

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**Evaluation of the Health Education  
Process for European People with  
Type 2 Diabetes Mellitus**

**A thesis presented in partial fulfilment of  
the requirement for the degree of Master  
of Science in Nutrition Science**

**Massey University, Albany Campus,  
New Zealand**

**Lynnette A Ferguson**

**2006**

# Abstract

---

## **Evaluation of the Health Education Process of European People with Type 2 Diabetes Mellitus**

*Diabetes is a significant health problem in New Zealand. With a limited number of health professionals working in the area of diabetes it is essential that the educational and empowerment process is examined to ensure that the limited specialist resources are used effectively and efficiently with the best outcomes possible. For this to be achieved the holistic approach to education must be examined and evaluated. The aim of this research was to better understand the needs of European people between 45 – 65 years of age. The method used was a questionnaire to 50 female and 50 male subjects with type 2 diabetes randomly selected from patients seen by the researcher (a dietitian), within the Counties Manukau District Health Board geographical area. The results showed that most subjects were diagnosed between the age of 40 – 59 years, 64% had a relative with diabetes, 10% of females and 22% of males were overweight and 60% of females and 48% of males were obese. Group education was shown to be just as effective as individual therapy, with the preferred educators being specialist diabetes dietitians and nurses. Seventy two percent reported the best time for education was at diagnosis and 87% requested ongoing education. Once subjects knew their biochemical results 87% reduced their fat intake with 78% reducing saturated fat. The mean drop in HbA1c for females was 0.9mmol/l and males 1.4 mmol/l, with both being statistically significant. Level of self reported education bore no relationship to level of HbA1c achieved. Sixty two percent of those who had three years or less of secondary education, 30 % of those with three to five years secondary education, 52% with a technical or trade certificate, and 59% of those with a degree had reached a target HbA1c at follow-up. After diagnosis 45% reduced their alcohol intake. The most popular form of exercise was walking (46%), followed by gardening (28%). Fifty percent chose an exercise of moderate intensity and overweight subjects were more likely to exercise daily. The preferred medium for education was written pamphlets (86%) follow by books (60%). The conclusions reached were that most had changed to a healthy lifestyle since being diagnosed but vegetable intake was still much less than the New Zealand Guideline (2003). From the results it is hypothesised*

*that this diabetes population group, before diagnosis, had a higher intake of sweet drinks than the national average and this may have contributed to the development of the disease. Most were endeavouring to lose weight, improve biochemical indices and increase exercise. Both group and individual education were found to be equally effective as forums for education.*

# Acknowledgements

---

I would like to acknowledge the Whitiara diabetes service of Counties Manukau District Health Board for their support and encouragement.

Special thanks to Lesley Sanderson for her continuous support and for sharing her knowledge.

Thank you to the patients who were willing to be part of my research, without you this would not have been possible.

To Patsy Watson, my supervisor, for the endless hours spent guiding me through the process, keeping me focused, correcting my script and generally being there. Without her this would never have been completed.

Lynnette Ferguson  
Institute of Food, Nutrition and Human Health  
Massey University  
Private Bag 102 904 North Shore Mail Centre  
Auckland  
New Zealand.  
Email: lferguson@middlemore.co.nz

# Contents

---

<b>Abstract</b>	ii
<b>Acknowledgements</b>	iv
<b>Table of Contents</b>	v
<b>List of Tables</b>	ix
<b>List of Figures</b>	xi
<b>Chapter 1: Introduction</b>	1
<b>Chapter 2: Literature Search</b>	2
<b>2: 1 Definition of Diabetes</b>	2
<b>2: 2 Diagnosis of Diabetes</b>	3
<b>2: 3 Incidence</b>	4
2:3.1 Global Incidence	4
2:3.2 Incidence in New Zealand	5
<b>2: 4 Causes of Diabetes</b>	6
2:4.1 Foetal Origins Hypothesis	6
2:4.2 Diabetes During Pregnancy	7
2:4.3 Genetic Susceptibility	7
2:4.4 Obesity and Inactivity	8
2:4.5 Insulin Resistance	10
2:4.6 Amyloid Deposits	12
<b>2: 5 Educational Strategies in the Treatment of Diabetes</b>	13
2:5.1 Glycaemic Control	13
2:5.2 Methods of Education	17
2:5.2.1 Self-Management Education	17
2:5.2.2 Group versus Individual Appointments for Education	19
2:5.2.3 Preferred Educator	20
2:5.2.4 Style of Education	20
2:5.3 Nutritional Strategies in the Treatment of Diabetes	21
2:5.3.1 Healthy Eating in Practice	21
2:5.3.2 Lipids, Takeaways	22
2:5.3.3 Carbohydrate, Glycaemic Index, Fibre	24
2:5.3.4 Meat, Fish, Egg, Dairy Products	27

