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**INTRODUCTION**

T-cell mediated antigen cross-reactivity between viruses and allergens is a relatively new area of study in clinical immunology; a discipline that may be particularly useful regarding the COVID-19 virus and the allergic response in humans.

It has previously been demonstrated that the COVID-19 virus shares protein sequences with common allergens like grass pollens, dust mites, and molds. Thus post-infection, COVID-19 oriented T-cells may provide a mediated immune response to these allergens.

Similarly, vaccination against COVID-19 may play a role in protection against T-cell-mediated chronic inflammation in allergic disease.

**OBJECTIVES**

Our objective was to explore the potential overlap between the COVID-19 vaccines from Pfizer and Moderna and common allergens indexed through two known and reputable databases.

**METHODS**

Given the protective factor of COVID-19 vaccines against the virus and their mass distribution, our objective was to explore the potential overlap between the COVID-19 mRNA vaccines from Pfizer-BioNtech and Moderna and known allergens indexed through the University of Nebraska's FARRP Allergen Protein Database (allergenonline.org) and the FASTA tool, using the BLOSUM 50 scoring matrix as previously published.<sup>5</sup> Given the Codex Alimentarius Commission recommendation likelihood of cross-reactivity criteria, we reported allergens with 35% (or greater) similarity over segments of 80 amino acids (Criteria A) and those with short (8 or more amino acids) identical matches (Criteria B).

**RESULTS**

For the Pfizer vaccine, we identified 1 allergen meeting Criteria A, from pine nuts, and 6 that met Criterion B from Tufted Grass and Alternaria Alternata, the most common fungal allergen associated with asthma (Figure 1).<sup>6</sup> For the Moderna vaccine, we found 7 allergens meeting Criteria A and 12 that met Criteria B. Allergens meeting Criteria A included Spreading Pellitory (grass), lipocalin from Guinea Pigs, ragweed, wheat endosperm, sesame, and dust mites. Allergens that met Criteria B were Kentucky Blue, Cat, and Timothy Grasses, and Penicillium Crustosum (mold; Figure 1). Both vaccines showed matching sequences (Criteria B) with perennial ryegrass (Table 1).

Figure 1. Allergens with 35% (or greater) similarity over segments of 80 amino acids (Criteria A)

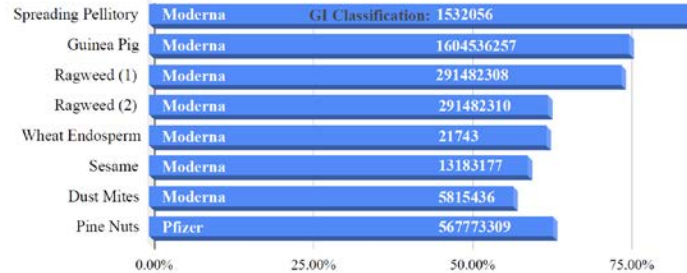


Table 1. Allergens with ≥ 8 sequential amino acids match (Criteria B)

Common Allergen Name	GI Class
<b>Moderna</b>	
Mold (Cheese)	371537645
Hazel	29170509
Perennial Ryegrass	4416516, 6634467
Timothy Grass	345108717
Kentucky Bluegrass (KBG 31, 60, 41, clone 7.2)	113560, 113562, 539056, 113561
Orchard Grass, Cat Grass	14423124, 18093971
Yorkshire Fog/Tufted Grass	2266625
<b>Pfizer</b>	
Perennial Ryegrass	4416516
Yorkshire Fog/Tufted Grass	2266625
Fungal Allergen	1850540, 1173071, 5777795
Soil-Borne Fungus	19879657

**CONCLUSION**

Considering the homologous overlap of known allergens and the COVID-19 vaccines, an altered T-cell mediated immune response may be observed in allergic asthma and allergic rhinitis reaction after vaccination

**SIGNIFICANCE OF FINDINGS**

These results suggest that vaccination with the Pfizer-BioNtech and Moderna COVID-19 vaccines may contribute to T-cell cross-reactivity with allergens that impact allergic asthma and allergic rhinitis.

Further research should assess the clinical implications of COVID-19 vaccination on the severity and symptomatology of the allergic disease, in addition to natural viral infection.

