Free Communications of The Seventh Qatar Diabetes, Endocrinology, and Metabolic Conference, Doha, Qatar, March 2–4, 3–5, 2023

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Abstract

These are the abstracts of the free communications of The Seventh Qatar Diabetes, Endocrinology, and Metabolic Conference, Doha, Qatar, March 2–4, 3–5, 2023. The QDEM-7 was a hybrid conference. The declared educational objectives of the congress were to give a "state of the art in endocrine practice." International and regional key opinion leaders delivered plenary and symposia presentations. In addition, free communications on current research and clinical practice in the region and worldwide were presented . We present here the abstracts of the congress as submitted by the authors of the free communications after minimal restyling and editing to suit the publication requirements of the Journal. We hope that by publishing them in our open-access Journal, we provide early recognition of the work and extend the benefit to those who could not make it to the live presentations.

Keywords
- diabetes
- education
- hypoglycemia
- pituitary
- research
- thyroid
- lipids
- pregnancy

Introduction

The meeting is the Seventh Annual Congress of Qatar Diabetes, Endocrinology, and Metabolic Conference, Doha, Qatar, March 2–4, 3–5, 2023.The declared educational objectives of the congress are to give a "state of the art in endocrine practice." It caters primarily to the professional development needs of endocrinologists, internal medicine physicians, and family medicine, with a particular interest in diabetes and endocrinology. However, in the past, many primary care physicians, doctors in training, and specialist nurses and educators found many aspects of the contents particularly relevant to their continuous professional development needs.

The conference highlights the latest research and clinical practice in presentations delivered by international and regional key opinion leaders. Furthermore, free communications on current research and clinical practice in the region and worldwide attract significant interest. The QDEM-7 sees this as a core role in its mission to enhance knowledge through education and research . The abstracts of the free communications as submitted by the authors after minimal restyling and editing to suit the publication requirements of the Journal. We hope that by publishing them in our open-access Journal, we provide early recognition of the work, stimulate networking between parties of mutual research interests, and extend the benefit to those who could not make it to the live presentations.

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Oral Communications

OC1. Effects of GLP-1 Infusion upon Whole-Body Glucose Uptake and Skeletal Muscle Perfusion during Fed-State in Older Men

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Background: Aging skeletal muscles become both insulin resistant and atrophic. The hormone glucagon-like peptide 1 (GLP-1) facilitates postprandial glucose uptake as well as augmenting muscle perfusion—independent of insulin action. We thus hypothesized exogenous GLP-1 infusions would enhance muscle perfusion and positively impact glucose metabolism during fed-state clamps in older people.

Methods: Eight men (71 ± year) were studied in a randomized crossover trial. Basal blood samples were taken prior to postprandial (fed-state) insulin and glucose clamps, accompanied by amino acid infusions, for 3 hours. Reflecting this, following insertions of peripheral and femoral vessel cannulae and baseline measurements, peripheral I.V infusions of octreotide, insulin (Actrapid), 20% glucose, and mixed amino acids (AA); Vamin 14-EF) ± a femoral arterial GLP-1 infusion were started. GLP-1, insulin, and C-peptide were measured by ELISA. Muscle microvascular blood flow (MBF) was assessed via contrast enhanced ultrasound (CEUS). Whole-body glucose handling was assayed by assessing glucose infusion rate (GIR) parameters.

Results: Skeletal muscle microvascular blood flow significantly increased in response to GLP-1 versus feeding alone (5.0 ± 2.1 vs. 1.9 ± 0.7-fold change from basal respectively, $p = 0.008$), while also increasing whole-body glucose uptake (AUC 16.9 ± 1.7 vs. 11.4 ± 1.8 $mg.kg^{-1}.180\ minute^{-1}$, $p = 0.02$ ± GLP, respectively).

Conclusions: The beneficial effects of GLP-1 upon whole-body glycemic control are evident with insulin clamped at fed-state levels. GLP-1 further enhances the effects of insulin on whole-body glucose uptake in older men, underlining its role as a therapeutic target. The effects of GLP-1 in enhancing microvascular flow likely also impacts other glucose-regulatory organs, reflected by greater whole-body glucose uptake.

OC2. Targeted Micro-RNA Profiling Reveals That Exendin-4 Modulates the Expression of Several MicroRNAs to Reduce Steatosis in HepG2 Cells

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Background: Excess hepatic lipid accumulation is the hallmark of nonalcoholic fatty liver disease (NAFLD), for which no medication is currently approved. However, Glucagon-Like Peptide-1 Receptor Agonists (GLP-1RAs), already approved for treating type 2 diabetes, have lately emerged as possible treatments. Herein we aimed to investigate how the GLP-1RA Exendin-4 (Ex-4) affects the microRNA (miRNAs) expression profile using an in vitro model of steatosis.

Methods: 400 mM oleic acid (OA) were used to induce steatosis in the hepatoma cell line HepG2, which was then treated with 200 nM Ex-4. Total RNA, including miRNAs, was isolated from untreated, steatotic, and Ex-4-treated steatotic cells and used for probing a panel of 799 highly curated miRNAs using NanoString technology. Enrichment pathway analysis was used to find the signaling pathways and cellular functions associated with the differentially expressed miRNAs.

Results: Our data identified several differentially expressed miRNAs between untreated and steatotic cells and between steatotic and Ex-4-treated steatotic cells. Notably, we found that Ex-4 reversed the expression of a set of miRNAs. Although several of the identified differentially expressed miRNAs have previously been linked to NAFLD, the relationship between numerous of the identified miRNAs, steatosis, and with the beneficial impact of Ex-4 on steatosis is being described for the first time. Functional enrichment analysis highlighted many relevant signaling pathways and cellular functions enriched in the differentially expressed miRNAs, including hepatic fibrosis, insulin receptor, PPAR, Wnt/β-Catenin, VEGF, and mTOR receptor signaling pathways, fibrosis of the liver, cirrhosis of the liver, proliferation of hepatic stellate cells, diabetes mellitus, glucose metabolism disorder, proliferation of liver cells, and production of reactive oxygen species in the liver.

Conclusion: Our findings suggest that miRNAs may play essential roles in the processes driving steatosis reduction in response to GLP-1R agonists which warrants further functional investigations.

OC3. Genes Differentially Expressed in Skeletal Muscles of Healthy Arab Men with High or Low Insulin Sensitivity Under Hyper-Insulinemic Euglycemic Clamp (HIEC)

Ilham Bettahi[1,2], Khalid Ouararhni[3], Khaoula Errafii[3], Ian R. Thompson[3], Manjunath Ramanjaneya[1,2], Jayakumar Jerobin[1,2], Meis Alkasem[1], Ibrahem Abdelhakam[1], Ahmad Iskandarani[1,2], Tareq A. Samra[1,2], Mutasem A. R. A. lShraim[1], Ayat Hashish[1], Rasha Alsiddig[1], Noor Nabeel M. Suleiman[1], Abdul Badi Abou-Samra[1,4]

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Background: Skeletal muscle insulin resistance is one of the defects implicated in type 2 diabetes mellitus (T2DM). T2DM is widespread in the Middle East and North Africa regions. This study aimed to reveal altered genes and gene networks associated with insulin sensitivity.

Methods Muscle biopsies from vastus lateralis were obtained at baseline and the end of HIEC. Biopsies samples from 24 subjects having high (HIS) and low insulin sensitivity (LIS) were processed for Deep sequencing using Illumina HiSeq 4000.

Results: At baseline, we identified 82 genes with significant differences between LIS versus HIS groups, while 103 were differentially expressed under insulin stimulation. Analyzing each group separately, 77 genes were significantly different under insulin stimulation versus baseline in in the

HIS group. Similarly, in LIS subjects, 61 genes were differentially expressed under insulin stimulation versus baseline. Functional analysis reveals differential enrichment in multiple pathways, including fatty acid metabolism pathway (ELOV6, FC = +1.8), glycerophospholipid (PLA1A, FC = +1.8), sphingolipid pathway (S1PR5, FC = −2.6) in the LIS versus HIS groups at baseline. However, under insulin stimulation, functional analysis reveals differential enrichment in a few pathways, including oxidative phosphorylation such as (MT-ND6, FC = −1.5), metabolism pathways (CA14, FC = −2.6), and regulation of insulin secretion (SLC2A1, FC = +1.7).

Conclusion: These results show changes in skeletal muscle expression of genes involved in mitochondria and oxidative phosphorylation between LIS and HIS. Interestingly, under insulin stimulation, we found that the SLC2A1 gene, which is involved in the insulin-resistant pathway, was upregulated in LIS versus HIS. The differential expression between HIS and LIS may represent early events for developing insulin resistance, prediabetes, and type 2 diabetes.

OC5. Metformin Is Comparable to Insulin for Pharmacotherapy in Gestational Diabetes Mellitus: A Network Meta-analysis Evaluating 6,046 Women

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Background: The comparative efficacy of gestational diabetes (GDM) treatments lack conclusive evidence for choice of first-line treatment.

Objective: The aim of this study was to compare the efficacy of metformin and glibenclamide to insulin using a core outcome set (COS) to unify outcomes across trials investigating the treatment of gestational diabetes mellitus.

Methods: A network meta-analysis (NMA) was conducted, using generalized pairwise modeling framework was employed. PubMed, Embase, and Cochrane Controlled Register of Trials were searched from inception to January 2020. RCTs that enrolled pregnant women who were diagnosed with GDM and that compared the efficacy of different pharmacological interventions for the treatment of GDM were included.

Results: A total of 38 RCTs with 6046 participants were included in the network meta-analysis. Compared with insulin, the estimated effect of metformin indicated improvements for weight gain (WMD −2ċ39 kg; 95% CI: −3.31 to −1.46), maternal hypoglycemia (OR: 0.34; 95% CI: 0.12–0.97) and LGA (OR: 0.61; 95% CI: 0.38–0.98). There were also improvements in estimated effects for neonatal hypoglycemia (OR 0.48; 95% CI: 0.19–1.25), pregnancy induced hypertension (OR: 0.63; 95% CI: 0.37–1.06), and preeclampsia (OR: 0.74; 95% CI: 0.538–1.04), though with limited evidence against our model hypothesis of equivalence with insulin for these outcomes.

Conclusion: Metformin is, at least, comparable to insulin for the treatment of GDM. Glibenclamide appears less favorable, in comparison to insulin, than metformin.

OC6. Insulin Inertia in Type 2 Diabetes in Qatar: The INERT-Q Study

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Background: Type 2 DM (DM-2) is characterized by progressive loss of β-cell function, necessitating insulin therapy in some patients. Data from different countries have shown a substantial delay in starting and optimizing insulin therapy resulting in sub-optimal glycemic control. This study aims to examine the degree of clinical inertia in insulin initiation and intensification in Qatar.

Methods: INERT-Q is a retrospective study that followed a strict data-collection protocol. We enrolled patients with DM-2 who were newly started on Insulin. Subjects must have data for two years prior to the index date and two years after insulin initiation. The main outcome was the proportion of patients achieving the HBA1c target (≤7.5%) at 6 months, 12 months and 2 years.

Results: We included 374 patients majority of which were males (62%), the mean age (SD) was 55.3 (11.3) years, the mean duration of DM-2 (SD) was 12.0 (7.3) years, the mean (SD) age of onset of DM-2 was 41.2 (9.6) years, and 64.4% were obese. Most patients were on 2 or 3 oral agents when the Insulin therapy was started, 38.8% and 37.4%, respectively. As shown in Fig. 1A, the mean HBA1c at the time of insulin initiation was 10.3%, dropping to 8.5% at 6 months with no further improvement. Similarly, the proportion of patients who achieved HBA1c targets at 6 months was 32.9%, with no further improvement. Multivariate regression analysis showed that younger age of DM onset, higher age and HBA1c levels at the start of insulin therapy reduces the odds of achieving glycemic targets. Furthermore, for every 1 unit increase in HBA1C at 6 months, the odds of achieving targets at 2 years are reduced by 58%.

Conclusion: The study showed a substantial delay in starting insulin therapy in patients with DM-2. The results stress the importance of early initiation and intensification of insulin; otherwise, HBA1c targets are unlikely to be achieved.

OC7. Prevalence of Nonalcoholic Fatty Liver Disease in Type 2 Diabetes Patients Based on FIB-4 Score: A Retrospective Study

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Background: Several noninvasive scores have been proposed to assess the presence of underlying nonalcoholic fatty liver disease (NAFLD). in this retrospective study, we aimed to evaluate the prevalence of NAFLD based on the Fibrosis-4 (FIB-4) score in patients with type 2 diabetes (T2D).

Methods: Data of patients with T2D presenting to the medicine outpatient clinic at Hamad General Hospital, Doha, Qatar, between 2017 and 2019 were extracted from the electronic medical records (Cerner). Descriptive statistics were used to summarize the study results. Differences between the groups were analyzed using one-way ANOVA and chi-square tests as appropriate.

Results: Out of 3,419 patients included in the study, 639 (20%) had an intermediate risk of fibrosis, and 192 (6%) had a high risk of fibrosis based on the FIB-4 score. Patients in the intermediate and high-risk fibrosis groups were older (51.2 ± 12.5 vs. 62.5 ± 10.1 vs. 61 ± 12, $p < 0.001$) and had a higher prevalence of chronic kidney disease and ischemic heart disease ($p < 0.001$) than those with low risk. Males constituted 56% (1913) of the total study cohort but comprised a significantly higher proportion of intermediate (398, 62.3%) and high risk (131, 68.2%) groups than females. Patients in these two groups also had statistically significant ($p < 0.001$) higher creatinine, AST and ALT levels while lower platelet and HDL cholesterol levels than the low-risk group. There were no statistically significant differences between hbA1c, body mass index (BMI) and triglyceride (TG) levels between the three groups

Conclusion: The prevalence of intermediate to high-risk of fibrosis in T2D patients based on the FIB-4 score in our study cohort was 26%. More extensive studies are needed to compare the sensitivity of different noninvasive scores for evaluating the risk of NAFLD development in T2D patients.

OC8. Evaluation of a Hybrid Closed-Loop System Initiation Protocol for Adults with Type 1 Diabetes on Multiple Daily Injections Therapy

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Background: The 10-day onboarding protocol from multiple daily injections (MDI) to MiniMed 670G hybrid closed-loop (HCL) system demonstrated effectiveness in the pediatric age group. We aimed in this study to assess this protocol for adults with type 1 diabetes (T1D) to achieve glycemic targets.

Methods: We included individuals aged 18 to 65 years with T1D on MDI in an open-label, single-arm, single-center, clinical research following a structured protocol: 2-days, HCL system readiness; 5-days, HCL system training (2 hours sessions on 5 consecutive days with groups of 3 to 5 candidates); 3-days, Manual Mode use of HCL system; 84 days, Auto Mode use of the HCL system, cumulating 10 days from MDI to Auto Mode.

Results: A total of 31 individuals (17 females), aged 28.8 ± 8.6 years with T1D for 12.6 ± 8 years were enrolled. Only 30 participants completed the study as one participant became pregnant during the study. The participants had a median sensor usage of 87.5% (IQR: 78–92) of the time and spent a median of 83.5% (IQR: 77–92) in Auto Mode. The mean HbA1C improved from $8.8 \pm 1.4\%$ at baseline to $7.5 \pm 0.8\%$ by the end of the study ($p \leq 0.0001$). Time in range (3.9–10 mmol/L) increased from $49.9 \pm 18\%$ on MDI to $68.8 \pm 12.4\%$ on Auto Mode ($p \leq 0.0001$). These were accomplished with time below 3.9 mmol/L of $3.1 \pm 2.7\%$. No severe hypoglycemia or DKA episodes were noted during the study.

Conclusion: A structured 10-day initiation protocol was a successful strategy to commence the HCL system for adults with T1D on MDI.

Poster Presentations

P1. DEFEND: Defining the Factors Encoding Natural Genetic Protection from Type 1 Diabetes

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Background: Specific HLA alleles have been linked to autoimmune diseases including susceptibility to type 1 diabetes (T1D). The T1D risk has been shown high for certain HLA class II genes while others provide protection from disease development. Defining the underlying mechanisms of DQB1*06:02-mediated protection will help identify the molecular, metabolic, and immunologic pathways responsible for T1D pathogenicity. We aimed to map the HLA alleles and haplotypes from 15k whole genomes of Qatar Genome subjects. Assessment of the risk and protective HLA alleles that exist in Qatari population associating with an increased or a lower risk of T1D development.

Methods: HLA type inference was performed using multiple independent typing methods with high accuracy on the WGS data and association with clinical traits of T1D was performed using linear regression models.

Results: We found a high diversity of rare alleles among class II HLA genes in our population. We further tested the association of observed HLA alleles with five clinically relevant traits of T1D and identified several potentially protective and risk alleles for the disease. We particularly analyzed the associations of the HLADQB1*06:02 allele and found that the protective effects of DQB1*06:02 could be gender specific in our population. Compared with males, homozygous females for DQB1*06:02 allele are likely to have greater levels of hemoglobin A1c (HbA1c), glucose and thyroid stimulating hormone (TSH), some of the clinical traits that are associated with an increased risk for T1D. Conversely, homozygous males have significantly higher levels of Insulin and C-peptide, the clinical traits that are associated with a lower risk for T1D.

Conclusion: Multiple alleles from genes DRB1, DQA1 and DQB1 which are known to segregate with T1D predisposition showed a significant association with clinical phenotypes of T1D suggesting a greater genetic susceptibility for T1D in the general population.

P2. Microbiome-Modulating Nutraceuticals Improve Glucose Homeostasis and Ameliorates Dyslipidemia in Type 2 Diabetes: A Systematic Review, Meta-analysis, and Meta-regression Of Clinical Trials

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Background: The type 2 diabetes (T2D) epidemic contributes significant morbidity and mortality worldwide. Recent research demonstrates increasing awareness of gut microbiota in human health and disease, and microbiome-modulating nutraceuticals are being investigated for their potential to restore floral and metabolic homeostasis in T2D.

Methods: Systematic reviews, meta-analyses and meta-regressions were conducted to identify clinical trials investigating the effect of probiotics, prebiotics and synbiotics on biomarkers of glucose homeostasis and dyslipidemia in T2D patients based on multi-database searches through April 2022. Data were pooled using random effects meta-analyses and reported as mean differences with 95% confidence intervals (CI), followed by linear meta-regressions.

Results: Concerning glucose homeostasis, data from 68 trial comparisons across 58 studies ($n = 3,835$) showed that, compared with placebo/control, pro/pre/synbiotics resulted in significant changes in fasting plasma glucose (−12.41 mg/dL [95% CI: −15.94 to −8.88], $p < 0.0001$), HbA1c (−0.38% [95% CI: −0.47 to −0.30], $p < 0.0001$), fasting insulin (−1.49 µU/mL [95% CI: −2.12 to −0.86], $p < 0.0001$), HOMA-IR (−0.69 [95% CI: −1.16 to −0.23], $p = 0.0031$), and QUICKI (0.0148 [95% CI: 0.0052–0.0244], $p = 0.0025$), but not C-peptide (−0.0144 ng/mL [95% CI: −0.2564 to −0.2275], $p = 0.9069$). Regarding dyslipidemia, data from 47 trial comparisons across 42 studies ($n = 2,692$) showed that, compared with placebo/control, administration of pro/pre/synbiotics resulted in significant changes in total cholesterol (−9.97 mg/dL [95% CI: −15.08 to −4.87], $p < 0.0001$), low-density-lipoprotein (−6.29 mg/dL [95% CI: −9.25 to −3.33], $p < 0.0001$), high-density-lipoprotein (+3.21 mg/dL [95% CI: 2.20–4.22], $p < 0.0001$), very-low-density-lipoprotein (−4.52 mg/dL [95% CI: −6.36 to −2.67], $p < 0.0001$), and triglycerides (−22.93 mg/dL [95% CI: −33.99 to −11.87], $p < 0.001$). Despite confounding variables like age, baseline BMI and biomarker value, nutraceutical type, dosage, region and trial duration, inter-study heterogeneity often persisted in secondary analyses.