2:5.3.5	Vegetables and Fruit	26
2:5.3.6	Non Alcoholic Drinks	28
2:5.3.7	Alcohol	28
2:5.3.8	Weight Loss	29
2:5.3.9	Label Reading	30
2:5.4	Lifestyle - Exercise	30
<b>2: 6</b>	<b>Medical Treatment of Type 2 Diabetes</b>	<b>32</b>
2:6.1	Non Insulin Medication	32
2:6.2	Insulin	33
2:6.3	Future Directions in Medication	35
<b>2: 7</b>	<b>Complications Associated with Type 2 Diabetes</b>	<b>36</b>
<b>2: 8</b>	<b>Strategies for Prevention of Type 2 Diabetes</b>	<b>37</b>
<b>Chapter 3: Methods</b>		<b>37</b>
<b>3: 1</b>	<b>Ethical Application</b>	<b>39</b>
<b>3: 2</b>	<b>Sample Selection</b>	<b>39</b>
<b>3: 3</b>	<b>Methodology</b>	<b>42</b>
3:3.1	Design and Pretesting of the Questionnaire	42
3:3.1.1	Principles of Design	42
3:3.1.2	Development of the Questionnaire	43
<b>3: 4</b>	<b>Data Collection, Analysis and Feedback</b>	<b>44</b>
<b>Chapter 4: Results</b>		<b>46</b>
<b>4: 1</b>	<b>Demographics</b>	<b>46</b>
<b>4: 2</b>	<b>Anthropometrics</b>	<b>49</b>
<b>4: 3</b>	<b>Biochemical Results</b>	<b>51</b>
4:3.1	Glycosylated Haemoglobin (HbA1c)	51
4:3.2	Lipids	52
<b>4: 4</b>	<b>Self-Empowerment</b>	<b>55</b>
4:4.1	Home Blood Glucose Monitoring	55
4:4.2	Hypoglycaemia	57
4:4.2	Hyperglycaemia	58
<b>4: 5</b>	<b>Education</b>	<b>59</b>
<b>4: 6</b>	<b>Food Choices made by Subjects</b>	<b>68</b>
4:6.1	Lipids	68
4:6.2	Carbohydrate	70
4:6.3	Protein	73
4:6.4	Vegetables and Fruit	75
4:6.5	Non Alcoholic Drinks	76
<b>4: 7</b>	<b>Alcohol</b>	<b>76</b>

<b>4: 8</b>	<b>Food Labels</b>	79
<b>4: 9</b>	<b>Physical Activity</b>	80
<b>4: 10</b>	<b>Health and Medications</b>	85
4:10.1	Complications	85
4:10.2	Medication	86
4:10.3	Comparison of the Relationship of Duration of Diabetes to % HbA1c, Complications and Medications.	88
<b>Chapter 5: Discussion</b>		89
<b>5: 1</b>	<b>Demographics</b>	89
5:1.1	Education	89
5:1.2	Employment Status	89
5:1.3	Family History of Diabetes	90
<b>5: 2</b>	<b>Anthropometrics</b>	92
5:2.1	Age at Diagnosis	92
5:2.2	Obesity	93
<b>5: 3</b>	<b>Biochemical Indices</b>	94
5:3.1	Glycosylated Haemoglobin A1c	94
5:3.2	Lipids	96
<b>5: 4</b>	<b>Self-Empowerment</b>	97
5:4.1	Home Blood Glucose Monitoring	97
5:4.2	Hypoglycaemia	99
5:4.3	Hyperglycaemia	100
<b>5: 5</b>	<b>Education</b>	101
5:5.1	Timing of Education	101
5:5.2	Preferred Educators	101
5:5.3	Group versus Individual Education	102
5:5.4	Times and site of Education	104
5:5.5	Usefulness of Education	105
5:5.6	Education Medium	105
<b>5: 6</b>	<b>Food Choices made by Subjects</b>	105
5:6.1	Lipids	107
5:6.1.1	Type of Fat Used	107
5:6.1.2	Changes Made by Subjects After they Knew Their Lipid Profile	108
5:6.1.3	Low Fat Methods of Cooking	109
5:6.1.4	Takeaways	109
5:6.1.5	Spreads	110



