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DietPLUS- a User-friendly '2 in 1' Food Composition Database and Calculator of Nutrient Intakes

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ABSTRACT

The teaching and research tool called 'DietPLUS', developed by the present author at an institution of higher learning in 2007, contains nutrient information of 840 food items in Excel format. DietPLUS functions as a '2-in-1' food composition database plus a rapid calculator of nutrient intakes, with the option of 'collapsing' the food composition face leaving only the nutrient calculator face. The macronutrients featured in the programme are energy, protein, fat, carbohydrates, dietary fibre, sugars (intrinsic + added), polyunsatuared omega-6 fatty acids (mainly linoleic acid, LA) and polyunsaturated omega-3 fatty acids [alpha-linolenic acid (ALA) or eicosapentaenic acid (EPA) + docosahexaenolic acid (DHA)]. The micronutrients in the programme are vitamin A (as retinol equivalents, RE), vitamin C, thiamin (vitamin B_1), riboflavin (vitamin B_2), and niacin. Cholesterol content was included to complete the list of food components tabled. Food items consumed are converted into gram quantities (edible portion) and are entered in one column in the Excel programme which emphasises the simplicity and user-friendliness of the present nutrient calculator. DietPLUS instantaneously sums up the macronutrients and micronutrients consumed with each subsequent entry. Macronutrients (protein, fat, carbohydrate, sugars and dietary fibre) consumed are presented as gram quantities and a percentage of the Recommended Nutrient Intakes for Malaysia 2005. An approximate number of servings are also provided for vegetables, fruits, legumes, fish and meat, which may be useful in meal planning and nutrition / dietetic counselling.

INTRODUCTION

The calculation of the nutrient composition of foods and meals is of paramount importance in teaching, research and meal planning. However, work in this area is often hampered by the lack of an updated food composition database as well as a suitable, user-friendly, low-cost calculator of nutrient intakes. Hence, there is an urgent need for the Malaysian food composition database to be updated as well as a rapid nutrient calculator which is low-cost and allows for flexible use by the layman, the student, and the teacher.

The last version of the Nutrient Composition of Malaysian Foods (Tee, 1997) a product of the Malaysian Food Composition Database Programme (MFCDP) led by the Institute for Medical Research (IMR), Malaysia was in 1997. Despite its wide usage (>500 copies sold a year), the publication lacked information on dietary fibre and sugars, and provided only some

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information on omega-6 and omega-3 fatty acids which is difficult to access in the publication. The IMR also developed a nutrient calculator software called *Nutrical* (Tee, Yeoh & Mastura, 1998) which was based almost entirely on the 1997 MFCDP publication, and hence lacked the nutrients mentioned above. The MFCDP was discontinued and no new edition of the Malaysian Food Composition has been published for the past 12 years.

Many local nutritionists and dietitians, especially academicians, next turned to the software *Nutritionist Pro* for their computerised nutrient calculation requirements. This software, produced in the United States, has information on Malaysian foods but it is beyond the affordability of the student. Costly, commercialised software calculators of nutrient intakes do facilitate flexible-hour use by the academic staff and students. This is exemplified by the current availability of four units of the *Nutritionist Pro* programme to cater for the approximately 200 academic staff and 2,000 students at the university where the present author works. Besides, it is anticipated that the food composition data on Malaysian foods in the imported research tool would become obsolete for the reasons mentioned earlier.

The urgent need for a user-friendly nutrient calculator programme which is readily accessible by the university population during and outside office hours has spurred the development of the present food database programme called 'DietPLUS'. This software, based on Excel format, was developed to cater for the teaching and research needs at the IMU. More importantly, it would facilitate ready accessibility and flexible-hour use of a '2-in-1' food composition database and calculator of nutrient intakes.

Therefore, DietPLUS was developed with the following objectives:

1. To develop a user-friendly, low-cost calculator of nutrient intakes for use in teaching and research at the International Medical University (IMU).
2. To develop added values such as dietary fibre, total sugars, and polyunsaturates (omega-6 and omega-3 PUFA) which are currently not available in other locally-developed calculators of nutrient intakes.
3. To provide undergraduate and post-graduate students at the IMU ready access to, and flexible-hour usage of, a simple software format for calculations of nutrient intakes.

