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Dietetic management of obesity in Saudi Arabia: towards evidence based clinical practice guidelines

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**DIETETIC MANAGEMENT OF OBESITY IN SAUDI
ARABIA: TOWARDS EVIDENCE BASED CLINICAL
PRACTICE GUIDELINES**

A thesis submitted in fulfillment of the requirements
for the award of the degree

Doctor of philosophy

From

University of Wollongong

By

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M.Sc (Nutrition and Dietetics, McGill University, Canada)

Smart Foods Centre

School of Health Sciences

2009

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CERTIFICATION

I, Ali Almajwal declare that this thesis, submitted in fulfillment of the requirements for the award of Doctor of Philosophy, in the Smart Foods Centre and School of Health Sciences, is wholly my own work unless otherwise referenced or acknowledged *below*. The document has not been submitted for qualifications at any other academic institution

Ali Almajwal

15 October 2009

DEDICATION

To my parents, Madi (deceased) and Khaznah

To my wife Nehal

To my children Reema and Muath

For their love and continued support

ACKNOWLEDGEMENTS

There are many people who I need to thank for their help during the course of my thesis. I would firstly like to thank my primary supervisor, Associate Professor Peter Williams, who has generously shared his research knowledge and skills, as well as guiding me through the process of scientific publications and supporting opportunities for conference presentations. Thank you for your time, endless patience, regular encouragement and for the constructive, extensive and quick feedbacks on all aspects of this thesis. I would also like to thank you for your supervision through the teleconferences from overseas and for your visit to Saudi Arabia to supervise and support my work there.

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LIST OF ABBREVIATIONS

%	Percent
ADA	American Dietetic Association
ANOVA	Analysis of variance
AUC	Area Under the Curve
BG	BodyGem
BMI	Body mass index
BWLP	Behavior weight loss program
Ca	Calcium
CFBG	Capillary fasting blood glucose
CI	Confidence Interval
CRBG	Capillary random blood glucose
CV	Coefficient variation
CVD	Cardiovascular disease
DAA	Dietitians Association of Australia
DEXA	dual-energy X-ray absorptiometry
EBM	Evidence based medicine
EF	Eating frequency
FN	False negative
FP	False positive
FPG	Fasting plasma glucose
GI	Glycaemic index
GL	Glycaemic load
GRADE	Grade of Recommendations, Assessment, Development and Evaluation
HB	Harris-Benedict
HCLF	High-Carbohydrate, Low-Fat
HF	High Fat
Ht	Height
IASO	International Association for the Study of Obesity
IOTF	International Obesity Task Force
IRS	Insulin resistance syndrome

JBI	Joanna Briggs Institute
Kcal	Kilocalorie
Kg	Kilogram
KJ	Kilojoule
L	Liter
LR-	Negative likelihood ratio
LR+	Positive likelihood ratio
m	Meter
m ²	Meter square
Mg	Milligram
Mmol	Millimoles
MOH	Ministry Of Health
MUFA	Monounsaturated fatty acids
NA	Not available
NGCEBM	National and Gulf Centre for Evidence Based Medicine
NGT	Nominal group technique
NHLBI	National Heart, Lung and Blood Institution
NIH	National Institute of Health
NPV	Negative predictive value
NSW	New South Wales
NWCR	National Weight Control Registry
P	Confidence value
PHCCs	Primary health care centers
PPV	Positive predictive value
PUFA	Polyunsaturated fatty acids
r	Pearson's Correlation Coefficient
RCTs	Randomized controlled studies
REE	Resting energy expenditure
ROC	Receiver operator characteristic
RQ	Respiratory quotient
RTE	Ready-to-eat
SD	Standard deviation

