

Orthorexia nervosa behavior in a sample of Brazilian dietitians assessed by the Portuguese version of ORTO-15

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ABSTRACT. BACKGROUND: *Orthorexia nervosa (ON) is described as an obsessive pathological behavior characterized by a strong preoccupation with healthy eating and the avoidance of foods or ingredients considered unhealthy by the subject. Although it is still not officially recognized as an eating disorder, previous studies have discussed its frequency in some groups and a fifteen-question test (ORTO-15) was developed elsewhere to assess ON behavior.* **OBJECTIVE:** *The present study aimed to evaluate ON behavior in a sample of Brazilian dietitians after testing the psychometric properties of the Portuguese version of ORTO-15.* **METHODS:** *A total of 392 dietitians answered an online version of the test. The answers were analyzed regarding ON tendency, according with the scoring grid proposed by its authors. Exploratory factor analysis was performed and internal consistency was assessed.* **RESULTS:** *It was found that three questions of the test presented loadings lower than 0.5. The 12 remaining question formed 3 factors with internal consistency of -0.51, 0.63 and 0.47. The answers of the participants to these questions revealed a tendency to orthorexic behavior, mainly regarding aspects such as: making food choices conditioned by worry about health status, evaluating food rather from nutritional quality than from its taste, believing that consuming healthy food may improve appearance, discrediting the influence of mood on eating behavior and banning food choices considered by them as eating transgressions.* **CONCLUSION:** *There is no evidence of the validity and reliability of the ORTO-15 with the initial psychometric evaluation performed. Further analyses are needed. Nevertheless, it was possible to observe a high frequency of orthorexic behavior among the studied Brazilian dietitians. However, additional studies are needed to completely understand dietitians behavior toward ON.*

(*Eat. Weight Disord.* 17: e29-e35, 2012). ©2012, Editrice Kurtis

INTRODUCTION

The term orthorexia nervosa (ON), created in 1997, comes from the Greek word *orthos* (straight, proper) and *orexia* (appetite) (1). It has been described as a pathological behavior characterized by “maniacal obsession for healthy food” (1, 2). The concept of ON is controversial (3) and it does not have a universally accepted definition (4). At present, researchers are either discussing if it could be considered as a new type of eating disorder (ED) or just a new eating behavior (5-12).

Kummer et al. (3) stressed the need to ponder the following DSM-IV statement before considering ON as an ED: “a psychiatric disorder must have caused and continue to cause significant distress or negative

consequences in different aspects of the person’s life”. Recently, Vandereycken (12) organized an opinion pool among 111 Dutch professionals in the field of eating disorders. Among these individuals, ON was well known. They agreed that it should be taken more seriously in the sense of “genuine” syndromes, which deserve more attention in research and clinical practice.

Despite the fact that ON does not have a valid diagnostic criterion (4), it presents similarities with ED and also with disordered eating behaviors (13). The selective eating pattern may lead to malnutrition and underweight, thus resembling anorexia nervosa (12). In the scientific literature, orthorexic behavioral pattern appears to be very recognizable. As listed by many authors (2, 5, 6, 10, 12, 14, 15), it includes:

Key words:

Orthorexia nervosa, psychometrics, dietitians, eating disorders, disordered eating.

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Received: February 15, 2011

Accepted: June 27, 2011

(a) a strong preoccupation with healthy eating; (b) avoidance of all foods or ingredients considered by the subject to be harmful or unhealthy, such as manmade food additives, genetically modified ingredients, fats, salt and sugars; (c) an unusual concern about one's own health; (d) spending a considerable amount of time to plan, purchase, prepare (using specific cooking methods and utensils) and consume food considered to be healthy; (e) having a rigid definition of what is healthy, according to personal beliefs. This behavior may generate a feeling of safety, comfort, superiority and disdain over others who do not adopt such "healthy" eating standards (5, 14, 15). However, a paradoxical feeling of loneliness and dissatisfaction related to the social isolation caused by the particular eating behaviors may be present (2, 5, 6, 14, 15). The wish to be healthy may even surpass the need to obtain pleasure while eating. Moreover, the lapses in the "ideal diet" may be followed by guilt feelings (2, 5, 10, 15). Additionally, the symptoms are not due to another mental disorder (e.g. anorexia nervosa) (12).

