

In spite of science has been advancing more and more in discovery of regulation mechanisms of energy balance and adiposity, establishing the factors that influence food consumption and energy expenditure; and the immense range of drugs consecrated to the treatment of the obesity,<sup>7</sup> it is not still possible to interfere satisfactorily on the expression of anabolic and catabolic factors as the uncoupling proteins<sup>13,14,15</sup>. Besides that, is generally accepted that changes in feed behavior and cognitive behavior learning are necessary for long-term success<sup>16</sup>.

The base of a good health and prevention of many non-transmittable chronic diseases is still a feeding with good quality and quantity, associated with regular physical activity<sup>17</sup>. Therefore, the appropriate food selection is indispensable for success to reach a pattern of healthy life<sup>18</sup>.

During prevention campaigns and treatment of obesity, type 2 diabetes, hypertension, dyslipidemia and other states of metabolic overload, there is emphasis in food choices and change of feed behavior, through the nutritional education, a process that guides about the food composition, leading to good alimentary practices through the nutrition science knowledge for health maintenance.

The nutritional education will be the largest component in the health promotion, that should be seen as something much wider than the simple absence of disease<sup>19</sup>. However, in order to nutritional education practice become effective, the nutritionist needs resources to offer the necessary back-up to the transmission of healthy feeding concepts.

Nowadays, health professionals can count with several nutritional guides, for example, the Food Guide Pyramid,<sup>20</sup> a model developed by the Agriculture Department of United States, wish is quite known in Brazil, and it has been adapted to assist nutritional and cultural needs of specific groups, as senior<sup>21</sup>, vegetarians<sup>22</sup> and children of 2 to 6 years<sup>23</sup>.

Spite of Pyramid is undoubtedly a model of fundamental importance in the nutritional education process, many flaws were already pointed, as the lack of clarity in the size of recommended servings and in the maximum number of food choices for group,<sup>24</sup> besides that relative critics to the message of using sparingly foods located in its top, that can generate mistakes on interpretation, suggesting priority in the consumption of sweets<sup>25</sup>. Moreover, there is not distinction among several types of fats and nor emphasis in consumption of whole grains in the carbohydrate group<sup>26</sup>.

It still could be considered an important problem of the Pyramid, the difficulty in establishing correlation among the structure presented in illustration and distribution of foods in meals, because it is absent the visualization of the portion's size, as well as the proportion among the number of servings that should be maintained among the food groups.

University students were oriented through the Pyramid, and even so they had problems with the portion's size, underestimating the vegetable group and overestimating the meat group. They also classified erroneously popcorn, simple cake and cookie on the Pyramid top.<sup>27</sup>

The Plate Model<sup>28</sup> is a visual method of nutritional education and is constituted in a simple alternative for dietary orientations, increasing connection among the diet in the theory and practice for allowing the visualization of food groups portioned in a dinner plate<sup>29</sup>. This model is applied for individual or in group orientations, both for healthy individuals that want to maintain a balanced feeding, or for obese individuals, with dyslipidemias or type 2 diabetes, because visual model facilitates understanding and memory retention, decreasing the number of recommendations done by the health professionals<sup>30</sup>.

Health professionals have been instructed with plate model for modification of feed behavior, reduced significantly its habitual consumption of proteins and cholesterol, and increased its ingestion of polyunsaturated fatty acids and ascorbic acid; besides that great majority of professionals aimed countless advantages of the model as tool for nutritional education,

mentioning the intention to use it in the instruction of several types of patient; what demonstrates the efficiency of model in change of alimentary practices<sup>31</sup>.

As well as in the case of Pyramid, the plate model has also been adapted, as The Diabetics Atherosclerosis Intervention Study (DAIS), that complemented the model with a equivalent system<sup>32</sup>. With evolution of biochemical and molecular bases of feeding and nutrition knowledge, more and more adaptations should be proposed, considering the tendency for next nutritional guides in driving its orientations for specific groups needs,<sup>33</sup> facilitating the nutritional education process for professionals and patients.

Both the physiologic determinants that induces satiety (cholecystokinin, bombesin, somatostatin, etc.) and the humoral determinants of food consumption and energy balance (like leptin) that regulate adiposity can be mediated by the diet chemical composition<sup>5,9,15</sup>. Then, the fact that diet macronutrients influences hunger, satiety, food consumption, weight and corporal composition<sup>34</sup> suggests an adaptation of the plate model for obesity control.

This work proposes a plate model adaptation, considering equivalent system, proportional distribution among the different food groups in six daily meals, dietetic habits from Brazil and, mainly the visualization of fat role in energy density of meals, considering its importance in corporal weight gain and its negative effect on the leptin levels and, consequently on satiety<sup>9,10</sup>.

## MATERIAL AND METHODS

The adapted plate model showed in this work was based on several studies,<sup>34,35</sup> that established basic requirements for elaborate nutritional guides with scientific elements translated in practical concepts for simple learning by population. Its construction considered the model proposed by ARMSTRONG<sup>28</sup>, whose central point is a plate with different food groups, giving the idea of the proportionality that should be maintained among these in the meals, and in the food exchange meals<sup>36</sup>.

We elaborated recipes with natural foodstuff in Technique Dietetic Laboratory of Federal University of Paraná (UFPR) on Nutrition Department, using regular equipment and utensils. After its prepare, foods were properly portioned according to measures specified by food exchange meals and then were photographed.

The standard utensils demonstrated on photos of model were: glass (250 mL), teaspoon (10 g), dessert spoon (15 g), small bowl (250 mL), plate (diameter:26 cm)

### Caloric value and macronutrientes distribution :

The present model was standardized for a 2435 Kcal diet (Diet A), that is approximately the average of the energy value recommended for adults, healthy men and women<sup>37,38</sup>. The percentage distribution of macronutrients was based on Recommended Dietary Allowances<sup>39</sup>, Food and Nutrition Board<sup>40</sup> and Committee on Diet and Health e cols<sup>41</sup>. id est.: 60% carbohydrates, 15% proteins and 25% fat of total daily energy value, approximately. Although the percentage of proteins is higher than recommended,<sup>42</sup> this value is similar to popular alimentary habits and allows to amplify the iron's offer.

Starting from standard diet (diet A), an hypocaloric diet with 1210 Kcal was specified composed by 50% of total energy value of the diet pattern (diet B), as secure proposal for weight reduction,<sup>43</sup> because there would not significant damages in micronutrients consumption. In this case, in order to preserve the quality of the diet, the nutritionist should counsel the patient about need of varying the consume of fruits and vegetables.

It was also determined a third diet (Diet C), with same food amounts of 1210 Kcal diet, but, there were additional fat on original servings or that servings were substituted by