Obesity Abstracts

Obesity Update 2020

13 February 2020, Royal College of Physicians, London, UK

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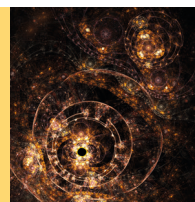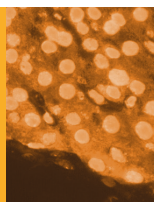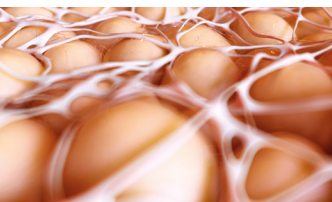
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Obesity Update 2020

13 February 2020

Royal College of Physicians, London, UK

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A year in review: what are the highlights?
OU1

Abstract unavailable.

OU2

Personalised obesity management

Carel le Roux
Diabetes Complications Research Centre, University College Dublin, Dublin, Ireland.

Obesity is not simply a behavioural or lifestyle issue, but a set of complex chronic and relapsing diseases worthy of the same consideration as any other life-threatening diseases. While obesity is often viewed as a single risk factor for other diseases, there are in fact many distinguishable subpopulations living with different types of obesity, including those defined by risks of complications and others by optimal treatment response. While subpopulations will overlap, the decomposition of the amorphous collective of people with obesity into clinically relevant subpopulations will revolutionise future obesity care. Treating specific disease subpopulations will lead to better results. Much research to date has focused on exploring the aetiology of obesity. While multiple causes and risk factors for obesity have been identified, with few exceptions this has not led to successful treatment of most people living with obesity. We need to focus on diagnosing patients with specific obesity diseases and thus specific treatment needs. Treatment can now focus on reducing the risks associated with those diseases, and delivering the optimum response. This goes far beyond current 'one size fits all' approaches, which have often delivered poor results to date. By diagnosing and treating well-defined subpopulations of obesity, we may be able to offer new hope. New scientific knowledge generated will only have value when it changes perceptions and behaviours of people living with obesity, clinicians, regulatory bodies, payment agencies and industry alike. There is a common ill-informed perception that obesity is solely a behavioural condition and that it is the responsibility of people living with obesity to address their own condition through willpower alone. This perception is held by patients themselves, by clinicians, by payment agencies, and by industry and leads to inappropriate choices: patients do not seek medical help, clinicians fail to apply chronic disease models to treat the disease, reimbursement agencies are slow to pay for treatment and industry try to develop one-size-fits-all interventions. This is deeply counterproductive, given the ongoing cost (to the patient's quality of life, in clinical time and resources) of obesity and its complications. By helping stakeholders to understand that obesity is a set of complex and chronic diseases, and that complications and clinical outcomes can be predicted and prevented, we may be able to establish a new narrative, understanding and vocabulary.

OU3

Working with commercial providers to deliver weight loss services at scale

Susan Jebb
University of Oxford, Oxford, UK.

Weight management services need to operate at scale if everyone one who might benefit is to have the opportunity to receive treatment. There is a large body of research developing and testing 'boutique' weight-loss interventions, usually involving highly trained professionals, with multiple contact points, putting them beyond the budget or workforce capacity of the NHS. For the few interventions that do make it into routine care, experience has shown that the effectiveness of the intervention usually wanes when the programme is delivered by generalists. Remote interventions, delivered using technology, are an attractive proposition but need to be maintained over time which is often beyond the capacity or remit of research teams. In recent years there has been a marked expansion in the NHS use of commercial providers to offer weight-loss programmes on an 'industrial' scale. Our research has shown that referral to commercial weight-loss groups in the community leads to weight losses of about 5 kg at 1 year, double that of programmes offered within a GP practice. A trial involving referral to a commercial provider offering a total diet replacement programme achieved 10 kg weight loss at 1 year, very similar to another trial offering the same diet but supported by practice nurses. In each case the commercial provider was more cost effective. Qualitative research shows that patients find these services acceptable and in some cases more convenient than treatment offered by health professionals. By working with commercial providers the National Diabetes Prevention programme has achieved universal coverage, with significant reductions in weight and HbA1c. While many of these services can be accessed directly by the public, well-managed partnerships with the NHS provide reassurance to patients of a credible service, increase motivation to attend and help to avoid widening health inequalities by providing access to those with the greatest need.

Plenary 1: Identification and treatment of eating disorders in obesity
OU4

Identification and treatment of eating disorders in obesity – emotional eating

Samantha Scholtz
West London NHS Trust, London, UK.

People living with obesity have higher rates of eating disorders, particularly binge eating disorder, which also carries a higher risk of depression and anxiety disorders. The relationship between obesity disordered eating and emotional regulation is an area of research interest, particularly as we know that loss of control over eating leads to weight remission after even the most effective weight loss interventions, such as bariatric surgery. In this plenary we examine the interaction between these factors and consider methods of early detection and evidence based treatments which may improve outcomes in weight management.

Debate: There is no such thing as healthy obesity
OU5

Abstract unavailable.

OU6

Abstract unavailable.

Symposium: NASH & Type 2 diabetes
OU7

Prevalence and Identification of NASH in type 2 diabetes

Matthew Armstrong
Queen Elizabeth University Hospital Birmingham, Birmingham, UK.

Non-alcoholic fatty liver disease (NAFLD) is the commonest cause of liver disease in the UK, with an estimated prevalence of 25% of the general population.

