

## Assessment of Magnitude and Associated Factors to Postoperative Myalgia After Suxamethonium Injection in Adult Surgical Patients at Jimma University Medical Center, Jimma, South West Ethiopia.

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### Abstract:

Suxamethonium, introduced in 1951 as a depolarizing muscle relaxant, remains the preferred drug in scenarios requiring rapid paralysis and airway control. It is commonly used for rapid sequence induction due to its ability to create optimal conditions for intubation. However, its usage is frequently linked to postoperative myalgia (POM). Though the exact cause of POM is unclear, it is believed to result from stimulation of presynaptic acetylcholine receptors and contractions in the muscle spindles' intrafusal fibers. These fasciculations involve asynchronous muscle contractions without shortening, potentially causing muscle damage and pain.

**Keywords:** Suxamethoneum, Postoperative, Myalgia, Muscle relaxants

### Introduction:

Suxamethonium is a depolarizing muscle relaxant that remains the drug of choice in clinical situations where rapid paralysis and respiratory control are required. Succinylcholine administration may cause postoperative myalgia. [1-5] Postoperative myalgia is thought to be due to the physiologically high firing of the motor after succinylcholine administration, causing asynchronous muscle contraction and hence shear forces of the skeletal muscle fibers, resulting in pain.[5] The exact mechanism is unknown, but stimulation of presynaptic acetylcholine receptors and contraction of intrafusal fibers of the muscle spindles may contribute. It has been shown that the mechanism underlying the muscle damage associated with Suxamethoneum may be related to calcium-induced degradation of phospholipids and release of harmful products of fatty acid metabolism.[6]

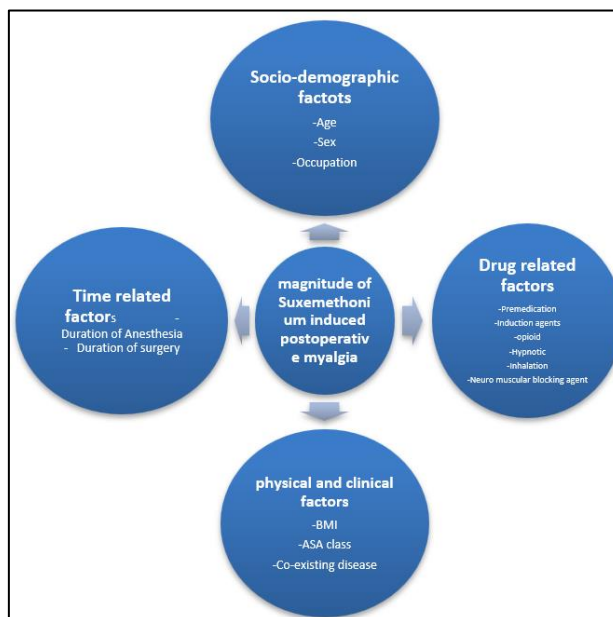
Although short-acting, non-depolarizing neuromuscular blocking agents have recently been introduced, succinylcholine is useful during endotracheal intubation because of its rapid onset, short duration of action, and complete and presumptive paralysis, which is still inconsistent with ideal incubation conditions. ) increase. [7] Suxamethoneum is considered the drug of choice to provide the best pain relief and hasten recovery. However, its use is limited because of the frequent occurrence of postoperative myalgia.[8]

The first attempt to reduce the incidence and severity of muscle pain was pretreatment with gallicamine in 1954. Various treatments have been tried. The best practice is to administer a paraplegic dose of a non-depolarizing neuromuscular blocker a few minutes before the injection of Suxamethoneum, in order to eliminate visible fasciculation and postoperative myalgia.[9]

The drugs can prevent many cases. Various strategies have been proposed to reduce the incidence of these adverse effects; one of the most successful is the administration of non-

depolarizing neuromuscular blocking agents prior to surgical application of Suxamethonium. Many factors influence the effectiveness of pretreatment, including the choice of the non-depolarizing agent, the degree of pre-junctional receptor blockade, the interval between injections of the pretreatment agent and succiniamide, and the speed at which a non-depolarizing agent can be used.<sup>[10]</sup>

Conceptual Frame work: The factors described below can be thought as determinates of magnitude of postoperative myalgia after Suxamethonium injection.