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**Examination of homologies between COVID-19 vaccines and common allergens: the potential for T cell-mediated responses for allergic rhinitis and asthma.**

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## **Abstract**

### **Introduction**

Current evidence suggests SARS-CoV-2 virus shares protein sequences with common allergens like grass pollens, dust mites, and molds. Thus post-infection, COVID-19 sensitized T-cells may provide a mediated immune response to these allergens. Similarly, vaccination against COVID-19 may play a role in protection against T-cell-mediated chronic inflammation in allergic disease.

### **Methods**

Our objective was to explore the potential overlap between the COVID-19 vaccines from Pfizer and Moderna and common allergens indexed through two known and reputable databases. We reported allergens with 35% (or greater) similarity over segments of 80 amino acids (Criteria A) and those with short (8 or more amino acids) identical matches (Criteria B).

### **Results**

For the Pfizer vaccine, we identified 1 allergen that met Criteria A, from pine nuts, and 6 that met Criterion B - notably, Tufted Grass and *Alternaria alternata*, the most common fungal allergen associated with asthma. For the Moderna vaccine, we found 7 allergens meeting Criteria A and 12 that met Criteria B.

### **Discussion**

Considering our findings of overlap between known allergens and the Pfizer and Moderna vaccines, an altered T-cell mediated immune response may be observed in persons with allergic asthma and allergic rhinitis after vaccination, with Pfizer or Moderna mRNA vaccines, against COVID-19. These results suggest that vaccination with the Pfizer-BioNtech and Moderna COVID-19 vaccines may contribute to T-cell cross-reactivity with allergens that may positively impact allergic asthma and allergic rhinitis.

# Asthma medications in schools: A cross-sectional analysis of the Asthma Call Back Survey

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## INTRODUCTION

- Asthma is the most common childhood chronic disease in the United States, with over 7.1 million children currently diagnosed. Moreover, one-third of those diagnosed with asthma in the US are children.<sup>1,6</sup>

- Quality treatment of complex conditions, such as asthma, requires appropriate patient screening and education.<sup>1,3</sup>

- Long-term goals of asthma management include achieving symptom control, maintaining a normal activity level, and minimizing risk of asthma-related mortality, exacerbations, persistent airflow, and side-effects of treatment.<sup>1,3,5</sup>

## RESEARCH QUESTION

- Our objective was to analyze the amount of children with asthma permitted to carry medications in school and to assess the prevalence of children with an asthma action plan in school.

## METHODS

- Using the CDC's 2017 & 2018 BRFSS Asthma Call Back Survey for children, we assessed the prevalence of children in school that are allowed to carry medication and if they had an asthma action plan.

- We included only children who were *in school* and were reported to *currently have asthma*, ranging in age from 0-17 in BRFSS defined *age groups* show in Figure 2..

- We assessed if there was a difference in allowance of asthma medication in schools or having asthma action plans based on *urbanicity* (rural vs. metro area).

Asthma medications allowed in school



Figure 1a.

Written asthma action plan in school



Figure 1b.

Age groups of children with asthma whose school did not allow children to carry their medication with them (Left) and did not have an asthma action plan.

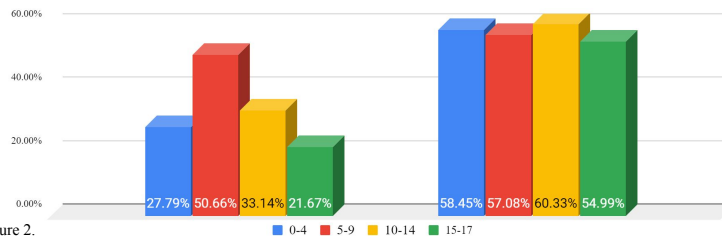


Figure 2.