It is a spectrum of disease ranging from simple liver steatosis, through to progressive liver inflammation (known as non-alcoholic steatohepatitis - NASH) and liver scar tissue (fibrosis). The latter can lead to thedevelopment of cirrhosis, liver failure and hepatocellular cancer (HCC). The main risk factors for NAFLD are type 2 diabetes, obesity and to a lesser extent other components of the metabolic syndrome. The severity of fibrosis is the main predictor of significant liver-related morbidity and mortality, whereby patients with cirrhosis have a 40-fold risk of liver death compared to those without fibrosis. However, patients with advanced fibrosis or cirrhosis may have no signs or symptoms and can have normal liver function tests (LFTs) on blood sampling and a falsely reassuring liver ultrasound. Simple scoring systems (Fib-4, NAFLD Fibrosis Score), specialist bloods tests (Enhanced Liver Fibrosis Test – ELF) and imaging modalities (Transient Elastography – Fibroscan) are now increasing available to 'rule out' or 'rule in' advanced liver fibrosis. All these modalities have negative predictive values ('rule out') for advanced liver fibrosis of greater than 85%, whereas the positive predictive value ('rule in') are less so, especially in the primary care setting. Clinical guidelines and referral pathways recommend the sequential algorithmic use of a simple scoring system (i.e. Fib–4) followed by a specialist tool (either ELF test or Fibroscan depending on their availability locally) to identify patients at risk of advanced fibrosis in primary care and/or in secondary care metabolic clinics. Identifying patients with cirrhosis enables 6–monthly HCC surveillance, screening for portal hypertension (i.e. varices) and more focused lifestyle and pharmaceutical management to prevent progression to liver failure and premature death.

OU8

Abstract unavailable.

Plenary 2: Is there a future for bariatric surgery in the NHS?
OU9

Is there a future for bariatric surgery in the NHS?
Richard Welbourn
Consultant Upper GI and Bariatric Surgeon, Musgrove Park Hospital, Taunton, UK.

Bariatric surgery remains the only long–term effective treatment for patients with severe and complex obesity. Many studies have shown its superiority over lifestyle interventions and dieting. There are also many cost effectiveness studies indicating that the cost/QALY for bariatric surgery is well below the threshold set by NICE. Bariatric surgery is also safe, with HES data to indicate that 30-day mortality rates are less than 1 in 1000 in NHS England. The data are representative of bariatric surgery around the world. Despite this the provision of surgery remains extremely low. Only ca. 5500 operations are done annually in the English NHS, much less than 1% of those potentially eligible for surgery according to NICE Guidance. Most NHS surgery is carried out in England, there is very little done in Wales and Scotland and none in N Ireland. The 2014 NICE Guidance recommended an expedited referral for consideration of surgery for people with recent onset type 2 diabetes (within 10 years) and a Body Mass Index (BMI) of 35 or more, but Clinical Commissioning Groups and referrers have largely ignored this. Patients are also eligible with BMI of 40 or more. Clinical inertia and weight prejudice likely play a role. To begin change, all healthcare workers starting at undergraduate level need education on nutrition. Clinicians should lead a change in mindset for all healthcare professionals towards opportunistic identification and recommending eligible patients to Weight Assessment and Management clinics. In other healthcare settings such as Sweden bariatric surgery has been prioritised over less cost-effective treatments e.g. minimally symptomatic hernias or gallstones. The NHS needs extra capacity but it cannot continue largely to ignore treatment for the major health problem affecting the most obese population in Western Europe. The NHS cannot afford not to offer bariatric surgery.

Case Discussions

Case Discussions: Complex Clinical Cases 1

CD1.1

The prevalence and impact of obesity in adults with type 1 diabetes; a cross-sectional study

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Background
Obesity has largely been associated with type 2 diabetes, while people with type 1 diabetes (T1DM) are usually lean at diagnosis. Given the growing prevalence of obesity in the general population, people with T1DM are at increased risk of weight gain, insulin resistance and developing 'double diabetes (DD)'. People with DD are at increased risk of micro/macrovascular complications and mortality. In this study we aimed to examine the prevalence and impact of overweight/obesity in people with T1DM.
Methods
We conducted a retrospective cross-sectional study of consecutive patients with T1DM who attended an adult diabetes clinic between January and September 2019 in a secondary care hospital. Data was collected from electronic patients' records. Estimated glucose disposal rate (eGDR) was utilised as marker of insulin resistance and an eGDR value of <8 used to identify individuals with DD. Data is presented as mean $\pm$ standard deviation, or numbers (percentage).
Results
The records of 103 people with T1DM were screened with 10 excluded as no body mass index (BMI) data was available. Study population had mean age of 48.1 (± 17.1) years; BMI 27.5 (± 6.1) kg/m^2, and 46 (49.5%) were females. The prevalence of overweight/obesity was 56/93 (60.2%), and of obesity 30/93 (32.6%). People with T1DM and overweight/obesity compared to those with normal BMI had longer duration of diabetes (21.3 vs 12.7 years, $P=0.004$); higher total daily insulin dose (72.2 vs 39.5 units, $P<0.001$), and higher DD prevalence (76.8% vs. 27.0%, $P<0.001$); but similar HbA1c (67.8 vs. 70.6 mmol/mol, $P=0.35$). There was an association between increasing BMI and decreasing eGDR, $R^2=0.503$. People with T1DM and overweight/obesity had an odd's ratio of 42.6 to suffer from DD compared to those with normal BMI (95% confidence interval 4.9–369.0, $P<0.001$).
Conclusions
Overweight/obesity is common in people with T1DM and requires more attention. People with T1DM and overweight/obesity are at increased risk of DD and subsequent risk of complications. Longer duration of T1DM is associated with higher BMI independent of age or glycaemic control. Interventions aiming to prevent weight gain early on after the diagnosis with T1DM are needed.