Conclusions: Pro/pre/synbiotic adjunct supplementation can potentially improve glucose homeostasis and ameliorate dyslipidemia in T2D patients, although some interstudy heterogeneity limit their unanimous acceptance.

P3. Effect of Microbiome-Modulating Nutraceuticals on Biomarkers of Inflammation and Oxidative Stress in Type 2 Diabetes: A Systematic Review of Clinical Trials

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Background: Type 2 diabetes (T2D) affects 10% of adults worldwide. The significance of homeostasis and dysbiosis of the gut microbiome in pathophysiology and potential therapy of metabolic disorders has been widely investigated. The volume of literature exploring effects of various microbiome-modulating nutraceuticals in T2D patients is ever-increasing.

Methods: We conducted a systematic review of PubMed, Scopus, Web of Science, Embase, and Cochrane from inception to January 2022 for studies investigating

the effect of probiotics, prebiotics, and synbiotics on biomarkers of inflammation and oxidative stress in T2D populations, pooled results by type of nutraceutical and analyzed findings based on concurrent themes.

Results: An initial screening returned 5,984 hits, of which 47 clinical studies were included. We compiled both statistically significant and nonsignificant results and found promising trends. Multistrain/multispecies probiotics were more effective than monostrain interventions. Resistant dextrin appeared to be the most promising prebiotic, followed by inulin and oligosaccharides. Synbiotics have shown promising effect on biomarkers of oxidative stress and antioxidant enzymes. Intestinal dysbiosis and permeability are key mechanisms linking to the chronic low-grade inflammation state in T2D. However, multi-center and longer-term trials with coordinated research methodology and data analysis are needed to compare the effects of factors such as genetic susceptibility to the disease and acceptance to the biotic therapy.

Conclusion: Pro/pre/synbiotic adjunct supplementation for T2D therapy is promising with respect to most markers of inflammation and oxidative stress.

P4. Down-regulation of Circulating GDF15 Levels Following Insulin-Induced Acute Hypoglycemia in Type 2 Diabetic Subjects

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Background: Growth differentiation factor 15 (GDF15) is a protein that belongs to the transforming growth factor-β superfamily. The circulatory levels of GDF15 levels are elevated in impaired fasting glucose and type 2 diabetes (T2D) patients, and GDF15 was positively correlated with insulin resistance (IR) independent of age and BMI in these patients. Hypoglycemia is a condition in which the circulating glucose levels are low and is associated with increased mortality. This study aims to understand the relationship between GDF15 and hypoglycemia.

Methods: Hypoglycemia was induced in both control ($n = 15$) and diabetic ($n = 15$) through intravenous insulin infusion, and blood samples were drawn at baseline and hypoglycemia (0 hours). Following hypoglycemia identification, intravenous glucose 150 mL of 10% dextrose was administered, and repeated blood glucose was performed at different time intervals (1, 2, 4, and 24 hours). Two-way ANOVA with Tukey's multiple comparison tests is done for statistical analysis, and $p < 0.05$ is statistically significant.

Results: GDF-15 was significantly elevated ($p < 0.05$) in T2D compared with controls. We found a significant decrease in GDF-15 levels following hypoglycemia in diabetic subjects. Intravenous glucose administration restored the GDF15 levels after an hour. We did not find any further alterations in the GDF-15 levels at 2, 4, and 24 hours.

Conclusion: GDF15 levels were elevated in T2D subjects, and inducing hypoglycemia lowered the GDF-15 levels. The GDF-15 levels decreased during hypoglycemia were restored following intravenous glucose administration. This study showed that the impaired glucose and IR due to the hypoglycemia condition might result from lower GDF15 production. The pathways linked with the association of GDF15 with hypoglycemic conditions need to be studied further.

P5. The miRNAs Related to Energy Metabolism, Endothelial Function, and Insulin Signaling Pathways Are Dysregulated in Women with Gestational Diabetes Mellitus (GDM)

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Background: Occurrence of GDM during pregnancy increases risk for type 2 diabetes (T2D) postpartum in mother. In offspring this may increase risk of developing metabolic disorder such as obesity, T2D and cardiovascular disease later in life. Mostly GDM is diagnosed through OGTT performed during second trimester of pregnancy. Performing OGTT during pregnancy may cause discomfort in some women leading to less compliance. Hence alternative methods need to be identified to diagnose GDM. MicroRNAs are small non coding RNAs with 20 to 24 nucleotides that have been implicated in many metabolic diseases including T2D and GDM. The miRNAs could serve as noninvasive biomarkers for diagnosis and management of GDM.

Methods: In the present study we compared the expression levels of 112 miRNAs in plasma sample obtained during second trimester of pregnancy in control and GDM women. These miRNAs were selected based on literature search and or identified in T2D subjects in our previous study.

Results: We found that 3 miRNAs were down regulated, and 26 miRNAs were upregulated in GDM women (Table 1). Kegg pathway analysis on miRTarBase database shows that 7 out of 29 miRNA (hsa-miR-135a-5p, hsa-miR-153–3p, hsa-miR-15a-3p, hsa-miR-210–3p, hsa-miR-224–5p, hsa-miR-24–2-5p and hsa-miR-409–3p) were involved in regulation of lipids, HIF-1, PI3K-Akt, JAK-STAT, VEGF, AMPK, TNF signaling pathway, diabetic cardiomyopathy and insulin resistance.

Conclusion: our data suggests miRNAs related to energy metabolism, endothelial function and insulin signaling pathways are dysregulated in GDM women.

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P6. Inflammatory and Cardiometabolic Pathways Are Dysregulated in Nonalcoholic Fatty Liver Disease

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Background: Nonalcoholic fatty liver disease (NAFLD) is most common liver defined by presence of steatosis in more than 5% of hepatocytes. NAFLD is estimated to be present in ~25% of population worldwide. If untreated this can progress nonalcoholic steatohepatitis, fibrosis, cirrhosis and hepatocellular carcinoma. NAFLD is associated with inflammation, insulin resistance, metabolic syndrome and cardiovascular risk. In the present study we performed multiplex Olink proteomics to look at protein involved in inflammation and cardiometabolic disorder to compare the protein biomarkers in NAFLD and control subjects.

Methods: NAFLD was diagnosed based on elevated alanine aminotransferase (>35 U/L) and/ ultrasound imaging. We performed Olink proteomics to measure 192 proteins using cardiometabolic and inflammation panel in plasma samples from $n = 50$ subjects from each group.

Results: We found 23 proteins that were differentially regulated in NAFLD group compared with controls (Fig. 1). The string analysis showing protein–protein interaction demonstrated that differentially regulated proteins identified in NAFLD group belongs to family of proteins that are involved in cytokine-chemokine receptor interaction, chemokine signaling, insulin signaling, NF-kappa B signaling pathway, IL-17 signaling, and TNF signaling pathway.

Conclusion: Our data suggest that cardiometabolic and inflammatory pathways are dysregulated in NAFLD patients and these early molecular changes may aggravate cardiovascular disease and progression to liver fibrosis.

P7. Endocrine FGF19 Subfamily Is Associated with Nonalcoholic Fatty Liver Disease (NAFLD)

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Background: Nonalcoholic fatty liver disease (NAFLD) is a spectrum of liver disease with high prevalence in diabetes type 2 (T2D) patients. The prevalence of NAFLD in T2D is twofold higher than in nondiabetic subjects; conversely, the risk of developing T2D increases by fivefold in patients with NAFLD. The endocrine FGF19 sub family which includes (FGF19, FGF21 and FGF23) are involved in regulation of glucose, fatty acid, phosphate and lipid metabolism. These proteins elicit their functions by activating four tyrosine kinase receptors FGFR1–4, their affinity to FGFRs varies between the tissues. In this study we measured circulating levels of FGF19, FGF21 and FGF23 and adiponectin in patients with NAFLD, NAFLD+T2D and control subjects. We correlated these proteins with clinical and biochemical variables.

Methods: NAFLD was diagnosed based on elevated alanine aminotransferase (>35 U/L) and/ ultrasound imaging. Circulating FGF19, FGF21, FGF23, and adiponectin were measured in a fasting blood sample.

Results: ANOVA analysis showed lower levels of FGF19 in NAFLD and NAFLD+T2D ($p = 0.013$) group compared with controls. Conversely, FGF21 was higher in NAFLD and NAFLD+T2D ($p = 0.001$) group compared with controls. Detectable levels of FGF23 were found only in NAFLD and NAFLD+T2D group. Suggesting that FGF23 levels are elevated in NAFLD and NAFLD+T2D patients. Adiponectin an insulin sensitivity marker was found to be lower in NAFLD and NAFLD+T2D ($p = 0.000$) group compared with controls. Further Pearson bivariate correlation analysis showed that FGF21 levels significantly correlated with markers of insulin resistance HbA1c, adiponectin, HOMA-IR and QUICKI. FGF19 correlated with BMI, fat mass, visceral fat, and QUICKI.

Conclusion: A lower FGF19 and elevated FGF21 and FGF23 are associated with the development of NAFLD and NAFLD+T2D. Increase in lipid accumulation triggers dysregulated release of FGF19 sub family members and this may be early events in development of metabolic syndrome in these patients.

P8. Validation of the Single-Point Insulin Sensitivity Estimator (SPISE) as a Surrogate Marker for Insulin Sensitivity in Multi-ethnic and Arab Populations among Qatar Residents

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Background: The hyperinsulinemic euglycemic clamp (HEIC) test has been the gold standard for measurement of insulin sensitivity in humans. The single point insulin sensitivity estimator (SPISE), which was introduced as a surrogate marker for insulin sensitivity, is derived from HDL, triglycerides and BMI; it does not require insulin or glucose measurements. Here, we evaluate SPISE and determine the cutoff point for IR in a multiethnic and in Arab populations among the residents of Qatar.

Methods: We included 110 participants previously characterized with HEIC. SPISE, HOMA-IR and QUICKI were calculated. Each modeling result was scored by identifying insulin resistance and determining the correlation coefficient. SPISE was compared with traditional insulin sensitivity indices using area under the receiver operating characteristic curve (aROC) analysis.

Results: Overall, there was a significant correlation between SPISE and HEIC, HOMA-IR and QUICKI ($R = -0.439$, and -0.686 and -0.686, respectively). The subgroup analysis including 59 subjects with high insulin sensitivity (M value >12, $n = 21$) and low insulin sensitive (M value <6, $n = 28$), improved the significant correlation between SPISE and HEIC, HOMA-IR and QUICKI (0.614, -0.698, and -0.698). The cutoff value of SPISE for predicting insulin resistance was 5.74; whether calculated for all the participants ($n = 59$) or for Arab only ($n = 44$). The sensitivities and specificities were slightly different among the 2 cohorts and ranged between 65.2 to 70.3% and 90 to 90.5%, respectively.

Conclusion: SPISE could be a clinically useful low-cost indicator with high sensitivity and specificity for predicting IR among the different ethnic groups of Qatar residents.

P9. Proteomics Analysis Identified a Cluster of Proteins That Differ by Insulin Sensitivity

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Background: Insulin Resistance (IR) is characterized as an impaired response to insulin in target tissues, primarily the liver, muscle, and adipose tissue. Our objective here is to obtain a deeper insight into the pathophysiological processes leading to IR and type 2 diabetes mellitus (T2D) in an Arab population.

Methods: We included a total of 30 healthy male participants previously characterized with high insulin sensitivity ($n = 16$) and low insulin sensitivity ($n = 14$) with hyperinsulinemic euglycemic clamp. We used the Olink and mass spectrometry analysis for measuring ~1,400 proteins in their fasting plasma samples. . String analysis was performed to assess protein- protein interactions among the differentially regulated proteins.

Results: Seventy out of 1,000 proteins were significantly different between the 2 groups (26 proteins downregulated and 44 proteins upregulated) (Fig. 1). The string analysis showed a cluster of 18 proteins related to five different Kegg pathways: Ras signaling pathway, Rap1 signaling pathway, MAPK signaling pathway, PI3K-Akt signaling pathway and Focal adhesion. These five pathways are important to insulin signaling and are related to the insulin resistance (Kegg pathways database).

Conclusion: Proteomic analysis identified a set of proteins that may play an early role in insulin resistant subjects.

P10. Establishing Reference Intervals for Plasma Amino Acids and Trace Level Glycated Amino Acids of Healthy Subjects in Qatar

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Background: Free amino acids and trace level modified amino acids may be quantified in human plasma by the reference technique of stable isotopic dilution analysis liquid chromatography-tandem mass spectrometry (LC-MS/MS). Modified amino acids reflect different aspects of metabolic control: N_{ε}-fructosyl-lysine (FL)—glycemic control; and methylglyoxal-derived hydroimidazolone MG-H1—exposure to glucose-derived reactive metabolite, methylglyoxal (MG). They are not quantified in conventional metabolomics analysis.

Methods: The aim of this study was to establish reference intervals for these analytes in plasma of healthy subjects in Qatar collected in the fasting phase by collaboration with Qatar Biobank (QBB); and to compare **l**evels with those of the UK HATFF Study.

Results: Subject characteristics were: QBB study ($n = 120$)—gender (M/F, 60/60), age 33 ± 9 years and BMI 28 ± 5 kg/m^2; and HATFF study ($n = 29$)—gender (M/F, 8/21), age 45 ± 13 years and BMI 30 ± 4 kg/m^2. Plasma ultrafiltrates were prepared by microspin ultrafiltration, mixed with stable isotope-substituted internal standards and analyzed by LC-MS/MS. Data are median (lower – upper quartile) with difference assessed by the Mann–Whitney U test. For Qatari subjects, fasting plasma FL concentration was 536 (386–754) nM, and MG-H1, 470 (325–727) nM. The MG-H1/FL ratio reflects exposure to MG, normalized to glycemic control. It was over twofold higher in Qatar versus UK subjects: 85 (65–119)% versus 34 (22–49)%; $p < 0.001$.

Conclusions: This suggests that Qatari subjects appear predisposed to relatively high levels of MG for a given glycemic control. Increased MG is associated with activation of the unfolded protein response, low grade inflammation, decreased satiety and overeating, and increased risk of insulin resistance and type 2 diabetes. Plasma MG-H1/FL ratio may be a mechanistic biomarker of this.

P11. Exendin-4 Promotes GSIS by Upregulating Genes Related to Maturation, Glucose-Sensing Apparatus, and Mitochondrial Oxidative Phosphorylation Machinery in hPSC-Derived β-cells

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Background: Impaired insulin secretion contributes to the pathogenesis of diabetes mellitus type 1 (T1DM) through autoimmune destruction of pancreatic β-cells and the pathogenesis of diabetes mellitus type 2 (T2DM) through β-cell dedifferentiation and other mechanisms. Emerging β-cell replacement with human pluripotent stem cell (hPSC)–derived β-cells may provide remedial cell therapy. Most protocols to differentiate hPSCs to insulin-expressing β-cells in vitro have generated hPSC-derived β-cells with either immature phenotype such as impaired or weakened glucose-stimulated insulin secretion (GSIS) relative to primary β-cells. Evidence has shown that β-cell mitochondria play a central role in coupling glucose metabolism to insulin exocytosis. Therefore, the impairment of GSIS in hPSC-derived β-cells may be attributed to mitochondrial dysfunction. The aim of this study is to investigate the effect of Exendin-4 (GLP-1 receptor analog), known to promote mitochondrial function, on enhancing maturation and functionality of hPSC-derived β-cells.

Methods: Differentiation of hPSC into β-cells was performed in a stepwise 3D differentiation protocol using 30 mL spinner flask adapted from the protocol of Veres et al. (2019). This consists of 6 stages: S1, definitive endoderm; S2, gut tube endoderm; S3, pancreatic progenitors 1; S4, pancreatic progenitors 2; S5, endocrine precursors; and S6, β-like cell formation. The efficiency of relevant stage-specific marker expression was tested using flow cytometry. Finally, to further test the effect of GLP-1 receptor analog in promoting the maturation of β-cell phenotype, 50 nM Exendin-4 was added to the suspension culture during the last three days of differentiation. To determine the functionality of hPSC-derived β-cells, GSIS was performed. Gene expression in cell clusters was determined by RT-PCR. Data are mean ± SEM ($n = 3$)

Results: Flow cytometry data for relevant stage-specific markers showed 96% OCT4 positive, 89% SOX17 and 83% PDX1 positive cells, indicating good pluripotency, high definite endoderm and pancreatic progenitor induction, respectively. As for β-cell markers, we found 41.4% NKX6.1/insulin double positive cells at final stage 6, indicating a generation of β-cells. Expression profiling during differentiation confirmed

the generation of insulin-expressing β-cells. However, GSIS data showed no difference in c-peptide secretion between low (2.8mM) and high (20 mM) glucose but high response to direct cellular depolarization-mediated c-peptide by KCl; suggesting a lack of functional β-cells. Interestingly, addition of Exendin-4 (50 nM) during the last 3 days of the differentiation significantly enhanced GSIS associated with increased expression of NeuroD1, MAFA) GCK, G6PC2 and genes encoding mitochondrial oxidative phosphorylation machinery.

Conclusion: Our data demonstrated for the first time in 3D differentiation of hPSC-derived β-cells that addition of Exendin-4 enhances GSIS through upregulation of maturation, glucose-sensing apparatus and mitochondrial oxidative phosphorylation machinery genes without increasing β-cells number.

P12. ADCY3 Variants Causing Severe Early-Onset Obesity in Patients from Qatar

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Background: Mutations in the ADCY3 gene are known to cause severe-early onset obesity. ADCY3 encodes for adenylate cyclase 3 enzyme which is crucial for creating a balance between appetite and energy expenditure and thus regulating body weight.

Methods: Here, we report four patients with severe early-onset obesity attending the endocrinology clinic at Sidra Medicine, who were tested with whole genome sequencing (WGS). Two patients (BMI of 75 kg/m^2 at the age of 15 years; BMI of 45 kg/m^2 at the age of 16 years) were carriers of a heterozygous variant c.1222G>A (p.Gly408Arg) in ADCY3. The other two patients (BMI = 55 kg/m^2 at age of 14 years; BMI = 48 kg/m^2 at age of 13 years) carried another heterozygous ADCY3 variant; c.1658C>T (p.Ala553Val).

Results: All patients report the obesity onset before the age of 10 years. The patients and their family members ($n = 10$) were subjected to familial segregation analysis was conducted. The variant c.1222G>A segregated in the two probands and an obese mother, while the variant c.1658C>T segregated in the two probands, an obese younger sibling and an obese parent for each proband. We further molecularly visualized the protein encoded by those variant using PyMol software which revealed clashes and misalignment between the wildtype protein and mutant type. Minor clashes between variants and neighboring residues are shown in small green discs, while larger discs present significant clashes points. a. ADCY3; p.V553 shows minor and significant clashes along with increased affinity to residue E549. b. ADCY3; p. R408 shows minor and significant clashes along with increased affinity to residue Q330.

Conclusions: Our results support that the pathogenicity of the 2 variants in relation to severe early onset obesity, in autosomal dominant manner with incomplete penetrance. Further functional analysis is needed to better understand the impact of the variants identified in obesity development.

P13. Dicarbonyl Stress Is a Dominant Activator of the Unfolded Protein Response in Hyperglycemia

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Background: The unfolded protein response (UPR) detects misfolded proteins and activates protein refolding, protein degradation and inflammatory responses linked to the development of vascular complication of diabetes. It is activated in hyperglycemia by metabolic factors which remain unclear. High glucose concentration increases the cellular concentration of the reactive dicarbonyl metabolite, methylglyoxal (MG)—an abnormal metabolic state called dicarbonyl stress. This increases protein modification by MG, forming unexpected surface hydrophobicity on proteins and increasing protein misfolding. MG is metabolized mainly by glyoxalase 1 (Glo1) of the glyoxalase system.

Methods: We explored if dicarbonyl stress activates the UPR and the link to inflammation and apoptotic signaling in human aortal endothelial cells and microvascular HMEC-1 endothelial cells in vitro.