SFA	Saturated fatty acids
SIGN	Scottish Intercollegiate Guidelines Network
TEE	Total energy expenditure
TEF	Thermic effect of food
TFI	Total dietary fat intake
UK	United Kingdom
UOW	University of Wollongong
USA	United States of America
VCO ₂	Carbon dioxide production
VO ₂	Oxygen consumption
Vs	Versus
WC	Waist circumference
WHO	World Health Organization
WHR	Waist-to-hip ratio
WMD	Weighted mean differences
WRC	Whole room calorimetry
wt	Weight

PUBLICATIONS

Peer reviewed publications in support of this thesis

- Almajwal A, Williams P, Batterham M. Planning for the development of evidence based guidelines for the nutritional management of obesity in Saudi Arabia. *New Egypt J Med.* 2008, 38 (1): 34-39
- Almajwal A, Williams P, Batterham M. Current dietetic practices of obesity management in Saudi Arabia and comparison with Australian practices and best practice criteria. *Nutrition & Dietetics.* 2009;66:94-100
- Almajwal A, Al-Baghli N, Batterham M, Williams P, Al-Turki K, Al-Ghamdi A. Performance of Body Mass Index in predicting diabetes and hypertension in the Eastern province of Saudi Arabia. *Ann Saudi Med.* 2009;29(6):437-445
- Almajwal A, Williams P, Batterham M. Validity of the BodyGem™ calorimeter and prediction equations for the assessment of REE in overweight and obese Saudi male. *Nutr Clin Prac* (Submitted January 2010)

Peer reviewed conference publications and presentations in support of this thesis

- Almajwal, A., Williams, P. & Batterham, M. 2008, 'Development of evidence-based clinical guidelines for the nutritional management of obesity in Saudi Arabia - Project methodology and update', 4th Saudi Annual Evidence Based Medicine Conference and Workshops, King Fahad Medical City, Riyadh, pp. 25 (oral presentation)
- Almajwal, A., Williams, P., Batterham, M. & Alothman, A. 2008, 'Planning for the development of evidence based guidelines for the nutritional management of obesity in Saudi Arabia'. Dietitians Association of Australia. 26th National Conference, *Nutrition and Dietetics* 65 (Supp 11):A26. (poster presentation)
- Almajwal, A., Williams, P. & Batterham, M. 2008, 'Current dietetic practices of dietitians in Saudi Arabia and comparison with Australian practices and best practice criteria'. Dietitians Association of Australia. 26th National Conference, *Nutrition and Dietetics* 65(Supp11):. A26 (poster presentation)

TABLE OF CONTENTS

CERTIFICATION.....	3
DEDICATION.....	4
ACKNOWLEDGEMENTS.....	5
LIST OF ABBREVIATIONS.....	7
PUBLICATIONS.....	10
TABLE OF CONTENTS.....	12
LIST OF APPENDICES.....	16
LIST OF TABLES.....	18
LIST OF FIGURES.....	21
ABSTRACT.....	22
CHAPTER 1: INTRODUCTION.....	24
PART A: GENERAL INTRODUCTION	25
1.1 Scope of thesis	
1.2 Prevalence of obesity in Saudi Arabia	
1.3 Current dietetic practices with obesity in Saudi Arabia	
1.4 Evidence based medicine (EBM) organizations in Saudi Arabia and the region	
1.5 Thesis aims	
PART B: PLANNING FOR THE DEVELOPMENT OF EVIDENCE BASED GUIDELINES FOR THE NUTRITIONAL MANAGEMENT OF OBESITY IN SAUDI ARABIA.....	29
1.6 Abstract	
1.7 Introduction	
1.8 Methods	
1.9 Results	
1.10 Discussion	

