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
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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I convey my thanks to Ms Nola Hurt, Ms Beryl Schafe and Pat Gracie, who have assisted in administration needs over the entire process of this thesis.
This research would not have been possible without the wonderful participants whom volunteered the time and experiences. Also I would to thanks all dietitians and other health professionals in Saudi Arabia who participated in the dietetic practices survey, interviews, consultation workshops and Delphi consultations.

To my wife who has always been supportive of my studies while we were away from home and relatives in Canada when I was doing my master program and now in Australia. Thank you for all your encouragement, patience, support, love and your assistance with the children. Now we can return back home and enjoy our life.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>%</td>
<td>Percent</td>
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<tr>
<td>ADA</td>
<td>American Dietetic Association</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Analysis of variance</td>
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<tr>
<td>AUC</td>
<td>Area Under the Curve</td>
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<tr>
<td>BG</td>
<td>BodyGem</td>
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<tr>
<td>BMI</td>
<td>Body mass index</td>
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<tr>
<td>BWLP</td>
<td>Behavior weight loss program</td>
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<tr>
<td>Ca</td>
<td>Calcium</td>
</tr>
<tr>
<td>CFBG</td>
<td>Capillary fasting blood glucose</td>
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<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>CRBG</td>
<td>Capillary random blood glucose</td>
</tr>
<tr>
<td>CV</td>
<td>Coefficient variation</td>
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<tr>
<td>CVD</td>
<td>Cardiovascular disease</td>
</tr>
<tr>
<td>DAA</td>
<td>Dietitians Association of Australia</td>
</tr>
<tr>
<td>DEXA</td>
<td>dual-energy X-ray absorptiometry</td>
</tr>
<tr>
<td>EBM</td>
<td>Evidence based medicine</td>
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<tr>
<td>EF</td>
<td>Eating frequency</td>
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<tr>
<td>FN</td>
<td>False negative</td>
</tr>
<tr>
<td>FP</td>
<td>False positive</td>
</tr>
<tr>
<td>FPG</td>
<td>Fasting plasma glucose</td>
</tr>
<tr>
<td>GI</td>
<td>Glycaemic index</td>
</tr>
<tr>
<td>GL</td>
<td>Glycaemic load</td>
</tr>
<tr>
<td>GRADE</td>
<td>Grade of Recommendations, Assessment, Development and Evaluation</td>
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<tr>
<td>HB</td>
<td>Harris-Benedict</td>
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<tr>
<td>HCLF</td>
<td>High-Carbohydrate, Low-Fat</td>
</tr>
<tr>
<td>HF</td>
<td>High Fat</td>
</tr>
<tr>
<td>Ht</td>
<td>Height</td>
</tr>
<tr>
<td>IASO</td>
<td>International Association for the Study of Obesity</td>
</tr>
<tr>
<td>IOTF</td>
<td>International Obesity Task Force</td>
</tr>
<tr>
<td>IRS</td>
<td>Insulin resistance syndrome</td>
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</tbody>
</table>
JBI Joanna Briggs Institute
Kcal Kilocalorie
Kg Kilogram
KJ Kilojoule
L Liter
LR- Negative likelihood ratio
LR+ Positive likelihood ratio
m Meter
m² 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
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
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<tbody>
<tr>
<td>SFA</td>
<td>Saturated fatty acids</td>
</tr>
<tr>
<td>SIGN</td>
<td>Scottish Intercollegiate Guidelines Network</td>
</tr>
<tr>
<td>TEE</td>
<td>Total energy expenditure</td>
</tr>
<tr>
<td>TEF</td>
<td>Thermic effect of food</td>
</tr>
<tr>
<td>TFI</td>
<td>Total dietary fat intake</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>UOW</td>
<td>University of Wollongong</td>
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<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
<tr>
<td>VCO₂</td>
<td>Carbon dioxide production</td>
</tr>
<tr>
<td>VO₂</td>
<td>Oxygen consumption</td>
</tr>
<tr>
<td>Vs</td>
<td>Versus</td>
</tr>
<tr>
<td>WC</td>
<td>Waist circumference</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>WHR</td>
<td>Waist-to-hip ratio</td>
</tr>
<tr>
<td>WMD</td>
<td>Weighted mean differences</td>
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<tr>
<td>WRC</td>
<td>Whole room calorimetry</td>
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<tr>
<td>wt</td>
<td>Weight</td>
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Peer reviewed conference publications and presentations in support of this thesis


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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 $\geq 30$, 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.