Results: High glucose concentration increased expression and activation of UPR sensor IRE1α, with increased expression of XBP1 and cleavage of miR-17 - the latter response stabilizing TXNIP mRNA, increasing its expression and inflammatory signaling via the NLRP3 inflammasome. PERK and ATF6 signaling were stimulated with increases in CHOP and GRP78, although there were decreases of these UPR sensors at the protein level, through impaired stabilization to proteolysis by MG modification of protein thiol isomerases. These effects were recapitulated by Glo1 silencing in low glucose concentration and prevented in high glucose concentration by overexpression of Glo1 and induction of Glo1 expression by trans-resveratrol and hesperetin combination, "Glo1 inducer." The pharmacological UPR activator, tunicamycin, produced similar increased expression of TXNIP but markedly higher increased expression of CHOP and GRP78. We conclude that dicarbonyl stress is a dominant activator of the UPR in hyperglycemia. It produces responses that contribute to low grade inflammation and cell dysfunction in hyperglycemia which Glo1 inducer corrects. This may contribute to endothelial dysfunction and the development of diabetic vascular complications.

Conclusion: This is a study on physiological activation of the unfolded protein response—a key regulator proteostasis which is activated in hyperglycemia associated with diabetes producing vascular cell dysfunction and low grade inflammation linked to the development of diabetic vascular complications. We show for the first time that accumulation of the reactive metabolite, methylglyoxal - an abnormal metabolic state called dicarbonyl stress - is the dominant activator of the unfolded protein response in hyperglycemia.

P14. Finding Novel Targets for the Treatment and Reversal of Type 2 Diabetes Mellitus and Obesity

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Background: Recent studies have identified branched chain amino acids (BCAAs; isoleucine, leucine and valine) as

potential biomarkers of, and being involved in, the pathogenesis of type 2 diabetes mellitus (T2DM), insulin resistance (IR) and obesity. Reducing circulatory BCAAs by dietary restriction was suggested to mitigate these risks in rodent models, but this is a challenging paradigm to deliver in humans.

Methods: We aimed to design and assess the feasibility of a diet aimed at reducing circulating BCAA concentrations in humans, while maintaining energy balance and overall energy/protein intake.

Results: Twelve healthy individuals were assigned to either a 7-day BCAA-restricted diet or a 7-day control diet. Diets were iso-nitrogenous and iso-caloric, with only BCAA levels differing between the two. The BCAA-restricted diet significantly reduced circulating BCAA concentrations by ~50% i.e., baseline 437 ± 60 to 217 ± 40 µmol/L ($p < 0.005$). Individually, both valine (245 ± 33 to 105 ± 23 µmol/L; $p < 0.0001$), and leucine (130 ± 20 to 75 ± 13 µmol/L; $p < 0.05$), decreased significantly in response to the BCAA-restricted diet. The BCAA-restricted diet marginally lowered Homeostatic Model Assessment of Insulin Resistance (HOMA-IR) levels: baseline 1.5 ± 0.2 to 1.0 ± 0.1; ($p = 0.096$). We successfully lowered circulating BCAAs by 50% while maintaining iso-nitrogenous, iso-caloric dietary intakes, and while meeting the recommended daily allowances (RDA) for protein requirements.

Conclusions: The present pilot study represents a novel dietary means by which to reduce BCAA, and as such, provides a blueprint for a potential dietary therapeutic in obesity/diabetes.

P15. Assessment of c.485C<T MC4R Missense Variant in Obesity Pathogenesis Using the Zebrafish Model

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Background: Monogenic obesity (MO) is a rare genetic condition characterized by severe early-onset obesity in affected individuals. Melanocortin 4 receptor (MC4R) gene variants are the most common cause of nonsyndromic MO, and they are usually inherited in an autosomal dominant manner. The activation of this receptor by α-melanocyte-stimulating hormone reduces food intake and regulates body weight and energy balance. In our previous work, we used whole genome sequencing data from Qatar Genome Program and identified some obesity variants. Among the identified variants, three cases of c.485C<T in MC4R (with an average BMI of 40.4 ± 2.1 kg/m^2). We aimed to characterize the function of the identified MC4R variant in a heterozygous state in the development of obesity using Zebrafish as a model organism. To achieve this aim, we will 1) Knockdown MC4R and characterize the impact of gene down-regulation on adiposity and 2) Perform rescue experiments using our identified variant and quantify the impact of the mutation on obesity development.

Methods: For the first objective: different doses of morpholinos were injected in embryos at 1 to 4 cell stages to identify the optimum dose. The survival rate (SR), hatching rate (HR), tail flicking, and blood flow were recorded. The decrease in protein expression was assessed using western blotting. Measurements were obtained for length, weight, and yolk retention. To achieve the second objective, a similar methodology will be conducted.

Results and Conclusion: Based on our dose–response data, 4 ng was the optimum MC4R morpholino dose. This dose did not affect the SR, HR, and growth of the zebrafish. Furthermore, it was not found to result in any cardiotoxicity or neurotoxicity. The confirmation of gene knockdown was confirmed using western blotting and the phenotypic analysis showed a significant increase in body weight that is currently being supplemented by yolk retention measurements.

P16. Efficacy of Low-Dose Pioglitazone in Combination with Exenatide on Glucose Control in Poorly Controlled Long-Lasted T2DM Patients: Results from a Qatar Study

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Background: We aimed to examine the safety and efficacy of lower dose pioglitazone in combination with exenatide in Qatar studies

Methods: Poorly control patients with long standing diabetes on maximal dose of metformin plus sulfonylurea were started on combination of pioglitazone plus exenatide. Patients were followed for 3 years. In this analysis, we stratified patients according to pioglitazone dose utilized, and the efficacy of HbA1c lowering and change in body weight and incidence of ankle edema were related to pioglitazone dose.

Results: The reduction in HbA1c was comparable in patients receiving 15, 30 and 45 mg pioglitazone, $-3.3\% \pm 0.4$, $-3.4\% \pm 0.5$, and $-3.6\% \pm 0.5$, respectively, $p =$ NS. However, the mean change in body weigh was dose dependent. Subjects receiving 15 mg pioglitazone experience a mean weight loss (1.4 ± 1.2 kg) compared with mean weight gain in subjects receiving 30 and 45 mg doses (4.8 ± 1.4 kg and 5.8 ± 1.6 kg, respectively, $p < 0.01$ vs. 15 mg dose).

Conclusion: When combined with GLP-1 RA, the lower doses of pioglitazone produce a comparable reduction in HbA1c with lower risk of weight gain than the maximal approved pioglitazone dose (45 mg).

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P17. Therapeutic Inertia and Vascular complications in Type 2 Diabetes In Qatar: Results from the INERT-Q Study

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Background: Type 2 DM(DM-2) is associated with an increased risk of both micro-vascular and macro-vascular complications. The main derive for these complications is the cumulative exposure of the body to hyperglycemia. Even after achieving glycemic targets, prolonged exposure to poor glycemic legacy continues to derive complications in short to intermediate term. This study aims to examine the prevalence of both microvascular and macrovascular complications in DM-2 patients enrolled in INERT-Q at baseline and two years

Methods: INERT-Q was described elsewhere. For this analysis, we report the proportion of microvascular and macrovascular disease at baseline and two years. We compared the proportion at the two-time points using the McNemar test.

Results: The study's primary cohort was detailed elsewhere. We recruited 374 DM-2 patients. The mean HBA1c at 2 years, 1 year, and at the time of insulin initiation was 9.2, 9.3, and 10.4%, respectively. At 2 years, the mean

HBA1c dropped to 8.5%, and 32.9% achieved HBA1c targets of $\leq$7.5%. Table 1 shows the rates of complications at the two time points. Despite the reduction in HBA1c, there was a significant increase in the progression of microvascular and macrovascular disease (47.6–64.7%, $p < 0.001$) and (25.3–28.3, $p < 0.001$), respectively. As shown below, apart from diabetic kidney disease, all other components of microvascular complications have significantly progressed. There was also no progression in cerebrovascular disease. Sensitivity analysis showed no difference between those who did and did not achieve glycemic targets

Conclusion: Prolonged exposure to hyperglycemia continues to derive complications in the short term despite the reduction in HBA1c. Earlier interventions are critical to reducing vascular complications.

P18. The Association between Stress and Depressive Symptoms among Adult Patients with Type 2 Diabetes Mellitus in Qatar during COVID-19 Pandemic

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Background: We aimed to examine the association between stress associated with COVID-19 policy measures and depressive symptoms among adults with type 2 diabetes mellitus (T2DM).

Methods: This study was a part of a cross-sectional survey conducted among 288 patients with T2DM at the National Diabetes Centre in 2021. The perceived stress, depressive symptoms and diabetic self-care activities were assessed using the Perceived Stress Scale (PSS), the Patient Health Questionnaire 9 (PHQ-9) and the Summary of Diabetic Self-Care Activities tool (SDSCA), respectively. Descriptive statistics (mean $\pm$ SD, median (IQR), frequency (%)) were used to describe the sample, while the Chi-square, Mann–Whitney, and Spearman rho correlation (at $\alpha = 0.05$) were used to test the association between depressive symptoms and the independent variables.

Results: The mean age was 51.4 ($\pm$9.5) years, 93.3% were fully vaccinated (at least two doses), and 4.2% were partially vaccinated (one dose). Moreover, 25% of the participants were previously infected with COVID-19. About 16.9% of participants were stressed about COVID-19 and its measures. The greatest worries were about a family member getting infected, followed by the measures related to lockdown, distance learning, and travel restrictions. However, 15.9% of the patients were stressed due to other reasons. The median (IQR) of the perceived stress total score was 8 (3). The prevalence of minimal, mild, moderate, and moderately severe depressive symptoms was 69.4%, 26%, 3.5% and 1.2%, respectively. There is a statistically significant positive correlation ($r = 0.279$, $p < 0.001$) between the perceived stress score and depressive symptoms score. Another statistically significant association was between stress unrelated to COVID-19 and the severity of depressive symptoms ($p < 0.001$). However, we failed to find a statically significant association between depressive symptoms and diabetic self-care activities ($p = 0.07$)

Conclusion: Stress and depressive symptoms are common among patients with T2DM, and assessment by mental health experts is crucial during and after the pandemic.

P19. Epidemiological Impact of Public Health Interventions against Diabetes in Qatar: Mathematical Modeling Analyses

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Background: Qatar, part of the Middle East and North Africa, has one of the highest prevalence of diabetes mellitus (DM) worldwide at 16.2%. Type 2 DM (T2DM) along with obesity, the main driver of DM in Qatar, is predicted to rapidly rise over the next three decades. Tackling DM is a national priority for policy makers as delineated in Qatar's National Health Vision 2030. We aimed to predict the impact of specific, and mainly structural, public health interventions on reducing T2DM burden among adult Qataris between 2021 and 2050.

Methods: A deterministic population-based model was adapted to investigate the impact of public health interventions on T2DM epidemiology among Qataris aged 20 to 79 years. Each intervention was assessed by comparing the predicted T2DM incidence and prevalence in the presence of the intervention to a counterfactual scenario with the absence of the intervention. The model was parametrized by nationally representative survey data and stratified by sex, age group, T2DM risk factors, T2DM status, and intervention status.

Results: All intervention scenarios had an appreciable impact on reducing T2DM incidence and prevalence. A lifestyle management intervention approach, specifically applied to those who are categorized as obese and $\geq$35 years old, averted 9.5% of new T2DM cases by 2050. An active commuting intervention approach, specifically increasing cycling and walking, averted 8.5% of new T2DM cases by 2050. Enhancing the consumption of fruits and vegetables, specifically through education and environmental dietary modification at the workplace, averted 23.2% of new T2DM cases by 2050. A subsidy and legislative intervention approach, implementing subsidies on fruits and vegetables and taxation on sugar-sweetened beverages, averted 7.4% of new T2DM cases by 2050. A least to most optimistic combination of the interventions above averted 22.8 to 46.9% of new T2DM cases by 2050, respectively.

Conclusion: The study highlights the critical need to implement a combination of structural public health interventions to prevent and reduce the rising T2DM epidemic in Qatar. The approach used in this study can be extended to other countries and evidence generated has immediate implications for improvements to public health policy, practice, research, and resource allocation toward reducing T2DM.

P20. Screening Rates for Diabetes in Pregnancy—Results from the National Screening Program

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Background: Diabetes is the most common metabolic disorder that affects pregnancies. It is associated with adverse pregnancy outcomes such as pre-eclampsia, preterm delivery, large-for-date offspring, and shoulder dystocia. Besides, offspring born for women with diabetes during pregnancy are at higher risk of adulthood metabolic disorders. Hence, Qatar has implemented a national program to screen all women for diabetes during pregnancy. On average eligible women are screened in the first antenatal visit using FBG and HBA1c and —if negative—using an Oral Glucose tolerance test(OGTT) after 24 weeks of gestation This audit aims to examine the screening rates for diabetes in pregnancy in the years 2019, 2020, and 2021.

Methods: We included all deliveries in HMC hospitals in each calendar year. We identified the Expected Date of Delivery (EDD) as the reference point to note 40 weeks gestation. We extracted glucose data (FBG, 1-hour post-OGTT, 2 hours post-OGTT and HBA1C) from Cerner that were done 40 weeks prior to the EDD. We excluded women with pre-existing diabetes. We then included glucose data between 4–35 weeks gestation.

Results: Out of 24,321 women eligible for screening in 2019, 20023 women (82.3%) were screened. In 2020, out of 25,585 eligible women for screening, 20005 (78.2%) were screened. While in 2021, out of 22164, 19974 women (90.1%) were screened. Women of Qatari and Arab origin under the age of 25 had the lowest screening rates in the three calendar years. Fig. 1 shows a bimodal distribution of screening in 2019 —in keeping with the current guidelines.

Conclusion: We report the successful implementation of the National screening program for diabetes in pregnancy.

Acknowledgment:
Ms. Ionna Skaroni – National Diabetes Program-MoPH. Venkateswara Rao Chinta- HICT- HMC

P21. Prevalence of Diabetes in Pregnancy: Results from the National Screening Program

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Background: Diabetes in pregnancy (DIP) is a common metabolic disorder associated with adverse pregnancy outcomes and long-term metabolic sequala. Qatar has implemented a national program to screen all women for DIP. The primary objective of this study is to report the prevalence of DIP in the years 2019, 2020, and 2021. The secondary objective is to report the COVID pandemic's impact on DIP's prevalence.

Methods: Data extraction and processing were explained elsewhere. We calculated the prevalence of pre-existing DM based on the total number of deliveries in each calendar year. We classified new-onset diabetes in pregnancy based on the National Guidelines into Gestational Diabetes Mellitus (GDM) and new-onset Type 2 DM (DM-N). We calculated the prevalence of new-onset DIP among women who were screened for diabetes during pregnancy

Results: The prevalence of pre-existing DM in pregnancy was 2.9% (95% CI: 2.6–3.1) in 2019, 2.3% (95% CI: 2.1–2.5%) in 2020, and 2.6% (95% CI: 2.3–2.8%) in 2021. The prevalence of GDM in pregnancy was 28.3% (95% CI: 27.6–28.9) in 2019, 33.1% (95% CI: 32.4–33.8) in 2020, and 33.4% (95% CI: 32.7–34.1) in 2022. However, the prevalence of DM-N was 1.7% (95% CI: 1.7–2.1) in 2019, 1.7% (95% CI: 1.6–1.9) in 2020, and 2.2% (95% CI: 2.0–2.4) in 2021. As outlined in Fig. 1, there was a significant rise in the prevalence of both GDM between 2019 to 2020, and DM-N between 2020 and 2021.

Conclusion: Almost one-third of all pregnant women have diabetes in pregnancy in Qatar. We report, for the first time, a significant increase in the prevalence of diabetes in pregnancy during the COVID pandemic

Acknowledgment:
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P22. The Impact of the COVID Pandemic on the Prevalence of Diabetes in Pregnancy Varies by Ethnicity

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Background: Diabetes in pregnancy (DIP) is a common metabolic disorder associated with adverse pregnancy outcomes and long-term metabolic sequala. Qatar has a multi-ethnic population with a moderate to high genetic predisposition to diabetes. We have reported elsewhere a rise in the prevalence of GDM during the COVID pandemic. The primary objective of this study is to examine the prevalence of GDM based on ethnicity during the years 2019, 2020, and 2021.

Method: Data extraction and definitions of GDM were explained elsewhere. For the sake of this study, we report on the three largest ethnic groups, Qatari, Arabs, and Asians, representing >85% of the deliveries.

Results: There was a steady increase in the number of deliveries by Qatari women: 5,098/25,044 (20.3%), 5,604/24,939 (22.4%), and 5,836/21,705 (26.9%) in 2019, 2020, and 2021, respectively. There was a decline in the number of deliveries by Arab women; 10,409/25,044 (41.5%), 9,197/24,939 (36.8%), and 7,365/21,705 (33.9%), respectively. In comparison, the number of deliveries by Asian women remained steady at 6,528/25,044 (26.0%), 7,023/24,939 (28.1%), and 5,836/21,705 (26.8%). Fig. 1 shows the prevalence and 95% (CI) among the three ethnic groups over the three calendar years. In any calendar year, Asians had the highest GDM prevalence. Among Qatari, there was a significant increase in GDM prevalence from 26.6% in 2019 to 36.6% in 2020 ($p < 0.001$), followed by a significant reduction in 2021 to 27.9% ($p < 0.001$). Among the Arabs, GDM prevalence significantly increased from 27.3% in 2019 to 32.2% in 2020 ($p < 0.001$), with no significant change in 2021. Among Asians, there was a significant increase in GDM prevalence between 2020 and 2021, from 33.7% to 40.3% ($p < 0.001$).

Conclusions: Asians have the highest prevalence of GDM in Qatar. We report ethnic variations in the prevalence of GDM during the COVID pandemic.

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Ms. Ionna Skaroni – National Diabetes Program-MoPH. Venkateswara Rao Chinta- HICT- HMC.

P23. Impact of the National Screening Program for Diabetes in Pregnancy on Pregnancy Outcomes over the Last Decade

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Background: Diabetes in pregnancy (DIP) is a common metabolic disorder associated with adverse pregnancy outcomes. Since 2017, Qatar has implemented a national screening program for diabetes in pregnancy. Screening programs aim to reduce overall adverse pregnancy outcomes. Besides, all women with diabetes during pregnancy are treated based on national guidelines, protocols, and referral pathways. The primary objective of this study is to examine the impact of the national screening program on pregnancy outcomes.

Methods: We used two cohorts for this study. A 2011 study by Bener et al invited pregnant women to undertake OGTT-selective screening. A cohort of 20,023 women screened based on the national screening program in 2019 —universal screening. We compared pregnancy outcomes among both the GDM and the normal groups. We used the chi-square test to compare the groups.

Results: There was a significant increase in the prevalence of GDM from 16.3% in 2011 to 28.3% in 2016 ($p < 0.001$). As shown in Table 1, among women with no GDM, the rates of stillbirth and macrosomia were reduced in the 2019 cohort compared with 2011. Among women with GDM, the rates of stillbirth, macrosomia, and preterm deliveries were all significantly reduced.

Conclusion: The national screening program resulted in a significant rise in the prevalence of GDM. However, there was an improvement in the rates of some serious adverse outcomes in women with and without GDM.

P24. Risk Factors for Gestational Diabetes in Multi-ethnic Pregnant Women

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Backgrounds: Gestational diabetes (GDM) is known to have a negative impact on pregnancy outcomes. In the last decade, its prevalence has increased nearly threefold. In recent studies, the prevalence ranged between 8.9 and 53.4%. Identifying risk factors may aid in early diagnosis and prompt glycemic control. So, a study was conducted on a multi-ethnic population of Qatar to assess the risk factors for GDM.

Methods: A retrospective clinical review of women delivered at a secondary hospital in the Middle East. A total of 1,000 women were screened for the study. Women with type 1 and 2 and overt diabetes were excluded. Women with normal fasting blood sugar results on booking were screened for GDM between 24 and 28 weeks of gestation with a 75-g oral glucose tolerance test (OGTT). Risk factors like age, ethnicity, parity, family history of diabetes, and previous history of miscarriage were evaluated. Risk factors in pregnant women with GDM were compared with dose who had normal OGTT. OR was calculated using multiple logistic regression to assess possible risk factors for GDM.