Even considering that ON is not a defined construct or an ED, a test was developed (BOT or Batman's orthorexia test) when ON behavior was first described (1). To date, three research works used BOT: an evaluation of Austrian dietitians (16), one with students of nutrition sciences (17) and other with Swedish physical activity practitioners (18).

Latter, a screening proceeding based on BOT was proposed and named ORTO-15 (2). The questions cover the presence of obsessive-compulsive personality features and exaggerated healthy eating behavior patterns. The authors of the ORTO-15 affirmed that they identified a threshold value (40 points) considered to be more predictive of ON (efficacy 73.8%, sensitivity 55.6%, specificity 75.8%). They also asserted having observed an ON occurrence of 6.9% in the 404 subjects examined (14).

Besides being originally developed for Italian language, ORTO-15 has a Turkish version, which was used to evaluate the frequency of ON among resident medical doctors (19) and performance artists (20). Another group evaluated the psychometric properties of the Turkish version and found low internal consistency (Cronbach's $\alpha=0.44$). A factorial analysis was conducted and 4 questions with loadings <0.50 were left out. The new version, renamed as ORTO-11 showed $\alpha=0.62$ and was used to investigate the relationship among ON, eating attitudes and obsessive-compulsive symptoms (4) and to evaluate ON among medical students (19). To date, no other additional studies that examined the psychometric properties of the scale were found.

It is discussed if health professionals would be more prone to ON behavior due to their daily confront with nutrition and health eating (16, 17, 19, 21). Knowledge on health and illness could exert influence on orthorexic tendency (19) and it was suggested that ON behavior seems to be frequent among Austrian dietitians (16). On the other hand, a German study (17) did not support that the increased preoccupation with healthy eating rose ON tendency in students of nutrition sciences.

Besides that, studies evaluating ON behavior in diverse cultures can contribute to clearly define its concept and to delineate the similarities and differences between ON and other psychopathologies (4).

Considering the emergence of the ON construct and the possibility that it can affect dietitians, the present study had the purpose to evaluate ON behavior in Brazilian dietitians. For this purpose, a Portuguese version of ORTO-15 was used and its psychometric properties were tested before application.

MATERIAL AND METHODS

A partnership was made with the Nutrition Association of Professionals in Sao Paulo-Brazil (APAN), which is an official association of dietitians, nutrition students and correlated areas professionals. Approximately 2800 dietitians listed in APAN database were invited to enroll in the online research with an e-mail. This mail had a link to the website address where they could access and fill the informed consent and the self-reporting questionnaire. This strategy was chosen because of its feasibility and to enable the adhesion of a diversified group of dietitians, in terms of age, professional field, and time after graduation conclusion. The Ethics Committee of the Brazil Adventist University - Sao Paulo (UNASP) evaluated and approved the research protocol.

Participants were registered dietitians ($n=392$), residents in Sao Paulo State/Brazil. There were no exclusion criteria for the participation. Those who received the invitation and agreed were included in the study.

The first part of the questionnaire covered information about the characteristics of group, such as: age, gender, self-reported body weight and height, data about undergraduation (university, time after conclusion) and professional field. The nutritional status was classified according with the Body Mass Index (BMI) categories (22).

The second part consisted of the ORTO-15 test which has 15 items concerning behavior towards food selection, acquisition, prepara-

tion and consumption (2). The test has four answer options: “always”, “often”, “sometimes” or “never”, which reflect how often the subject identifies himself with these expressions. Each item is scored on a Likert scale. Items that reflect an orthorexic tendency are scored as 1, and items that reflect a tendency toward normal eating behavior are scored as 4. Questions 3-4-6-7-10-11-12-14 and 15 are scored as 1, 2, 3 and 4 points. Questions 2-5-8 and 9 are reversely coded and questions 1 and 13 are scored as 2, 4, 3 and 1 points. According with the original authors of the ORTO-15, a total score <40 is indicative of ON behavior for the Italian population (2).

ORTO-15 was translated from both its original Italian version and from the English published version (2) into Portuguese by fluent translators. Then the questions were subsequently translated from Portuguese back into Italian. No discrepancies were found between the original and the adapted version. A pre-test was performed with nutrition science students to evaluate comprehension.

Statistical analyses were conducted using SPSS 14.0 (Statistical Package for Social Science Inc., Chicago, Illinois USA). The significance level adopted was 0.05.