## SIGNIFICANCE OF FINDINGS

- Improving asthma control status positively impacts school absenteeism, academic success, and quality of life. These factors are further elevated with increased levels of asthma control, school environmental conditions, and teacher knowledge of student's condition.<sup>9</sup>

- Establishing relationships between schools, healthcare students, and physicians is essential for effective asthma management plan implementation, especially in the educational setting.<sup>4,7</sup>

- Implementing protocols for stock albuterol to be supplied in schools increases access to medication for children who are not permitted to carry it.<sup>8</sup>

- The Osteopathic Principles and Practices should guide an osteopathic physician's asthma management plan through the understanding that the body is a unit of mind, body, and spirit; capable of self-regulation, self-healing, and self-maintenance once that unity is restored.

## Results

- Nearly 35% of students reported that they were not allowed to carry asthma medications (Figure 1a) and 58% did not have a written asthma action plan (Figure 1b).

- Reported urbanicity was not significantly associated with either medication access at school ( $P=.46$ ) or having an action plan ( $P=.57$ ).

- Further, nearly 51% of children ages 5 - 9 and 33% of children ages 10-14 were unable to carry medications at school (Figure 2).

## CONCLUSION

- More than one-third of students were not permitted to carry asthma medications and nearly 3 out of 5 did not have a written asthma action plan.

- These findings indicate the need for both access to medication in schools in addition to written asthma action plans to improve asthma management in school.

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## **Asthma medications in schools:**

### **A cross-sectional analysis of the Asthma Call Back Survey 2017-2018**

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**Purpose of Research:** Asthma is the most common chronic disease affecting children in the United States.<sup>1,5</sup> Goals for asthma management include symptom control, ability to maintain a normal activity level, and minimizing adverse events.

**Research Question:** Our objective is to analyze the amount of children with asthma that are permitted to carry medications at school and without an asthma action plan.

**Methods:** In this study we analyzed the Center for Disease Control and Prevention's Asthma Call Back Survey to assess the prevalence of children in school allowed to carry medication and with

asthma action plans. Using sampling weights provided, we estimated population prevalence by age group and urbanicity.

**Results:** Results showed that, overall, 34.8% of students reported that they were not allowed to carry asthma medications in school. Specifically, nearly 51% of children ages 5 - 9 and 33% of children ages 10-14 were reported not to be allowed to carry medications at school (Figure 2). Further, 58.2% of children did not have a written asthma action plan. Reported urbanicity was not significantly associated with access to medication at school ( $P=.46$ ) or having an asthma action plan ( $P=.57$ ).

**Conclusions:** In our study, more than one-third of students were not permitted to carry asthma medications and nearly three-fifths did not have a written asthma action plan. Osteopathic Principles and Practices should guide asthma management. Therefore, we recommend partnerships between schools, healthcare students, and physicians to increase access to asthma action plans and medication in schools.

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## Background

- As of November 2020, the prevalence of chronic pain was 20.4% in the United States. Of those, most patients with chronic pain are in rural areas. Many of these patients are on long-term opiate therapy to address their pain. Presently, there is limited data on multimodal pain management approaches that include osteopathic manipulative therapies.
- With the ongoing opiate epidemic in the United States, safe reduction in Morphine Milligram Equivalents in patients using multimodal techniques is becoming a greater priority.
- Osteopathic techniques exist to safely and effectively treat patients of all ages with a variety of ailments.