Results: A total of 900 women were included in the study. 270 of 900 women (30%) had abnormal OGTT. The study demonstrated that the risk factors of GDM were maternal age >35 years (OR: −2.25, 95% CI: −1.20 to 4.20, $p < 0.05$), Asian ethnicity other than Middle East (OR: −1.52, 95% CI: −1.03–2.30, $p < 0.05$), family history of diabetes (OR: −4.79, 95% CI: −2.67–8.51, $p < 0.05$), previous miscarriage ≥2 (OR: −1.71, 95% CI: −1.01–2.9, $p < 0.05$), and maternal obesity with body mass index ≥30 kg/m^2 (OR: −3.35, 95% CI: −2.31–4.84, $p < 0.001$).

Conclusions: Advanced maternal age, Asian ethnicity, maternal obesity, family history of diabetes, and more than two previous miscarriages were identified as important risk factors for GDM. Early pregnancy booking with antenatal fetal surveillance should be considered in these women.

P25. The Influence of Maternal Body Mass Index on Gestational Diabetes in Pregnant Women in Qatar

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Background: Both gestational diabetes mellitus (GDM) and high body mass index (BMI) are correlated with adverse pregnancy outcomes. GDM in pregnancy is independently associated with poor neonatal outcomes. In Qatar, with a multiethnic population and high prevalence of obesity, its relevant to study the impact of prepregnancy BMI and its association with GDM.

Objective: The objective of this study was to investigate the impact of prepregnancy BMI on gestational diabetes mellitus.

Methods: A retrospective clinical survey was conducted at a secondary hospital in Qatar. One thousand women with singleton pregnancies were included. Pregnant women who were enrolled after 16 weeks of gestation, those with type 1, type 2 and overt diabetes were excluded. Diagnosis of GDM was made by an abnormal oral glucose tolerance test (OGTT) during 24–28 weeks of gestation. Odds ratios were calculated using logistic regression to assess the association between GDM and prepregnancy BMI.

Results: Of 900 singleton pregnant women, 270 (30.0%) were diagnosed with GDM. Average BMI in women with GDM was 32.91 kg/m^2. In total, 24.37% (OR: −0.67, 95% CI: −0.48–0.89, $p < 0.05$) and 59.6% (OR: −8.32, 95% CI: −6.04–11.4, $p < 0.0001$) women diagnosed with GDM were overweight and obese before pregnancy, respectively. In addition, 47.45%, 76.54%, and all women with type 1, 2, and 3 obesity developed GDM ($p < 0.0001$).

Conclusion: Prepregnancy BMI and GDM were noted to have a strong association. Prevalence of GDM increased with increasing BMI. Prepregnancy weight reduction strategies should be considered in overweight and obese women to reduce the prevalence of GDM and associated complications in pregnancy.

P26. Glycemic Control in Pregnant Women with Type 2 Diabetes Enrolled in the CCPC-Program—A Five Years Data

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Background: Achieving adequate glycemic control is critical in reducing adverse pregnancy outcomes in women with type 2 diabetes (DM-2). The current glycemic target for women with DM-2 is HBA1c ≤6.5%. We aimed to measure glycemic control in pregnant women with DM-2.

Methods: We included all women with DM-2 enrolled in the CCPC program since August 2018. We classified DM-2 as New-onset (N-DM2) and Old-onset (O-DM2) if it was

detected ≤ 12 months and >12 months of conception, respectively.

Results: We are reporting on 841 women with DM-2, of which 294 (35.4%) were New-onset. In those with O-DM2, the mean age (SD) was 34.9(5), the mean (SD) duration of diabetes was 6 (4.4), the mean preconception BMI was 32.7 ± 6.4 kg/m^2, and the mean preconception HBA1c was 7.1 ± 1.6%. The median(SD) age of women with N-DM2 was 33 (4.8) years, mean (SD) preconception BMI was 32.7(6.1) kg/m^2 and mean (SD) HBA1c at conception was 6.6 ± 1.2%. Metformin was used in 94.3% of the women, while insulin was used in 77.2% of the women [81.5% in 0-DM2 and 64.3% in newly N-DM2]. The median total daily doses (TDD) of insulin by the end of pregnancy was 0.4 units/kg (IQR 0.3–0.7) in N-DM2 and 0.7 units/kg(IQR 0.4–1.0) in O-DM. The third-trimester target HBA1c of 6.5% was achieved in 82.8% of total patients, 91.9% in N-DM2 and 78.6% in O-DM2. After correction for interaction between booking HBA1c and average weekly gestational weight gain, multivariate regression analysis showed that gestational weight gain, followed by booking HBA1c and prepregnancy BMI, is the primary determinant of the third trimester HBA1c. (Table 1)

Conclusion: The proportion of women with DM-2 achieving glycemic targets (82.8%) was better than the previous report in 2019 (79.2%). Booking HBA1c, prepregnancy BMI and weekly GWG explain 24% of the third trimester HBA1c. Indeed, the weekly GWG is the most significant determinant for the third trimester HBA1C. Furthermore, Booking HBA1c significantly impacts GWG. Hence appropriate optimization of glycemic control is critical.

P27. Glycemic Control in Pregnant Women with Type 1 Diabetes Enrolled in the CCPC Program

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Background: Achieving target glycemic control is critical in improving pregnancy outcomes in women with type 1 diabetes (DM-1). The NICE and the Qatar guidelines suggest a HBA1c target of 6.5% without inducing undue hypoglycemia. Hence, a HBA1c target of <7.0% is recommended for those with recurrent hypoglycemia. To measure the glycemic control in pregnant women with DM-1

Methods: We included all women with DM-1 enrolled in the CCPC program since August 2018.

Results: We report 128 pregnancies in 110 women with DM-1. At the time of conception, the mean age (SD) was 30.5 (4.6) years, the mean (SD) duration of diabetes was 14 (7) years, the mean (SD) preconception BMI was 27.4 ± 5.4 kg/m^2, and the mean (SD) preconception HBA1c was 7.8 (1.2)%. After adjusting for ethnicity, 28.% of the women were overweight, and 34.4% were obese. The median total daily doses (TDD) of insulin by the end of pregnancy was 0.84 units/kg (IQR 0.6–1.1). The mean (SD) of HBA1c in the third trimester was 6.8 (0.9)%. The target HBA1c of ≤6.5% and <7.0% was achieved by 37.6 and 54.4% of the patients in the third trimester. Univariate regression analysis of the third trimester HBA1c identified booking HBA1c as the only predictor; β-coefficient 0.47 (95% CI: 0.35–0.59), $p < 0.001$, adjusted R^2 32.7.

Conclusion: The proportion of women with DM-1 achieving tight glycemic targets ≤6.5% (37.6%) is lower than patients with DM-2 (82.8%)—reported elsewhere—and lower than the most recent UK report in 2021 (40.1%). It is critical to note that the booking HBA1c could explain 33% of the last trimester HBA1c levels. Compared with a 2017 report, more women with DM-1 are now obese at conception (34.4 vs. 28.6%). Furthermore, the total daily doses (0.84 units/kg) are higher than in patients with DM-2 (0.7 units/kg), suggesting superimposing insulin resistance. Hence, similar to DM-2, it is critical to optimize weight and glycemic control before pregnancy.

P28. Prevalence and Progression of Graves' Disease during the Pregnancy—Data from Qatar

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Background: Hyperthyroidism during pregnancy is not uncommon. If not well treated, hyperthyroidism is associated with severe adverse pregnancy outcomes. However, antithyroid medications cross the placenta and are associated with an increased risk of congenital malformations and fetal goiter. Hence treatment should be based on the benefit–risk ratio. Most women with Graves' disease will achieve total or partial remission during pregnancy. In this study, we aim to describe the prevalence of hyperthyroid disorders in pregnancy. We also aim to describe the remission rates in women with Graves' disease.

Methods: We performed a retrospective study between January 2018 till December 2019 in the Women Wellness and Research Centre (WWRC), Doha, Qatar. WWRC is the largest maternity hospital in the state of Qatar. We identified all patients diagnosed with hyperthyroidism during pregnancy using ICD codes. Women are defined as being in remission if they do not require antithyroid medications and the FT4 was normal.

Results: The overall prevalence (95% CI) of hyperthyroidism in pregnancy among 32,700 deliveries was 0.6% (0.5–0.7), of which gestational thyrotoxicosis was 0.33% (0.28–0.40), GD was 0.25(0.2–0.31), and toxic multinodular goiter was 0.01% (0.0003–0.003). Out of the 82 women with GD, 17 (20.7%) were new onset, and 65 (79.3%) had preexisting GD. Among women with preexisting GD, 23 women (35.4%) were off treatment at conception, while 25 women (38.5%) were on Carbimazole [median dose (IQR): 15 mg (5–20)], and 17 women (26.5%) were on Propylthiouracil [median dose (IQR): 100 mg (100–150)]. Among the women with new-onset GD, 10 (59.4%) required treatment. By the end of pregnancy, most patients with GD have achieved remission 59/79 (74.7%). Among those who did not achieve remission, one woman was treated with PTU, and the rest were on Carbimazole [Median dose (IQR): 10 mg (10–20)].

Conclusion: The prevalence of hyperthyroid disorders in pregnancy in Qatar is similar to other countries. Gestational thyrotoxicosis is the most common cause of hyperthyroid disorders in pregnancy. We report a high rate of remission (74.7%) of GD during pregnancy.

P29. Causes of Hyperprolactinemia: An Audit from a Single Clinic—HGH

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Background: Prolactin is a polypeptide hormone produced by the anterior pituitary glands. Hyperprolactinemia has been associated with many etiologies, including pituitary tumors. Furthermore, transient hyperprolactinemia can result from stress. Persistently elevated prolactin levels result in abnormal sexual function in both genders. Hence, prolactin levels should always be re-measured in the absence of symptoms suggestive of persistent hyperprolactinemia. We aim to examine the causes of hyperprolactinemia among patients referred to the pituitary clinic in HGH.

Method: We collected data on 178 consecutive patients. Prolactin levels were re-measured in all patients. An MRI scan was ordered accordingly.

Results: The mean age (SD) of the patients was 29.7 (8.3) years, the mean BMI (SD) was 29.1 (7.0) kg/m^2, and 166 (93.2%) were females. Half of the males presented with headaches 6/12 (50%), while the other half had no symptoms. Most of the females had no symptoms 55/166 (33.1%), while 45 (27.1%) of them presented with irregular menses, and 23 (13.9%) presented with infertility. Repeated prolactin levels were back to normal in 90/177 (50.6%) patients, decreased to <1,000 mIU/L in 58/177 (16.8%) and increased in 30/177 (16.8%) patients. MRI scans were normal in 33/62 (53.2%) patients, showed pituitary microadenoma in 19/61 (30.6%), and pituitary macroadenoma in 9/62 (14.5%) patients. Table 1 shows the final diagnosis of the cohort. Prolactinomas were diagnosed in 50% of males and 11.4% of females.

Conclusion: Elevated prolactin levels are more commonly seen in females. Among females, PCOS is the most common cause. While among males, prolactinoma was the most common cause.

P30. Hyperprolactinemia in Asymptomatic Patients

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Background: Prolactin is a polypeptide hormone produced by the anterior pituitary glands. Hyperprolactinemia has been associated with many etiologies, including pituitary tumors. Furthermore, transient hyperprolactinemia can result from stress. Persistently elevated prolactin levels result in abnormal sexual function in both genders. Hence, prolactin levels should always be re-measured in the absence of symptoms suggestive of persistent hyperprolactinemia. We aim to examine the final diagnosis of patients referred with elevated prolactin levels based on presenting symptoms and persistently elevated prolactin levels.

Method: We collected data on 178 consecutive patients. Prolactin levels were re-measured in all patients. An MRI scan was ordered accordingly.

Results: The mean age (SD) of the patients was 29.7 (8.3) years, the mean BMI (SD) was 29.1 (7.0) kg/m^2, and 166 (93.2%) were females. Most of the females had no symptoms 55/166 (33.1%), while 45 (27.1%) of them presented with irregular menses, and 23 (13.9%) presented with infertility. Repeated prolactin levels were back to normal in 90/177 (50.6%) patients, decreased to <1000 mIU/L in 58/177 (16.8%) and increased in 30/177 (16.8%) patients. On the second measurement, 36/61 (59.0%) and 18/61 (29.5%) had normal or reduced prolactin levels among asymptotic patients. While among those with headaches, 7/13 (53.8%) had increased prolactin levels. Among those with no symptoms, only 4/61 (6.6%) had prolactinoma, all of which had increased prolactin levels. Among those with persistently elevated prolactin levels, 23/30 (76.6%) had prolactinoma, 3/30 (10%) had idiopathic hyperprolactinemia, and 2/30 (6.6%) were on antipsychotics medications while 2/30 (6.6%) had PCOS and normal pituitary MRI scan.

Conclusion: Among patients referred with elevated prolactin levels, it is critical to repeat the test before proceeding with further workup. This is particularly important in patients with no symptoms of hyperprolactinemia.

P31. Overlap of Prolactin Levels among Patients with Different Causes of Hyperprolactinemia

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Background: Prolactin is a polypeptide hormone produced by the anterior pituitary glands. Hyperprolactinemia has been associated with many etiologies, including pituitary tumors. There is no clear threshold to differentiate between various causes of hyperprolactinemia based on a single prolactin measurement. We aimed to explore the threshold that identifies prolactinoma among patients with hyperprolactinemia referred to a tertiary clinic

Method: We collected data on 178 consecutive patients. Prolactin levels were re-measured in all patients. We used the ROC curve to define the diagnostic threshold for prolactinoma

Results: The mean age (SD) of the patients was 29.7 (8.3) years, the mean BMI (SD) was 29.1 (7.0) kg/m^2, and 166 (93.2%) were females. As shown in Table 1, 5% (25/178) of the cohort had a prolactinoma. A cut-off level of 1,315 mIU/L had an 80% sensitivity and 82% specificity with a ROC of 0.81, indicating good accuracy. However, despite the good accuracy, only 42.5% of patients with prolactin levels >1,315 mIU/L had prolactinoma. Fig. 1 is a BOX-plot curve of the initial prolactin levels showing the poor discriminatory value of a single prolactin measurement.

Conclusion: A single prolactin level has a limited ability to discriminate between various etiologies of hyperprolactinemia.

P32. Efficacy and Safety of Insulin Glargine 300 units/mL versus Insulin Degludec in Patients with Type 1 and Type 2 Diabetes: A Systematic Review and Meta-analysis

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Background: Ultra-long-acting insulin analogs like insulin degludec (IDeg) and insulin glargine 300 units/mL (IGla-300) last longer and cause less hypoglycemia than other long-acting insulins. However, efficacy and safety findings are inconsistent.

Methods: We searched CENTRAL, PubMed, Embase, ICTRP Portal, and ClinicalTrials.gov. RCTs comparing the safety and efficacy of IDeg (100 or 200 units/mL) and IGla-

300 in patients with type 1 or type 2 diabetes were included. Studies of hospitalized patients were excluded. Three authors independently selected studies, assessed bias, retrieved data, and assessed GRADE evidence certainty. Random-effects meta-analyses pooled trials. The primary outcomes were HbA1c and any hypoglycemia, while the secondary objectives were FPG and severe and nocturnal hypoglycemia.

Results: Four open-label RCTs (2,727 individuals) were included. Treatment lasted 4–88 weeks. Overall, bias risk was high or some concerns. Selective reporting was the main source of bias. The mean change in HbA1c from baseline to the end of therapy was 0.07% (95% CI: 0.06–0.19; $p = 0.29$; 3 trials; 2,652 patients; very low-certainty evidence) and the rate of any hypoglycemia was comparable with risk ratio 1.02 (95% CI: 0.8–1.3; $p = 0.87$; 3 trials; 2,881 patients; very low-certainty evidence). IDeg reduced FPG greater than IGla-300, mean difference of 10.27 mg/dL (95% CI: 7.25–13.29; $p < 0.001$; 3 trials; 2,668 participants; low-certainty evidence). Nocturnal and severe hypoglycemia rates were similar: rate ratio 1.13 (95% CI: 0.72–1.78; $p = 0.54$; 3 trials; 2,668 patients; very low-certainty evidence) and 1.4 (95% CI: 0.41 – 4.73; $p = 0.59$; 2 trials; 1,952 patients; very low-certainty evidence), respectively.

Conclusion: IDeg and IGla-300 have similar mean HbA1c changes and risk of any-time, nocturnal, and severe hypoglycemia. IDeg reduced FPG more than IGla-300. Due to the few trials and substantial bias, these findings should be regarded with caution.

P33. Atrioventricular Blocks in the Setting of Hyperthyroidism—A Systematic Review

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Background: HTH is reported as a rare cause of atrioventricular blocks (AVBs). Little is known about the clinical course and outcomes of AVBs in the setting of HTH. We aim to pool all the available data on patients with AVBs in the context of HTH in the form of a systematic review.

Methods: Electronic databases were searched for English-language articles reporting patients of any age who developed AVB in the context of HTH. Data were analyzed in STATA-16.

Results: Our search term identified 1,275 studies, of which 57 studies with 82 patients were included. The mean age was 38.3 ± 17.2 years, with 62% females. Goiter (42.6%), palpitations (35.3%), and ophthalmopathy (28%) were the commonest signs of HTH. Grave's disease (GD) was the most common etiology of HTH (30.4%). Treatments of HTH included thionamides (82.9%), radioactive iodine ablation (RAIA) (14.6%), and thyroidectomy (15.8%). Complete heart block (CHB) was the commonest AVB (54.9%), followed by first-degree (FD) and second-degree AVB (15.8% each). The highest rates of RAIA (17.8%), thyroidectomy (22.2%), any form of pacing (35.6%), and permanent pacemaker insertion (13.3%) were reported in patients with CHB. Only one patient, a female with HTH complicated with CHB, died. Overall pacing was required in 25.6% of patients, with the rest managed by treatment of the underlying HTH.

Conclusion: CHB is the commonest AVB reported in HTH, followed by FD and SD AVB. Patients with CHB underwent the most aggressive treatments for HTH and received the highest pacing rates. However, the pacing was required only for a small subset of the patients, indicating that AVBs that occur with HTH may be reversible by managing HTH itself. Further studies are required to identify these patients' risk factors and optimal management guidelines.

P34. An Integrative Comparative Study Between Biguanides (Metformin) and Thiazolidinediones in the Improvements in Glucose Tolerance and Insulin Sensitivity in Patients with Type 2 Diabetes Mellitus: A Systematic Review and Meta-analysis

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Background: Type 2 diabetes mellitus (T2DM) is a global epidemic affecting people of all ages in both developed and developing countries. The disease is usually characterized by insulin resistance and glucose intolerance; therefore, oral antidiabetic drugs such as thiazolidinediones (TZDs) and the biguanide metformin are used to counter these defects. Due to the varied action mechanisms of TZDs and metformin, their effects on insulin sensitivity and glucose tolerance may differ. Therefore, the current study was performed to compare the effects of Metformin and TZDs on insulin sensitivity and glucose tolerance among patients with T2DM.

Methods: Two methods, including using a well-outlined search strategy in 5 electronic databases including ScienceDirect, Google Scholar, PubMed, Scopus, and Embase, and a manual search which involved going through the reference lists of studies from the electronic databases were used to retrieve studies published between 2000 and 2022. Additionally, data analysis of outcomes retrieved from the studies eligible for inclusion and the methodological quality was performed using the Review Manager software (RevMan 5.4.1) and STATA.

Results: The meta-analysis has shown that TZDs have a significantly better overall effect on fasting plasma glucose (FPG) (SMD: 0.61; 95% CI: 0.06–1.16: $p = 0.03$) and insulin sensitivity than metformin (Mean QUICKI: 0.306 ± 0.019 vs. 0.316 ± 0.019, respectively; $p = 0.0003$). However, the TZDs and metformin offer the same effect on glycemic control as assessed using HBA1c levels (MD: 0.10; 95% CI: −0.20, 0.40; $p = 0.52$).

