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

Ali Almajwal
University of Wollongong

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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

Ali Almajwal

B.Sc (Clinical Nutrition, King Saud University, Saudi Arabia)

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

JB I	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 BodyGemTM 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)

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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 co-morbidities 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.