cases, uncontrolled blood pressure and vitamin K-antagonists intake were excluded from the study. Hemodynamic parameters were measured using an A-pulse CASP-AL device. Carotid stiffness indices were measured by one-point echo-tracking method with Aloka Hitachi Prosound on the both common carotid arteries (CA).

**Results:** all hemodynamic parameters showed increased values compared to the baseline: SAP (+5 mmHg) (p=0.1), DAP (+2.9 mmHg) (p=0.19), PP (+1.4 mmHg) (p=1.4), MAP (+3.4 mmHg) (p=0.08). CASP increased from 119.8 ± 12.1 mmHg to 126.8 ± 11.4 mmHg (+5 mmHg), and this change was significant (p = 0.02). PWV on the right CA did not change significantly before and after (7.19 ± 1.28 m/s) supplementation (p=0.47), similar to BSI 10.08 ± 3.41 and respectively 10.51 ± 3.99 (p=0.61). PWV on the left CA before supplementation is 7.01±1.22 m/c, respectively after 7.19±1.56 m/c (p=0.49). BSI on the left CA is 9.97±2.79, resp. 10.69±5.07 (p=0.43).

**Conclusions:** Vitamin K2 supplementation for four weeks showed significant increase in CASP in our cohort of patients with T2DM. The other hemodynamic parameters as well as the indicators of carotid stiffness do not change significantly. A limitation of our study is the small number of patients included and the short period of intake of vitamin K2, which may not lead to morphological changes in the vessel wall. More extensive research is needed in the field.

**PULSE PRESSURE SIGNIFICANTLY AND INDEPENDENTLY CORRELATES WITH CAROTID PULSE WAVE VELOCITY AND BETA-STIFFNESS INDEX IN PATIENTS WITH TYPE 2 DIABETES MELLITUS**

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**Objective:** Introduction: Pulse wave velocity (PWV) and beta-stiffness index (BSI) are the most popular echo-tracking parameters indicating increased carotid stiffness. Pulse pressure (PP) values turns out to be higher in patients with increased indices of arterial stiffness and is an independent predictor of cardiovascular disease and mortality. This is of greater importance for patients with type 2 Diabetes Mellitus (T2DM).

**Aim:** To find out correlation between the pulse pressure and carotid stiffness indices.

Design and method: 100 patients with T2DM without overt cardio-vascular diseases and 30 healthy age and sex matched controls were included in the study. All participants underwent carotid examination of PWV and BSI, by echo-tracking method with Aloka Hitachi Prosound alfa-7. Patients with uncontrolled blood pressure and history of CV diseases were excluded from the study.

**Results:** Pulse pressure significantly correlated with left carotid artery PWV (r = 0.43; p = 0.0001) and BSI (r = 0.44; p = 0.0001) and right carotid artery PWV (r = 0.38; p = 0.001), BSI (r = 0.39; p=0.001). Multivariate regression analysis with independent variable PWV, revealed that PP remained a significant and independent determinant (B = 5.78; p <-0.0001), similar to systolic blood pressure (B = 2.97; p = 0.003).

**Conclusions:** PP is among the most important independent determinants associated with increased carotid stiffness in patients with T2DM without cardiovascular complications and with well controlled blood pressure. PP may serve as an early marker of increased cardiovascular risk in patients with T2DM.

**BLOOD PRESSURE RESPONSES TO STRESS AFTER CHRONIC PHYSICAL EXERCISE: A SYSTEMATIC REVIEW WITH META-ANALYSIS**

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**Objective:** To assess the effects of physical exercise interventions on blood pressure (BP) responsiveness to laboratory stress tests.

**Design and method:** This is a systematic review with meta-analysis that examined the effect of at least 4 weeks of exercise training on adults BP responsiveness to stressor tasks. For quantitative analysis, a random-effects model by Hunter Smith method was used. The searches were performed in 4 digital databases (PUBMED, LILACS, EMBASE and PsycInfo) and 19 studies and 2 event abstracts were included, totaling 857 individuals (12 studies and 516 individuals, in the quantitative phase).

**Results:** Regarding qualitative analyses, 66.7% of the full text and abstracts showed favorable BP responses (either in SBP, DBP and/or MBP) after chronic exercise training, and the most frequent stressor test was the Arithmetic task, used in 33.3% of studies. Besides that, no asymmetries were found in the funnel graphs that would infer publication bias. Favorable metaanalytic results for the exercises were found in systolic BP (SBP; mean effect size = -0.47 [-0.69; -0.24]) and diastolic BP (DBP; mean effect size = -0.35 [-0.58; -0.12]).

**Conclusions:** In summary, chronic physical exercise lowers SBP and DBP responsiveness to laboratory stress tests. So, these results associated with information from previous studies reinforce the idea that physical exercise is a valid strategy to control not only BP at rest but also its levels under stress, reducing hypertensive peaks of these individuals.

**PREDIALYSIS SYSTOLIC PRESSURE AND MORTALITY**

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**Objective:** This study aimed to verify the impact of predialysis systolic pressure (PDSP) on patients’ mortality.

Design and method: We reviewed files of incident patients, in one reference center of hemodialysis, between January 2009 and June 2010. Arterial pressure was measured by sphygmomanometer before initiating the patient’s first dialysis session.
session. We considered: as "high PDSP" a SP equal or over 180 mmHg; as "low PDSP" a SP equals or less than 100 mmHg. Univariate and multivariate analysis were performed to study PDSP association with absolute mortality at five years. Odds ratio (OR) was subject to a 95% confidence interval. We used Kaplan Meier method for survival curves.