Conclusion: TZDs offer better insulin sensitivity and glucose tolerance improvements compared with metformin. However, the TZDs are subject to side effects that should be closely monitored when they are used in patients with T2DM.

P35. Can Probiotic, Prebiotic, and Synbiotic Supplementation Modulate the Gut–Liver Axis in Type 2 Diabetes? A Systematic Review of Clinical Trials

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Background: Type 2 diabetes, one of the most common noncommunicable diseases, is a metabolic disorder that results in disrupted homeostatic balance of several organs, including the liver. Due to the potential role of gut dysbiosis in the pathogenesis of type 2 diabetes, prebiotics, probiotics, and synbiotics have been tested as complimentary therapeutic approaches aimed at microbiota readjustment and modulation of the gut–liver axis.

Methods: A systematic review was conducted on PubMed, Scopus, Web of Science, Embase, and the Cochrane Library searching for the effect of probiotics, prebiotics, and synbiotics on hepatic biomarkers in patients with type 2 diabetes.

Results: From 9,502 search hits, 10 studies met the inclusion criteria. A total of 816 participants (460 treatment and 356 control) were examined for the effects of different types of biotics on nine hepatic biomarkers. Supplementation of certain formulations, such as prebiotic chicory inulin enriched with oligofructose and multi-strain probiotics,

demonstrated statistically significant improvements in liver function across multiple studies, specifically in the levels of liver enzymes. However, several studies also showed no significant changes or significant increases in these biomarkers upon administration of specific strains and types of probiotics and prebiotics. Thus, more research needs to be done to better assess the best dose–response relationships for the pre-, pro-, and synbiotics.

Conclusion: Although some studies yielded insignificant results, overall, several clinical trials demonstrated the potential of some biotics in decreasing liver damage and improving hepatic biomarker levels due to reduced oxidative stress, pro-inflammatory cytokines, gut dysbiosis, and insulin resistance.

P36. A 4-Year Retrospective Study on the Impact of the Dietary Program on Anthropometric and Metabolic Parameters among Overweight and Obese Subjects in Primary Health Care Centers in Qatar

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Backgrounds: Obesity is a worldwide epidemic and one of the risk factors for many diseases including heart disease, diabetes mellitus, kidney disease and cancer. The aim of this study was to review the impact of the local dietary program on anthropometric and metabolic parameters among overweight and obese subjects attending primary health care centers in Qatar from 2016 to 2019.

Methods: A 4-year retrospective cohort study.

Results: Among 10,451 patient's the overall success rate of BMI reduction was 10% while 22.22% of population had $\geq$5% reduction in BMI from baseline (Fig. 1). The median time for weight reduction was 3.2 years, with women showing earlier significant weight loss than men. The patients with 3–5 number of visits had earlier significant weight reduction than those with $\leq$3 visits and >5 number of visits (Fig. 2). Greater weight reduction was seen in those with chronic diseases and who had constant follow up visits in the dietetic clinic during the study period.

Conclusion: Our results are encouraging, showing improvement in the management of adult obesity with medical nutrition therapy through involvement and guidance in the community dietetic clinics. The dietetic clinic services could be an operative strategy to prevent expensive diabetic and cardiovascular events, mainly in high-risk patients.

P37. Prevalence and Clinical Management of Metabolic Syndrome among Older Adult Population Attending Geriatric Outpatient Clinics in Qatar

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Background: Limited research has been done on the prevalence of the metabolic syndrome (MS) among older people, a predisposing factor for cardiovascular diseases (CVDs). The objective of the study is to determine the prevalence of MS and its risk factors.

Method: This was a retrospective study to examine the metabolic syndrome (MS) risk factors (hypertension, diabetes mellitus, obesity, hyperlipidemia) amongst patients 60 years and above visiting medical outpatient clinics in Rumailah Hospital, Doha, Qatar during November 1, 2016 to November 1, 2018.

Result: Mean age of the patients was 70.1, 50% were males. In total, 97% (95% CI: 95.3–98.7) of the study population were having metabolic syndrome. In addition, 46% were obese, 98% were diabetic, and 98% were hypertensive. Commonest drugs used for the treatment were Amlodipine (hypertension), Metformin (diabetes mellitus), Rosuvastatin (lipid lowering), and Bisoprolol (cardiovascular medicine).

Conclusion: The prevalence of metabolic syndrome and its risk factors were more in older adults' population visiting medical outpatient clinics of a tertiary care hospital at Qatar. These findings may help to design an appropriate plan, including goal of therapy for metabolic risk factors and integration of nondrug therapy in metabolic syndrome. Exercise programs have been demonstrated to delay or reverse risks associated with metabolic syndrome, thus it is essential to identify at-risk patients as early as possible. Further population-based studies and randomized control trials are warranted.

P38. Predictors of ICU Admission in Patients with DKA: A 6-Year Retrospective Study

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Background: Diabetic ketoacidosis (DKA) contributes to 94% of diabetes-related hospital admissions, and its incidence is rising. A considerable proportion of patients with DKA require management in intensive care unit (ICU). However, the ICU admission rates vary significantly in studies. This study aimed to identify predicting factors that would determine the need for ICU admission and management in patients with DKA.

Methods: All consecutive adult patients with index DKA admissions at four general hospitals of Hamad Medical Corporation (HMC), Doha, Qatar, between January 2015 and March 2021 were included. Factors predicting the ICU admission were assessed using univariate and multivariate logistic regression analysis.

Results: Out of 922 patients, ICU admission was required in 25% (229), whereas 75% were managed in emergency departments and medical floors. The patients admitted to ICU were older (40.4 ± 13.7 years vs. 34.5 ± 14.6 years, $p < 0.001$) and had a higher body mass index; 24.6 kg/m^2 (21.5–28.4) versus 23.7 kg/m^2 (20.3–27.9), p 0.03. The patients who required ICU admission predominantly had type 2 diabetes mellitus (T2D) (61.6%), and males (69% vs. 31% in the non-ICU group-p 0.02). Hospital length of stay was 4.2 days (2.7–7.1) in the ICU group and 2 days (1–3.9) in the non-ICU group ($p < 0.001$). The DKA duration was 24 hours (13–37) and 15 hours (19–24) in ICU and non-ICU groups, respectively ($p < 0.001$). The multivariate logistic regression analysis model identified older age, Asian ethnicity, concomitant COVID-19 infection, moderate to severe DKA, infection as a trigger to DKA development, and NSTEMI while admission as strong factors associated with ICU admission among patients with DKA.

Conclusion: Among patients with DKA, up to 25% of DKA patients may require ICU admission. Older age, T2D,

infection, moderate–severe DKA, concurrent NSTEMI, and COVID-19 infection strongly predict ICU admission.

P39. Incidence of Diabetic Ketoacidosis Does not Differ in Ramadan Compared to Other Months and Seasons

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Background: Diabetic ketoacidosis (DKA) is a significant health care burden among patients with diabetes mellitus (DM). It is proposed that fasting can increase the risk of DKA among patients with DM. Limited data from different and small cohorts of patients with DKA have shown variable results concerning a difference in DKA incidence in Ramadan compared with other months. This study aimed to study the differences in the number of DKA episodes in Ramadan compared with other months in a diverse and large cohort with type 1 DM (T1D) and type 2 DM (T2D).

Methods: Consecutive index-DKA admissions from 2015 to 2021 were included. Descriptive statistics compared the episodes of DKA in Ramadan versus other months and seasons.

Results: Of 922 patients, 480 (52%) had T1D, whereas 442 (48%) had T2D. The median age was 35 (25–45) years, with majority being Arabic ($N = 502$, 54.4%), followed by Asians ($N = 300$, 32.5%). There were 94 DKA admissions in Ramadan, whereas the DKA admissions ranged from 61 to 88 episodes in other months ($p = 0.3$). The highest DKA admissions were observed in autumn ($N = 236$) and the lowest in spring ($N = 226$) with no statistical difference ($p = 0.4$). The DKA rates were not different base on the type of DM and duration (new vs. pre-existing) ($p = 0.2$).

Conclusions: We presented the most extensive regional data on DKA in Ramadan compared with other months. There was no significant difference in the occurrence of DKA in Ramadan and other months. With proper education on DM management, patients with T1D or T2D can safely fast without an increased risk of DKA.

P40. Clinical Outcomes of Diabetic Ketoacidosis in Patients with New and Pre-existing Type 1 and Type 2 Diabetes Mellitus—A Retrospective Study

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Background: Diabetic ketoacidosis (DKA) was once known to be specific to type-1 diabetes mellitus (T1D); however, many cases are now seen in patients with type-2 diabetes-mellitus (T2D). Little is known about how this shift of etiology affects patient outcomes in DKA.

Methods: We studied consecutive index DKA admissions from January 2015 to March 2021. Descriptive analyses were performed based on pre-existing T1D and T2D (PT1D and PT2D, respectively), and newly diagnosed T1D and T2D (NT1D and NT2D, respectively).

Results: Of the 922 patients, 480 (52%) had T1D, of which 69% had PT1D and 31% NT1D, whereas 442 (48%) had T2D, of which 60% had PT2D and 40% NT2D. The mean age was highest in PT2D (47.6 ± 13.1 years) and lowest in PT1D (27.3 ± 0.5 years). Patients in all groups were predominantly male except in the PT1D group (55% females). Majority of patients were Arabic (76% in PT1D, 51.4% in NT1D, 46.6% in PT2D) except for NT2D which mainly comprised Asians (53%). Patients with NT2D had the longest hospital length of stay (LOS) (6.8 ± 11.3 days), longest DKA duration (26.6 ± 21.1 hours), and more intensive care unit (ICU) admissions (31.2%). Patients with PT1D had the shortest LOS (2.5 ± 3.5 days), DKA duration (18.9 ± 4.2 hours), and lowest ICU admissions (16.6%).

Conclusions: We presented the largest regional data on differences in DKA based on the type and duration of diabetes mellitus (DM), showing that T2D is becoming an increasing cause of DKA, with worse clinical outcomes (especially NT2D) compared with T1D.

P41. Neutrophil-to-Lymphocyte Ratio and Platelet-to-Lymphocyte as Markers of Clinical Outcomes in Patients with Diabetic Ketoacidosis

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Background: Neutrophil–lymphocyte ratio (NLR) and platelet–lymphocyte ratio (PLR) are novel biomarkers that are readily available and have prognostic importance in various diseases including infections, rheumatological diseases, and malignancies. We aimed to assess the association of NLR and PLR with biochemical and clinical outcomes in patients with diabetic ketoacidosis (DKA).

Methods: The study included consecutive patients with DKA admitted to the Hamad Medical Corporation, Qatar between January 2015 to March 2021. Associations between NLR and PLR with various factors were assessed using chi-square for categorical variables and spearman correlation for continuous variables.

Results: The study included 922 patients, of which 575 (62.4%) were males. The median age was 35 (25–45) years and the mean body mass index (BMI) was 24.8 ± 6.2 kg/m^2. The median duration of diabetes was 6 (3–12) years and the mean HbA1c at admission was 12.05 ± 2.7%. 202 (21.9%) patients had mild, 332 (36%) had moderate and 388 (42%) had severe DKA. Both NLR and PLR positively correlated with age, BMI, white cell count, serum urea, creatinine, C-reactive protein, lactate, and hbA1c levels at admission. Patients with a higher NLR or PLR also had a more severe DKA, higher rates of intensive-care unit admission, and inpatient mortality. In addition, a higher NLR (but not PLR) was also associated with lower sodium, higher glucose, longer inpatient length of stay, and duration of DKA.

Conclusion: NLR and PLR are useful and readily available biomarkers to predict clinical outcomes in patients with DKA. Further studies are needed to identify cut-off values of these markers to timely identify patients with DKA at risk of worse outcomes.

P42. Smoking Doctors Have Wrong Beliefs and Are Less Likely to Promote Smoking Cessation: A Cross-Sectional Questionnaire-Based Study from Sudan

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Background: The tobacco epidemic is one of the most serious public health threats. The prevalence of smoking among physicians and its impact on smoking cessation intentions among physicians vary by country/community. Improving the capacity and willingness of health care providers to intervene with tobacco-using patients is an essential strategy for reducing smoking and its negative health impact on society. According to studies, cessation advice is infrequently given or only given to patients with a smoking-related disease. We aimed to assess knowledge, attitudes, and practices of smoking cessation counseling among doctors practicing in Khartoum governmental hospitals in 2021.

Methods: We conducted a cross-sectional study in Khartoum state, Republic of Sudan, from October 2021 to December 2021. We sent a link to a self-assessment questionnaire to physicians via text, email, or social media (WhatsApp). We classified physicians according to gender, specialty, smoking status, and grade.

Results: A total of 260 doctors participated in this study, 133 (51%) were females, and 164 (63%) were between 30 and 40 years old. Most of the participants were registrars (55%), followed by medical officers (24.6%), specialists (16.54%), and only (3.85%) consultants. Most of the participants were from Internal Medicine (42%). Most participants (81.5%) were nonsmokers, 14.23% were smokers, and 4.23% were ex-smokers. Males were more likely to be smokers than females (89.19 vs. 40% $p = 0.0001$), and consultants were less likely to be smokers than other grades ($p = 0.049$). Most participants identified "cancer" (90%), "coronary artery disease" (86%), and "COPD (87%) as smoking-related diseases, but fewer identified "male erectile dysfunction" (54%) and "osteoporosis" 87 (34%). More males than females considered occasional smoking to be safe (52 vs. 26%, $p = 0.0001$) and thought that smoking could relieve anxiety and stress (31 vs.19% $p = 0.007$). Similarly, more smokers than nonsmokers agree that occasional smoking is safe (58.8 vs. 33%, $p = 0.0001$) and that smoking can relieve anxiety and stress (58 vs. 17%, $p = 0.0001$). Internists give more advice on smoking cessation than other specialists ($p = 0.023$). However, smokers and ex-smokers were less likely to advise on smoking cessation than nonsmoking doctors ($p = 0.042$). Senior staff (specialists and consultants) compared with junior physicians believe that smokers can quit without assistance ($p = 0.015$).

Conclusion: We have shown a significant variation in knowledge, attitude, and practice of smoking cessation counseling among study participants. Smoking doctors were less likely to advise patients on smoking cessation. There was a poor provision of additional resources or medication prescriptions to assist tobacco cessation. Regular education of doctors about smoking cessation practices could potentially lower prevalence of tobacco use.

P43. The Ratio of Thyroglobulin in Wash-out Fluid from Fine-Needle Aspiration to Serum Thyroglobulin Level in the Evaluation of Metastatic Cervical Lymph Nodes in Patients with Papillary Thyroid Cancer

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Background: In patients with papillary thyroid carcinoma who exhibit suspicious lymph node characteristics on ultrasonography, fine-needle aspiration, with cytology analysis and thyroglobulin level of the aspirated sample (FNAB-Tg), is an important method to detect metastases to cervical lymph nodes (CLN). Despite the great diagnostic accuracy of the FNAB-Tg. Despite the FNAB-excellent Tg's diagnostic accuracy, studies have been unable to determine the optimal cutoff value for FNAB-Tg. In this study, we outline a novel technique for carrying out the Tg washout and processing it locally at our laboratory at Hamad General Hospital (a tertiary care center). To combat the variety in both cutoff values and the assays used to detect thyroglobulin levels, we employed the FNAB-Tg to serum thyroglobulin level (FNAB-Tg/Tg serum) ratio.

Methods: We conducted a retrospective analysis on 70 patients with papillary thyroid cancer (PTC) or suspected PTC who had ultrasound-detected worrisome cervical lymph nodes. Every patient had a fine-needle aspiration of the cervical lymph nodes, followed by cytology and Tg-level testing of the aspirated sample (FNAB-Tg). FNAB from the suspected CLN was sent to our local cytopathology department for cytology analysis. Thyroglobulin level of the aspirated biopsy (FNAB-Tg) was obtained in all subjects using the following novel method: blood samples are drawn from the patient's peripheral vein and placed in two yellow top tubes (3 mL of blood in each tube). 1 mL of normal saline (NS) is add to Tube # 1 (Tg Serum tube). The suspected lymph node aspirate is obtained via US guided FNA. It is washed in 1 mL of NS and added to tube #2 (FNAB-Tg washout tube). Both tubes are sent to our local laboratory for Tg assay. The FNAB-Tg to serum thyroglobulin level (FNAB-Tg/Tg serum) ratio is calculated. The test is considered positive, i.e., the suspected lymph node is likely metastatic thyroid cancer, if the FNAB-Tg/Tg serum ratio is more than 3. We compare our results to the final pathology reports from total thyroidectomy and or neck dissection.

Results: Thirty two patients (45%) have cytology positive for malignancy, 31 of 32 positive cytology have positive FNAB–Tg/serum Tg ratio (ratio >3), while only one has FNAB-Tg/serum TG < 3, though the FNAB-Tg is 4,474 ng/mL and serum Tg is 2,444 ng/mL. Metastatic PTC to these cervical LN was confirmed on pathology report from total thyroidectomy or neck dissection. Fourteen patients (20%) have negative cytology and negative FNAB-Tg/serum Tg ratio (ratio <3). Five patients underwent thyroid surgery or neck dissection. Pathology report showed no metastatic PTC to the cervical LN. Seven patients (10%) have negative cytology with positive FNAB-Tg/serum Tg ratio (ratio >3). Four of these patients underwent neck dissection in our institute and confirmed to have metastatic PTC to these cervical LN. One patient elected to have surgery in his home country.

Conclusion: The ratio of thyroglobulin in wash-out fluid from fine-needle aspiration to serum thyroglobulin level (FNAB-Tg/serum Tg ratio) is a novel method to overcome the differences in cutoff values and assays used to measure the Tg level both in serum and FNAB. A positive FNAB-Tg/serum Tg ratio (ratio >3) is more accurate than cytology in

detecting cervical lymph node metastasis in patients with papillary thyroid cancer (PTC). 27% of cervical lymph node metastasis will not be detected if FNAB cytology was used alone to detect metastatic cervical lymph nodes. This will help optimizing surgical approach in patients with PTC before thyroidectomy and also in those with suspected recurrence after the initial treatment.

P44. Diabetes Registry for National Diabetes Center at Hamad Medical Corporation

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Background: Diabetes Registry is a process of collecting a variety of patient information in a registry system to produce analytical reports to assess the level of care that is provided and recognize the need for improvement. It also gives insight into the results and compares them with the desired outcome.

Methods: This report is a data analysis of the Diabetes Registry for 11,324 diabetic patients who are followed in the National Diabetes Center (NDC) at Hamad Medical Corporation.

Results: We are presenting a diabetes registry of 11,324 patients. The selection of these patients was random from the lists of clinics in NDC. In addition to having an established diagnosis of diabetes mellitus, all patients should have at least three HbA1C readings and a minimum of 2 LDL readings. Vital signs and biometric measurements like weight, height, and BMI should be available for all patients. According to nationality, Qataris are 51.5% while non-Qataris are 48.5%. Females were slightly more than males 51.4%: 48.6%. Most patients were having type 2 DM 92.7%, while type 1 DM constitutes 5.5%. Current smokers were around 10.9% while ex-smokers are 8.7%. Only 35% are involved in regular exercise. Obesity and overweight are highly prevalent in the selected patients 56.4% and 30.2% respectively. Nephropathy has the highest percentage of microvascular complications 32.1%, while 15.8% have retinopathy, 12.6% have neuropathy, and only 1.7% have diabetic foot disease. Cardiac disease is present in 18.5%. Hba1c $\leq$7% was achieved in 35.5% while 22% has HbA1C >9%. 25% have HbA1C 7.1–8%. LDL <100 mg/dL was achieved in 65.8% of the patients. Insulin was used as the sole therapy in 9%, Oral Medications alone are used in 46.2%, Insulin added to oral medications are used in 28%, GLP1 agonists are added to insulin in 7.6% while added to oral medications in 7.3%.

Conclusion: The diabetes registry gives insight into the quality of care and the level of diabetes control. It also compares the diabetes outcome to the global standards to help plan national policies and effectively utilize health resources.