5:6.2	Carbohydrate	112
5:6.3	Protein Intake	113
5:6.4	Vegetables and Fruit	114
5:6.4.1	Vegetables	114
5:6.4.2	Fruit	116
5:6.5	Non-Alcoholic Drinks	116
<b>5: 7</b>	<b>Alcohol Intake</b>	117
<b>5: 8</b>	<b>Label Reading</b>	119
<b>5: 9</b>	<b>Physical Activity</b>	120
<b>5: 10</b>	<b>Health and Medication</b>	122
5:10.1	Complications	122
5:10.2	Medication	122
5:10.2.1	Glycaemic Control	122
5:10.2.2	Hypertension	124
5:10.2.3	Depression	125
5:10.2.4	Hypercoagulability	126
5:11	Limitations of the Study	126
<b>Chapter 6:</b>	<b>Conclusion</b>	129
6:1	Recommendations for Future Research	135
6:1.1	Future Trends	136
	<b>References</b>	137
	<b>Appendices</b>	139
<b>1</b>	<b>Counties Manukau District Health Board Approval</b>	159
<b>2</b>	<b>Massey Ethical Approval Document</b>	160
<b>3</b>	<b>Introduction Sheet</b>	179
<b>4</b>	<b>Patient Information</b>	180
<b>5</b>	<b>Informed Consent</b>	183
<b>6</b>	<b>Questionnaire</b>	172
<b>7</b>	<b>Massey University Letter of Approval</b>	196
<b>8</b>	<b>Auckland Ethical Committee Letter of Approval</b>	197
<b>9</b>	<b>Anthropometric and Medical Data</b>	198
<b>10</b>	<b>Participants Report Back Letters</b>	199
<b>11</b>	<b>Diet Sheets</b>	201

## List of Tables

---

<b>Table 4:1</b>	Demographics of Subjects by Sex and Experimental Group	47
<b>Table 4:2</b>	Weight and Body Mass Index of Subjects at Referral and Follow Up	50
<b>Table 4:3</b>	Subjects in each BMI Category Happy with their Weight at Follow Up	51
<b>Table 4:4</b>	HbA1c in Subjects at Referral and Follow Up	51
<b>Table 4:5</b>	Comparison of HbA1c Percentage with BMI at Follow Up	51
<b>Table 4:6</b>	Comparison of Level of Education and HbA1c	52
<b>Table 4:7</b>	Biochemical Results of Subjects by Sex at Referral and Follow Up	53
<b>Table 4:8</b>	Biochemical Results by Therapy Group in Subjects at Referral and Follow Up	54
<b>Table 4:9</b>	% HbA1c in Relationship to Number of Days Testing	57
<b>Table 4:10</b>	Diagnosis and Education	60
<b>Table 4:11</b>	Education	61
<b>Table 4:12</b>	Type of Education Preferred	59
<b>Table 4:13</b>	Value of Individual Appointments for Initial Education	62
<b>Table 4:14</b>	Diabetes Education Material	63
<b>Table 4:15</b>	Comparison of the Level of Education with Preferred Medium of Education	64
<b>Table 4:16</b>	Value of Education Sheets	65
<b>Table 4:17</b>	Value of Education Sheets	66
<b>Table 4:18</b>	Value of Education Sheets	67
<b>Table 4:19</b>	Changes made once Lipid Profile Known	68
<b>Table 4:20</b>	Life Style Changes – Changes in Alcohol Consumption since Diagnosis	77
<b>Table 4:21</b>	Life Style: Frequency and Type of Alcohol Drunk by Subjects	78
<b>Table 4:22</b>	Frequency of Exercise Compared with Mean Body Mass Index and Biochemical Results	82
<b>Table 4:23</b>	Frequency of Exercise Compared with Body Mass Index at Follow Up	82
<b>Table 4:24</b>	Frequency of Exercise Compared with Level of Education	83
<b>Table 4:25</b>	Relationship of Time Spent Exercising per Week with Level of Education	83
<b>Table 4:26</b>	Time Subjects Spend in Exercise per Week Compared with Body Mass Index at Follow Up	84
<b>Table 4:27</b>	Frequency of Exercise with Change in Weight of Obese Subject Between Referral and Follow up (BMI >30)	84