**Fig 1:** Scheme of conceptual framework to assess factors that influence the magnitude of Suxamethonium induced postoperative myalgia

### **Materials and Methodology:**

**Study Area and Time:** The study was conducted from November 2022 to February 2023 at Jimma University Medical Center (JUMC) in Jimma, Western Ethiopia. JUMC is a referral hospital serving approximately 12 million people and covers a large area. The center has several departments and surgical centers, and more than 4,200 surgeries are performed each year. A cross-sectional cohort study of elderly patients undergoing elective surgery using succinylcholine as an anesthetic. (Fig 1) **Sample size determination:** The sample size was calculated using a standard population formula, resulting in 160 participants, accounting for a 10% non-response rate.

**Results:** A total 160 adult elective surgical patients were involved in this research. A total of 112(70%) patients were Oromo, 32(20%) patients were Amhara and 13(10%) patients were keffa in ethnicity.

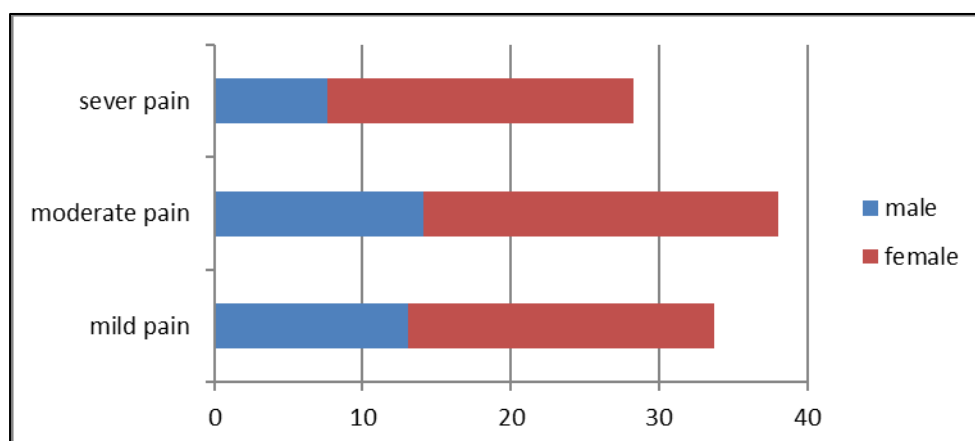
Variables	group	frequency	Percentage
Age	18-29	38	23.8%
	30-41	59	36.9%
	42-53	41	25.6%
	53-65	22	13.8%
Sex	Male	76	46.5%
	Female	84	52.5%
BMI	Bellow 18kg/m <sup>2</sup>	29	18.1%
	18-24.9kg/m <sup>2</sup>	66	41.3%
	25-29.9kg/m <sup>2</sup>	54	33.8%
	30-34.9kg/m <sup>2</sup>	11	6.8%
Occupation	Farmer	46	28.4%
	Labor	12	7.6%
	Civil servant	17	10.4%
	Merchant	25	15.6%
	Others	9	5%
ASA class	ASA I	129	80.4%
	ASA II	31	19.6%
Educational Status	Non-formal learning	34	21%
	Elementary school	67	42%
	High school	37	23%
	Collage degree	22	14%

**Table 1:** Distribution of socio-demographic characteristics of patients who undergone elective surgical procedure from November,2022 to February, 2023 in JUMC.