P45. The Epidemiology of Type-2 Diabetes in Secondary Care in Qatar

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Background: Diabetes prevalence in Qatar is one of the highest in the world. Qatar has a young population with a complex ethnic mosaic.

Methods: This is a secondary analysis of data collected from 1,153 subjects with type-2 diabetes studied prospectively for the prevalence of diabetic neuropathy project in Qatar.

Results: The population mean age $\pm$SD was 52 $\pm$ 11.4 years, included 715 males (62%), and 29% were Qatari nationals, 37% were Asians, 29% of Middle Eastern Arabs, 4% Africans, and 1% Caucasians, and those who were smoker 18%. The cohort diabetes duration was 9.9 $\pm$ 7.6 years, 20% had history of coronary artery disease, 35.9% had microalbuminuria, 25% had retinopathy, and 7.97% had laser treatment. Of the total group, 84% were on metformin, 51% were on a DPP-4 agent, 33% were on insulin, 37% were on SU, while only 9, 7, and 8% were on SGLT-2i, GLP-receptor agonists, and TZD, respectively. The cohort average BMI was 31 $\pm$ 6.6 kg/m^2, HbA1c 8.13 $\pm$ 2.0%, LDL 2.56 $\pm$ 0.9 mmol/L, TC 4.4 $\pm$ 1.1 mmol/L, TG 1.8 $\pm$ 1.2 mmol/L, and HDL 1.05 $\pm$ 0.28 mmol/L. Patients on lipid lowering agent were 63%, of whom 57% were on statin, 4.3% on fibrate and 0.09 on ezetimib. The population had a mean creatinine of 84 $\pm$ 64 µmol/L, with only 6.8% had CKD stage 3. There were 33% overweigh and 52% were obese, and 84% of the total group were less than 65 years of age. Those who were on ACEI were 13.2%, while 24% were on ARB, 18,5% were on β blockers, and 16.5% on CCB. Only 32% of the cohort exercise regularly and 6% were manual workers.

Conclusion: People with type-2 diabetes in Qatar reflect the background population in their age and diversity. The above data were the first from Qatar and the Arabian Gulf in being robust and comprehensive.

P46. Has COVID-19 Put Students at Risk of Obesity and Metabolic Diseases? An Examination of School Closures' Impact on BAZ Scores

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Background: As evidence continues to mount, children and adolescents are reportedly experiencing tremendous adverse effects on their health and lifestyle behaviors from the COVID-19 containment measures such as school closures leading to obesity and increasing the risk of many noncommunicable (1–4). This study assessed the impact of school closures on the body mass index for age Z (BAZ) scores of students in Qatar.

Methods: We conducted an interrupted time series study and compared the BAZ scores (extracted from Cerner) before and after school closures for students aged 8 to 15 years at government schools.

Results: The BAZ scores increased significantly by 0.30 over the period of school closures. The increase was significantly higher among males and those 8 to 11 years of age (Table 1). The prevalence of obesity increased from 21.5%, before to 27.4% after the closure with a significantly higher proportion of students falling in higher BMI for age categories after the closure (Fig. 1).

Conclusion: BAZ scores and obesity increased significantly over the period of school closures risking the health of students and increasing their risk of metabolic diseases.

Acknowledgment:

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P47. Evaluating the Appropriateness and the Factors Associated with SGLT2 is Prescribing in Qatar

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Background: Sodium glucose co-transporter 2 inhibitors (SGLT2is) are the most recently approved class of antidiabetic drugs (ADDs). This study aims to assess the appropriateness of prescribing SGLT2is according to the American and Canadian labeling standards, and to investigate the factors associated with SGLT2is prescribing compared with other oral ADDs in Qatar.

Methods: This descriptive, retrospective cross-sectional study included 650 patients newly initiated on SGLT2is ($n = 400$) and/or any oral ADDs ($n = 250$) during 2020. Data including demographics, clinical characteristics, comorbidities, medications, and SGLT2is' (dapagliflozin and empagliflozin) indication and dose were extracted from Hamad Medical Corporation's electronic medical record system (Cerner). Multivariable logistic regression was conducted to investigate associations with prescribing SGLT2is.

Results: SGLT2is were prescribed for appropriate indication in 400 (100%) patients, while inappropriate dosing was found in 13 (3%) patients. Males were more likely to start an SGLT2i compared with females (odds ratio [OR]: 1.70; 95% confidence interval [CI]: 1.01–2.86). Patients with a baseline glycated hemoglobin ($HbA1_c$) >7% and atherosclerotic cardiovascular disease (ASCVD) were more likely to be prescribed SGLT2is (OR: 3.14; 95% CI: 1.78–5.53) and (OR: 2.43; 95% CI: 1.15–5.11), respectively. Patients on metformin (OR: 7.53; 95% CI: 4.43–12.82), sulfonylureas (SUs) (OR: 2.25; 95% CI: 1.13–4.48), and dipeptidyl peptidase 4 inhibitors (DPP4is) (OR: 3.36; 95% CI: 1.95–5.78) were more likely to start an SGLT2i. Patients with chronic kidney disease (CKD) were less likely to be prescribed SGLT2is (OR: 0.36; 95% CI: 0.14–0.88).

Conclusion: SGLT2is were very likely to be prescribed at an appropriate dose and indication. Male patients with baseline $HbA1_c$ >7% and ASCVD, were most likely to start an SGLT2i, while those with CKD were less likely to be prescribed this class. SGLT2is were likely to be added to metformin, SUs, or DPP4is.

P48. Future Health and Economic Burden of Cardiovascular Disease among People with Type 2 Diabetes in Qatar: A 10-Year Analysis

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Background: Prevalence rates of cardiovascular disease (CVD) outcomes are required to forecast the societal burden of CVD in type 2 diabetes (T2D). Therefore, we projected the health and economic outcomes of CVD among people with T2D from Qatari public health care and societal perspectives from 2023 to 2032.

Methods: A dynamic multistate model with yearly cycles was constructed to estimate cardiovascular events among people with T2D aged 40 to 90 years from 2023 to 2032 in Qatar (Fig. 1). CVD risk (i.e., myocardial infarction [MI] and stroke) in the T2D population was estimated using the 2013 Pooled Cohort Equation, and recurrent cardiovascular event rates in the T2D with established CVD population were obtained from the global REACH registry. Input data for costs and utilities were extracted from published sources. Outcomes included fatal and nonfatal MI and stroke, years of life lived (YLL), quality-adjusted life years (QALYs), total health care costs, and total productivity losses. All outcomes were annually discounted by 5%.

Results: Over the next decade, a total of 4,648,607 (3,461,581 males and 1,187,026 females) and 791,618 (732,370 males and 59,248 females) individuals with T2D at risk of CVD and established CVD were included in the model, respectively. A total of 82,517 nonfatal MIs and 50,018 nonfatal strokes were projected. Total YLL and QALYs were estimated to be 3,924,620 and 3,105,412, respectively. Total health care costs and total lost productivity costs were projected to be QAR12.90 billion and QAR92.42 billion, respectively.

Conclusions: This study illustrates the substantial health and economic impact of CVD in T2D in Qatar.

P49. Impact of JCI Clinical Care Program on the Metabolic Parameters in Adults with Diabetes: 3-Year Data

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Background: JCI Clinical Care Program (CCPC) is a patient-centered program aims at improving patients' care quality through applying a standardized MDT care model. National Diabetes Centre is a certified CCPC center providing services in three sites: Hamad General Hospital (HGH), Al Wakra Hospital (AWH), and Women's Wellness and Research Centre. We aimed to measure the impact of the CCPC program on the metabolic parameters in adult nonpregnant patients with diabetes in HGH and AWH.

Method: We enrolled complex patients with poorly controlled diabetes to the CCPC intensive MDT approach program aiming at enabling patients to self-manage, improve glycemic control, and reduce other metabolic risk factors.

Results: We studies 276 patients, 54.7% were males, 39% Asians, 30% Qataris, and 28.2% Arab with mean age of 51 ± 12 years. The mean HbA1c dropped from 10.2 to 8.9% at 6 months and was maintained over 3 years. The proportion of patients achieving HbA1c ≤8.0% was 32.7, 38.1, 31.2, and 42.3% at 6 months, 1 year, 2 years, and 3 years, respectively, while almost a quarter achieved HBA1c ≤7.5% across 3 years. The proportion of patients with systolic BP ≤140 mm Hg has increased from 74.5% at baseline to 82.8% at 6 months and 80.9% at 3 years but dropped to 75.6% at 1 year and 71.8% at 2 years. The mean BMI remained stable at 31 kg/m^2; however, the proportion of obese patients (BMI >30 kg/m^2) dropped from 53.9 to 47.4% at 1 year and was maintained after an initial rise to 56.4% at 6 months. The mean LDL remained unchanged at 2.3 mmol/L, but the proportion of patients with LDL ≤2.6 mmol/L increased from 62.3 to 70% at 6 months then reduced to baseline.

Conclusion: The intensive MDT approach has resulted in improvement in all metabolic risk factors. More critical, the program has remained successful during the COVID-19 pandemic.

P50. Novel Method in PTH Washout Assay for Localizing Parathyroid Adenoma: A Retrospective Study

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Background: Primary hyperparathyroidism (PHPT) is a common cause of hypercalcemia. Definite treatment is the surgical removal. Preoperative localization is important for planning the surgery. PTH washout obtained with ultrasound guided fine needle aspiration (FNA) may be useful in precise localization when sestamibi scan is contraindicated or inconclusive.

Methods: We describe a novel method of performing PTH washout and processing it locally at our laboratory in HGH. Blood samples are withdrawn into two tubes. Normal saline (1 mL) will be added to Tube #1 (Control tube). The suspected parathyroid lesion aspirate is obtained via US-guided FNA and washed in NS (1 mL) and added to tube #2 (washout tube). The ratio of the PTH level in the PTH washout tube to the PTH level in control tube is calculated. The test is considered positive if the ratio is >2.

Results: We looked at 22 patients with diagnosis of primary hyperparathyroidism using PTH washout assay to localize the PTH adenoma before surgery when sestamibi scan is contraindicated or inconclusive. PTH washout ruled in PTH adenoma in16 patients while 6 patients were ruled out. Eighteen patients underwent surgery, and pathology confirmed that 16 of them have PTH adenoma, while the other 2 patients were found to have benign thymic tissue and benign thyroid nodules, which were ruled out by the PTH washout method. However, in 2 patients, the PTH washout assay ruled out the presence of PTH adenoma, and the pathology following surgery confirmed it.

Conclusion: PTH washout is a crucial tool for localizing parathyroid adenoma in PHPT patients when sestamibi scan is inconclusive or cannot be done. We describe a simple technique to perform PTH washout in outpatient settings. Our results helped rule in or rule out parathyroid adenoma and directing surgical procedure.

P51. The Role of Digital Health in Tackling Obesity and Diabetes

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Background: The purpose of this study was to evaluate the effectiveness of a digital lifestyle mobile application, aimed at improving weight and HbA1c levels for type 2 diabetic (T2D) patients registered with Primary Health Care Corporation.

Method: Participants, with T2D, recruited by health center physicians and nurses were offered 6 months access to a digital health mobile application. This provided users with access to health educators (experienced in diabetes management) and nutritionists to monitor, coach and advise them on solutions for the management of diabetes based on their activities and lifestyle. PHCC evaluated the effectiveness of the application for users with an initial HbA1c $\geq$8, that had a second measurement at least 3 months after the start of the intervention—a total of 633 patients. The primary outcome was the change in HbA1c (%) from baseline based on a paired *t*-test for pre–post comparison. Secondary outcomes included changes in BMI mean levels.

Results: The use of a mobile app-based intervention was associated with a statistically significant HbA1c reduction of 0.91% (95% CI: 0.73–1.09%, $p \leq 0.001$) and BMI reduction of 0.72% (95% CI: 0.16–1.28%, $p = 0.006$) among participants with at least 3-month outcomes data.

Conclusion: In conjunction with PHCC's existing preventative health and diabetes management services, a digital health mobile application can provide additional self-management support and monitoring of lifestyle for diabetic patients. Research on other digital health coaching applications has also demonstrated positive health outcomes for diabetic patients. Evidence shows that type 2 diabetes can be reversed through lifestyle changes—diet and exercise. Therefore, the utilization of digital lifestyle monitoring applications in conjunction with more traditional medical interventions can help to reduce both the health and cost burden of diabetes and obesity.

P52. Prevalence and Associated Factors of Diabetes Distress, Depression, and Anxiety among Primary Care Patients with Type 2 Diabetes in Egypt

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Background: Type 2 diabetes mellitus (T2DM) is often complicated by multiple psychological disorders that interfere with glycemic control.

Methods: Cross-sectional study was done from September 2020 to June 2021 using convenient sampling from eight rural primary care facilities in Egypt. Diabetes distress, depression, and anxiety were assessed using the Arabic version of the 20-item Problem Areas in Diabetes (PAID), Patient Health Questionnaire-9, and Generalized Anxiety Disorder Scales.

Results: A total of 403 individuals with T2DM were interviewed. The prevalence rates of severe diabetes distress, depression, and anxiety were 13.4% (95% CI: 10.1–16.7), 9.2% (95% CI: 6.4–12.0%), and 4.0% (95% CI: 2.1–5.9), respectively. Serial hierarchical logistic regression found that being married, illiterate, not working, having insufficient income, and having multi-comorbidities were significant predictors for diabetes distress. The significant predictors for depression and anxiety were glycated hemoglobin level and the PAID total score, while having multi-comorbidities was a significant predictor for anxiety only.

Conclusion: Diabetes distress was more prevalent than depression and anxiety. Several sociodemographic and clinical characteristics were identified to be related with psychological problems among patients with T2DM.

P53. Prevalence and Determinants of Depression among Patients with Type 2 Diabetes Mellitus Attending Family Medicine Clinics in Qatar

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Background: We aimed to assess the prevalence of depression and its associated factors among patients with type 2 diabetes mellitus (T2DM) attending family medicine clinics in Qatar

Methods: A cross-sectional study was conducted from January to April 2021 where 683 adult patients with T2DM were selected by cluster sampling technique using probability-proportionate to size sampling. They were assessed for depression using the Patient Health Questionnaire-9. The relationship between depression, glycemic control, and background characteristics of the participants was analyzed using Chi-square and odds ratio, and binary logistic regression analysis was used to estimate the significant factors associated with depression among the participants.

Results: The majority of the subjects were males 417 (61.2%) and 48.8% were Qatari (333), with a high prevalence of diabetes-related complications 67.2% (593). 20.1% of the participants had depression and most of them had mild depression (70.8%). More than three-quarters had uncontrolled diabetes mellitus (81.5%). Male patients were at higher risk for developing depression (AOR = 1.984, 1.251–3.146), whereas being Qatari and treatment with insulin were associated with lower risk of depression with AOR = 0.555 (0.341—0.902) and AOR = 0.486 (0.302–0.782), respectively.

Conclusions: Prevalence of depression among patients with T2DM attending family medicine clinics in Qatar is high. Utilizing a multidisciplinary health care plan for screening and management of depression in patients with diabetes in a primary health care setting is highly recommended.

P54. Association between Diabetes-Related Distress and Glycemic Control in Primary Care Patients with Type 2 Diabetes during the Coronavirus Disease 2019 (COVID-19) Pandemic in Egypt

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Background: The association between diabetes-related distress and glycemic control is of particular concern during the COVID-19 era. This study aimed to assess the association between the diabetes-related distress and glycemic control among primary care patients with type 2 diabetes mellitus (T2DM) during the COVID-19 pandemic.

Methods: A cross-sectional study was performed at the primary care setting of rural areas in Egypt and involved 430 patients with T2DM. Data were collected between September 2020 and June 2021. All patients were interviewed for their sociodemographic, lifestyle, and clinical characteristics. Problem Areas in Diabetes Scale (PAID) was used to assess diabetes-related distress. Quantile regression model (0.50 quantile) was used to perform the multivariate analysis to identify significant predictors associated with HbA1c level.

Results: In total, 13.3% of patients had severe diabetes-related distress. HbA1c level was significantly and positively correlated with the total PAID score and all its sub-domains. Multivariate quantile regression revealed that obesity, multimorbidity, and severe diabetes-related distress were the only significant determinants of HbA1c median level. Obese patients had significantly higher median HbA1c than non-obese patients (coefficient = 0.25, $p < 0.001$). Patients with two or more comorbidities had significantly higher median HbA1c than patients with single or no chronic comorbidities (coefficient = 0.41, $p < 0.001$). Patients with severe diabetes-related distress had significantly higher median HbA1c of 0.20 than patients with no severe diabetes-related distress (coefficient = 0.20, $p = 0.018$).

Conclusion: Diabetes-related distress was significantly associated with a higher HbA1c level. Family physicians should implement multifaceted interventions to optimize glycemic control and reduce diabetes-related distress.

P55. Can We Stop Excessive Gestational Weight Gain in Women with Pre-existing Diabetes?

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Background: Excessive gestational weight gain (GWG) is associated with worse maternal and fetal outcomes. We have previously reported that excessive GWG was associated with an increased risk of poor neonatal outcomes in women with DM-1 and DM-2. Some studies have successfully used diets with total daily calories of <1,500; however, the lowest recommended daily calorie intake during pregnancy is 1,600. We offer 1,600 calories to women with pre-existing DM when there is evidence of excessive gestational weight gain (GWG), when the booking HBA1c was ≥9.0%, and for women with Obesity Class 1 and above at booking—using an ethnic-specific classification. Urinary ketones are monitored during each visit to the clinic. We aimed to report on the efficacy and safety of a low-caloric diet in women with pre-existing DM.

Methods: We included all women with DM-2 and DM-1 enrolled in the CCPC program and received a low-calorie dietary plan. Women were classified into three groups; elevated HBA1c at booking (A1c), Excessive GWG (EGWG), and Obesity (Obese).

Results: We report on 159 women, of which 87.4% are type 2 diabetes; mean prepregnancy BMI 34.4 ± 6.4 kg/m^2, and mean gestational age at review was 11 weeks. By the end

of pregnancy, excessive gestational weight gain was recorded in 36.5% of the cohort; 22.2% (2/9) women in the A1c group, 38.2% (34/89) in the EGWG group, and 36.1% (22/62) women in the Obese groups. More critical, among women with EGWG, the mean weekly gestational weight gain was reduced from 0.37 kg to 0.26 kg ($p < 0.001$). There was no rise in the ketones levels recorded during the clinic visits.

Discussion and Conclusion: These findings suggest that using a low-calorie diet in women with pre-existing diabetes can stop excessive gestational weight gain with no increase in ketonuria. More data are needed to confirm the safety and examine the impact on pregnancy outcomes.

P56. Patient Experience in Type 2 Diabetes Management in Qatar

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Background: Diabetes and its complications are a major cause of morbidity and mortality in Qatar. Management of diabetes can only be effectively done through delivering high-quality multidisciplinary care and effective support system. Education and diabetes-related services are vital to patient empowerment to understand their disease and avoid serious complications. Assessment of patients' experience with diabetes care helps improve quality of care. This study examines the health-seeking behavior of diabetic patients and their experience in managing diabetes and on quality of diabetes care received at different health facilities in Qatar.

Methods: A mix-method (qualitative-quantitative) study was conducted through face-to-face interviews using an English/Arabic pretested semi-structured questionnaire among 53 T2DM patients and 21 health care practitioners from different health care facilities from August 2018 to March 2019. Informed consent and permission of relevant institutions were obtained. Descriptive statistics and thematic analysis were used in analyzing data. Satisfaction rating was based on 1–5-point scale.

Results: Eighty-one percent of T2DM patients did not suspect that they had diabetes prior to diagnosis; 62% see the same physician for their diabetes care and 36% access medication from Primary Heath Care Corporation clinics. Eighty-one percent had high satisfaction with the quality of diabetes care provided to them. One in six T2DM patients reported dissatisfaction with some aspects of diabetes care including difficulty in making appointments, time spent with physician, information given regarding diabetes medication's side effects, and amount/type of exercise required to control diabetes. Only 9% of participants were aware of diabetes hotline number.

