
Nutritional Science – 2014
Valencia, Spain
September 23-25, 2014
Education Materials

• Food Guide Pyramid/ MyPlate
• Food labelling scheme of pre-packaged foods
• Seminar-led
• eLearning
eLearning

- Web-based or mobile-based (apps)
- Education purpose
- Dietary recording
- Dietary analysis
- Energy reporting
- Nutrient reporting
- Self-monitoring
Dietary Recording Process

Dietary intake records

Nutrient analysis

Nutrition Status Assessment

Diet details, pattern, eating pattern

Energy profile, nutrient profiles

Energy balance, nutrient deficiency, risks of chronic diseases
http://www.choosemyplate.gov/supertracker-tools/supertracker.html

- Text-based food searching
- Mainly western food and dishes

www.eatright.org
Photo-Supported System

- Accessibility
- Individualization
- User-friendliness
- Interactivity
- Stickiness
New Dietary Recording Portal

Specifications

Dietary Analysis
- 2D Images
- Food Items
- Dishes

Age
Body height
Body weight
Gender
Activity level

Assessment of energy input
Assessment of nutrients
Assessment of energy requirement

Nutrient Balance
Carbohydrate
Protein
Saturated fat
Unsaturated fat
Cholesterol
Calcium
Vitamin C
Dietary fibre
Sodium

Energy Balance

Specifications of new dietary recording portal

System requirements
Web Base
Reporting
Interactive
Database

Fields
Gender
Activity level

Reporting
Interactive
Database

Specifications
Defining Energy Balance

Energy Requirement (Energy Output) =

Resting Energy Expenditure (REE) x

Physical Activity Level (PAL) x

Thermic Effect of Food (TEF)

# Defining Daily Nutrient Values

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>DRV/RDI</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>DRV</td>
<td>&gt;60%</td>
</tr>
<tr>
<td>Protein</td>
<td>DRV</td>
<td>10%</td>
</tr>
<tr>
<td>Fat</td>
<td>DRV</td>
<td>&lt;30%</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>DRV</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>DRV</td>
<td>300mg</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>DRV</td>
<td>&gt;25g</td>
</tr>
<tr>
<td>Sodium</td>
<td>DRV</td>
<td>2400mg</td>
</tr>
<tr>
<td>Calcium</td>
<td>RDI</td>
<td>&gt;1000mg</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>RDI</td>
<td>&gt;60mg</td>
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</table>

*DRV=Daily reference value, RDI=Dietary reference intakes*
Dietary Intake Interface with Individualized Food Questionnaire
Daily Dietary Reports

<table>
<thead>
<tr>
<th>Food Name</th>
<th>Unit</th>
<th>Calories</th>
<th>Carbohydrate</th>
<th>Protein</th>
<th>Total Fat</th>
<th>Saturated Fat</th>
<th>Non-saturated fat</th>
<th>Fibre</th>
<th>Calcium</th>
<th>Potassium</th>
<th>Sodium</th>
<th>Cholesterol</th>
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<td>30.0</td>
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<td>Cheese Cake</td>
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<td>8.0</td>
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<td>Night Snacks</td>
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<tr>
<td>Cup Noodle</td>
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<td>9.0</td>
<td>9.0</td>
<td>9.0</td>
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<tr>
<td>Total</td>
<td>2950.0</td>
<td>118.0</td>
<td>118.0</td>
<td>118.0</td>
<td>236.0</td>
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</table>

Energy Requirement: 1888 Kcal

<table>
<thead>
<tr>
<th>Nutritional Status</th>
<th>Total Energy Intake 2950.0 Kcal</th>
<th>Carbohydrate 118.0 g</th>
<th>Protein 118.0 g</th>
<th>Total Fat 236.0 g</th>
<th>Saturated Fat 118.0 g</th>
<th>Calcium 118.0 mg</th>
<th>Sodium 118.0 mg</th>
<th>Cholesterol 118.0 mg</th>
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</thead>
<tbody>
<tr>
<td>Too Much</td>
<td></td>
<td>Not Enough</td>
<td>Not Enough</td>
<td>Pass</td>
<td>Pass</td>
<td>Not Enough</td>
<td>Pass</td>
<td>Pass</td>
</tr>
</tbody>
</table>
Reliability, Accuracy, Usability

- **Good reliability and accuracy in food evaluation** (ICC=0.916, F=17.001, p<0.001)
  

- **Good usability in terms of system usability and information and interface quality**
  
Potential Applications

- Promotion of nutrition knowledge
- Weight management intervention
- Behavioural modification
- Benefits to large scale research
Relevant Research

• Comparing weight loss effect in 3 groups: controlled group, paper format and electronic dietary recording methods.

