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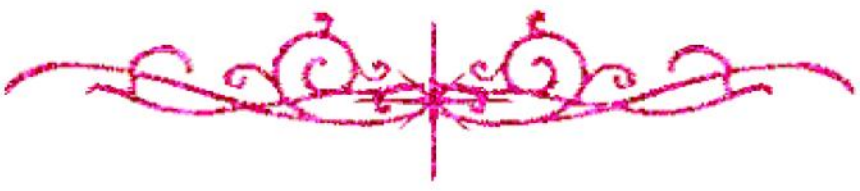

بالرسالة صفحات
لم ترد بالأصل

Critical illness myopathy in intensive care setting

A systematic review and meta analysis

For Partial Fulfilment of Master Degree in General Intensive Care

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Abstract

Aim of the work: to provide cumulative data about the efficacy and safety of neuro-muscular electrical stimulation (NMES) combined with usual care (UC) versus usual care alone in ICU patients with Critical Illness Myopathy (CIM). **Methodology:** The current systematic review was done on studies published between 2009 and 2019. The total number of patients in all the included studies was 1259 patients; 652 in NMES group, and 607 in UC group. Our data were divided into two groups: NMES (652 patients), and UC (607 patients). Meta-analysis study was done on 11 studies which described and compared the 2 different techniques for treatment of CIM; with overall number of patients (N= 1259). **Results:** Regarding 1ry outcome measures, we found 8 studies reported MRC scale for muscle strength, with total number of patients (N=968). The random-effects model of the meta-analysis study showed non-significant difference in mean MRC scale in NMES group compared to usual care group ($p > 0.05$). We also found 11 studies reported ICU stay with total number of patients (N=1259). The random-effects model of the meta-analysis study showed non-significant difference in mean ICU stay in NMES group compared to usual care group ($p > 0.05$). We also found only 2 studies reported SF-36 scale for quality of life, with total number of patients (N=270). The fixed-effects model of the meta-analysis study showed highly significant decrease in mean SF-36 scale in NMES group compared to usual care group ($p = 0.003$). Regarding 2ry outcome measure, we found 3 studies reported CIM incidence with total number of patients (N=394). The fixed-effects model of the meta-analysis study showed marked decrease in CIM incidence in NMES group compared to usual care group, but not reaching statistical significance ($p > 0.05$). We also found 9 studies reported mortality rate with total number of patients (N=1044). The fixed-effects model of the meta-analysis study showed non-significant difference in mortality rate in NMES group compared to usual care. Our systematic review and meta-analysis showed that NMES combined with usual care was not associated with significant differences in global muscle strength, ICU stay, quality of life score, CIM incidence and mortality rate in comparison with usual care alone in critically ill patients. **Conclusion:** NMES is not superior to usual care in management of CIM. Usual care remains the mainstay of management of CIM with significant better outcomes, in addition to preventive measures as early aggressive treatment of sepsis and MOF, blood glucose control, optimizing certain drugs use, early enteral nutrition, maintaining water, electrolyte and acid-base balance.

Key words: Critical illness myopathy, intensive care setting

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List of abbreviations

Abb.	Full term
AIDS	Acquired immune deficiency syndrome
ALI	Acute lung injury
APACHE	Acute physiology, age, Chronic health evaluation
ARDS	Acute respiratory distress syndrome
ATP	Adenosine tri- phosphate
CIT	Conventional insulin therapy
ICUAW	Intensive care unit acquired weakness
IFN-γ	Interferon gamma
IIT	Intensive insulin therapy
IL-1	Interlukin – 1
CI	Confidence interval
CIM	Critical illness myopathy
CIP	Critical illness polyneuropathy
CIPNM	Critical illness polyneuromyopathy
CMAPs	compound muscle action potentials
CK	Creatine kinase
dmCMAPS	Direct muscle compound muscle action potentials
DMS	Direct muscle stimulation
EMG	Growth differentiation factor-15
GDF-15	Electromyography
HRQOL	Health- related quality of life
ICU	Intensive care unit
IQR	Inter-quartile range
MD	Mean difference
MIP	Maximal inspiratory pressure
MOF	Multi- organ failure
MRC	Medical Research Council
MV	Mechanical ventilation
MUPs	Motor unit potentials
NCS	Nerve conduction studies
NMBAs	Neuromuscular blocking agents
NMES	Neuro - muscular electrical stimulation
OR	Odds ratio
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-analyses
P value	Probability value
RCT	Randomized clinical trial
ROS	Reactive oxygen species
RR	Risk ratio
SD	Standard deviation
SF-36	Short form -36
SIRS	Systemic inflammatory response syndrome
SMD	Standard Mean Difference
SNAPs	Sensory nerve action potentials
TNF	Tumor necrosis factor
UC	Usual care

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Introduction

Generalized muscle weakness, which develops during the course of an ICU admission, and for which no other cause can be identified besides the acute illness or its treatment, is labeled "intensive care unit acquired weakness" (ICUAW), that is classified into three component conditions: Critical illness myopathy (CIM), critical illness polyneuropathy (CIP), and the overlap, critical illness polyneuromyopathy (CIPNM). It is the most common cause of neuromuscular weakness in the intensive care setting and a common cause of failure to wean from the ventilator, prolonged ICU stay, increased mortality rate, increased long term disability and reduced quality of life after ICU discharge (***Hermans et al., 2015).***

Bolton et al first described a small case series of patients with various causes for ICU admission and subsequently for invasive ventilation, of which all of these patients progressed to flaccid quadriparesis, inability to wean from the ventilator and electro-diagnostic findings consistent with a severe motor and sensory polyneuropathy ***(Bolton et al., 1984)***.

The incidence of CIM and CIP is approximately 40% of critically ill patients who were admitted to intensive care units ***(Appleton et al., 2015).***

CIM manifests clinically with diffuse symmetric muscle weakness involving all extremities and respiratory muscles especially the diaphragm. Muscles of the face are usually spared, but rarely eye muscles may be weakened leading to ophthalmoplegia ***(Hermans et al., 2015).***

Aim of the Work

The objective of this systematic review and meta-analysis was to evaluate the efficacy and safety of neuro - muscular electrical stimulation (NMES) combined with usual care (UC) in comparison with usual care alone for preventing skeletal muscle weakness and wasting in critically ill patients with Critical Illness Myopathy (CIM).

Given the potential use of NMES among patients with a limited capacity to engage in voluntary muscle work, assessment of the evidence for the use of NMES in critically ill patients is needed.

A- Incidence:

ICUAW syndromes are common in the ICU and their approximate incidence as a group is about 40%. The evaluation of their incidence is affected by the underlying disease process, diagnostic criteria used, and timing of diagnostic evaluation ***(Appleton et al., 2015).***

There are specific disease processes that are associated with higher incidence of ICUAW; in sepsis and systemic inflammatory response syndrome (SIRS), the rate is much higher at 70% ***(Tennila et al., 2000).*** Acute respiratory distress syndrome (ARDS) can also result in ICUAW with reported rates of 60% ***(Bercker et al., 2005).***