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Research Article

Design of Nutrition Catering System for Athletes Based on Access Database

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Abstract: In order to monitor and adjust athletes' dietary nutrition scientifically, Active X Data Object (ADO) and Structure Query Language (SQL) were used to produce program under the development environment of Visual Basic 6.0 and Access database. The consulting system on food nutrition and dietary had been developed with the two languages combination and organization of the latest nutrition information. Nutrition balance of physiological characteristics, assessment for nutrition intake, inquiring nutrition of common food and recommended of functional nourishing food could be achieved for different events and different level of athletes.

Keywords: Access, athlete, catering, food, nutrition

INTRODUCTION

Nutrition is the science that interprets the interaction of nutrients and other substances in food (e.g., phytonutrients, anthocyanins, tannins, etc.) in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism and excretion (Eke *et al*., 2013).

As a special group, athletes usually consume more energy substances than common people. They need more and more comprehensive nutrition in order to fulfill the requirements of sports (Schumacher and Boland, 2005). Therefore, they should pay more attention to nutritionally balance (Butte *et al*., 2010). Scientific and reasonable diet is the essence for getting good grades in sports competitions (Magkos and Yannakoulia, 2003). However, due to the difference of sport projects, there are significant differences among explosiveness, endurance and coordination, which generate the nutrition requirements respectively (Colbert *et al*., 2011). Therefore, it is necessary to understand the kinds and numbers of nutrition in diets and develop the reasonable and specific diet structure according to different athletes' different requirements. In order to suggest the reasonable nutrition from the perspective of nutrition supply, developing a nutrition catering system for different athletes can ensure the requirement of training and competition.

MATERIALS AND METHODS

Main algorithm model and the flow chart of program: The mathematical model for the calculation of nutrition is shown as follows:

$$Z_i = \sum_{j=1}^{n} Y_{ij} \bullet X_j \quad (1)$$

where,
Z_i = The content of the i kind of nutrition
Y_{ij} = The content of the i kind of nutrition in the j kind of food
X_j = The use of the j kind of food
N = The number of kinds of food

After calculating each nutrition of a diet, we use the result to make comparisons with the dietary reference intakes respectively, calculating the difference between the two respects. Due to the different intakes of different people, we should refer to the data such as ages, genders, sport projects and sport levels. The flow chart of the estimation of the nutrition intake is shown in Fig. 1.

Design of system database: During the input of the system data to the Access database, the part between each two data tables is independent, which means that there's no relationship with other tables, like the nutrition table of swimming athletes. There also exist the relationships among many tables, some of which are one-one relationship, while others are many-one relationship and many-many relationship. As for many-many relationship, we usually establish the correlation between the two aspects, like the usual food content table and category code table, which are related by the field of category code table. We set two fields in the data table of physiological characteristics of nutritional balance and they were set as the title and the main

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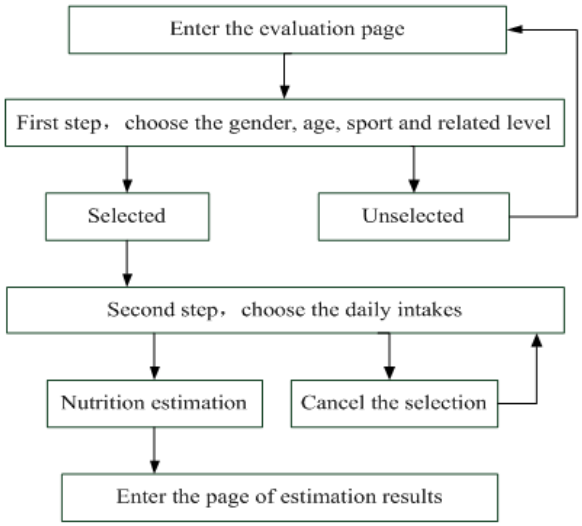

Fig. 1: Flow chart of assessing nutrient intake

content respectively. In the data table of "swimming athlete dietary", five fields were set, called project name, project feature, diet principle, diet example, selection point respectively. We used relevant data in the latest content table of food to recommend the best diet for Chinese athletes (Chen *et al*., 2001). Data consists of five tables, including:

- **Common food composition table:** Number, category of food, name of food, the field of potassium (mg), calcium (mg), ferrum (mg) and zinc (mg)
- **Category code table:** Category code and food group
- **Dietary reference intakes vector table:** Fields including gender, age, activity level, energy (KJ), energy (kcal), protein (g), fat accounted for the proportion of energy
- Vector table of recommended intake of certain micronutrients and tolerable upper intake
- Fields including gender, retinol equivalents (μg) recommended intake, retinol equivalents (μg) tolerable upper intake and thiamine (mg) recommended intake
- **Nutrition calculation table:** Fields including food name, food department, the energy (KJ), energy (kcal), water (g), protein (g) and fat (g). The tables i) and ii) are linked by category code field. In the food category tables, fields include category code and category name. In the food presentation tables, fields include ID, category code, food name. Picture information was required by VB to convert image formats for long binary data, binary data in the form of a long stored in the database

RESULTS AND DISCUSSION

Functions and achievements of the module "project features nutritional balance": This module mainly introduce the feature of the projects, reasonable nutrition and nutritional requirements:

- **The feature of different projects include:** Classification in the project phase, physical characteristics, mental characteristics and intensity confrontation.
- **The reasonable nutrition of different projects include:** The importance of proper nutrition, proper nutrition basic requirements, the contents of a balanced diet, a balanced diet composition, dietary principles athletes different projects and different projects for keeping athletes appetite.
- **The requirements of nutrition of different athletes include:** The needs for heat, protein, fat, carbohydrate, dietary fiber, vitamin of minerals and water.

We used ADO Data to connect the module table of Access database. Combining the ADO Data and Data Grid control, it records the content in the form of single row grid. And it uses ADO Data to bind the Text control in order to achieve the synchronous update of Data Grid control and Text control. When selecting the title content in the ADO Data control, the Text control will output the corresponding main content of relevant title.

Functions and achievements of the module "estimation of the nutrition intake": In this module, we mainly evaluate the daily intake content of different kinds of athletes. Two steps of the required system modules were used to achieve the user's choice. Not determining before the first step, we are unable to achieve the second selected step, deselect various nutrients sum and nutritional assessment. In the second step, we determined the total food intake system a day chosen by the user. By binding the Combo control and ADO Data control and binding the List control and ADO Data control and united the utilization of the two controls, we can select different food and for the system

users. After determining the quant of intake, the module can add the target food to Data Grid in order to achieve the calculating the nutrition the daily intake and estimate the abundance of the food.

Functions and achievements of the module "dietary contest period ": Here we mainly introduce different diet structure of different athletes. This module has four sub-project for users to choose, including event overview, diet principles, recipe examples anf selected points. The module uses ADO Data control to connect the table of Access database. By using ADO Data, SSTab and Data Grid control, we can achieve the update of SSTab and Data Grid's contents. ADO Data is used to connect the database, while Data Grid is used to present the records of titles in the form of single row grid, while SSTab is used to show the four aspects of the same disease using four pages. In order to achieve the update process, Data Grid control and SSTab control are bound with ADO Data control.

Functions and achievements of the module "recommendation of the food function": This module mainly introduce the food of weight control, hurt recovery, nutrition supplement, tranquilizing and sleep promoting. And it introduce the corresponding food with related functions. Each module have the corresponding picture data of the functional food, helping athletes to understand the food with the guidance of the food picture for the convenience of choice and memory. The module uses Combo control and List control to bind the ADO Data control respectively in order to help users distinguish different functions of food and then make a good choice. After confirming the target food, Test control will update the content and the picture data in the Image with the food name in the List control. Using Image control to combine the VB code from the picture data extracted from Access database, this operation can transform the picture data into long binary data. Image control can memorize the BMP, TIFF, GIF and JPEG data in the Image data type with the combination of VB code.

Functions and achievements of the module "common food nutrition query": This module mainly contains two query models, including the search of the food category and food name. The searching mode of food category is on the basis of the selection of food category in order to achieve the comparable enquiry of nutrition of the same kind of food. By comparing the difference of nutrition in the same kind of food, users are convenient when selecting the suitable intake food according to their tastes. The searching mode of food name is on the basis of the input of the keywords of the content of the target food, which is very easy to enquire. The results of the searching will present with the unit of 100 g. The query of food category is achieved by binding the ADO Data control with the Data Grid control's contents, helping people to search for the nutrition of the target food. Results are presented in another Data Grid control, which cannot be modified or deleted. This mode search results for a number of records. A variety of food belong to the same food category. This mode allows system users to easily select their favorite food to eat in the same nutrients.

CONCLUSION

We developed an athlete food nutrition catering system, which is the combination the techniques of database and information management. Using the idea of structured programming method, under the system of Win98/XP/Win2000 and 2003, this system can achieve the nutrition balance of different athletes, estimation of the nutrition intake, the requirement during the competition period, recommendation of functional food and the search for food nutrition. The application of the system can effectively address the problem of the diet of athletes and provide a powerful strategy support for athletes.

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