CD1.2

A case of refractory euglycemic diabetic ketoacidosis post elective bariatric surgery

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SGLT2 inhibitors (SGLT2Is) are increasingly prescribed for patients with Type 2 Diabetes (T2D) as they are associated with cardiovascular benefit and weight loss with low risk of hypoglycaemia. However, in the last few years, euglycemic ketoacidosis has emerged as a recognized complication of treatment with SGLT2I. The challenge lies in delayed recognition and treatment as it can be easily overlooked due to the conspicuous absence of marked hyperglycaemia. Ketoacidosis can also occur in starvation, low calorie diet, pregnancy and alcohol excess. Herein we present a case of a 54-year-old patient with T2D on empagliflozin, who presented with euglycemic ketoacidosis (euDKA) within 24 h following elective bariatric surgery. Pre-operatively, he had undergone liver shrinkage diet (LSD) for 2 weeks and continued empagliflozin contrary to clinical instructions. His ketonemia proved unusually refractory to DKA protocol, complicated by episodes of hypoglycaemia and hypotension. Ketosis worsened on weaning of DKA treatment and he required ITU admission. His ketonemia took 72 h to resolve. He mistakenly continued to take empagliflozin on discharge, leading to continued ketonemia (with no acidosis) for 2 weeks post-op, until he was once again advised to stop, during his diabetes post-op review. This case highlights the multifactorial causes of euDKA: treatment with SGLT2I throughout LSD, and prolonged starvation peri-operatively. It exemplifies the importance of stopping SGLT2I during LSD, as well as post bariatric surgery. The current recommendation is to withhold SGLT2i 24 h prior to surgery, given their half-life is 12.5 h. In agreement with a recently published review of euDKA cases following surgical procedures, we feel that there is a need to revise the current recommendation and develop a comprehensive guideline for perioperative management for patients on SGLT2I, in particular as these drugs are likely to be used more widely in Type 1 diabetes and heart failure patients in the near future. Moreover, it is important to maintain a high index of suspicion for euDKA in patients with T2D on SGLT2I, especially in perioperative setting. Finally, this case emphasizes the importance of preoperative patients' and healthcare professionals' education and close follow-up by the diabetes team.

CD1.3

The use of Somatostatin Analogue and Novel use of Freestyle Libre™ continuous blood sugar monitoring in refractory Hyperinsulinaemic Hypoglycaemia Post Bariatric Surgery

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Bariatric surgery has increasingly been associated with complications including hyperinsulinaemic hypoglycaemia associated primarily with early and late dumping syndrome, with a suggested prevalence of 0.36% (1). The symptoms can be extremely problematic with late dumping often presenting several years after surgery (1). Here we summarise the management in two such patients. Case 1: A 44 year old lady with a history of successful Roux-en-Y gastric bypass surgery (6 years prior) presented with a 24 months of autonomic and neuroglycopenic symptoms relieved by the ingestion of carbohydrate. Capillary blood glucose monitoring revealed hypoglycaemia, glucose level falling to 1.6 mmol/l post prandially. Mixed meal testing, confirmed late dumping and inpatient 48 h fast excluded insulinoma. Strict low carbohydrate diet with the exclusion of liquid carbohydrate was followed with specialist bariatric dietetic input and medical trial of Acarbose and Diazoxide, both failed to provide sustained glycaemic control. Freestyle Libre™ was utilised as novel way to predict glycaemic trend and measure success of treatment. She underwent successful test dosing with subcutaneous Octreotide and she was later switched to Sandostatin LAR 30 mg IM injections every 28 days. Case 2: A 49-year-old lady, known to have had Roux-en-Y bariatric gastric bypass surgery (7 years prior) was investigated for episodes of symptomatic hypoglycaemia. She underwent mixed meal testing which revealed evidence of late dumping syndrome. Insulinoma was excluded biochemically with 48 h fasting. Initial trial of Acarbose and Diazoxide failed to control hypoglycaemia. A test dose of Octreotide was successful and 50 mcg OD S/C with significant improvement in hypoglycaemic episodes. Once again Freestyle Libre™ was used to assist in patient management. These cases demonstrate the difficulties of management of late dumping syndrome notable several years after successful bariatric surgery. Here we have successfully used the effect of Octreotide in delaying gastric emptying, inhibiting insulin secretion, and increasing gut transit time (2) to manage refractory dumping syndrome. This treatment has significantly improved the quality of life of these patients, albeit for the short term (3). We have also shown how the use of Freestyle Libre™ was a novel way of monitoring treatment and in the post bariatric surgical setting.

CD1.4

Liraglutide downregulates the expression of miRNA-424 in patients with obesity

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[1]King's College Hospital NHS Foundation Trust, London, UK; [2]University of Warwick, Coventry, UK; [3]University Hospitals Coventry and Warwickshire NHS Trust, Coventry, UK; [4]University of Derby, Derby, UK; [5]Imperial College London, London, UK; [6]King's College London, London, UK; [7]Nottingham Trent University, Nottingham, UK

Aims
Liraglutide 3 mg once daily is an approved, prescription injectable Glucagon Like Peptide-1 receptor agonist that, when used with a low-calorie diet and increased

physical activity, can reduce excess weight in patients with obesity. MiRNAs are small non-coding single stranded RNAs that regulate gene expression post-transcriptionally by inhibiting their mRNA target translation into proteins. MiRNAs can be secreted in the blood stream and affect the molecular pathways of distal cells. Several studies have demonstrated that obese patients express a differential pattern of circulating miRNAs compared to lean subjects. The effects of liraglutide in circulating miRNAs remain largely unknown.

