Assessment of Respiratory Muscles Performance in Patients with Chronic Renal Failure Immediately before and after Hemodialysis

Thesis
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List of abbreviation

ACE	Angiotensin converting enzyme inhibitors.

ACE	Albumin/creatinine ratio (ACR).
AER	Albumin excretion rate .
ARB	Angiotensin Receptor Blockers.
ATS	American Thoracic Society.
ANG II	Angiotensin 2.
BSA	Body surface area .
BMI	*Body mass index.*
CS	Citrate synthase.
CKD	Chronic kidney disease.
Cm	Centimeter.
CMS	Cervical magnetic stimulation .
COPD	Chronic obstructed pulmonary disease.
CRI	Chronic renal impairment.
CRF	Chronic renal failure.
CT	Computed tomography.
DH	Dynamic hyperinflation.
ERS	European Respiratoty Sosiety.
ES	Electrical phrenic nerve stimulation ..
ESRD	End-stage renal disease
FEV1	Forced expiratory volume in the first second.
FRC	Functional residual capacity.
FVC	Forced vital capacity.
ID	Internal diameter.
IGA	Immunoglobulin A.
IGF-1	Insulin growth factor-1.
IL-6	Interleukin-6.
IRS-1	Insulin receptor substste-1.
GH	Growth hormone.
GFR	Glomerular filtration rate.
HD	Haemodiaylasis.
KDOQI	Kidney disease quality outcome initiative.
MS	Magnetic phrenic nerve stimulation .
MIP	The maximum inspiratory pressure .
MEP	Maximum expiratory pressure .

M.I	Myocatdial infarction.
Micromol/l	Micromole per minute.
Ml/min	Mililiter per minute.
Ml/min/sq.m	Mililiter per minute per square meter.
Mm	Millimeter.
Mmol/l	Milimole per liter.
MRI	Magnetic resonance imaging .
M2	Miter square.
mTOR	mammalian target of rapamycin.
MVV	Maximum voluntary ventilation
NICE	*National Institute for Health and Clinical Excellence.*
NKF	National Kidney Foundation (classification of chronic kidney disease).
NS	Non significant.
OHV$	Obese hypoventilation syndrome.
PD	Peritoneal dialysis.
Pab	Abdominal pressure.
Pao	Airway opening pressure.
PCR	protein/creatinine ratio
Pdi,sn	Transdiaphragmatic pressure during sniff .
Phi	Transdiaphragmatic pressure.
PKB	Protein kinase B.
Pmo,tw	Twich mouth pressure.
Phi,tw	Twitch transdiaphragmatic pressure
PEEP	Positive end expiratory pressure.
P E max	Maximum exspiratory pressure.
Pes	Esophageal pressure.
PET	Positron emission tomography .
Pga	Gastric pressure.
P I max	Maximum inspiratory pressure.
PI3K	the phosphoinositide 3-kinase .
Pmo	Mouth pressure.
Pmus	Respiratory muscle pressure.
Ppi	Pleural pressure.

Prs	Transrespiratory system pressure.
RCT	Randomized clinical trail.
R_{RS}, E_{RS}	the mechanical properties of the respiratory system (RS) i.e. R_{RS}, E_{RS}, whi
RRT	Renal replacement therapy.
RV	*Residual volume.*
TNF	*Tumor necrosis factor.*
SIGN	*Guideline Scottish Intercollegiate Guidelines Network.*
S	Significant.
6 MWT	Six minutes walking test.
SPECT	Single-photon emission computed tomography .
SPSS	Statistical Package for Special Science .
SD	Standard deviation.
TLC	Total lung capacity.
UK	United Kingedom.
$\Delta V_{(t)}$	Instantaneous volume relative to passive functional residual capacity (FRC) .
$V'_{(t)}$	Instantaneous flow.
VC	Vital capacity.

Introduction

Chronic renal failure (CRF) is characterized by progressive and irreversible destruction of renal structures. The respiratory system suffers alterations in respiratory drive, pulmonary mechanics, muscle function and gas exchange. This pulmonary dysfunction may be a direct result of the circulation of toxins or, indirectly, from the excess volume due to the increased quantities of circulating body fluids, anemia, immunological suppression, drugs and deficient nutrition ***(David J. and Pierson, 2006).***

Among (CRF) patients undergoing dialysis, hemodialysis (HD) is the most frequently used modality (90.7%). Such intervention is usually performed three times a week, three to four hours per session. Although advances in HD have improved the survival of those patients, significant changes in their quality of life have been shown. The physical functioning of such patients has been shown to be decreased, including a reduction in physical activity, muscle weakness, anemia, and several metabolic and hormonal alterations ***(Chemma BSB. and Sing MAF., 2005).***

Physiological abnormalities are frequent in the skeletal muscle structure of patients with (CRF), and their main signs are fatigue, muscular weakness and low exercise tolerance. Respiratory

muscular weakness may lead to hypoventilation, maximum respiratory pressure measurements may help in early diagnosis and therapeutic interventions for these patients ***(Sala et al., 2001).***

Maximum inspiratory (PImax) and expiratory (PEmax) pressures produced during static efforts are considered a reflex of the strength of the respiratory muscles. The relations of those maximum static pressures to general muscle development have been described by some authors ***(Rocha and Araújo, 2010).***

The most widely used test for assessing the overall strength of inspiratory and expiratory muscles consists in measuring maximum static mouth pressures. Those tests have the advantage of being non invasive and normal values have been well established in adults ***(Rocha and Araújo, 2010).***

Aim of the work

The aim of this study is to assess the respiratory muscle performance by measuring the maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP) in chronic renal failure patients immediately before and after hemodialysis.