The ORTO-15 answers were analyzed regarding ON tendency, which means the sum of the frequencies of answers for the two lower scores according to the scoring grid for ORTO-15 test responses proposed by its authors (2).

An exploratory factorial analysis was conducted to evaluate the loadings of questions in the Portuguese version using principal component analysis followed by Varimax rotation. The criteria adopted were as follows (23, 24): the adequacy of the analysis was inspected using the Kaiser-Meyer-Olkin measure for sampling and Bartlett’s Test of Sphericity; for each the values should be >0.5 and ≤0.05 respectively. Each variable should have commonality ≥0.5; all factors should have eigenvalues ≥1; each factor should explain at least 5% of the total variance; each variance, within its factor, should have a loading ≥0.45. To decide the number of factors the scree plot was also checked.

The internal consistency of the Portuguese version (with all 15 questions and after the exploratory analysis) and the possible factors were evaluated using Cronbach’s α coefficient.

RESULTS

The profile of registered dietitians is shown in Table 1.

The participants presented wide age range.

TABLE 1
Characterization of registered dietitians by age, weight, height and body mass index [mean (standard deviation); median, range].

	Registered Dietitians (n=392)
Age (years)	31.7 (8.9); 28, 20-70
Weight (kilograms)	59.6 (9.7); 58, 40-106
Height (meters)	1.63 (0.64); 1.63, 1.50-1.90
Body Mass Index (kg/m ²)	22.3 (3.3); 21.6, 16.9-37.6

Most of them (56.2%) were younger than 30 years. A total of 24.6% was between 30-39 years old, 12.7% between 40-49 years, and 6.5% >50 years old. BMI also showed a wide range, but most of the subjects were in the normal range weight (77%).

From total, 364 (93%) were female and 12 (3%) were male. Sixteen individuals (4%) did not inform gender. The professionals were graduated in 70 different institutions from 16 Brazilian states, except for two participants, who studied abroad. There was also high amplitude of time after graduation conclusion (0 to 48 years).

Regarding the professional field, some referred to work in more than one area. A total of 293 (75%) were practicing clinical nutrition (working in hospitals or under private practice), 75 (19%) worked with public health, 75 (19%) were teaching in dietetic majors, 71 (18%) were foodservice dietitians, 33 (8.5%) worked with sports nutrition and 15 (4%) with food marketing. Ninety-three participants (24%) referred to work in other different fields.

The initial exploratory factorial analysis indicated 4 factors with eigenvalues ≥1.0; the Kaiser-Meyer-Olkin adequacy measure was 0.72 and Bartlett’s test of sphericity was $\chi^2(300) = 683$, significance = 0.0001. These 4 factors explained 46.35% of total variance. The distribution of items showed just two questions in factor 3 and 4 and a 3-factor solution was adequate examining the scree plot. Another analysis was performed for a 3-factor solution. A total explained variance of 39% was found, the Kaiser-Meyer-Olkin adequacy measure and Bartlett’s test were the same. At this time three questions were found in the factor 3, and 3 items presented loadings <0.5.

A 2-factor solution was also tried, but the explained variance was lower (30.6%), 5 questions would present loadings <0.5, and two more questions would have marginal values (around 0.45). Finally, another factorial analysis was conducted for a 3-factor solution excluding the items which presented loadings <0.5 (items

TABLE 2

Results of the exploratory factorial analysis for the Portuguese version of the ORTO-15 questions (after excluding items with loadings <0.5).

Questions	1	2	3
1. When eating, do you pay attention to the calories of the food?			
2. When you go to a food shop do you feel confused?			
3. In the last 3 months, does the thought of food worry you?	0.722	-0.061	-0.185
4. Are your eating choices conditioned by your worry about your health status?	-0.002	0.714	0.239
5. Is the taste of food more important than the quality when you evaluate food?	-0.008	0.175	0.529
6. Are you willing to spend more money to have healthier food?	-0.018	0.653	0.041
7. Does the thought about food worry you for more than three hours a day?	0.653	0.000	-0.046
8. Do you allow yourself any eating transgressions?	-0.002	-0.041	0.827
9. Do you think your mood affects your eating behavior?	-0.490	0.014	0.537
10. Do you think that the conviction to eat only healthy food increases self-esteem?	0.378	0.532	0.166
11. Do you think that eating healthy food changes your life-style (frequency of eating out, friends)?	0.569	0.148	0.128
12. Do you think that consuming healthy food may improve your appearance?	0.329	0.655	0.049
13. Do you feel guilty when transgressing?	-0.563	-0.120	0.026
14. Do you think that on the market there is also unhealthy food?	-0.092	0.550	-0.322
15. At present, are you alone when having meals?			