MATERIALS AND METHODS

Source of nutrient data

Information on macronutrients and micronutrients of foods was obtained mainly from four sources, namely: (i) Nutrient Composition of Malaysian Foods (Tee *et al.*, 1997), (ii) Food Composition Guide Singapore (Health Promotion Board Singapore, 2003), (iii) the Australian Food Composition Tables (NUTTAB, 2006), and (iv) publications in the literature on the composition of Malaysian foods.

The bulk of the nutrient data was obtained from the Nutrient Composition of Malaysian Foods (Tee *et al.*, 1997). The Food Composition Guide Singapore 2003 served mainly to provide information on dietary fibre, total sugars (intrinsic + added) and polyunsaturated fatty acid (PUFA) content. The dietary fibre information from the Singapore database was particularly useful as the Malaysian Food Database (Tee *et al.*, 1997) provided only crude fibre. Data for crude fibre is outdated as crude fibre has been reported to contribute only one-seventh to one-half of total dietary fibre (Anderson *et al.*, 2007).

Information on omega-3 fatty acids (ALA from plant food sources and EPA+ DHA from animal food sources) was obtained mainly from the Australian Food Composition Tables (NUTTAB, 2006), and selected publications on Malaysian food composition (Endinkeau & Tan, 1993; Ng, 2006).

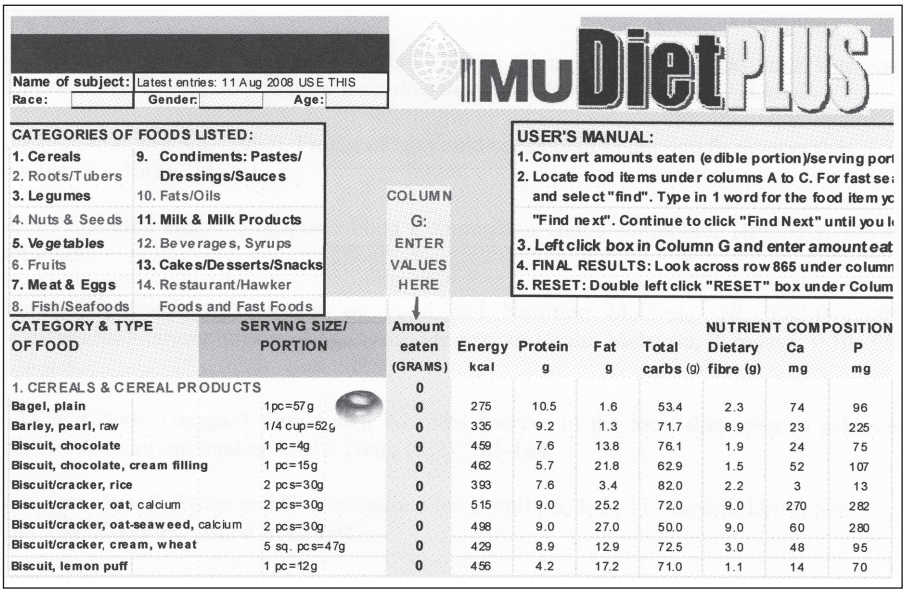

Figure 1. A portion of the left face of DietPLUS on Food Composition

Categories of food formatted

A total of 840 food items of the food composition database in the Excel format programme were divided into the following food categories which resemble the format used in the Malaysian Food Composition database (Tee *et al.*, 1997): (i) Cereals and cereal products, (ii) Roots and tubers, (iii) Legumes, (iv) Nuts and seeds, (v) Vegetables, (vi) Fruits, (vii) Meat and eggs, (viii) Fish and seafoods, (ix) Condiments (pastes, dressings and sauces), (x) Fats and oils, (xi) milk and milk products, (xii) Beverages and syrups, (xiii) Cakes, desserts, snacks, and (xiv) Restaurant / hawker foods and fats foods. The category 'Condiments' which did not appear in the Malaysian database mentioned, was included as Category 9 in DietPLUS. The separation of pastes, dressings and sauces under 'Condiments', as in the Australian food database (NUTTAB, 2006), appeared very useful to locate these food items and was therefore adopted by the present author.

