Effect of isolation for anti-infectious activity on stress parameters in hemodialysis unit at the outbreak of MERS-CoV

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INTRODUCTION

At the outbreak of the Middle East Respiratory syndrome corona virus (MERS-CoV) in 2015, hemodialysis patient (HDP) and medical staff (MS) in our center were exposed to one patient infected by MERS and had been isolated during 2 weeks. This study was performed to investigate clinical meaning of circulating cell free genomic DNA (ccf-gDNA), mitochondria DNA (ccf-mtDNA) and pentraxin-3 (PTX-3) in HDP and MS at isolating and subsequent times.

Table 1. Baseline characteristics in HDP and MS

	HD patients (n=82)	Medical staffs (n=12)	p-value
Age	62.09±1.54	36.01±1.61	<0.001
Sex (M/F)	48/34	12/0	<0.001
Height (cm)	162.71±0.92		
BMI (kg/m^2)	24.16±0.38		
Dry weight (kg)	62.79±1.06		
SBP/DBP (mmHg)	141.41±2.06/74.24 ±1.44		
Dialysis vintage (month)	74.24±1.44		
Cause of ESRD			
DM	37/82 (45.12%)		
Hypertension	15/82 (18.29%)		
Glomerulonephritis	14/82 (17.07%)		
Others	12/82 (14.63%)		
Unknown	4/82 (4.88%)		

METHODS

The plasma of 82 HDP and 12 MS was collected at isolating (M0) time, following month (M1), and 3 months after isolation (M3). Circulating cell free DNA (ccf-DNA) and PTX-3 was measured by real-time PCR and ELISA, respectively.