1-2 and 15). Table 2 shows questions loadings within each of the three factors in this analysis.

Cronbach's α of the Portuguese version for the initial total test (with the 15 questions) was 0.31. When the remained 12 questions were analyzed, Cronbach's α was 0.39. The 3-factor structure was defined as following: factor 1: questions 3-7-11 and 13 ($\alpha = -0.51$); factor 2: questions 4-6-10-12-14 ($\alpha = 0.63$); factor 3: questions 5-8-9 ($\alpha = 0.47$).

Using complete ORTO-15 test, the sample had an average score of 36.08 (SD=3.73) in a range from 25 to 45. With the 12 remaining questions, the total score of the sample was 28.68 (SD=3.59), in a range from 16 to 39.

Table 3 shows the answers to these 12 questions according with the ON tendency.

DISCUSSION

The present study performed the first evaluation about ON behavior in a Brazilian sample. These Brazilian dietitians showed high frequency of answers in the ON tendency.

It is important to emphasize that the ON concept is still not completely defined, since it has been proposed recently (3, 7). Bosi et al. (19) preferred the term highly sensitive attitudes in the eating behavior instead of ON. Therefore, it is necessary to discuss the possibility to use any test as a "screening" instrument.

In this work, ORTO-15 was chosen to study ON behavior in Brazilian dietitians because it was previously proposed for ON evaluation and used in four other investigations (2, 4, 19, 21), including a psychometric analysis in Turkey (4). However, when ORTO-15 was first proposed, neither a factorial nor an internal consistency analysis were performed (2). The other instrument proposed until now (BOT) was used three times (7, 16, 17) without any validation or psychometric evaluation.

The Brazilian version of ORTO-15 showed a low internal consistency ($\alpha=0.39$), similar to the level found in the Turkish version (4) ($\alpha=0.44$). Our version showed a 3-factor scale, with Cronbach's α of -0.51, 0.63 and 0.47 respectively. Thus it seems that the factors performed better than the total scale. The Turkish version resulted in a 2-factor scale in their ORTO-11 after the questions with loadings <0.4 were removed; but when we tried this solution, the explained variance and Alpha coefficients were lower. Moreover, the questions 1-2 and 15 excluded in the present exploratory factorial analysis were also excluded in the ORTO-11. Therefore, these questions seem to not perform properly.

Based on our results, we conclude that ORTO-15 seems to perform differently in culturally diverse populations. More than this, it seems necessary to conduct a confirmatory factorial analysis to check if it performs as a proper scale.

Interestingly, when our mean score was recal-

TABLE 3
Answers to the ORTO test remained questions according with ON tendency* (A=always, O=often, S=sometimes, N=never).

Questions	ON tendency N (%)	No ON tendency N (%)
3. In the last 3 months, does the thought of food worry you?	A/O 69 (17.6)	S/N 323 (82.4)
4. Are your eating choices conditioned by your worry about your health status?	A/O 322 (82.1)	S/N 70 (17.9)
5. Is the taste of food more important than the quality when you evaluate food?	S/N 353 (90.0)	A/O 39 (10.0)
6. Are you willing to spend more money to have healthier food?	A/O 231 (55.0)	S/N 185 (45.0)
7. Does the thought about food worry you for more than three hours a day?	A/O 38 (9.7)	S/N 354 (90.3)
8. Do you allow yourself any eating transgressions?	S/N 253 (64.5)	A/O 139 (35.5)
9. Do you think your mood affects your eating behavior?	S/N 264 (67.3)	A/O 128 (32.7)
10. Do you think that the conviction to eat only healthy food increases self-esteem?	A/O 161 (41.1)	S/N 231 (58.9)
11. Do you think that eating healthy food changes your life-style (frequency of eating out, friends)?	A/O 68 (17.3)	S/N 324 (82.7)
12. Do you think that consuming healthy food may improve your appearance?	A/O 328 (83.6)	S/N 64 (16.4)
13. Do you feel guilty when transgressing?	A/N 185 (43.6)	O/S 231 (54.5)
14. Do you think that on the market there is also unhealthy food?	A/O 390 (93.8)	O/S 26 (6.2)