The present author had considered the issues raised by Puwastien (2002), particularly the need for the systematic development of national food composition databases. However, it is not the objective of this paper to systematically develop a national food composition database. As such, the recommendations of Puwastien (2002), including the use of INFOODS tag names, were not adopted in this paper.

Calculation of nutrient intakes

Food items consumed must first be converted into gram quantities (edible portions) with the help of serving size / portion and wherever essential, percentage edible portion (e.g., for fish and chicken) given next to each food item. These gram quantities are entered in Column G in the programme which underscores the simplicity and user-friendliness of DietPLUS (Figure 1).

With each entry, the corresponding nutrients consumed automatically appear in the right face rapid calculator. The nutrient calculator is formatted with amount eaten (g) as the numerator and 100g edible portion of the food item as the denominator. All nutrients consumed are automatically

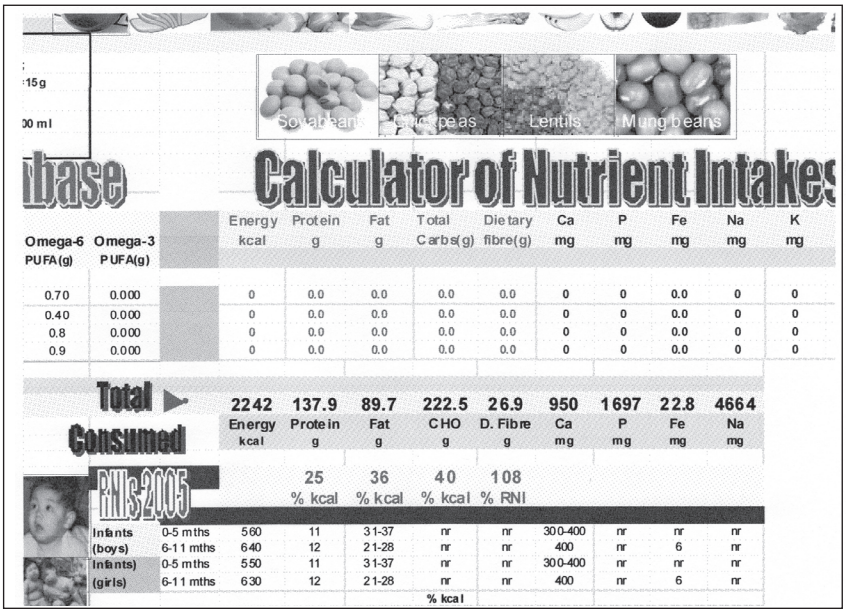

Figure 2. Right face of nutrient calculator of DietPLUS

summed up as absolute grams eaten and in the case of the macronutrients, also as a percentage of the Malaysian Recommended Nutrient Intakes (RNIs) [NCCFNM, 2005]. A table on the said RNIs are provided in close proximity to the summed results for easy reference. The approximate number of servings entered for vegetables, fruits, legumes, fish and meat are also calculated and displayed in a table at the end of the programme (Figure 2).

User manual

DietPLUS comes with a User Manual located at the front page of the programme, which guides the user for ease of operation and a 'quick search' of food items. In addition, a table on household measures such as tablespoon, cup (250 ml), and Chinese bowl sizes is also provided at the same location next to the User Manual. After each set of entries, the user has the option to save the results or click the reset button to zerorise the entries in Column G for amounts of food items consumed.

Research and Ethics Committee approval

This project was approved by the Research and Ethics Committee of the International Medical University, Kuala Lumpur.