Intra operative findings showed 106(66.3%) patients were induced with thiopentone, 51(31.9%) patients were induced by propofol and 3 patients were induced by ketamine. Almost all patients were maintained with 0.75-2.5% MAC halothane. The most common surgery was general surgery, accounting for approximately 132 (82.5%) of the patients. Post-operative findings showed, 145 (90.6%) patients were given diclofenac and tramadol, 7 (4.4%) patients were given diclofenac, tramadol and peripheral nerve therapy together and 5 (3.1%) patients were not given medical treatment. The site of postoperative myalgia was 1 in 31 patients (19.4%), 2 in 45 patients (28.1%) and more than 2 in 16 patients (10%). All the details are described in table 1 and 2 and figure 2.

Variables		frequency	Percentage
Myalgia	yes	92	57.5%
	no	68	42.5%
Myalgia in 24hrs	Yes	184	52.5%
	No	76	47.5%
Myalgia in 48hrs	Yes	74	46.2%
	No	86	53.8%
Myalgia in female	Yes	61	67.3%
	No	23	30.3%
Myalgia in male	Yes	31	33.7%
	no	45	69.7%

**Table 2:** Distribution of Suxamethonium induced postoperative myalgia in patients who were under went elective surgical procedure from November,2022 to February, 2023 in JUMC.



**Fig 2:** Prevalence and severity of Suxamethonium induced postoperative myalgia among male and female patients from November,2022 to February, 2023G.C.

Thiopental caused postoperative myalgia in 62 cases (58.49%), propofol in 28 cases (54.9%), and ketamine in 2 cases (66.6%). In addition, muscle pain developed in 70 patients who received anti-pain medications before surgery, while muscle pain was not observed in the remaining 61 patients. Of the patients who did not receive analgesic medication before surgery, 22 did not develop myalgia, and 7 developed myalgia.

Factors associated with postoperative Suxamethonium-induced myalgia: In a multivariate analysis, postoperative Suxamethonium-induced myalgia was found to be significantly associated with the patient's gender when calculating the 95% confidence level for change in difference; females had four times lower odds of postoperative Suxamethonium-induced myalgia (AOR = 4.015, 95% C.I. 1.959, 8.228) compared to patients without preoperative analgesia, whereas the odds of preoperative Suxamethonium-induced myalgia were 0.265 times lower (AOR = 0.265, 90, 9). , the probability of postoperative Suxamethonium-induced

myalgia is 5 times higher than the percentage of patients who will develop fasciculation during induction than the probability of not developing fasciculation during induction (AOR = 5.095, 95% CI 1.938, 13.497).

Variables		Patients with myalgia		Odds ratio		P-value
Sex	Yes	No	Crude(95%C.I)		Adjusted(95%C.I)	
	Female	Male	Yes	No	Yes	No
Sex	Female	61	23	3.85(1.984,7.47)	4.015(1.959,8.228)	<0.001*
	Male	31	45	1	1	
Analgesia Preoperatively	Yes	70	22	0.308(0.117,808)	0.265(0.09,0.780)	<0.016*
	NO	61	69	1	1	
Fasciculation	Yes	84	46	5.807(2.072,12.173)	5.095(1.938,13.497)	<0.001*
	NO	8	22	1	1	

**Table 3:** Distribution of peri-operative factors associated with Suxamethonium induced postoperative myalgia who was undergone elective surgical procedure from November,2022 to February, 2023 G.C

### Discussion:

Suxamethonium considering the fact that its introduction into clinical practice it has been identified that fasciculation, myalgia, and upward push in biochemical markers along with serum creatine kinase and potassium occur regularly with its use. post-operative myalgia is thought to be resulting from motor units firing at physiological higher rate following Suxamethonium administration, leading to unsynchronized muscle contractions causing shearing forces of skeletal muscle fibers.<sup>[5]</sup>

In this examine a complete of 92(57.5%) of patients who gone through general anesthesia had post Suxamethonium induced myalgia with within the first 24 to 48hr of post-operative day. The rate of myalgia in patients 24hr became especially higher than within the 48hr of post-operative day. In assessment with this study the study results stated from the united states and a Meta-analysis study completed in Canada, in the united states with the aid of American society of Anesthesiologists, in Pakistan and Iran the value of succinylcholine prompted myalgia were ranges from 5%to 83%, (1.5 to 89% but the maximum typically quoted figure is round 50%), 41%–92%, 50 percentage, respectively.