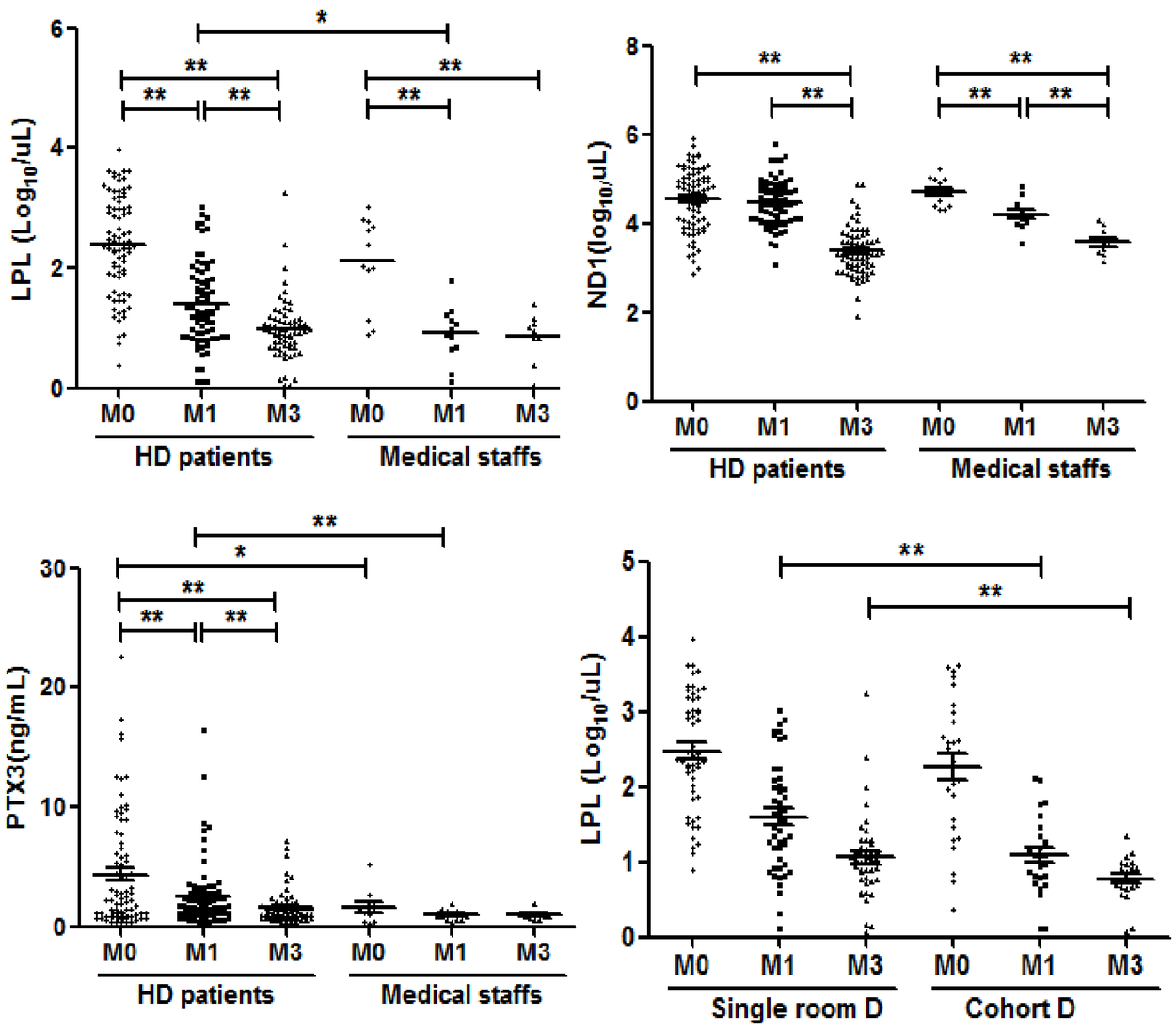

Figure1. The level of ccf-DNA and PTX-3 in HDP and MS and the change of stress parameters by isolation methods in HDP

Table 2. Laboratory change before and after isolation in HDP

	M-1	M0	M1	M2	M3	M4	M5	p-value
Hb (g/dL)	10.38±0.14	10.14±1.44	10.16±0.15	10.50±0.20	10.76±0.14	10.83±0.13	10.69±0.14	0.001
Hct (%)	31.48±0.54	30.73±0.53	30.55±0.44	32.29±0.45	32.57±0.43	32.73±0.37	32.31±.042	< 0.000
Ferritin (ng/mL)	417.38±33.28		457.20±39.00		371.44±41.82		303.24±24.66	0.018
CaxP	43.45±1.57	43.66±1.62	48.03±2.10	48.35±2.03	48.37±1.77	48.79±1.88	44.53±1.92	0.790
Kt/v	1.52±0.06	1.45±0.06	1.49±0.07	1.52±0.07	1.62±0.06	1.64±0.06	1.64±0.07	0.018