PART C: PLAN OF THESIS.....	39
1.11 Thesis hypotheses	
1.12 Studies undertaken	
CHAPTER 2 METHODOLOGY.....	42
2.1 Introduction	
2.2 BMI and obesity classification	
2.3 Methods for assessment of energy expenditure	
2.4 Evidence based clinical practice guidelines	
CHAPTER 3: CURRENT DIETETIC PRACTICES OF OBESITY MANAGEMENT IN SAUDI ARABIA AND COMPARISON WITH AUSTRALIAN PRACTICES AND BEST PRACTICE CRITERIA...	60
3.1 Abstract	
3.2 Introduction	
3.3 Methods	
3.4 Results	
3.5 Discussion	
CHAPTER 4: PERFORMANCE OF BODY MASS INDEX IN PREDICTING DIABETES AND HYPERTENSION IN THE EASTERN PROVINCE OF SAUDI ARABI.....	76
4.1 Abstract	
4.2 Introduction	
4.3 Methods	
4.4 Results	
4.5 Discussion	

CHAPTER 5: VALIDITY OF THE BODYGEM™ CALORIMETER AND PREDICTION EQUATIONS FOR THE ASSESSMENT OF REE IN OVERWEIGHT AND OBESE SAUDI MALES.....

93

5.1 Abstract

5.2 Introduction

5.3 Methods and Materials

5.4 Results

5.5 Discussion

5.1 Abstract

CHAPTER 6: DEVELOPMENT OF EVIDENCE BASED CLINICAL PRACTICE GUIDELINES.....

115

6.1 Introduction..... 115

6.2 Methodology..... 117

6.2.1 Adaptation of existing evidence based statements

6.2.2 Development of new evidence based statements

6.2.3 Development of new consensus statements

6.3 Results..... 128

6.3.1 Adaptation of existing evidence-based statements

6.3.2 Development of new evidence based statements

6.3.2.1 Effect of Calcium/dairy diet on body weight in adults

6.3.2.2 Effect of Polyunsaturated fatty acids and Monounsaturated fatty acids on body weight in adults

6.3.2.3 Effect of low glycemic index diet on body weight in adults

6.3.2.4 Effect of Fiber intake on body weight in adults

6.3.2.5 Effect of eating frequency and breakfast intake on body weight in adults

6.3.2.6 Accuracy of equations for the calculation of REE in obese people

6.3.3 Development of new consensus statements

CHAPTER 7: SUMMARY AND CONCLUSIONS..... 219

7.1 Summary of the research

7.2 Significance of the research

7.3 Limitations and future research

REFERENCES..... 226

APPENDICES..... 249

LIST OF APPENDICES

Appendix A: Quality Criteria Checklist.....	250
Appendix B: Dietetic practices survey – English version.....	254
Appendix C : Dietetic practices survey – Arabic version.....	264
Appendix D: Dietetic practices survey – samples of the web-based form.....	273
Appendix E: Dietetic practices survey – Ethics Approval.....	276
Appendix F: Dietetic practices survey – Introductory letter and participant information sheet (English version).....	277
Appendix G: Dietetic practices survey – Introductory letter and participant information sheet (Arabic version).....	279
Appendix H : BodyGem and prediction equations study – recruitment advertisement	281
Appendix I: BodyGem and prediction equations study – Screening questionnaire....	282
Appendix J: BodyGem and prediction equations study –Participant Information Sheet.....	284
Appendix K: BodyGem and prediction equations study – Consent Form.....	287
Appendix L: BodyGem and prediction equations study – Ethics Approval.....	289
Appendix M: Delphi consultations study- Participants list.....	290
Appendix N: Delphi consultations study-Ethics Approval.....	291

Appendix O: Delphi consultations study- Invitation Email.....	293
Appendix P: Delphi consultations study-Participant Information Sheet.....	294
Appendix Q: Delphi consultations study-Delphi Emails.....	296
Appendix R: Workshop on the development of consensus statements.....	298
Appendix S: Delphi consultations study-First round questionnaire.....	305
Appendix T: Delphi consultations study-Round 1 Feedback and Final Round Questionnaire.....	314
Appendix U: Delphi consultations study- Round 2 Feedback and Final report.....	321
Appendix V: Draft clinical practice guidelines for nutritional management of obesity in Saudi Arabia.....	327