Nutrition Education (Obese adults)

- RCT-pre-post design, 3 groups (electronic recording, paper recording, no recording), N=60
- General Nutrition Knowledge (Parmenter & Wardle, 1999)
- It consists of 110 multiple-choice and short-answer questions
- It tests participants’ knowledge
  - dietary recommendations
  - sources of nutrients
  - choosing everyday foods
  - diet-disease relationships
### Results

#### With-in group diff.

<table>
<thead>
<tr>
<th></th>
<th>EG (n=20)</th>
<th></th>
<th>FD (n=20)</th>
<th></th>
<th>CG (n=20)</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean (s.d.)</td>
<td>p</td>
<td>Mean (s.d.)</td>
<td>p</td>
<td>Mean (s.d.)</td>
<td>p</td>
</tr>
<tr>
<td>Nutrition knowledge score</td>
<td>-1.30 (2.0)</td>
<td>&lt;0.05</td>
<td>-0.80 (1.7)</td>
<td>&lt;0.05</td>
<td>-0.20 (2.2)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Sources of nutrients</td>
<td>-3.95 (9.8)</td>
<td>&gt;0.05</td>
<td>-4.65 (5.2)</td>
<td>&lt;0.05</td>
<td>-1.80 (11.8)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Choosing everyday foods</td>
<td>-0.35 (1.6)</td>
<td>&gt;0.05</td>
<td>0.30 (1.6)</td>
<td>&gt;0.05</td>
<td>-0.30 (1.1)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Diet-disease relationships</td>
<td>-0.20 (2.5)</td>
<td>&gt;0.05</td>
<td>-0.70 (2.1)</td>
<td>&gt;0.05</td>
<td>-0.85 (2.6)</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

#### Between-group diff.

<table>
<thead>
<tr>
<th></th>
<th>Effect Size</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition knowledge score</td>
<td>0.021</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Sources of nutrients</td>
<td>0.038</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Choosing everyday foods</td>
<td>0.124</td>
<td>&lt;0.05</td>
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<tr>
<td>Diet-disease relationships</td>
<td>0.030</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

Reflective Learning in Higher Education

- 43 university students studied in a co-curricular course of healthy eating.
- They recorded their 14 days diet using the electronic dietary system.

Outcome measures:
- Average dietary intake (first 7 days, last 7 days)
- Reflection on submitted reflective journals
## Results

Table 1. Paired samples t-test in daily pre-post energy and nutrients.

<table>
<thead>
<tr>
<th>Energy/Nutrients</th>
<th>1st week Mean± s.d.</th>
<th>2nd week Mean± s.d.</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total calorie</td>
<td>1131±554</td>
<td>996±424</td>
<td>2.567</td>
<td>&lt;0.05a</td>
</tr>
<tr>
<td>Carbohydrate (gram)</td>
<td>174±190</td>
<td>133±57</td>
<td>1.492</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Protein (gram)</td>
<td>46±23</td>
<td>44±21</td>
<td>1.131</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Saturated fat (gram)</td>
<td>11.0±7.6</td>
<td>8.9±5.0</td>
<td>2.463</td>
<td>&lt;0.05a</td>
</tr>
<tr>
<td>Dietary fibre (gram)</td>
<td>9.1±5.7</td>
<td>8.2±6.1</td>
<td>1.397</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Calcium (milligram)</td>
<td>276±189</td>
<td>271±178</td>
<td>0.200</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Sodium (milligram)</td>
<td>1631±827</td>
<td>1526±705</td>
<td>1.002</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Cholesterol (milligram)</td>
<td>185±122</td>
<td>171±121</td>
<td>0.894</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Trans-fat (gram)</td>
<td>0.5±0.95</td>
<td>0.3±0.49</td>
<td>1.898</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Sugar (gram)</td>
<td>184±995</td>
<td>178±995</td>
<td>2.578</td>
<td>&lt;0.05a</td>
</tr>
<tr>
<td>Vitamin C (milligram)</td>
<td>73±158</td>
<td>62±104</td>
<td>0.787</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Total fat (gram)</td>
<td>39.6±25</td>
<td>31.8±15.6</td>
<td>2.830</td>
<td>&lt;0.05a</td>
</tr>
</tbody>
</table>

All energy and nutrients were analysis in daily basis.

a indicates significant difference at α=0.05 level.
Nutrition Education in Secondary Students (a pilot study)

- S2 students (N=27)
- Control group : 13
- Intervention group : 14

Method:

- 12 weeks dietary recording with electronic system. Intervention group review online report. Control group cannot review online report.

- General Nutrition Knowledge (baseline & 12 weeks)
Results

• Within-subject differences
  – dietary recommendations ($\eta=0.664$, $p<0.05$)
  – sources of nutrients ($\eta=0.688$, $p<0.05$)
  – choosing everyday foods ($\eta=0.662$, $p<0.05$)
  – diet-disease relationships ($\eta=0.498$, $p<0.05$)
Results

• Between-groups differences:
  – dietary recommendations ($\eta=0.216$, $p<0.05$)
  – sources of nutrients ($\eta=0.607$, $p<0.05$)
  – choosing everyday foods ($\eta=0.193$, $p<0.05$)
  – diet-disease relationships ($\eta=0.115$, $p>0.05$)
Thank You

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