Conclusions: T2DM patients had high satisfaction in their diabetes care received from the health care providers in Qatar, however patients expressed less than satisfactory experiences on some aspects of their diabetes management. Future strategies must focus on wider awareness campaigns, promoting diabetes hotline, patient education about medications side effects and exercises, continuity of care through Family Physician Model and support family pharmacy for medications, and institutionalizing periodic patient satisfaction survey for continuous quality improvement.

P57. Improve Diabetic Patient's Access to the Right Care Setting

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Background: National guidelines for managing diabetes and the National Diabetes Strategy in Qatar were developed to create an integrated model of care with clear patient pathways. In this model, all people with diabetes will experience consistent, high-quality care in all health care facilities. This Quality Improvement (QI) initiative intends to assess compliance with the established national guidance and procedures at both HMC and PHCC. A specific aim is to ensure that people with diabetes are treated in the right setting.

Method: A multidisciplinary team gathered from PHCC and HMC, utilizing a model of improvement method and QI tools, defined criteria for patients who require primary care and those who need secondary care. The data were extracted from Cerner for all patients labeled with "diabetes." Systematic issues and root causes in both health care setups were identified.

Results: We included 82,842 patients with diabetes who received diabetes care during the past 18 months at HMC or PHCC, 40.2% of whom were not treated in the right setting. We identified three significant contributing factors: (1) absence of a structured discharge process in HMC; (2) inconsistent triage and referral process between PHCC and HMC teams; and (3) lack of patient-flow monitoring process (real-time data) between the two organizations.

Conclusion: The data show significant flaws in implementing integrated care for people with diabetes across both organizations. The project identified multiple areas for improvement. However, with the current volume of cases, it is critical to consider a broader approach to re-structure diabetes care in Qatar, utilizing the available resources. Another critical area identified is the standardization of data entry to improve accuracy and reduce the time needed for data extraction and validation. Improving this critical area will allow monitoring of the patient flow, facilitating timely decisions.

P58. Diabetic Screening of Preoperative Adult Patients—Ensuring Healthy Futures through Early Detection

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Background: Diabetes mellitus is a common medical condition that can lead to serious surgical and postoperative complications if not identified early. At Al Khor Hospital, preanesthesia diabetic checkups were only done for those patients known to be diabetic, which accounted for 52% of the total population. This lack of screening for nondiabetics

resulted in many patients being identified as having diabetes on the day of surgery, leading to the cancellation of surgery, longer recovery times, increased costs, and patient dissatisfaction. To address this issue, a diabetic screening program was initiated for all preoperative adult patients in the OPD, to detect diabetes early and prevent further complications. The results of this program have been promising, with an increased rate of early identification of diabetes and a reduction in the number of surgical and postoperative complications.

Methods: This Quality Improvement (QI) project aimed to improve the screening of nondiabetic adult patients undergoing surgery, using QI methodology. The goal was to increase the percentage of diabetic screening for all adult patients prior to surgery from the anesthesia clinic at AKH from 52% in February 22 to 80% by June 2022, 90% by December 2022, and 100% by June 2023. To achieve this goal, multiple Plan-Do-Study-Act (PDSA) cycles were conducted. Furthermore, nurses were educated on the new changes, physician awareness was raised, patient education was provided, and an escalation pathway was established for those patients identified to have increased blood sugar at assessment.

Results: Despite the goal of the project to be achieved by June 2023, current data indicate a commendable progress. In December 2022, 94% of patients were screened for diabetes during preanesthesia assessment. Of those screened, an average of 11% were identified to have elevated random blood sugar (RBS) or fasting blood sugar (FBS) levels beyond the normal, necessitating management. This new screening process facilitates earlier detection of diabetes in the patients, thus potentially improving overall health outcomes.

Conclusion: The implementation of screening diabetic patients in the preanesthesia clinic has proven to be advantageous in several ways. Specifically, it helps to detect early diabetes, thus reducing the cancellation of surgeries due to high blood sugar. This, in turn, has been found to improve patient satisfaction and is cost-effective for the institution.

P59. Quality Improvement Project: Validation of Glucose Meter Accuracy in WWRC-NDC

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Background: Self-monitoring of blood glucose (SMBG) is vital in managing diabetes in pregnancy. Women with diabetes should monitor both fasting and postprandial blood glucose levels regularly. Based on this critical information, the physician drafts the care plan. Hence it is important to ensure the validity and accuracy of these SMBG readings. An accurate glucometer meter must provide results within ±15% of the laboratory results 95% of the time based on the ADA and FDA criteria. This project aims to reduce the rate of inaccurate SMBG.

Methods Baseline Data: For 6 weeks, we asked 90 women to bring their glucometer to each visit. We identified five factors for the inaccurate readings: old machines (more than four years), incorrect codes, expired strips, lack of accurate calibration, and inaccurate transcription of readings. The rate of inaccurate readings was 27%. **Intervention**: The intervention consisted of reinforcing education among patients and ensuring proper use and maintenance of the glucose meter and regular calibration. Glucometers were checked every clinic visit by the physician or the diabetes educators. We developed a new monitoring sheet with "nudges" to ensure monitoring compliance and maintaining the glucometer's accuracy.

Results: Following the intervention, there was a significant decrease in inaccurate readings, from 27 to 15% within two months. Positive results were also observed concerning the defined potential factors for inaccurate readings. The intervention reduced the most common element, inaccurate calibration, from 45 to 27%. The use of old machines as a factor was reduced to 21 from 38%, the use of wrong codes decreased to 10% from 23%, expired strips decreased from 17 to 12%, and the discrepancy between readings in the glucose meter and patient's records decreased from 13 to 10%.

Conclusion: We have shown that the rate of inaccuracy with SMBG records is not uncommon. We identified five critical factors in this regard. Regular review of the glucometers in each visit is essential to the care of women with diabetes during pregnancy.

P60. Enhancing Physicians' Clinic Consultation Quality for New Appointments through Improving the Availability of Biochemical Results in AWH-NDC

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Background: Biochemical tests have a fundamental role in the diagnosis and management process in the diabetes and endocrine clinics. Availability of these results during clinic appointments helps deliver a productive consultation, facilitates initiation of care plan and enhances better utilization of clinics capacity by reducing the need for a near follow-up appointment and clinic overbooking. Data from a previous quality improvement project on clinic capacity utilization in our center revealed up to 59% of new patients attend clinics without prior biochemical results. We aimed to improve the percentage of new patients attending diabetes and endocrinology clinics who have available biochemical results at Al Wakra National Diabetes Center (AW-NDC).

Method: Over 3 months period, all new patients in AW-NDC were screened for availability of recent relevant biochemical results (within the past 3 months from the appointment for diabetes and 1 month for endocrine cases). Patients with no available results were phoned 1 week before their appointment by AW-NDC patient coordinator to have tests done following a request by the treating physician.

Results: In the 3 months, 392 new patients were contacted, 41% were Asians, 30% Arab, and 20% Qataris. 59% of them had diabetes and 41% had other endocrine diagnoses. 44 (11%) were not reachable on the phone and 14 (3.5%) cancelled their appointment. The percentage of new patients attending clinics with available results have improved from 48 to 88% with only 12% attending clinics without results.

Conclusion: Patient telephone contact have improved the percentage of new patients attending clinics with available results. This reflects positively on the quality of clinic consultations, reduces delays in initiating care plan and enhances proper utilization of clinic capacity.

P61. Patient Experience and Satisfaction with Virtual Diabetes Bridge Clinic

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Background: Diabetes can result in serious health complications and hospitalization. The high rate of hospital admissions for people with diabetes (PWD) highlights the need for ongoing care after discharge from inpatient treatment. However, there is limited knowledge about the continuity of care between inpatient and outpatient settings for diabetes management, revealing a major gap in diabetes care.

Objective: To evaluate the success of the "Virtual Diabetes Bridge Clinic" for insulin-treated Type 2 diabetes patients discharged from HGH and referred to outpatient care. The assessment will focus on evaluating patient satisfaction, and tracking attendance rate, medication refill, home glucose reporting and insulin adjustment until their next diabetes clinic appointment.

Methods: Patients who were discharged from HGH on insulin were identified as eligible for the virtual diabetes Bridge Clinic. After discharge, they received phone calls from the clinic, run by a certified diabetes educator, to prompt medication refill, monitor blood glucose levels, and adjust insulin as needed. The clinic also reminded patients of their next doctor appointment. A satisfaction survey was conducted over the phone with all participants to evaluate their experience and satisfaction with the Bridge Clinic.

Results: Out of 78 participants, 41 filled out a satisfaction survey, with 37 (90%) reporting satisfaction, 2 (4.9%) dissatisfaction, and 2 (4.9%) having a neutral view of the Bridge Clinic. After 4 months, the results indicated substantial progress in clinic attendance, medication refill, home glucose monitoring, and insulin adjustment. Clinic attendance rose from 19 to 63%, medication refill from 41 to 86%, and home glucose monitoring from 4 to 50%. The most significant improvement was in the reporting of home glucose readings for insulin titration, which increased from 3 to 67%.

Conclusion: The project demonstrated high patient satisfaction with the Diabetes Bridge Clinic and a beneficial effect on self-management following hospitalization.

P62. The Efficacy of Diabetes Educator-Led Glycemia Clinic in Improving Glycemic Control in Type 2 Diabetes

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Background: By 2025, it is predicted that 24% of Qatari population would have type 2 diabetes (T2DM). Increasing workload in physician-led diabetes clinics leads to longer waiting time with subsequent adverse effects on diabetes care particularly glycemic control. We developed diabetes educator-led glycemia clinics for insulin treated T2DM patients providing more frequent self-management and insulin titration education to help improve glycemic control. To evaluate the impact of implementing diabetes educator-led glycemia clinic on HbA1C levels in poorly controlled T2DM patients.

Methods: Uncontrolled insulin treated T2DM patients (HbA1c $>8.5\%$) were referred to glycemia clinic by consultant endocrinologists. They received initial one-to-one diabetes education session followed by weekly phone consultation for 6 weeks then monthly for 6 months. Face-to-face visits were considered when clinically needed. ADCES-7 self-care behavior and insulin titration education (supported by physicians) were provided. HbA1c was checked at 3 to 6 months and those achieving target HbA1c of $<8.5\%$ were discharged.

Results: A total of 129 patients (55% males) were referred to glycemia clinic. 82 completed the program (mean age 55 ± 12 years, 42% on basal insulin, 58% on basal-bolus regimen, mean HbA1c was 10.4%), and 47 preferred to continue standard care and hence discharged (mean age 53 ± 11 years, 48% on basal insulin, 52% on basal-bolus regimen, mean HbA1c was 10.6%). At 3–6 months, mean HbA1c has significantly decreased in the intervention group compared with the standard care (8.6 vs. 10.5%, p-value <0.001). In the intervention group, HbA1c levels of <8.5, <8.0, and $<7.5\%$ were achieved in 51% (p-value <0.001, 95% CI: 2.04–3.27%), 33% (p-value <0.001, 95% CI: 2.30–3.99%), and 18% (p-value < 0.001, 95% CI: 2.61–4.70%) of patients, respectively. There were no significant associations between HbA1c and other variables including: age, gender, type of insulin/insulin regimen, and number of consultations.

Conclusion: Diabetes educator-led glycemia clinic for insulin treated T2DM patients can be safely and efficiently introduced to improve glycemic control. Effective communication between physicians and diabetes educators is crucial to ensure that clinics are well supported and run safely.

P63. The Efficacy and Safety of an Insulin Titration Protocol Managed by a Diabetes Educator for People with Uncontrolled Diabetes

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Background: One key aspect of diabetes management is controlling blood glucose levels through appropriate insulin dosing. The HMC National Diabetes Center has developed an insulin titration protocol to help patients achieve better glycemic control. We aimed to evaluate the efficacy and safety of insulin titration protocol led by a certified diabetes educator (CDE) for people with uncontrolled type 2 and type 1 diabetes.

Methods: A group of 130 patients were enrolled for implementation of the insulin titration protocol by a CDE trained in insulin titration. The Patients were requested to report their fasting blood glucose (FBG), 2-hour postprandial, and premeal blood glucose levels. The effectiveness was measured by tracking BG levels, hypoglycemic episodes, ER visits, need for physician input, and proper implementation of the protocol.

Results: A total of 130 patients (59% male, average age 51 ± 10) were studied. 11% had Type 1 diabetes. All mean FBG, postprandial and premeal blood glucose levels decreased significantly posttitration compared with baseline, with mean difference -5.64, p-value <0.001. FBG reduced from 184.51 to 145.88 mg/dL, postprandial reduced from 261.48 to 194.3 mg/dL, t-value 6.15, p-value < 0.001, preprandial reduced from 344.05 mg/dL to 267.52, Z-value -5.76, p-value < 0.001. The protocol saved physicians time by reducing physician involvement in insulin titration to 27% of patients, while CDE managed 73% of the required titration. The CDE used the insulin titration properly 84% of the time. However, the study found that 19% of patients had one or more episodes of mild hypoglycemia and less than 0.1% had severe hypoglycemia. The hypoglycemic episodes were particularly concerning in type 1 diabetic patients, where 42% of them had episodes of hypoglycemia, with a chi-square value of 5.12, (df) of 1, and a p-value <0.024, suggesting that the insulin titration protocol may not be safe for use with type 1 diabetic patients. There were no ER visits recorded.

Conclusion: The insulin titration protocol led by CDE was effective in reducing BG levels, but raises concern for safety among people with Type 1 diabetes due to frequent hypoglycemic episodes. The protocol was also effective in saving physician time and was properly executed by diabetes educators.

P64. Evaluating the Impact of Virtual Diabetes Self-Management Support through Diabetes Hotline on Safe Ramadan Fasting

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Background: DAR guidelines help people with diabetes (PWD) fast safely during Ramadan by addressing medication adjustments, glucose monitoring and risk assessment. However, further research is needed to determine if these guidelines remain effective when delivered virtually, particularly in situations when social distancing and remote communication are required, such as the recent COVID-19 waves. We aimed to evaluate the impact of virtual delivery of diabetes and Ramadan (DAR) guidelines recommendations through diabetes hotline service on people with Type 2 diabetes during Ramadan.

Methods: A team of diabetes educators screened PWD receiving diabetes hotline services and interested in fasting Ramadan. 75 patients were selected after using DAR risk stratification, with 83% low to moderate risk and 17% high risk, but they insisted on fasting. DAR recommendation was communicated in Arabic and English via two Zoom sessions Before Ramadan, followed by twice weekly phone calls and WhatsApp messages supported diabetes self-management and insulin titration during Ramadan. the measured outcomes were TIR, finger break readings, number of fasting days, hypoglycemic episodes and ER visits one month before and during Ramadan.

Results: A total of 75 patients with average age of 51 ± 10 years were included, of them 61% (46 patients) were CGM users and 39% were on finger break monitoring. The results showed that CGM users had a 69% TIR during Ramadan, up from 66% before and the results also demonstrated improvements in fasting and postprandial blood glucose, reduced from 145 to134 mg/dL, 209 to 187 mg/dL respectively. Additionally, the percentage of patients who were able to fast whole Ramadan increased from 70 to 77%. There was no change in the median of hypoglycemia events, median (1 ± 3.2) events/month, (1 ± 3.7) events/month respectively, with no ER visit recorded.

Conclusion: Overall, the results suggest that a virtual DAR recommendation implemented by a diabetes educator can be an effective tool in helping PWD safely fast Ramadan.

P65. Evaluation of the Effectiveness of a Structured Diabetes Education Program for patients with Type 1 Diabetes

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Background: In patients with type 1 diabetes (T1DM), structured diabetes education has been shown to improve carbohydrates (CHO) counting skills and psychological outcomes. We established a structured T1DM education program at AWH that involves four sessions group education (5 hours each) delivered on weekly basis. Over the 4-week program period, patients monitor their blood glucose using Freestyle Libre Flash Glucose monitoring (FGM) and are provided with ongoing support via communication platform (WhatsApp group). The curriculum includes educating patients on CHO counting, insulin dose adjustment, use of capillary ketone meters and glucagon injections as well as management of their diabetes during sickness, exercise and fasting to determine the effect of this diabetes education program on CHO counting skills, self-efficacy, depression, time in range (TIR), and hypoglycemia.

Methods: From (April 2019–September 2022), 38 type 1 diabetes patients were enrolled on this program. Participants were given AdultCarbQuiz, Beck Depression scale, Diabetes Self-Efficacy Questionnaires to be completed at baseline and also at the end of the program. FGM report was used to evaluate patients' data (TIR and Hypoglycemic events/duration) at baseline and 1 month after the program.

Results: A total of 38 patients (60% females, 40% Qataris), with an average age of 30 ± 9.3 years, were included. At baseline, the mean scores for AdultCarbQuiz, Beck depression scale, and Self-Efficacy questionnaires were 18.9/43, 12.16/27, and 6.58/10 respectively; these scores significantly improved (p-value <0.001) posteducational program, to 34.5/43, 8.16/27, and 8.87/10, respectively. There was also an observed improvement in TIR, with 66% of patients achieving an improvement at 1 month after program but it was not statistically significant (p-value <0.068). Interestingly both mean hypoglycemia events and hypoglycemia duration reduced significantly from 6.58 to 3.14 (p-value <0.001), (Z-value -3.29), and from 98.19 min to 79.75 min (p-value < 0.005), (Z-value -2.8) at follow-up compared with baseline duration.

Conclusion: Our structured type diabetes education program led to an improvement in CHO counting skills, psychological outcomes, and improvement in TIR with reduce number of hypoglycemia events. These results are consistent with the current body of evidence regarding the positive impacts of diabetes education programs but may be limited by the small number of the patients included in the study.

P66. Quality Improvement Project: Postpartum Transition of Care for Patients with Preexistent Diabetes in WWRC-NDC Outpatient Clinic

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Background: The CCPC program in the WWRC enroll women with pre-existing diabetes mellitus (DM) The program provides a multidisciplinary comprehensive care to achieve optimum glycemic control. Previously, once delivered, women with pre-existing DM were offered a routine review within 6 weeks of delivery. However, the no show rate was exceeding 80%. In this quality project we aim to improve the rate of postnatal follow up in women with pre-existing diabetes.

Methods: **Baseline data:** We collected data on 90 women who delivered between May and October 2021. Out of these, only 50 women (55.5%) were seen in postdelivery follow-up appointments.. The main reasons for this were: no show, booking several months prior to delivery, no follow-up appointment given. **Intervention:** Considering the

previously reported high no show rate to the 6 weeks appointment, due to the increase in child care demands, we arranged 3 months follow-up for women with DM-2. We offered women with DM-1 review in 6 weeks' time, if they wish. Appointments are arranged during the last clinic visit/or by the program coordinator after delivery. Following this clinic visit, the physicians decided the level of care required for each patient—primary or secondary care—and place the appropriate referrals.

Results: Postintervention, 56/76 women (73.7%) have attended their follow-up appointment and have been referred to the appropriate care setting. The main reason for not attending the follow-up appointments remain unchanged "overwhelmed with child's care."

Conclusion: In summary, the postpartum period is a critical time for women with diabetes. Child care increased demands is the main challenge for these women. The postnatal transition of care project has shown promising results in addressing the gap of lost follow-up.

P67. Coexistence of Moyamoya and Graves' Diseases in a Patient with Significant Stroke: Coincidence versus Cause?

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Background: Moyamoya disease (MMD)is an uncommon cerebrovascular condition characterized by a progressive narrowing of large intracranial arteries and the secondary development of prominent small-vessel collaterals. Ischemic cerebrovascular disease is a rare complication of hyperthyroidism. The coexistence of MMD and Graves' disease is rarely reported. This association between MMD and the thyroid could be due to the functional status or thyroid autoimmunity.