<b>Table 4:28</b>	Frequency of Exercise with Change in Weight of Overweight Subject Between Referral and Follow Up (BMI 25 – 30)	85
<b>Table 4:29</b>	Comparison of Time since Diabetes Diagnosis, % HbA1c and Number of Complications	87
<b>Table 4:30</b>	Comparison of Time since Diabetes Diagnosis, % HbA1c and Number of Medications	87
<b>Table 5:1</b>	Employment Status of Subjects Compare to the National Statistics	90
<b>Table 5:2</b>	Risk Factors in the Development of Type 2 Diabetes	90
<b>Table 5:3</b>	Comparison of Percentage Overweight / Obese in Study Subjects and the New Zealand National Nutrition Survey	93
<b>Table 5:4</b>	Studies Showing Reduction in HbA1c Reduces Complications	95
<b>Table 5:5</b>	Recommended Lipid Levels	97
<b>Table 5:6</b>	Recommended Fat Intake	97
<b>Table 5:7</b>	Comparison of Fish Cooking Methods used by Subjects and New Zealand National Nutrition Survey Participants (Expressed as a % of total subjects)	109
<b>Table 5:8</b>	Percentage of Subjects Eating Takeaways Compared to the Percentage Eating Hot Chips in the New Zealand National Nutrition Survey	110
<b>Table 5:9</b>	Comparison of the Percentage Eating Takeaways between the Herald Digipoll and Research Subjects	110
<b>Table 5:10</b>	Intake of Margarines / Butter of Subjects Compared to the New Zealand National Nutrition Survey	111
<b>Table 5:11</b>	Spreads Eaten by the Subjects Compared to the New Zealand National Nutrition Survey	111
<b>Table 5:12</b>	Number of Servings of Vegetables Eaten by the Subjects Compared to the New Zealand National Nutrition Survey	114
<b>Table 5:13</b>	Non Alcoholic Drinks chosen by the Subjects Compared to the New Zealand National Nutrition Survey	117
<b>Table 5:14</b>	Percentage of Subjects Drinking Alcohol Compared to the New Zealand National Nutrition Survey	118
<b>Table 5:15</b>	Comparison of Label Reading in the Vermonter Poll and the Research Results	120

# List of Figures

---

<b>Figure 4:1</b>	Number of Relatives with Diabetes	46
<b>Figure 4:2</b>	Relatives Diagnosed with Diabetes	48
<b>Figure 4:3</b>	Years between Initial Diagnosis and Appointment with the Researcher	48
<b>Figure 4:4</b>	Age of Subjects	49
<b>Figure 4:5</b>	Age at Diagnosis of Diabetes	49
<b>Figure 4:6</b>	Value of Home Blood Glucose Monitoring	55
<b>Figure 4:7</b>	Number of Home Blood Glucose Tests per Day	56
<b>Figure 4:8</b>	Number of Days per Week Home Blood Glucose Testing Performed	56
<b>Figure 4:9</b>	Hypoglycaemia Treatments	57
<b>Figure 4:10</b>	Level of Knowledge of Hypoglycaemia Treatment: Comparing Differing Treatment Modalities	58
<b>Figure 4:11</b>	Hyperglycaemia Treatments Chosen	58
<b>Figure 4:12</b>	Methods Used to Cook Fish	69
<b>Figure 4:13</b>	Frequency of Takeaway Consumption by Gender	69
<b>Figure 4:14</b>	Type of Spreads Used	70
<b>Figure 4:15</b>	Type of Cereals Chosen	71
<b>Figure 4:16</b>	Number of Helpings of Cereal Eaten by Subjects per Week	71
<b>Figure 4:17</b>	Type of Bread Chosen	72
<b>Figure 4:18</b>	Amount of Bread Subjects Ate per Day	72
<b>Figure 4:19</b>	Number of Helpings of Pasta & Rice Eaten by Subjects per Week	73
<b>Figure 4:20</b>	Number of Helpings of Dairy Products Eaten by Subjects per Day	73
<b>Figure 4:21</b>	Type of Milk Chosen	74
<b>Figure 4:22</b>	Number of Helpings of Meat, Fish, Chicken and Eggs Eaten Per	74
<b>Figure 4:23</b>	Number of Helpings of Vegetables Eaten by Subjects per Day	75
<b>Figure 4:24</b>	Number of Helpings of Fruit Eaten by Subjects per Day	75
<b>Figure 4:25</b>	Types of Non-alcoholic Drinks Chosen by Subjects	76
<b>Figure 4:26</b>	Macronutrients Checked on Food Labels by Subjects	79
<b>Figure 4:27</b>	Usefulness of Label Reading for Subjects	79
<b>Figure 4:28</b>	Frequency of Exercise as Reported by Subjects	80
<b>Figure 4:29</b>	Time Spent in Exercise per Week	80
<b>Figure 4:30</b>	Type of Exercise Chosen	81
<b>Figure 4:31</b>	Energy Level of Physical Activity Subjects Chose	81
<b>Figure 4:32</b>	Frequency of Complications Associated with Diabetes	85
<b>Figure 4:33</b>	Number of Medications Taken by Subjects	86
<b>Figure 4:34</b>	Type of Medication Taken	88