Methods
To investigate whether treatment with 3 mg liraglutide can affect the level of circulating miRNAs, we tested the expression of several miRNAs in the plasma of 16 patients with obesity enrolled in a clinical trial at baseline and after 8 weeks of treatment with qPCR analysis using the Locked Nucleic Acid technology. RNA was extracted using miRNeasy Serum/Plasma Advanced Kit (Qiagen) and reverse transcribed into cDNA using miRCURY Universal RT Kit (Qiagen). MiRNA expression was analysed using SYBR green (Sigma) and LNA primer assays (Qiagen). Cel-miR-39-3p and Unisp6 spike-ins were used as controls of RNA extraction and reverse-transcribed respectively to normalise the expression of the miRNAs of interest.

Results
At baseline, participants had a mean weight of 120.5 kg ($\pm$19.64) and BMI of 42.18 kg/m^2. At week 8, participants had lost a mean of -6.1 kg (s.d.$\pm$ 2.39) of body weight ($P<0.01$). Among the tested miRNAs, expression of miR-424 was significantly ($P=0.008$) decreased after 8 weeks of treatment. Statistical analysis was performed using paired, two-tailed student t-test with level of significance set at $P<0.05$.

Conclusions
Despite growing interest in the roles of obesity induced miRNAs in insulin resistance and T2DM, their molecular targets and regulation mechanism are not completely understood. According to evidence, upregulated expression of miR-424 impairs insulin-signaling and insulin-induced glycogen synthesis in hepatocytes of patients with obesity. Herein we demonstrate that miR-424 induced by obesity is reduced after treatment with liraglutide and this could be a potential weight-loss independent mechanism of action by which liraglutide exerts its beneficial effects on insulin resistance.

Case Discussions: Complex Clinical Cases 2
CD2.1

Obstructive sleep apnoea is highly prevalent in a bariatric surgical population

Rachel Agius, Claudia Coelho, James Crane, Piya Sen Gupta & Barbara McGowan
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Background
Obesity is an important predictor for development of obstructive sleep apnoea (OSA). Patients undergoing bariatric surgery are at increased risk of peri-operative morbidity from undiagnosed OSA. We aim to assess the prevalence and severity of OSA, and its association with the Epworth Screening Scale (ESS) in a bariatric surgical population.

Methods
Retrospective study of adult patients who attended the Tier 4 Medical Obesity Clinic (MOC) at Guys' and St Thomas' NHS Trust (GSTT) in 2018. Demographic characteristics, presence of concomitant medical comorbidities and the ESS score were captured. A home-based nocturnal pulse oximetry assessment was requested as part of the work-up prior to bariatric surgery. Severity of the OSA was defined according to the 4% oxygen desaturation index (ODI) and the respiratory physician's interpretation of the sleep study.

Results
430 new cases were referred to the MOC throughout 2018. Of these, 44.9% ($n=193$) underwent an overnight pulse oximetry. The majority were female 146 (75.7%), aged 46.1$\pm$12.2 years and BMI of 44.0 kg/m^2 (IQR 40.0–49.0). 35.2% ($n=68$) had a diagnosis of hypertension, 32.6% ($n=63$) of type 2 diabetes (T2DM) and 15.0% ($n=29$) of depression. Patients reported poor concentration 10% ($n=20$), nocturia 46% ($n=89$) and snoring 45.5% ($n=88$). Median ESS score was 6 (IQR 3–11) suggestive of higher normal daytime sleepiness. 68.4% ($n=132$) of patients were diagnosed with OSA of any degree with 41.9% ($n=81$) having mild, 18.7% ($n=36$) moderate and 7.8% ($n=15$) severe OSA. 25.9% ($n=50$) patients were initiated on CPAP and 8.3% ($n=16$) were referred for mandibular advancement device. BMI was significantly associated with increased risk of OSA (OR 1.1, 95% CI 1.0 to 1.2; $P<0.001$). No significant differences in the ESS score in patients without OSA vs with OSA (6 IQR 3–11 vs 7 IQR 4–12, $P=0.089$) or degree of OSA ($P=0.730$).

Conclusion
OSA was noted to be highly prevalent in patients undergoing bariatric surgery. Thus, routine pre-operative oximetry screening may prove to be a cost-effective approach in this cohort of subjects.

CD2.2

Predictors of weight loss in Tier 3 weight management service

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Introduction
Specialist weight management service provides an effective treatment option for severe obesity; however, there is limited data is exploring the baseline predictors of response and effect on HbA1c following engagement with the service.

Methods
We used prospective data from the regional weight management Tier 3 weight management services within the Hull and East Yorkshire NHS Tier 3 Obesity Programme. Data were available for 249 patients referred to the service. T-tests were used for univariate baseline characteristics of those with and without 5% weight loss after engagement with the service. Logistic regression analysis was used to identify independent predictors of weight loss at 12 months.

