthy life, taking into account that such care should be initiated as early as possible and maintained throughout life.

Mohebbi et al.<sup>13</sup> considered the following things as aspects of a healthy lifestyle: balanced nutrition, the use of carbohydrates, proteins, fibers, legumes, and vegetables, and controlling weight, blood pressure, cholesterol, triglycerides, and glucose, along with ideal plasma levels and adiponectin, both associated with physical activity. It concluded that there is a link between hypoadiponectinemia and metabolic syndrome among middle-aged people with unhealthy lifestyles, which suggests that interventions that improve the lifestyle of individuals mainly by increasing the level of physical activity, the intake of fibers, the reduction of calories, and the avoidance of smoking can effectively improve hypoadiponectinemia and metabolic syndrome.

Fernandes et al.<sup>8</sup> demonstrated that most individuals have an emotionally and professionally stable life. The university professors who participated in the study presented with a good evaluation of lifestyle, which was associated with the female sex and a stable relationship. According to the authors, to have a healthy lifestyle, it is necessary to strike a balance between the psychological and professional factors, since it reflects on the health of the individual as a whole.

Tuomilehto et al.<sup>9</sup> evaluated that the lifestyle among the obese and sedentary can favor the development of type 2 *diabetes mellitus* and, therefore, patients who practice physical activities on a regular basis and have a balanced diet reduce their risk of developing diabetes. With that, they

concluded that a healthy lifestyle clearly requires the practice of physical activity and a healthy diet, while reducing the risk of type 2 diabetes.

Ferreira et al.<sup>19</sup> evaluated the lifestyle of Seventh Day Adventists who, in their doctrines, preach abstention from alcohol and tobacco and encourage a vegetarian diet, the practice of physical exercises, the ingestion of water, and sufficient body rest. These authors concluded that semi-vegetarian individuals led a healthier lifestyle compared to non-vegetarians, reinforcing the idea that the vegetarian diet contributes to the preservation of health, diminishing the risk of cardiovascular diseases and obesity.

In a prospective, randomized, controlled study, Ornish et al.<sup>20</sup> evaluated whether, after a year, changes in lifestyle could determine an improvement of coronary atherosclerosis and concluded that changes in lifestyle were able to induce a regression of serious coronary atherosclerosis. For the authors, a healthy lifestyle includes eating habits, physical activities, and the non-use of tobacco and alcohol.

Kromhout et al.<sup>6</sup> developed an educational program based on the principles of a healthy lifestyle, in which the participants were encouraged to exercise for 30 minutes a day and follow a vegetarian diet based mostly on unprocessed foods which are rich in complex carbohydrates and fibers, and have very little fat, animal protein, sugar, and salt, and are practically free of cholesterol. A total of 304 participants in

the first program were in high risk of coronary artery and circulatory diseases. In four weeks there was a global improvement in the results from the participants (reduction in blood pressure, weight, and body mass indexes were highly significant) ( $p < 0.001$ ). The triglyceride levels decreased significantly ( $p < 0.05$ ).

A study was conducted<sup>21</sup> based on the concept of a healthy lifestyle that included a low fat diet, regular practice of exercises, and non-smoking. This group received additional psychosocial support and health education and was compared with the control group. The authors concluded that patients in the lifestyle intervention group reduced the consumption of saturated fat, sugar, and cholesterol ( $p < 0.001$ ), increased their level of exercise ( $p < 0.01$ ), and stopped smoking ( $p < 0.05$ ) when compared to the control group. They also showed that a favorable diet, daily exercises, and not smoking caused an additional reduction of five years for the risk of coronary artery disease in males.

Jaroslav Slavíček et al.<sup>36</sup> evaluated 1,349 individuals following a low fat, low energy, ovo-lacto vegetarian diet, and exercising, in a stress-free environment that was considered a habit of a healthy life style. The body weight, height, BMI, blood pressure, cardiac rate, cholesterol, and blood glucose levels were measured. The results showed that being on a low-fat, a low energy diet, for a week in a stress-free environment, had a positive impact on the risk factors of cardiovascular diseases.

## CONCLUSION

It can be said that the studies demonstrated the importance of a healthy lifestyle being initiated early and followed throughout life, and also defined the main actions directed to a healthy life style, as well as parameters of controls for metabolic variables.

Nevertheless, exceptions may be made as to the instruments of assessment and quantification of lifestyle, for there is not yet a gold standard method providing certainty in the evaluation of a healthy lifestyle. Thus, new studies with more rigorous methods are necessary to improve and provide more reliability in the evaluation of lifestyle.

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