*ON tendency means the sum of the frequencies of answers for the two lower scores according to the scoring grid for ORTO-15 test responses proposed by its authors (2).

culated for the ORTO-11 test (keeping the same questions of these authors) and compared with the scores found by Fidan et al. (21), which used ORTO-11 to evaluate ON among Turkish medical students, the mean score was quite the same (27 vs 26.33 in the present study). The rate distribution was somewhat different: 1.9% of Turkish rated between 0-15 points, 57.7% between 16-30 points and 21.1% rated >31; vs 0.2%, 89.9% and 9.9% of Brazilians, respectively. Therefore, we could suggest a possible use for ORTO-15 questions: to compare scores among populations and groups instead of calculating a cut-off or using it for "screening" purposes.

If we could adopt the cut-off point value of 40 used in Italy for ORTO-15 authors (2), 81.9% of the Brazilian dietitians would score for ON behavior, which would represent a higher value than found in other studies (16, 19). This proportion was calculated just for discussion,

since a cut-off for an instrument that deals with non-syndrome seems inappropriate. Moreover, a cut-off for the Brazilian population was not computed and we believe that it is difficult to determine this value, since the ON is still not officially considered as a disorder and does not have defined diagnostic criteria so far.

Kinzl et al. (16) suggested that ON behavior appears to be frequent among dietitians. Observing the ON tendency in the answers of the remained 12 questions, it is possible to affirm that the ON behavior was frequent in the present sample. In this study the ON behavior was characterized mainly as follows: to believe that on the market there is also unhealthy food, evaluate food more from quality than taste, believe that consuming healthy food may improve appearance, choices conditioned by worry about health status, do not think mood affects eating behavior and do not allow any eating "transgressions". The belief that consuming healthy food may improve appearance was also observed amongst Austrian dietitians (16).

Regarding the excluded items of ORTO-15, question 1 ("When eating, do you pay attention to the calories of the food?") was scored by the authors with an intriguing criteria, since both answers – "never" and "always" – are scored with 1 and 2 points, respectively and thus considered to be a tendency to ON behavior. Question 2 ("When you go to a grocery store do you feel confused?") was expected to be answered by people with orthorexic tendencies as "never", due to their strong conviction of which foods should or should not be eaten; if considered, 93.8% of the Brazilian sample had ON behavior tendency in this answer. However, this question was referred by ORTO-11 authors as an item that did not function well, since the Alpha of the scale rose when it was deleted (4).

Moreover, question 15 ("At present, are you alone when having meals?") does not seem to be the best way to evaluate ON behavior; BOT addresses a similar idea as "Does your diet socially isolate you?". It is important to evaluate the reason for eating alone, since it may be not possible to have company for every meal and for all kinds of people.

The remaining questions within its factors seem to have reasonable conceptual meaning. Factor 1 deals with questions that evaluate worries and negative emotions; Factor 2 encompasses behavior and motivation items and Factor 3 collects items that evaluate convictions.

In addition, some remaining questions must be discussed. Question 13 ("Do you feel guilty when transgressing?") deals with an important approach for ON symptoms evaluation, but the score proposed is also intriguing, since both

answers (“never” and “always”) are scored with 1 and 2 points, respectively, and thus considered to be a tendency to ON. Using the score proposed by the authors, 46.3% of this sample has ON tendency, but actually, 39.7% answered never and it does not seem to us that it could be considered an ON behavior; 12.3% answered always or often, which makes more sense as ON tendency. Thus, it could be stated that even the scored system proposed for ORTO-15 deserves better understanding and revision.

Question 14 (“Do you think that on the market there is also unhealthy food?”) remained in the factor 2 (“behavior and motivation”) but this item could be exacerbating the ON behavior result score and include people informed about “healthy eating” – as dietitians – in high scores. This question was not in the BOT and is important to discuss whether the agreement that “on the market there is also unhealthy food” is a dysfunctional signal. It does not seem that this question adds to the ON recognition.

Moreover, question 6 (“Are you willing to spend more money to have healthier food?”) could be discussed as not conceptually adequate to ON evaluation, since there is a study showing that energy-dense foods, some of which are high in added sugars, and added fats, have a lower cost than lean meats, fish, vegetables and fruits (25). Because of that, one may suppose that even a person normally interested in healthy eating may be willing to spend more money to have healthier food, thus this probably does not indicate an ON behavior.