Results
Three hundred three patients were referred to the Tier 3 adult weight management service, of which 249 (83%) patients participated in the program and had at least one follow-up. The median age of the study population was 46 (36–55) and consisted of 66% females with a median baseline BMI of 44 (42–45). The prevalence of Type 2 diabetes was 31%, hypertension was 34%, GORD was 34%, and osteoarthritis was 29%. The median baseline weight on enrolment in the program was 126 (115–138). During the follow-up period of 1 year, the median weight dropped to 120.5 kg at three months, 119.6 kg at six months, 117.7 kg at nine months and 117.5 kg at 12 months. The median HbA1c dropped from a baseline of 60.25 to 54.4 mmol/mol during the follow-up period. Sixty-four patients had baseline HbA1c of >53 mmol/mol (7% HbA1c) of which 21% had a dropped below 53 (7% HbA1c) mmol/mol in follow-up. In the logistic regression model higher age (OR $=1.05$, P-value$=0.0001$) Type 2 Diabetes (OR $=2.54$ P-value$=0.00$) and dyslipidaemia (OR$=2.21$ $P=0.03$) were independently associated with more than 5% weight loss at 12 months follow-up.

Conclusion
Engagement with Tier 3 adult weight management is associated with significant weight loss and improvement in glycaemic control in a large proportion of patients. Higher age, diabetes and dyslipidaemia at baseline are independent predictors of weight loss on Tier 3 weight management service.

CD2.3

Significant weight loss, co-morbidity improvement and reduced health risk-factors after treatment at a multidisciplinary weight management clinic in a university hospital in Sydney, Australia

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Background
Obesity is a global epidemic causing significant burdens on the health systems and economic productivity of most countries. In Australia it is estimated that 66% of the population is overweight or obese, similar to rates in the UK. The multidisciplinary approach to weight management has been developed in response to the growing demand for effective, evidence-based weight management services for people with complex health care requirements. This approach aims to facilitate weight loss with long-term weight maintenance and improvements in health risk-factors. A Sydney based multidisciplinary weight management clinic based on this principle was developed, employing endocrinology, dietetics, exercise physiology, psychology, and bariatric surgical domains.

Aim

To evaluate the effectiveness of a Sydney based multidisciplinary weight management clinic for patients receiving pharmacotherapy and lifestyle interventions between March 2017 and April 2019.

Methods

A retrospective chart review of 166 patients was conducted to evaluate change in; weight, BMI, excess weight lost (EWL), total body weight lost (TWL), reversal of clinical indicators for co-morbidities, change in body composition measures, HbA1c, total cholesterol, and triglycerides.

Results

84.3% ($n = 140$) of patients lost a statistically significant amount at each of the time points and weight loss was durable ($P < 0.0001$). Patients lost on average; -5.1 kg (-25.1 to $+3.5$ kg) ($P < 0.0001$) between baseline and 3 months; -2.5 kg (-10.0 to $+3.6$ kg) ($P < 0.0001$) between 3 and 6 months; -1.3 kg (-8 to $+2$ kg) ($P = 0.0449$) between 6 and 9 months. Patients lost a mean of; -7.20 kg (-31 to -0.1 kg), 24.55% (-245.50 to -0.66%) EWL, -6.68% (-21.68 to -0.12%) TWL. 44 patients dropped at least one BMI class, which was statistically significant (P-value < 0.0001), 2 patients dropped 2 BMI classes. In addition, 53.61% of patients achieved $> = 5$% TWL. 64 patients reached between 5 and 9.9% TWL, 12 patients reached between 10 and 14.9% TWL, and 13 achieved $> = 15$% TWL. Further follow up of this cohort is ongoing. After intervention many patients resolved clinical indications of metabolic co-morbidities; pre-diabetes ($n = 10$), dyslipidaemia ($n = 3$), NAFLD ($n = 5$), and hypertension ($n = 3$).

Conclusions

Through integrated multidisciplinary care patients achieved statistically and clinically significant weight loss, with improvements in co-morbidities. This demonstrates that real world multidisciplinary approaches to weight management can result in durable, clinically meaningful weight loss.

Poster Presentations

P1

A patient with hypothalamic obesity who responded well to GLP-1 agonist therapy and thereafter mini-gastric bypass surgery

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We present the case of a 28-year-old woman who initially presented aged 11 with a brain tumour in 2002. This was diagnosed as a craniopharyngioma and managed with neurosurgery, a ventriculoperitoneal (VP) shunt and radiotherapy. The consequence of this treatment gradually rendered her panhypopituitary and caused hypothalamic injury. Medications which were commenced around this time include hydrocortisone, thyroxine, desmopressin and growth hormone. The hypothalamic insult in turn led to a diagnosis of 'hypothalamic obesity', with hyperphagia leading to significant and rapid weight gain. By age 20, she had reached a weight of 117 kg, which led obesity surgery where she had a gastric band placed. This initially led to a significant improvement in weight to 84.2 kg by 2013. However, by 2014, problems with the gastric band began to emerge with symptoms of intermittent vomiting and acid reflux, and, in addition, her calorie intake led to weight regain. Investigations between 2014 to 2015 including barium swallow and gastroscopy firstly revealed a marked restriction through the band and later showed slippage of the gastric band. An MDT decision was thus made in conjunction with the patient to remove the gastric band in 2015. Unfortunately however, this led to further weight gain, and within 6 months of removal of the gastric band, her weight had increased to 115 kg and she underwent a laparoscopic sleeve gastrectomy. Within one year of this procedure however, she had lost no weight. At this point, the patient was not keen on any further surgical therapy so she was trialled on the GLP-1 agonist Liraglutide at a dose of 1.2 mg daily. With this regimen, she had 10 kg weight loss within 4 months. This dose was then uptitrated to 3 mg daily and by 9 months of commencing Liraglutide, she had lost 15% of her body weight, with her weight being 97.7 kg. At this point, she was concerned regarding weight regain and was thus reconsidered for further surgery. In early 2019, she therefore underwent a mini-gastric bypass which has led to further beneficial results with her latest weight being 84.9 kg.