Case Presentation: A 33-year-old Filipino lady with no past medical history presented to the emergency department after she was found semi-conscious on the floor. She had slurred speech and left-side body weakness—no other neurological symptoms. On exam, the vital signs showed a pulse rate of 118 beats per minute, blood pressure of 156 /99 mm Hg, a temperature of 36.7°C, and oxygen saturation is 97% on room air. Glasco Coma Scale (GCS) 12/15, power: right upper limbs 3/5, left upper limb 0/5, and left lower limb 1/5. Electrocardiography (ECG) showed sinus tachycardia. A head computed tomography scan (CT) showed significant diffuse luminal narrowing of the intra and extracranial portions of internal carotid arteries noted on both sides. Incidentally detected thyroid enlargement. The patient was admitted as a case of acute stroke and started on aspirin and statins. MRA head and neck: Multiple foci of diffusion restriction are keeping with acute infarction in the right frontal lobe watershed area. Left frontal lobe subacute lacunar infarctions suggestive of Moyamoya pattern. Because of persistent tachycardia, a thyroid function test (TFT) was done: Free T4: >100 pmol/L (11–23 pmol/L), Free T3: 44.6 pmol/L (3.7–6.4 pmol/L), TSH: <0.01 mIU/L (0.30–4.2 mIU/L). Anti-TPO: 239 mIU/L, TRAB: >40 mIU/L . A thyroid ultrasound revealed enlarged thyroid with increased vascularity. The endocrine team was consulted for abnormal TFTs. Apart from weight loss, no other symptoms of hyperthyroidism. Her thyroid exam showed diffuse painless soft goiter. The impression was Graves' disease; we started her on Carbimazole 20 mg twice daily and propranolol 60 every 8 hours. She showed improving TFTs 1 month later. Then she underwent an uneventful craniotomy with right and left carotid arteries bypass.

Conclusion: Moyamoya disease is infrequently associated with Graves' disease. Further research is needed to establish the optimal treatment strategy. Antithyroid and antiplatelet therapy, combined with revascularization surgery, may improve long-term outcomes.

P68. Thyrotoxic Periodic Paralysis albeit Normal Serum Potassium in a Patient with Graves' Disease

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Background: Thyrotoxic periodic paralysis (TPP) is an uncommon acute complication of thyrotoxicosis mainly seen in Asian males. It usually presents as sudden onset weakness of proximal musculature. The majority of TPP cases present with low serum potassium levels, and it is thought to attribute to the mechanism of weakness; however, few cases were reported of patients with TPP features and normal serum potassium. Little is known about the mechanism of paralysis, albeit normal potassium, and the optimal management of the condition. Our case report highlights TPP as an uncommon complication of thyrotoxicosis. The diagnosis becomes challenging in the presence of normal potassium levels, which may compel physicians to sway toward other causes of weakness.

Case Presentation: A 50-year-old Nepalese male presented to the emergency due to a sudden onset all limb weakness that he recognized when he woke up from sleep in the early morning. Physical examination revealed lower limb weakness 3/5 proximal and distal with normal reflexes and negative Babinski. The upper limbs and cranial nerves were normal, with no tremors. No goiter was noticed, and the eye examination was normal. Investigations revealed overt thyrotoxicosis. Electrolytes were normal, including potassium (4.2 mmol/L). Carbimazole 20 mg twice daily, propranolol 80 mg once daily, and intravenous fluids with potassium supplementation were initiated, resulting in complete recovery of symptoms. The patient remained asymptomatic at follow-up with a reduction in T4 levels.

Conclusion: We aim to highlight the importance of considering TPP in patients presenting with sudden onset weakness in the setting of thyrotoxicosis, even if the potassium level is within normal limits. Management should focus on treating the etiology. Whether potassium replacement is required in the setting of normokalemia with TPP remains unclear.

P69. Thyrotoxic Periodic Paralysis as the First Presentation of Graves' Disease: A Case Report

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Background: Thyrotoxic periodic paralysis (TPP) is a rare disease seen predominantly in men of Asian origin. Its incidence is around 2% in patients with thyrotoxicosis from any cause.

Case Report: A 28-year-old Nepalese male, previously healthy, presented to the emergency department with a one-day history of persistent bilateral lower limb weakness that started suddenly while at home and was associated with generalized body pain. There was no associated weakness in the upper limbs, numbness, or paresthesia. No dizziness, bowel or bladder incontinence, diplopia, or bulbar symptoms. He had no symptoms of thyrotoxicosis. He denied a history of heavy physical exertion, recent infection, or carbohydrate-rich food consumption. He is a nonsmoker and nonalcohol drinker. On examination, he was afebrile, had a blood pressure of 135/80 mm Hg, a heart rate of 76 beats per minute, a respiratory rate of 14 breaths per minute, and maintained 99% oxygen saturation on the room air. A neurological examination revealed a GCS of 15/15, intact cranial nerves, and normal motor and sensory examination of upper limbs. The lower limb motor exam revealed that the MRC scale for muscle power was 1/5 bilaterally. Ankles and knees deep tendon reflexes were diminished bilaterally. Plantar reflexes were equivocal. Sensory exam and coordination were unremarkable. He had no exophthalmos, lid retraction, or lid lag. On Neck examination, he has no goiter or bruit. Also, he has no hand tremors or leg edema. Cardiac, respiratory, and abdominal exams were all unremarkable. Investigations revealed severe hypokalemia of 2.2 mmol/L (3.5–5.5). ECG showed normal sinus rhythm without other remarkable findings. Urgent potassium correction through the central line was initiated. Twenty-four hours from admission, the patient's lower limb weakness dramatically improved after potassium correction. The thyroid function test showed was TSH: <0.01, FT4: 26.9, FT3: 13.3 consistent with primary hyperthyroidism. TSH-receptor autoantibody was positive indicating Graves' disease. The patient was started on carbimazole 10mg oral three times daily and propranolol 10mg once daily. In the 2-month follow-up, the patient was asymptomatic and did not report any further episodes of weakness or features of hyperthyroidism.

Conclusion: TPP should be considered in the differential diagnosis of patients with acute onset of weakness. It is a reversible condition, and it can be rarely the initial presentation of Graves' disease, even in patients without clinical manifestations of thyrotoxicosis.

P70. Tuberculosis Mimicking Thyroid Cancer: Two Case Reports

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Introduction: Thyroid tuberculosis is very rare and has variable presentations without pathognomonic features. The main method for establishing the diagnosis is fine-needle aspiration (FNA) with subsequent bacteriologic stain, microscopy, bacteriologic culture, and polymerase chain reaction (PCR). It is crucial to distinguish thyroid tuberculosis from other forms of thyroid disorders such as thyroid cancer to avoid unnecessary thyroid surgery. Here we present two patients who presented with neck swellings mimicking thyroid cancer.

Case Presentations: **Case 1.** A 28-year-old man, presented with neck swelling of four weeks duration. There were no symptoms suggestive of thyrotoxicosis. US neck revealed a left thyroid nodule that was solid, mixed hypoechoic/isoechoic with no suspicious lymphadenopathy. On further detailed history taking, the patient reported a history of night sweats and tuberculosis (TB) exposure. QuantiFERON test was positive; Chest X-ray was unremarkable, and two samples of sputum Acid Fast Bacilli (AFB) and TB culture came back negative. FNA thyroid nodule and lymph node cytopathology showed Necrotizing granuloma and Positive TB PCR. **Case 2.** A 30-year-old female was diagnosed with hyperthyroidism after presenting with two months of symptoms. She was started on Carbimazole, but treatment was stopped on subsequent follow-up as the patient developed anterior neck swelling and laboratory findings of subclinical hypothyroidism. She was referred to the Endocrine clinic for possible resolving thyroiditis or over-treated thyrotoxicosis. Thyroid US revealed bilateral hypoechoic rounded structures in supraclavicular and lower anterior cervical regions, with central hypoechoic regions. This was confirmed on a neck CT scan. She underwent a cervical lymph node excisional biopsy, which showed necrotizing granulomatous lymphadenitis with a positive AFB smear. The patient remained euthyroid after the completion of anti-TB treatment.

Discussion: Tuberculosis of the thyroid gland is one of the rare forms of extrapulmonary Tuberculosis, accounting for 0.1 to 0.4%. Thyrotoxicosis due to tuberculous thyroiditis occurs due to thyroid gland involvement and destruction; this most likely occurred in our second case, who presented initially with thyrotoxicosis. This period may be followed by hypothyroidism due to extensive glandular destruction. A proper history and physical examination are the keys to the diagnosis. During the pandemic, where most nonurgent clinics were virtual, clinical examinations could not be performed, probably delaying diagnosis. The role of imaging is limited in the absence of history suggestive of TB. However, in most TB thyroid nodules, Imaging cannot differentiate between malignancy and TB. A proper history and physical examination for possible lymphadenopathy are crucial. Radiological imaging could be of value, but FNA is the primary diagnostic tool. Follow-up during and after completion of anti-TB is necessary due to the possibility of hypothyroidism and, rarely to exclude underlying thyroid neoplasia.

P71. The Pendulum of Hyperthyroidism to Hypothyroidism: The Enigma of Hashitoxicosis Revisited—A Selection of Unusual Thyroid Cases

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Background: Hashitoxicosis since the 1970's has been an enigmatic condition. The swings between hyper- to hypothyroidism may confuse the unwary clinicians. More subtle cases may continue to emerge, with diverse clinical presentations.

Methos: Clinical case vignettes.

Results: Four patients, three females and one male were seen in our endocrine center over the last few years. A 29-year-old female presented with swinging hyper- to hypothyroidism over the 11 years preceding her review in our center with moderate hyperthyroidism. Investigation with imaging and thyroid autoantibody confirmed Hashitoxicosis. She was controlled with carbimazole, and she then conceived. She remained in remission following delivery. The second female patient had several episodes of hypothyroidism with alternating hyperthyroidism, for which she eventually opted for total thyroidectomy, and as she is keen to conceive via IVF. She had one successful pregnancy following long-term remission. The third female had long history of hyper- to hypothyroidism, which proved to be classical hashitoxicosis. She eventually opted for radioiodine therapy that culminated in hypothyroidism, now stable and asymptomatic on thyroxine. The only male was in his forties, had few months history

of relatively severe hyperthyroidism with positive TRAb, treated with carbimazole for few months, and developed profound hypothyroidism. He had elevated anti-TPO Abs and thyroid imaging consistent with destructive thyroiditis. He remained hypothyroid well controlled on thyroxine.

Conclusion: Since its first description by Faterouchi et al in 1971, the syndrome of Hashitoxicosis continues to be a conundrum of diverse presentations of thyroid dysfunction that does not spare children or adolescents, despite it is commonly seen in adult females. Our case series underscores the difficulty of managing these patients where the outcome may not always be that predictable and will warrant informed decision by the patient for definitive therapy.

P72. A Rare Case of Hyperthyroidism due to Co-existing TSH Secreting Pituitary Adenoma and Graves' Disease

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Background: The co-existence Graves' disease (GD) and TSH-secreting pituitary adenoma (TSHoma) is extremely rare. We present a case of co-existing TSHoma and GD in a patient presenting with visual field defect.

Case Presentation: A 46-year-old Filipino gentleman presented to the emergency department with decreased vision for one month and tremors and palpitations for 3 months. He had bitemporal hemianopia, a firm, diffuse, thyroid swelling, and a pale left-sided optic disc. Laboratory examination showed normal TSH (3.35 mIU/L), high free T3 (19.7 pmol/L), high free (68.9 pmol/L) and positive TSH receptor antibody. Rest of the pituitary hormonal profile was normal. Pituitary MRI showed a 3 cm macroadenoma causing optic chiasm compression. A nuclear scan of the thyroid (Tc 99m pertechnetate) demonstrated features suggestive of GD (diffusely increased homogeneous uptake). As a case of co-existing GD and TSHoma, patient was initially managed with subcutaneous octreotide 100 mg BID and oral carbimazole 40 mg once daily, followed by trans-sphenoidal endoscopic resection of pituitary macroadenoma. The immunohistochemistry was negative for ACTH, prolactin, GH, FSH, TSH, and LH. Further workup to confirm the diagnosis of TSHoma showed a positive α-subunit pituitary tumor marker. An NM Ga68 DOTATATE PET CT showed increased uptake in the pituitary adenoma showing the presence of functional tissue in the pituitary gland. A follow-up pituitary MRI showed a stable size of the residual tumor. The patient noticed a significant improvement in right-eye vision and mild improvement in left-eye vision. He was not willing to undergo a repeat surgery. He is now being managed with monthly octreotide intramuscular injection and carbimazole 20 mg once daily. His latest TSH and T4 are within normal range.

Conclusion: Co-existing TSHoma and GD in a patient with hyperthyroidism is rare but important to recognize as it has a significant impact on deciding management strategies.

P73. PTH Resistance Presenting with Severe Hypocalcemia on the Background of Infertility

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Background: Pseudohypoparathyroidism (PHP) with parathormone (PTH) resistance is a rare cause of hypocalcemia. The management is challenging due to associated conditions such as ossifications, fractures, and other hormones resistance. Our case describes PHP in the context of infertility.

Case Presentation: A 20-year-old male presented with bilateral hand and feet numbness and spasms for 10 days, on a background of infertility for two years. He gave a history of similar presentation years ago and he lost follow-up. Physical examination showed no bony deformities or gynecomastia and genitalia Tanner stage 5. Investigations showed hypocalcemia:1.54 mmol/L (N: 2.1–2.6), hyperphosphatemia:1.64 mmol/L (N: 0.87–1.45), Vitamin D: 9 ng/mL (N: 30–80), PTH: 362 pg/mL (N: 15–65), and normal urea and creatinine. An electrocardiogram was unremarkable. Therefore, the possibility of PTH resistance with PHP was considered. His symptoms improved with 4 g of calcium gluconate intravenously in two divided doses, then, he received calcium carbonate 1,250 mg thrice daily and calcitriol 0.25 mcg twice daily. A CT scan head was unremarkable for brain calcifications or Arnold–Chiari malformation. The patient's infertility workup showed normal FSH: 3 IU/L (N: 1.5–12.4), testosterone: 18.67 nmol/L (N: 10.4–37.4), prolactin: 225 mIU/L (N: 85–323) and TSH: 3.7 mIU/L (N: 0.4–4.2). However, his LH was high: 10.6 IU/L (N: 1.7–8.6). The patient was discharged asymptomatic with a normal calcium level. He was referred to the infertility clinic with a semen analysis, and to the genetic clinic for a genetic diagnosis of PHP. His follow-up calcium level was 1.95 with vitamin D:12 and PTH: 339, as he was noncompliant to medications and was advised to comply.

Conclusion: The management of PHP and its associated manifestations can be complex without established guidelines. We highlighted the clinical course of PHP with infertility.

P74. Nondiabetic Ketoacidosis Secondary to Primary Hyperthyroidism

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Objective/Learning Point: One of the rare presentation/complications of hyperthyroidism is nondiabetic ketoacidosis (NDKA) and diagnosis of hyperthyroidism should be added to the differential diagnosis of ketoacidosis and prompt treatment is essential.

Case Presentation: A 41-year-old African lady with no past medical history presented with a three- week history of lower quadrant nonradiating abdominal pain, severity 7/10, cramping in nature associated with nausea, vomiting (five times a day) and weight loss of 3 kg in 3 weeks. She denied fever, shortness of breath, chest pain, cough, hemoptysis or hematemesis, dizziness, vaginal bleeding or discharge, dysuria, change in urine color, or increase in frequency. No history of regular medications or herbal supplements. On assessment, she was tachycardic (110 beats/min), but non tachypneic, afebrile, normotensive and on room air. Physical exam was significant for diffuse mild tenderness in the abdomen. No eyes manifestation of thyrotoxicosis, no goiter, and no fine tremor. However, there were features of proximal myopathy of the limbs, which was attributed to her poor nutritional status. Initial investigation showed normocytic anemia, and blood chemistry showed high anion gap metabolic acidosis (HAGMA). Her kidneys function was unremarkable. Urine analysis showed 4+ ketones with a high β-hydroxybutyrate level. Her HbA1c was 5.1% with normal glucose readings. Lactic acid and salicylate levels were within normal limits. Thyroid functions test revealed thyroid-stimulating hormone <0.01 mIU/L (reference range: 0.3–4.2), free

T4 44.8 pmol/L (reference range: 11–23), and free T3 21.6 pmol/L (reference range: 3.7–6.4). She was started on propranolol (80 mg daily) and carbimazole (20 mg daily). Antithyroid peroxidase and antithyroid-stimulating hormone receptor were positive and she was diagnosed with Grave's disease. After starting the treatment, her symptoms improved, and ketoacidosis resolved. She was discharged home on same medications. Thyroid hormones increase lipolysis by different mechanisms. Adipocytes in hyperthyroid patients were found to have increased numbers of β- 2 adrenergic receptors and increased lipolytic response to β-agonists. A recent study showed that patients with thyrotoxicosis have elevated norepinephrine in subcutaneous adipose tissue compared with others, which might stimulate lipolysis by increasing the local release of NE and lead to increase ketogenesis.

P75. Severe Hypertriglyceridemia-Induced Pancreatitis during Pregnancy in Hypothyroid Patient: A Case Report

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Background: In comparison to prepregnancy levels, VLDL cholesterol, triglycerides, LDL cholesterol increases and reach their highest levels at term. Additionally, while triglyceride transport is unaffected by pregnancy, decreased adipose tissue lipoprotein lipase (LPL) activity in late gestation may lead to a redirection of triglyceride fatty acids to other tissues like muscle and the uterus for oxidation rather than storage.

Case: A 34-year-old Indian female G2P132 weeks pregnant, known case of type-II DM, hypothyroidism and previous history of hypertriglyceridemia-induced pancreatitis presented to the hospital with one-day history of severe epigastric pain, upon presentation, she was vitally stable apart from a few episodes of tachycardia. Physical examination showed epigastric tenderness. TG level was 33.8 mmol/L, and pancreatic enzymes levels were elevated. Ultrasound abdomen showed bulky and heterogeneous pancreas.

Decision-making: Plasma exchange was started with drop in triglyceride (TG) level to 13.1 mmol/L, insulin infusion was added with a further drop of TG to 9.1 mmol/L. Fenofibrate 200 mg was added. TG raised again to 14 mmol/L so the decision was to hold on Fenofibrate and to continue IV insulin + dextrose, Omega-3 2 g BID was added with limiting fat content in diet to <15% with avoidance of added sugar or juices. TG level continue to rise. Patient kept nil per mouth and resumed Fenofibrate and decision was made to go for delivery at 35 weeks.

Conclusion: Lipid metabolism is significantly impacted by pregnancy. Despite the rarity of difficulties in a normal physiological pregnancy, patients with a genetic predisposition are more likely to experience severe consequences from high levels throughout pregnancy such as hypertriglyceridemia-induced pancreatitis. To reduce symptoms and avoid difficulties for the mother and the fetus, it is very important to check up frequently and to use the proper management during this time.

P76. COVID-19 Lockdown and Its Impact on Diabetics' Lifestyle, Weight, and Blood Sugar Control in Qatar

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Background: The COVID-19 related restrictions had a detrimental impact on the glycemic control of diabetic patients. Such measures have led to the adoption of unhealthy lifestyle habits contributing to the deterioration of glycemic control and weight gain. The study explored the impact of COVID-19-related home confinement measures on lifestyle behaviors, body weight, and perceived glycemic control of adults with type 2 Diabetes Mellitus (T2DM) in Qatar.

Methods: A web-based survey was conducted in early 2021 targeting adults ≥18 years with T2DM.

Results: A total of 171 individuals with type 2 diabetes mellitus (T2DM) participated in the survey. The age group with the highest representation was 35–44 years old, accounting for ~40% of the participants. About 68% were male and 90% identified as non-Arab. One quarter of the participants reported having additional medical conditions, with hypertension being the most commonly reported comorbidity. Approximately 65% of the participants reported one or more unhealthy dietary changes, with a significant increase in sitting/reclining, and screen times. One-third of the participants reported weight gain, while one-fifth reported poorer glycemic control since the start of home confinement measures. Being a female and reporting at least one unhealthy dietary change were significantly associated with greater weight gain. Participants who reported five unhealthy dietary behaviors were more than seven times more likely to perceive poorer glycemic control during home confinement measures.

Conclusion: COVID-19 measures adversely impacted the lifestyle and glycemic control of diabetics

Authors' Contribution

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Compliance with Ethical Principles

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