LIST OF TABLES

Table 1.1: Mean level of agreement with specific statements ranked by participants (n=46)

Table 3.1 Demographic profile of survey respondents (n=253)

Table 3.2 Comparison of the assessment approaches and service provision for weight management by dietitians in Saudi Arabia in 2007 and Australia in 2002

Table 3.3 Comparison of the use of recommended strategies for weight management used by dietitians in Saudi Arabia in 2007 and Australia in 2002

Table 4.1 Population characteristics (n = 195,851)

Table 4.2 Diagnostic performance of BMI in detecting diabetes and/or hypertension using optimal BMI cut-off values based on the shortest distance in ROC curves in Saudi adults, Eastern province, 2004, (n = 195,851)

Table 4.3 Risk of diabetes and/or hypertension associated with increasing BMI in Saudi adults, Eastern province, 2004, based on regression analysis (n = 195,851)

Table 4.4 Diagnostic performance of BMI in detecting diabetes and/or hypertension using optimal BMI cut-off values based on the significant association using logistic regression in Saudi adults, Eastern province, 2004, (n = 195,851)

Table 5.1 Subjects characteristics (n=38)

Table 5.2 Energy predictive equations

Table 5.3 Accuracy of REE, VO₂ and RQ measured by WRC and BG

Table 5.4 Accuracy of REE measured by BG and REE predicted from prediction equations

Table 6.1 Main elements and approaches used for the development of the clinical practice guidelines

Table 6.2 Statements adopted from existing obesity guidelines

Table 6.3 Evidence Summary: Higher Calcium or dairy intake and weight loss in adults

Table 6.4 Calcium and body weight: type, quality and number of supportive and non supportive studies

Table 6.5 Evidence Summary: PUFA and weight loss in adult

Table 6.6 Evidence Summary: MUFA and weight loss in adults

Table 6.7 PUFA and intake and weight loss: type, quality and number of supportive and non supportive studies

Table 6.8 MUFA intake and weight loss in adults

Table 6.9 Evidence Summary: low glycaemic index diet and weight loss in adults

Table 6.10 Low glycaemic index diet and weight loss: type, quality and number of supportive and non supportive studies

Table 6.11 Evidence Summary: Fiber intake and weight loss in adults

Table 6.12 Fiber intake and weight loss in adults: type, quality and number of supportive and non supportive studies

Table 6.13 Evidence Summary: Meal frequency & breakfast intake and weight loss in adults

Table 6.14 Meal frequency and weight loss in adults: type, quality and number of supportive and non supportive studies

Table 6.15 Breakfast intake and weight loss in adults: type, quality and number of supportive and non supportive studies

Table 6.16 Evidence Summary: validation studies used to evaluate the Harris-Benedict equation in obese participants

Table 6.17 Evidence Summary: validation studies used to evaluate the Mifflin equation in obese participants

Table 6.18 Evidence Summary: validation studies used to evaluate the Owen equation in obese participants

Table 6.19 Evidence Summary: validation studies used to evaluate the Schofield equation in obese participants

Table 6.20 Evidence Summary: validation studies used to evaluate the WHO/FAO/UNU equation in obese participants

Table 6.21 Accepted statements with their scores in percentage

LIST OF FIGURES

Figure 1.1: Recent changes in the prevalence of obesity (% of the population with BMI > 30) in Saudi Arabia

Figure 1.2: Framework for the PhD program of studies

Figure 2.1 ROC curves for perfect, good and worthless tests

Figure 2.2 Human Whole Room Calorimeter in UOW

Figure 2.3 BodyGem device and its mouthpiece and nose clip

Figure 4.1 ROC curve showing the performance of BMI in predicting diabetes and hypertension

Figure 5.1 Bland-Altman plot of differences in REE measures between two BG measurements with the same device in overweight and obese Saudi males (n=35).