It is believed that some other important characteristics of the orthorexic tendency could be focused in a questionnaire or instrument, for instance: if somebody feels superior to others or purer by eating healthily (14, 15); if one completely restricts foods and/or ingredients that might be considered unhealthy or adopt an obsessive ritual involving cooking methods and/or utensils (5, 6); if the individual recognizes that much self-control is needed to keep healthy eating habits – even when they are different from his cultural habits (6); if one prefers fasting than eating what is considered unhealthy (14); and if the person is prone to convince others about healthy eating (15). Questions searching exaggerated need of self-care and phobic, obsessive, meticulous, ordered and perfectionist personality traits could also be formulated (5, 10, 26, 27). Finally, the social isolation due to the person’s strictly “healthy” dietary habits could be focused on a different approach, such as: Do you feel that the adoption of a healthy dietary lifestyle is harming your social life?

One limitation of this study is the absence of

a control group. Since there are only a few articles related to ON, especially investigative ones and others using distinct methodological approaches, we could not compare our data properly. Moreover, it is not known whether the behaviors toward ON found in the present study are present in other Brazilian groups. It should be investigated if the Brazilian population by itself shows a tendency to ON behaviors. It will be also necessary to have a representative sample of Brazilian dietitians in a future study to fully understand the professional pattern regarding ON in Brazil. Thus caution is needed in making any generalizations about these results.

Researchers seem to agree that what is known about ON is far from sufficient and more knowledge is warranted on this issue (7). Therefore, it can be suggested that further research should be done in different populations and groups to clarify if these results are a Brazilian pattern or a characteristic of this professional group. Further investigation is also necessary about ON in order to clarify the concept, verify the frequency of this behavior in general population and also establish if the ON could be classified as a “new ED” or one specific disordered eating pattern. Other studies must be done to understand if the available instruments are truly adequate to evaluate ON behavior, or properly develop and evaluate new ones for this purpose.

Despite its limitations, this study has some strengths, since it calls attention to a poorly investigated topic and the attempt to evaluate its behaviors in a Brazilian sample. It also sheds light onto the eating habits and attitudes toward ON that may be relevant amongst Brazilian experts in nutrition. Furthermore, the results point to the importance of discussing healthy eating concepts with professionals in nutritional fields.

Dietitians may be more exposed to higher demands related to their body weight, physical appearance (28) and possibly also to their diet quality. Without a good relationship with body and food it may be difficult to provide proper counseling for patients and clients. Thus, it is recommended that the most relevant and reliable issues found in present work concerning attitudes of dietitians towards food and healthy eating be presented and discussed among these groups in a preventive approach. This discussion should also include the real healthy nutritional concept, which encompasses not only physiological, but also social, cultural and psychological aspects. However, caution should be exercised in this approach, since ON has not been recognized as an ED yet.

CONCLUSION

The studied population of Brazilian dietitians presented high frequency of ON behavior. However, the initial psychometric evaluation of the Portuguese ORTO-15 does not provide evidence of the validity and reliability of this instrument. Other studies must be performed with different statements to understand the utility and meaning of possible questions in different ethnic, age, cultural and professional groups. If an adequate and proper scale could be defined for ON behavior, the establishment of a cut-off point for screening purposes remains a debatable point since there is no consensus about ON concept and evaluation.

The aspects that reliably defined ON tendency with the ORTO-15 questions in the studied group were: food choices oriented by excessive worries about health and physical aspect besides neglect of taste, synonym of pleasure in eating. In a lower level, but also important were the harshness of not allowing themselves to fall into “food transgressions”, and the conviction that healthy eating improves appearance. These aspects should be considered in discussions about healthy eating in the academic and professional level.

ACKNOWLEDGEMENTS

The authors would like to thank Professor Clodonil Honório Trigo for his help with the online survey; Nutrition Association of Professionals of São Paulo-Brazil (APAN) for their partnership with the research; Adventist University Center of São Paulo (UNASP) for statistical analysis financial support, and The State of São Paulo Research Foundation - FAPESP - (process 06/56850-9) for the financial support to the research. Departments and institutions where the research was developed: Dept. of Nutrition, Public Health School, University of São Paulo, São Paulo/SP; School of Nutrition, Brazil Adventist University, São Paulo/SP, Brazil.

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