Evaluation of Serum Copeptin and Psychological Stress Level Among Healthcare Providers During COVID-19 Pandemic

Serial no: 0304842

15/10/2020

Evaluation of Serum Copeptin and Psychological Stress Level Among Healthcare Providers During COVID-19 Pandemic.

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The (COVID-19) pandemic created a remarkable impact on healthcare providers both physically and psychologically. Perceived psychological stress (PSS) influences the homeostatic equilibrium, involving activation of the sympathetic nervous system and hypothalamus pituitary adrenal (HPA) axis. Copeptin; C-terminal portion of Vasopressin (AVP) precursor is stable, however, Evidence about impact of PSS on copeptin levels is lacking,

Aim: of this study was to estimate the influence of psychological stress on copeptin levels among healthcare providers working in ICU.

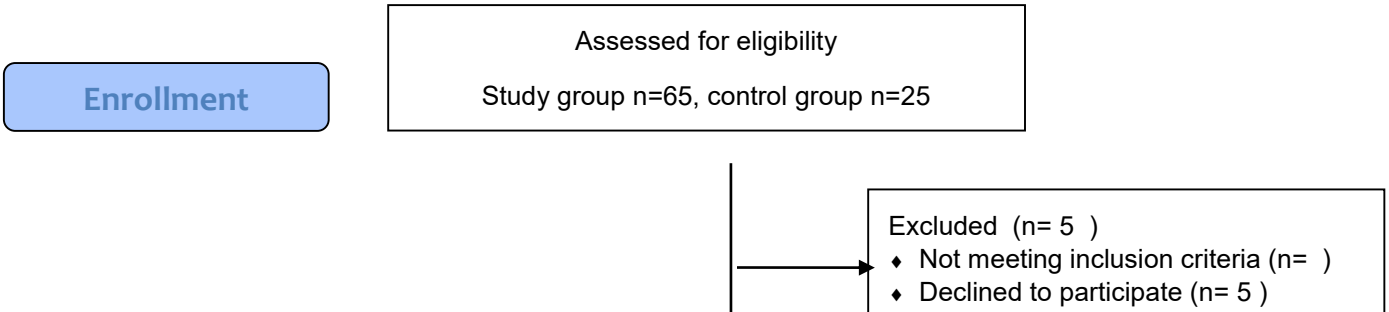
Methods: A total of 70 healthcare volunteers participated in this prospective study; 35 physicians (28 males and 7 females) and 35 nurses (10 males and 25 females). Fasting blood samples were withdrawn at 9:00 am for determination of copeptin, cortisol, insulin at three points; baseline prior onset of duty shifts in ICU. Second point at end of first week and third point was two weeks' after leave taking. A questionnaire was conducted to all participants to assess stress (PSS). Cortisol was determined by a chemiluminescence immunoassay while insulin and Copeptin were measured by ELISA.

Results: Baseline copeptin level was 15.76 ± 8.6 pmol/l significantly increased and was positively correlated with moderate stress PSS score was 29.4 ± 3.4. At second point, Copeptin level was significantly reduced 8.45 ±3.54 pmol/l. and third point, copeptin level was 3.98±1.28 pmol/l and PSS score14± 3.43 relieved stress. At conclusion, positive correlation between serum copeptin, PSS, systolic blood pressure, serum insulin and body mass index. On the other hand, there was no significant difference between serum cortisol level during 3 measurements.

Conclusion: finding suggest that copeptin may be used a potential biomarker for physiological strain during work in a stressful environment.

Study design

CONSORT 2010 Flow Diagram



Recruitment
Group one; (studied group)70 healthcare personnel volunteers participated; worked at Intensive Care Units at Alexandria Quarantine Hospitals.

Group two; (control group)25 healthcare personnel volunteers participated; not work in quarantine hospitals of matched same age, body mass index BMI, healthy not diabetic, no hypertension

Pre-assignment Details
group one ; healthcare providers worked in ICU: 35 physicians (28 males and 7 females) and 35 nurses (10 males and 25 females). All volunteers were in good physical health Exclusion criteria included hypertension, diabetes mellitus, obesity BMI ≥30, subjects with serum sodium ≤135 or ≥ 145 mmol /L at baseline or females receiving contraceptive pills.