RESULTS AND DISCUSSION

Added values

Besides cholesterol, the 'added-values' information available in DietPLUS are dietary fibre, omega-6 (mainly as linoleic acid and omega-3 fatty acids, and total sugars. The Excel format used has the advantage in that it is 'modular', that is, a column on trans fatty acids can be added in the near future as more information on this food component becomes available. In other words, DietPLUS has great flexibility for future updates, if necessary.

Limitations of Diet PLUS

The main caveat in the development of DietPLUS was that the foods from the 3 countries' food composition database used in the study was comparible in composition.

This was of course not strictly the case. Having said this, it is important to note that foods from Malaysia and Singapore are closely similar and as such, the use of the Singapore food database for information on dietary fibre, sugars and PUFA may produce minimal discrepancy at most. Substantial information on omega-3 fatty acid content, which could not be obtained from the local publications used, was formatted into DietPLUS. This may draw negative critique from local peers and the author is well aware of this. It may be pertinent to note that imported nutrient calculator(s) being used in Malaysia at the moment also do not have a complete *Malaysian* food composition database. As new information is obtained on the omega-3 content of Malaysian foods, DietPLUS will be updated accordingly.

DietPLUS was scrutinised by the nutritionists and dietitians of the Department of Nutrition and Dietetics, IUM in July 2008. Critiques and suggestions for improvement in the Excel format were noted and carried out. The present teaching and research tool was successfully used to calculate the food intake of 50 participants of a 3-day Short Course in Diet Therapy held at the IMU Clinical School, Seremban on 27-29 August 2007. In addition, DietPLUS was used in July-October 2008 to calculate 3-days, 24-hour food intakes of 100 participants in Semester 7 research projects of 4 students of the Bachelor of Pharmacy programme at the IMU.

CONCLUSION

Overall, the three objectives of the study have been achieved. DietPLUS has been used successfully by the Department of Nutrition and Dietetics, IMU for teaching and training purposes at the university since 2007. The tool's updated information (dietary fibre, total sugars, omega-6 and omega-3 fatty acids) on the composition of Malaysian foods, its simplicity of use as a rapid nutrient calculator and above all, its provision for flexible-hour use in and off the IMU campus, have underscored the immense potential for its use in Malaysia for teaching and research. In addition, DietPLUS lends itself to modular updates when new nutrient information (e.g., trans fatty acids, zinc, etc.) on Malaysian foods becomes available. Finally, DietPLUS possesses the potential to be commercialised either in its present Excel format form or some refined IT format.

REFERENCES

Anderson JS, Perryman S, Young L *et al.* (2007). Dietary fibre. Colorado State University Extension. Fact Sheet 9.333 *@www.ext.colostate.edu/PUBS/FOODNUT/09333.html* -

Endinkeau K & Tan KK (1993). Profile of fatty acid contents in Malaysian fresh-water fish. *J Trop Agri Sci* 16(3):215–221.

Health Promotion Board Singapore. Food Composition Guide Singapore, HPB B E 389-03, April 2003.

National Coordinating Committee on Food and Nutrition Malaysia (NCCFNM) (2005). Recommended Nutrient Intakes of Malaysia, Ministry of Health Malaysia, Putrajaya.

Ng TKW (2006). Omega-3 fatty acids: potential sources in the local diet towards achieving recommended nutrient intakes. *Mal J Nutr* 12(2): 181–188.

Nutritionists Pro. Software and User's Guide. First DataBank, Inc., 111 Bayhill Drive, San Bruno, CA 94066, April 2003.

NUTTAB 2006, Australian Food Composition Tables. Food Standards Australia New Zealand.

Puwastien P (2002). Issues in the development and use of food composition databases. *Publ Health Nutr* 5(6A): 991–999.

Tee ES, Mohd Ismail N, Mohd Nasir A & Khatijah I (1997). Nutrient Composition of Malaysian Foods(4th ed.), Malaysian Food Composition Database Programme.

Tee ES, Yeoh CW & Mastura AS (1998). NutriCal: your solution to nutrient calculations. *IMR Quart Bull* 44: 23.