Results: One hundred eleven patients were included. Sex ratio was 1.7. M/W. At dialysis initiation: mean age was 55 ± 14.9 years. Sixty nine patients (62%) were hypertensive; all of them were under antihypertensive agents. MAP, SP and DP were respectively 98.8 ± 16.3 mmHg, 139.4 ± 25.4 mmHg and 79.1 ± 14 mmHg. Mean urinary output was 1156 ± 542 ml/day and initial serum creatinine 887 ± 271 μmol/l.

In univariate analysis, absolute mortality at five years was associated with low PDSP (p<0.001; OR=4.8). This association was pronounced among orderlies (p<0.001) and diabetic patients (p=0.001). High PDSP was also associated with absolute mortality at five years (p=0.03; OR=1.67). In multivariate study, neither low nor high PDSP were associated to mortality.

Survival was decreased for patients with low PDSP (log-rank p=0.001) (Figure 1) and high PDSP (log-rank p=0.03) (Figure 2).

Conclusions: These results suggest the presence of a "U" curve relationship between PDSP and mortality. Further studies, with larger populations, are needed to determine the potential use of low PDSP as a mortality risk factor.

HYPERTENSION PHENOTYPES, TARGET ORGAN DAMAGE AND STIFF ARTERIES AND SEVERITY OF COVID-19

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Objective: Since the Coronavirus Disease 2019 (COVID-19) pandemic began, conflicting reports have emerged regarding its association with hypertension (HTN) in various populations worldwide. However, there is paucity of data regarding the association between the severity of COVID-19 and HTN phenotypes and HTN mediated organ damage (HMOD).

Design and method: In a cohort of patients (n=501, mean age 53.5±14.6) attending a specialist hypertension clinic at King Abdulaziz Cardiac Center, Riyadh, Saudi Arabia, we identified patients diagnosed with COVID-19 between January and November, 2020. We compared HTN phenotypes and HMOD in patients admitted with severe COVID-19 infection to those with mild disease and without disease. Data were analysed using JMP version 13 Pro (SAS for Windows).

Results: Twenty-seven patients developed COVID-19 (5.38%), 8 of whom were admitted (29.6%), with one fatality (3.8%). Patients admitted with COVID-19 were more likely to have refractory HTN (43% vs. 15% vs. 8.9%, p<0.01), body mass index >30 (85.7% vs. 46% vs. 47%, p<0.05), left ventricular hypertrophy (132±5 vs. 122±7 vs. 110±13, p<0.01) and greater central systolic pressure (132±5 vs. 122±7 vs. 110±13, p<0.01) with no difference in age and gender.

Conclusions: In hypertensive patients, severe COVID-19 is associated with severe uncontrolled hypertension with HMOD and stiff arteries. While this is a small single center study, it does highlight aspects of COVID-19 in hypertensive patients which warrant further investigation.

MENOPAUSAL HORMONE THERAPY AND RISK OF INCIDENT HYPERTENSION: IMPACT OF THE ROUTE OF ESTROGEN ADMINISTRATION AND PROGESTOGENS IN THE E3N COHORT

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Objective: Although menopausal hormone therapy (MHT) remains the most efficacious treatment for vasomotor symptoms of menopause, its effects on the development of arterial hypertension remain unclear. We sought to determine the effect of different formulations of MHT on incident hypertension among menopausal women in a large prospective cohort study.

Design and method: We used data from the E3N cohort study, a French prospective population-based study initiated in 1990 of 98,995 women. Out of these, 49,905 menopausal women with complete information on the use of MHT, and without prevalent hypertension at inclusion were included. Hypertension cases were self-reported and validated using the national drug reimbursement database.

Results: Among these women with a mean age was 54.2 ± 4.3 years, 10 173 cases of hypertension were identified in an average follow-up time of 10.6 years and 32 183 (64.5%) of the women reported ever using MHT. Compared with women who never used MHT, those who ever used it had an increased risk of incident hypertension (adjusted HR 1.07, 95% CI 1.02–1.12) after adjustment for body mass index and other potential confounders (Table 1). When formulation was taken into account, oral but not transdermal estrogen use was associated with an increased risk of hypertension (adjusted HR=1.09; 95% CI: 1.04-1.14 and HR=1.03; 95% CI: 0.99-1.07, respectively). Regarding the impact of concomitant progestogens, pregnant and norpregnane derivatives were significantly associated with hypertension risk (HR=1.12; 95% CI: 1.06-1.19 and HR=1.03; 95% CI: 1.01-1.13, respectively).

Conclusions: Use of MHT was associated with an increased risk of incident hypertension, especially when using oral estrogen and pregnant and norpregnane derivative in case of combined treatment. Surveillance of blood pressure should be added to the medical surveillance of MHT users.

RENOVASCULAR HYPERTENSION-INDUCED CARDIAC CHANGES IN A RAT MODEL: FEASIBILITY OF CONVENTIONAL AND RECENT EECGROCARDIOGRAPHY

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Objectives: Renovascular hypertension (RH) is a major cause of secondary hypertension, and hypertension eventually led to cardiac remodeling in patients. Hypertension leads to concentric left ventricle hypertrophy, while hypervolemia originated from renal failure leads to eccentric hypertrophy. Both mechanisms occur in RH which results in complex cardiac remodeling. Uraemic cardiomyopathy results from RH is characterized by diastolic dysfunction, but traditional echocardiography was limited in evaluating the diastolic function due to unknown hemodynamic and morphologic status. Recently, non-invasive intraventricular pressure gradient (IVPG), a preload-independent diastolic function parameter, was established and showed higher sensitivity to evaluate diastolic dysfunctions, particularly during cardiomyopathy. However, no previous studies highlighted the feasibility of the IVPG in the diagnosis of RH.