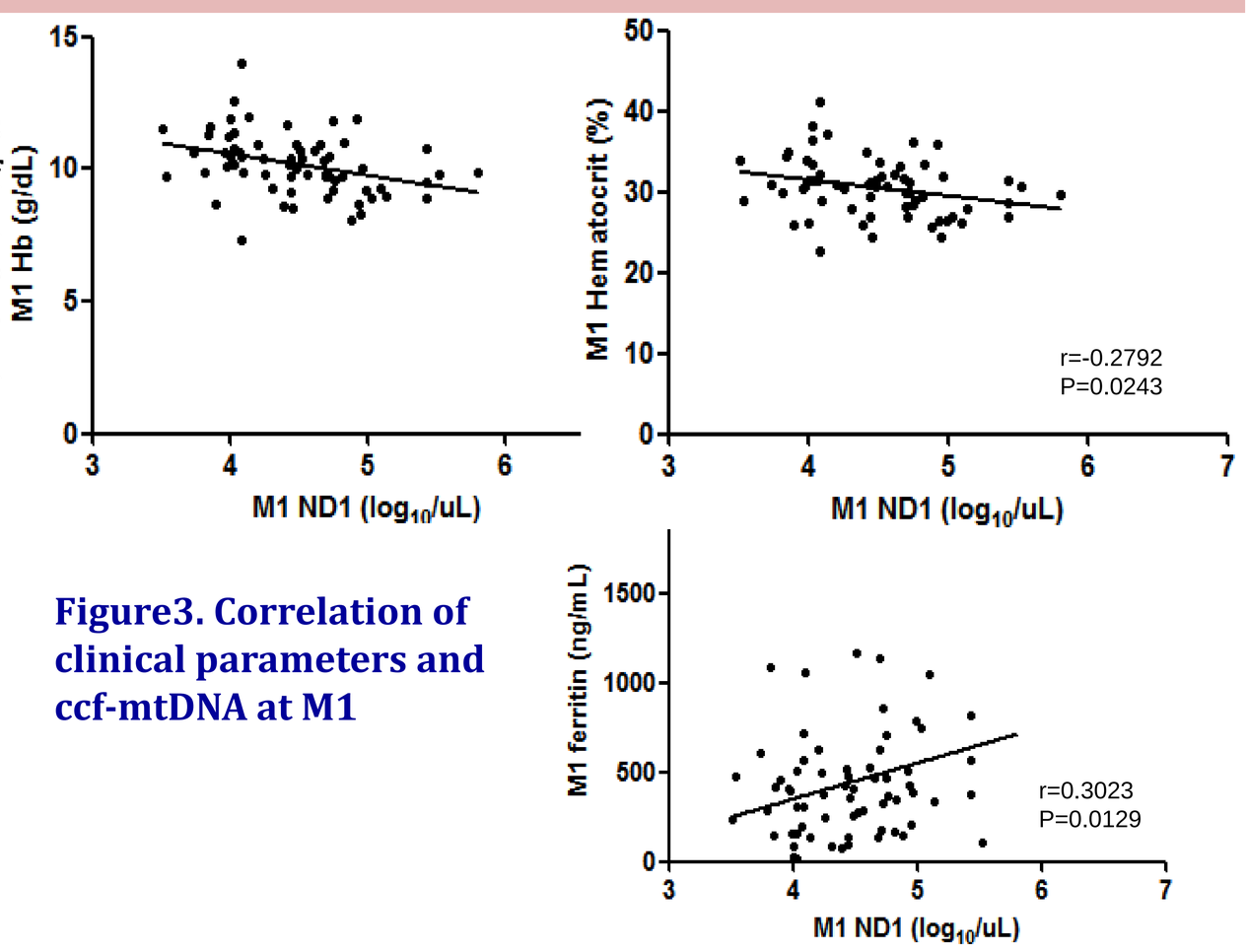

Figure3. Correlation of clinical parameters and ccf-mtDNA at M1

Table 3. Clinical characteristics of high and low level of PTX-3 at M0

	M0 High PTX3 (≥4.4ng/mL)	M0 Low PTX3 (<4.4ng/mL)	p-value
Age	64.56±2.38	60.87±1.97	0.238
Sex (M/F)	15/12	27/24	0.708
Dialysis vintage	51.87±11.02	41.39±5.83	0.494
DM ESRD	17/27 (64%)	19/51 (36%)	0.025
SBP (mmHg)	145.10±4.32	139.77±2.26	0.282
DBP (mmHg)	74.24±3.19	74.23±1.55	0.999
ferritin (ng/mL)	572.22±95.52	404.03±41.54	0.063
M0 PTX-3 (ng/mL)	9.75±0.83	1.41±0.14	<0.001
M0 LPL (log10/uL)	2.82±0.15	2.19±0.11	0.001
M0 ND1 (log10/uL)	4.81±0.13	4.41±0.09	0.016

RESULTS

The level of ccf-gDNA and ccf-mtDNA was highest at M0 and declined gradually over 3 months in HDP and MS. ccf-gDNA and ccf-mtDNA were not different between HDP and MS, however they were slowly decreased in HDP compared with MS. Hb/Hct and dialysis efficacy (kt/v) was lower and ferritin was higher at M0 and M1 than usual. At M1, ccf-mtDNA was positively correlated with ferritin and negatively related with Hb/Hct. PTX-3 was elevated only in HDP, not in MS. It showed peak level at M0, since then attenuated in HDP. PTX-3 was positively correlated with ccf-gDNA regardless of time points, but the correlation with ccf-mtDNA was weaker and steadily dwindled in process of time. Fifty three HDP dialyzed in isolating single room, but other 28 HDP treated in dialysis. The patients receiving single room dialysis (single room D) showed significantly elevated ccf-gDNA at M1 and M3 compared with them receiving cohort dialysis (Cohort D).

CONCLUSIONS

Temporarily elevated ccf-DNA in HDP and MS reflected extremely physical and emotional stress in isolation period. However, lowering of ccf-DNA was delayed in HDP and abrupt increase of PTX-3 in isolating times was only presented in HDP. Although HDP and MS were placed in an extreme situation together, underlying disease status of HDP with insufficient management was thought to be the factor of the difference between HDP and MS. .

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