P2

Exploring the effects of a novel anti-diabetes compound on adipose tissue

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Obesity is a global crisis associated with other metabolic diseases such as cardiovascular disease and Type 2 Diabetes (T2D). Current pharmacological therapies, including metformin, are prescribed for T2D to control blood glucose levels, however, treatment may be accompanied by undesirable side effects. Compound 14 (Cpd14) is a recently developed compound shown to promote weight loss and improve glucose metabolism in high-fat diet (HFD)-fed mice, treated intraperitoneally for 7 days. This study aimed to determine the effects of Cpd14 on adipose tissue from chow-fed and HFD-fed mice, treated orally for 10 days, as a potential therapeutic agent for diabetes and obesity in humans. Cpd14-treated HFD-fed mice exhibited a reduction in body weight and a decrease in blood glucose levels, without alteration in caloric intake and had significantly smaller adipocytes compared to vehicle-treated HFD-fed mice ($P<0.05$ and $P=0.0001$) in gonadal (gWAT) and inguinal white adipose tissue (iWAT), respectively. *In vivo,* Cpd14-treated HFD-fed mice had significantly reduced gene expression levels of the satiety hormone leptin ($P<0.05$) and significantly reduced FABP4 gene expression levels ($P<0.001$) of pre-adipocytes cultured *ex vivo* from the stromal vascular fraction (SVF) of gWAT in HFD-fed mice. In addition, Cpd14 significantly increased uncoupling protein 1 (UCP1) mRNA levels of chow-fed mice in iWAT ($P=0.0001$), with a collection of cells morphologically resembling brown-like adipocytes dispersed amongst iWAT. These acquired brown-like cells are known to resemble the traits of classical brown cells, in which UCP1 is highly expressed, thus promoting thermogenesis. Collectively, these results indicate that Cpd14, as well as improving glucose tolerance, may impact on adiposity and body weight through increased energy expenditure and adipocyte lipolysis. In addition, data collected from the SVF of gWAT suggests that as Cpd14 reduced gene expression levels of the pro-adipogenic marker FABP4, this compound may inhibit obesogenic adipogenesis. Furthermore, although the underlying mechanisms are still unknown, further

research will focus on elucidating the mechanistic effects of Cpd14 and its potential to act as a therapeutic compound for obese and diabetic individuals.

P3

The Aneurin Bevan University Health Board (ABUHB) level 3 multidisciplinary (MDT) service: description of age, demographic and anthropometric characteristics and 1-year and 2-year weight changes

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The ABUHB level 3 adult weight management service provides individualized 2-year multidisciplinary support for patients with severe obesity and associated multi-morbidity. Some patients are discharged before 2 years or voluntarily leave the service early. To date, this service has received >400 referrals from 5 local authority areas as well as out-of-area referrals. The prevalence of adult obesity (BMI ≥ 30.0 kg/m^2 and ≥ 40.0 kg/m^2) in the ABUHB area is approximately 25% and 2.5% respectively. Between February 2013 and May 2019, 267 (67.9%) female (mean age $\pm$ s.D., 45.6 ± 12.1 years) and 126 (32.1%) male (47.4 ± 12.4 years) patients attended initial assessment. Most were of White ethnicity (~98%) and 31.5% lived in areas that are in the lowest 20% of multiple deprivation (Welsh Index of Multiple Deprivation). Mean bodyweight and BMI were 149.1 ± 34.5 kg and 52.7 ± 10.5 kg/m^2, with no gender difference in BMI (-1.7 kg/m^2, 95%CI: -3.8, 0.7; $P=0.169$). The frequencies of class I, II and III obesity were 1.0%, 6.6% and 92.4%. Every patient had a waist circumference greater than recognised cut-offs for females (88 cm) and males (102 cm). In patients who had been in the service for at least 2 years ($n=265$), after imputing missing data (38.5%) with the last observation carried forward method, at 1-year follow-up 35.8% lost <5% of their bodyweight, 18.1% lost 5–10% and 11.7% lost >10%. Mean weight loss at 1-year was 4.35 kg (95% CI: -5.45, -3.25; $P<0.001$). At 2-year follow-up (60.8% missing data), 34.7% had lost <5% of their bodyweight, 15.5% had lost 5–10%, and 13.2% had lost >10%. Mean 2-year weight loss was -4.50 kg (95% CI: -5.86, -3.14; $P<0.001$). Analysis of complete data produced mean weight changes at 1-year ($n=163$) and 2-years ($n=104$) of -6.10 kg (95% CI: -7.51, -4.69; $P<0.001$) and -6.21 kg (95%CI: -8.87, -3.55; $P<0.001$). At 2-years, the maximum individual weight loss was -53.3 kg. These results show an individualized MDT weight management service, with many patients from socially disadvantaged communities, is an effective weight loss intervention for patients with severe obesity. This evaluation is part of on-going work to improve this service.

P4

Obesity and hypertension among civil servants in a typical Nigerian public service

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Introduction

Obesity is a non-communicable disease with increasing prevalence and complications in our society. Previous systematic review of published papers on obesity in Nigeria showed its prevalence ranged from 8.1% to 22.2% while overweight ranged from 20.3% to 35.1%.