Figure 5.2 Bland-Altman plot of differences in REE measures between one WRC measure and the mean of two BG measurements in overweight and obese Saudi males (n=38).

Figure 5.3 Bland-Altman plot of differences in REE measures between WRC measure and 3 predictive equations (HB, WHO, Schofield) in overweight and obese Saudi males (n=38).

Figure 6.1 Steps in Guideline Development

Figure 6.2 Delphi technique procedures

ABSTRACT

Obesity is one of the most common disorders encountered in clinical practice and has major public health implications. It is also one of the most difficult and frustrating disorders to manage successfully. The prevalence of overweight and obesity in Saudi Arabia is high and increasing over recent years. Management of obesity should be based on the best available scientific evidence. At present, there are no national clinical practice guidelines of use by dietitians and other health practitioners for the management of obesity. Since dietetics is a relatively new profession in Saudi Arabia there is little published data available in this area.

This thesis aimed to describe the current dietetic practices of obesity in Saudi Arabia and to develop a draft set of national clinical practice guidelines for obesity management. The present thesis includes three main projects. Based on the outcomes of these projects, a draft of evidence-based practice guidelines for the nutritional management of obesity in Saudi Arabia was prepared.

The first project (Chapter 3) involved dietitians to investigate the context and better understand the range of current practices in obesity management in Saudi Arabia, demand for and level of service, and barriers to obesity management. Analysis of the study showed that Saudi Arabian dietetic practice for the management of obesity does incorporate most practice recommendations, but some specific elements are rarely used. The most common assessment approaches were assessment of BMI, exercise habits and weight history while the most common strategies for obesity management were dietary total fat reduction and increased incidental daily activity. The major barriers for establishment of a weight management clinic were inadequate resources and administration and referral issues. None of the participants used local obesity guidelines but 61% of participants relied on international guidelines.

The second project included two studies focused on the validity of the most important practical tools used for the classification of obesity (Chapter 4) and the assessment of energy requirements (Chapter 5) since research has been lacking in this area in the Saudi population. The first study examined the use of different BMI cut-off points for obesity classification. Results indicated that the diagnostic usefulness of BMI alone in

defining obesity is limited in the Saudi adult population, for both men and women. It seems likely that limiting management of obesity only to those individuals with a BMI ≥ 30 , as defined by the WHO, may mean that many Saudis at risk of serious comorbidities could be missing necessary interventions. The second study assessed the accuracy of prediction equations and a popular hand-held calorimeter (BodyGem) for assessment of resting energy expenditure (REE). Based on the findings of this study it was concluded that the Harris-Benedict, Schofield and WHO equations tend to predict REE more accurately than the BodyGem device. However, their accuracy was not clinically acceptable on an individual level. Therefore, the value of the use of both BodyGem devices and predictive equations is still uncertain for Saudi population and more research is needed in this area.

The third project (Chapter 6) focused on the development of draft clinical practice guidelines, based on a review of existing international guidelines, supplemented with systematic literature reviews, and refined through the use of consultation workshops and Delphi technique consultations with Saudi experts and practitioners. Findings from the systematic mini reviews provided low to medium level evidence for the use of some novel dietary interventions such as the high intake of calcium, PUFA or fiber to assist with weight loss or maintenance. There was also similar evidence for the use of a low glycemic index diet. Higher eating frequency, not exceeding 6 meals per day, may also help in weight reduction. Regular breakfast intake also appears to be associated with lower body weight. Consultations workshops and Delphi consultations indicated that there are cultural differences between Saudi Arabian population and other Western populations. Therefore, specific consensus statements were developed to cover practice areas such as behavioral modifications, dietary counselling strategies, physical activity and obesity management in Ramadan.

In summary, this thesis has provided clinical practice guidelines for obesity management in Saudi Arabia. The application of these guidelines will improve nutritional management of obesity and enable dietitians and other health professionals to use approaches based on the best available evidence.