In comparison to our study, the study carried out in GTB medical institution, Shahdara, and Delhi, India turned into lower significance of Suxamethonium induced post-operative myalgia after 24h of surgical operation it become approximately 30% of patients had myalgia with a great difference and study performed at Hacettepe university, Ankara, Turkey 33.33% patients suffered from moderate myalgia, and 67.67patients had no myalgia.<sup>[11]</sup> whereas in other study performed in India, Institute of clinical education within 210 sufferers at 3 dose stages (1, 1.5and 2mg/kg) after Suxamethonium 70% of affected person turned into experience post-operative myalgia. It turned into higher than in this study end result.

This examine revealed that being woman became strongly associated with post-operative Suxamethonium brought on myalgia. Out of 92 patients who had experienced post-operative myalgia after Suxamethonium induction 31 (33.7%) had been male and 61(67.3%) had been females.

People who advanced severe pain out of these 19.77 were men and 36.04% of pain was mild pain and more in woman patients it changed into comparable to study carried out study performed at North Dakota in fifty patients shows that the significance of postoperative myalgia at the 24-hour had been (60%) had been women.<sup>[12]</sup> The reason may be due to woman's hormones play roles in having more pain sensitivity, women have more nerve density, psychological experience of ache differs from adult males they worry approximately ache and sense extra helpless about it.

This has a look at found out that the occurrence of fasciculation massive with a P-value of < 0.001 related to the significance publish-operative myalgia that of 81.25% patients had experienced fasciculation. From those affected person had fasciculation 84(64.61%) were had POM and 46(35.39%) patients had been did not have POM.<sup>[13]</sup> A study carried out in department of Anesthesia and Surgical intensive Care Unit, Liaquat national hospital, Karachi result showed that fasciculation had been noticed 100 % (moderate to excessive) and 6 and 12 hours after surgical treatment the prevalence of POM had been 76.66 % and after 24hours post-operative myalgia were 93.33%.<sup>[14]</sup> In this examine, fasciculation turned into significantly associated with myalgia. The purpose can be because of fasciculation involves energetic contraction by using muscle bundles with no possibility of shortening and without synchronous activity in adjacent bundles. this could produce fiber rupture or damage, as a result inflicting pain.

In keeping with the findings of this look at, 71(54.19%) of the patients have been obtained combined tramadol and diclofenac and 35(26.71%), 24(18.32%) participants had been acquired tramadol and diclofenac alone during preoperatively as analgesia, respectively. study conducted in Iran referral health facility suggests that magnitude of myalgia after pretreated with diclofenac at 12, 24 and 48 hours after operation had been 23.8%, 19.1%, and 12.7% respectively as opposed to incidences of 52.4%, 47.6%, and 44.4% respectively in placebo pretreated group.<sup>[15]</sup> The occurrence and severity of myalgia have been appreciably decrease in patients receiving diclofenac via three assessment periods.

**Conclusion:** In our study the magnitude of Suxamethonium caused post-operative myalgia within the first 24 to 48hrs turned into higher compared to other time gaps. This study suggests that most of the contributors who had been feeling ache were female. And, being lady had been considerably associated with Suxamethonium triggered POM. majority of the members who skilled fasciculation in the course of induction time had been having postoperative Suxamethonium prompted POM. in addition to, with this have a look at we had been able to recognize incidence of fasciculation is appreciably associated with POM. ultimately, patients who were pre-medicated with analgesic agents particularly the usage of NSAID much less probably develop POM. Similarly to this, preoperative analgesia turned into drastically associated with POM.

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