Objective

To evaluate the prevalence and associations of obesity and hypertension among civil servants in a state in North Central Nigeria.

Methods

This was a prospective comparative cross-sectional study of 130 consenting civil servants in a parastatal in North central Nigeria. Socio-demographic and relevant

clinical history was elicited through interviewer administered questionnaire. The body weight(kg), height(m), systolic blood pressure (SBP)[mmHg], diastolic blood pressure (DBP)[mmHg]), and fasting blood glucose (FBG)[mmol/l] were measured. Body mass index (BMI) was taken as a measure of obesity and calculated as weight/height^2 [kg/m^2]. Obesity (using BMI) was categorized by the World Health Organization. Blood pressure $\geq 140/90$ was taken as hypertension. Descriptive statistics was conducted and the prevalence of obesity, diabetes mellitus and hypertension determined. Pearson's correlation, univariable and multivariable linear regression modelling were conducted with BMI as the outcome variable. P value <0.05 was taken as statistically significant level.

Results

About 41.4% were men and the mean($\pm$s.D.)[years] age was 40.1 ± 9.6. The BMI ranged from 18.0 to 43.9 and the mean($\pm$s.D.) BMI was 29.5 ± 19.2. The prevalence of overweight and obesity was 36.2% and 32.8% respectively. The mean($\pm$s.D.) SBP: 136 ± 23.4; mean($\pm$s.D.) DBP: 90.7 ± 13.2. The prevalence of systolic and diastolic hypertension was 17.1% and 60.5% respectively. Family history of hypertension was found in 32.4% of the participants. The mean ($\pm$s.D.) FBG was 5.4 ± 3.0, the prevalence of diabetes mellitus was 3.4% while family history of diabetes mellitus found in 11.7% of participants. There was positive correlation between BMI and SBP($r = P=0.01$) and DBP($r = P=0.02$). After multivariable regression, it was found that for every unit increase in SBP, BMI increased by 64.6% ($\beta=0.646$, 95% confidence interval [CI] 0.202–1.090, P value $=0.04$).

Conclusion

The prevalence of obesity appears to be increasing in Nigeria and this probably contributes to the increase in hypertension in the country.

P5

Prevalence and determinants of metabolic health and different body composition phenotypes in a Maltese cohort

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The study determines the prevalence and lifestyle predictors of metabolic health (MH) among normal weight and obese individuals within a Maltese cohort using two main approaches a) the Metabolic Syndrome (Met-S) framework as per NCEP-ATPIII and b) Insulin Resistance (IR) as defined by HOMA-IR; and to determine which cut-off valueof HOMA-IR best predicts metabolic health. This was a cross sectional study. Subjects with a BMI <25 kg/m^2 were considered normal weight. Subjects with BMI ≥ 25 kg/m^2 were considered overweight/ obese. Participants having ≤1 features of the Met-S (as per NCEP ATPIII) or a HOMA-IR of <2.5 were deemed metabolically healthy. Subjects were then classified into one of the following body composition phenotypes: Metabolically healthy normal weight (MHNW); metabolically unhealthy normal weight (MUHNW); metabolically healthy obese (MHO) and metabolically unhealthy obese (MUHO). Out of 521 individuals recruited, 63% were female, 69% were overweight/obese and the median age was 41 years. There were 28.9% MHNW; 1.4% MUHNW; 16.7% MHO and 53% MUHO subjects as per the IR criterion and 27.8% MHNW; 2.1% MUHNW, 39.3% MHO and 30.7% MUHO individuals as per Met -S criteria. A higher proportion of individuals were MHO and MUHNW when assessed by the Met-S criteria. A higher percentage of females were MHO and significant differences in anthropometric and biochemical parameters were noted between the MHO and MUHO cohorts by both criteria. In the normal weight cohort, two-thirds of the MUHNW individuals were females by Met-S criteria and there were no MUHNW male subjects by IR criteria. There were no significant differences in anthropometric and biochemical parameters between the MHNW and MUHNW individuals by both criteria. Physical activity and non-smoking status were predictors of the MHO phenotype by both criteria but no significant association between lifestyle parameters and the MUHNW phenotype was found. Finally, a receiver operational characteristic analysis showed that a HOMA-IR value of >2 gave 69% sensitivity for defining metabolic health by NCEP ATPIII.

Conclusion

More than two thirds of the study population was overweight or obese. Prevalence of MHO and MUHNW phenotypes varied according to the definition used. Physical activity and no-smoking status were independent predictors of the MHO phenotype.

P6

Anthropometric measurements and prevalence of obesity-related diseases: a cross-sectional study of overweight and obese patients in a novel multi-disciplinary weight management program

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Background

According to the World Health Organization (WHO), the United Arab Emirates (UAE) has one of the highest prevalence rates of obesity in the Middle East at 33%. There is a paralleled rise in the incidence of related metabolic conditions, particularly type 2 diabetes, metabolic syndrome and non-alcoholic fatty liver disease (NAFLD). Through dietary, pharmaceutical, endoscopic and surgical options, multidisciplinary weight reduction programs offer a comprehensive approach to obesity management.

Aim

Study the prevalence of obesity-related diseases in a weight management program and determine the relationship to obesity anthropometric indices.