Assigned participants were clinically evaluated for as hypertension, DM, dyslipidemia, renal function.
Then were given a questionnaire to assess the perceived psychological stress.

Group Information
one group of participants healthcare providers designated to take duty shifts at ICU in Alexandria quarantine hospitals for two weeks during COVID-19 pandemic were assigned according to their will to participate in study. And a control group of healthcare providers not assigned to work in quarantine hospitals.
Period of evaluation:
First assembly: for clinical assessment of participants, determine BMI and blood pressure, take questionnaire and withdrawal of serum blood sample one day before enrolling to work in ICU.
Second assembly: at the end of first week after work in ICU take another blood sample
Third assembly: two weeks after departure from work in ICU for revaluation of participants, determine BMI and blood pressure, and withdrawal of a serum blood sample

Number of participants at initiating the period of study.
They were 70 healthcare providers (doctors and nurses).
Number of participants at the end of the period of study.
They were 65 participants; 5 healthcare providers withdraw from study as they didn't come during follow up in the third assembly two weeks after departure from ICU.

Participants 35 physicians (28 males and 7 females) and 35 nurses (10 males and 25 females), Age ranged from 24 to 37 years with a median of 31 years.

Table 1: Baseline clinical characteristics and metabolic variables of studied groups.

	Healthcare providers served at ICU (n=70)	**Control group (n=30)**	**P value**
Sex (M/F)	(38/32)	(16/14)	
BMI (Kg/m^2)	24.28±2.54	26.23±2.27	0.231
Systolic BP (mmHg)	137±9.3	136.7±8.4	0.145
Diastolic BP (mmHg)	82.5 ± 6.4	79.5 ± 7.3	0.168
Heart rate beats/min	72 ± 5	68± 6	0.098
FBG (mg/dl)	91.5 ± 13.54	92.62 ± 12.77	0.425
S. sodium (mmol/L)	140.4 ± 5.23	138.78±4.95	0.311
Total cholesterol (mg/dl)	191.2 ± 23.5	187.45±24.67	0.207
Plasma Copeptin(pmol/l)	15.76 ± 8.6	4.18±1.54	0.001*
S. cortisol (nmol/L)	501.7(348.4-675.4)	488(332.62-612.23)	0.138

Data are means ± SE or *n* (%). *$P < 0.05$.

Outcome measures:

Primarily outcome: First determination of psychological stress among doctors and nurses working in ICU through a questionnaire before duty shifts [first time] and re-evaluate it after one week of work in ICU [second time], and lastly two weeks after departure from shift duties [third time].

Second to determine stress hormones copeptin and cortisol (possible stress biomarkers) concurrently with questionnaire.

Secondary outcome: correlate the level of psychological stress calculated from provided questionnaire in the three assemblies with stress biomarkers copeptin and cortisol in the three measurements.

Time frame: four weeks for each participant.

Follow-up and outcome parameters:

All studied healthcare providers will be followed up before start of duty shifts, one week after work and two weeks from departure from duty shifts. They will be appraised every assembly for psychological stress level; before start of duty shifts (first time), one week after start (second

time) and two weeks after departure from shift duties in ICU (third time) for assessment of psychological stress level and stress hormones.

Biochemical parameters

Fasting blood samples will be collected from healthcare providers prior to start of duty shifts and two weeks after leave taking, after overnight fast and divided into two tubes; EDTA for complete blood count, the rest into plastic tubes and serum sample.

Serum glucose and Total cholesterol, urea, creatinine, serum sodium and potassium.

Serum cortisol and copeptin.

Statistical analysis

All data will be analyzed with Statistical Package for the Social Sciences version 20 software (SPSS, Inc., Chicago, IL). Results will be displayed as mean ± SD. Paired Student's t-test used to compare the data pre-operative and nine months postoperative. The chi-squared test used for category variables. Spearman correlation coefficient used to detect the correlation between different variables. Statistical correlations calculated by Pearson's correlation test. $P < 0.05$ is considered significant.

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