Methods

This is a cross-sectional study conducted at Mediclinic Parkview Hospital in Dubai, United Arab Emirates (UAE). 311 patients have been evaluated from January 2019 until September 2019 as part of a multi-disciplinary weight management program. Key demographics, anthropometrics, and clinical data were analyzed using Statistical Package for Social Sciences (SPSS) software (Version 24). Correlations were assessed by the Mann–Whitney test (significance $P<0.05$).

Results

311 consecutive patients assessed as part of the weight management program were studied. 208 (67%) were female and 103 were male. The mean age was 41 (±9.6) with a median BMI of 32.7 (±7.4). Mean waist circumference was 109.4 cm (±18.5), fat percent was 45.5% (±18.7), fat mass was 41 kg (±14.6), and visceral fat was 4.2 kg (±2.9). The population was heterogeneous with 38 nationalities. In relation to associated metabolic diseases, diabetes had the highest prevalence of 20.3% ($n=63/310$) (3.3% type 1, 50% type 2, 46.7% pre-diabetes). Other co-morbidities were dyslipidemia at 31% ($n=97/261$), hypertension at 20% ($n=63/311$) & NAFLD at 10% ($n=34/229$). BMI correlated with waist circumference ($r=0.62$, $P<0.01$) and was significantly associated with diabetes, hypertension, and NAFLD.

Conclusion

The study has confirmed the high prevalence rates of obesity-related diseases in a private hospital setting in a multinational cohort of obese patients. BMI and waist circumference are the most representative measure of obesity in our population and obesity-related diseases. Further studies will play a part in assessing the benefit of these measures during weight reduction interventions.

P7

A case report highlighting the potential for delayed diagnosis of colorectal cancer after obesity surgery

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Excess body weight is associated with increased risk of colorectal cancer. Obesity surgery (OS) is increasingly performed in individuals who are 'morbidly' obese. Increased CRC risk was particularly evident greater than ten years after OS and was similar for gastric bypass, gastric banding and gastroplasty. By contrast, CRC risk in non-operated obese individuals remained stable according to the literature review. We present a 35 year old male, who underwent laparoscopic gastric bypass and cholecystectomy in 2009. Then in 2018, the patient had revision laparoscopic bypass. He lost 33 kg with bariatric surgery. After six months from revision surgery with bilateral leg swelling which was associated with episodes of loss of consciousness. He was admitted to the hospital and initial blood tests revealed hypoalbuminemia (1.85 g/dl) and anemia (Hemoglobin level 8.1). The patient managed conservatively with albumin and protein supplements. Reviewed by the dietician and started on diet plan for his malabsorption. The patient generally improved for few weeks then deteriorated with watery diarrhea. Investigations showed pancreatic elastases deficiency and low zinc level. He was started on pancreatic enzymes replacement, and multivitamins. Diarrhea was ongoing without improvement, hence additional investigations were done. Labs revealed elevated transaminases. Fibro-scan showed normal liver. Tumor markers

were highly elevated CA 19–9 levels. Colonoscopy was performed. There was a lesion in the rectum showed rectal adenocarcinoma. The patient was referred to oncology team for further management. Our case highlights the potential risk of delayed diagnosis of colorectal cancer (CRC) after OS. Diarrhea after OS, mainly those with malabsorptive elements, is common. Multiple factors exert their influence on bowel habits; preoperative comorbidities and procedure-related aspects are intertwined with postoperative nutritional habits. Diarrhea may unmask underlying CRC. The risk of CRC increasing with time from OS, which would be consistent with the long natural history of colorectal carcinogenesis. It is plausible that colorectal carcinogenesis may be driven by changes in diet and the gut microbiota post-bariatric surgery. Another explanation that can be added, possible carcinogenetic action of the unabsorbed food and bile acid on colonic mucosa. Thus, diagnosis of CRC post OS can be challenging. Our case reflects CRC as a potential cause of chronic diarrhea post OS and the importance of keeping it in the differentials diagnoses while evaluating diarrhea in this specific patient population.

P8

Proglucagon peptide secretion post Roux-en-Y gastric bypass: one year prospective study

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Background

Hyperglucagonaemia is one of the key players in the pathophysiology of type 2 diabetes. Roux-en-Y Gastric Bypass (RYGB) is currently a highly effective treatment for weight loss and diabetes remission. However, the role of glucagon in the above effects is unclear.

Aim

To characterise the behaviour of proglucagon-derived peptides (glucagon, glucagon-like peptide-1, oxyntomodulin, glicentin) after RYGB surgery.

Subjects and methods

We profiled prospectively nineteen patients with obesity and pre-diabetes/diabetes undergoing RYGB by assessing the glucose, insulin, glucagon-like peptide-1 (GLP-1), GIP, oxyntomodulin, glicentin and glucagon responses to a mixed-meal test (MMT) before and 1, 3 and 12 months post-surgery. Glucagon was measured using a Mercodia glucagon ELISA utilising the 'Alternative' improved specificity protocol, which was validated against a reference LC/MS-MS method.

Results

After RYGB, there were early improvements in fasting glucose and glucose tolerance accompanied by an accelerated and amplified insulin response to MMT, in parallel to significant increases in post-prandial GLP-1, oxyntomodulin and glicentin secretion. There was a significant decrease in fasting glucagon levels at 3 and 12 months post-surgery. Glucagon response to the MMT was decreased post-prandially at 3 and 12 months after surgery. There was no significant change in GIP secretion.

Conclusions

RYGB clearly alters the dynamics of secretion of proglucagon peptides. The reduction in fasting and post-prandial glucagon secretion may be one of the mechanisms driving later improvements in glycaemia after RYGB.

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