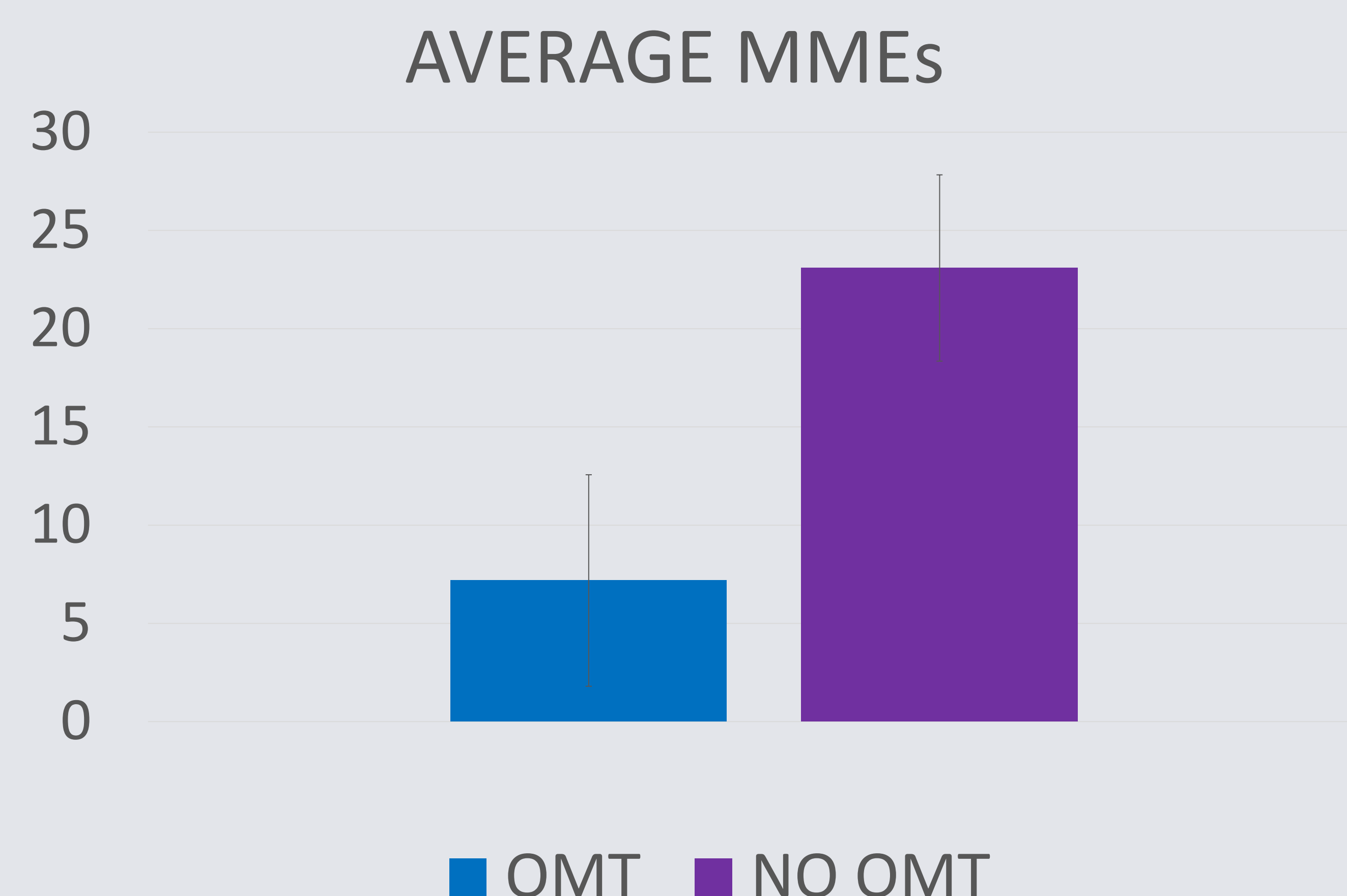
## Methods

- A retrospective study of patients within a rural outpatient primary care setting who were receiving treatment for chronic pain between the dates of January 1, 2021 and July 31, 2021 were analyzed.
- 210 patients with a diagnosis of chronic pain were included in the analysis. 30 were actively receiving OMT; 180 were not.
- Patients who were actively receiving OMT were compared to those who were not.
- Patients “actively receiving OMT” were defined by having received at least one dedicated OMT treatment during the data period. Modalities included well-known OMT techniques only.
- The primary outcome being assessed was total average opiate MMEs prescribed per month.
- Patient age and total length of opiate therapy were documented.

## Results

	OMT (n=30)	No OMT (n=180)	P-value
Average MMEs Prescribed	7.18 (±14.42)	23.09 (±32.24)	0.006655 <sup>a</sup>
Average Age in years	49.47(17.05)	59.21(14.89)	0.001352 <sup>a</sup>

<sup>a</sup>One Factor ANOVA



## Conclusions

- Augmenting chronic pain regimens with OMT appears to lead to fewer MMEs to achieve adequate pain control.
- OMT is anecdotally safe and efficacious for treating a variety of chronic pain complaints.
- OMT could be a viable option in helping combat the opiate epidemic.
- Further prospective study involving the use of OMT in patients with chronic pain is warranted.
- IRB approval has been obtained to pursue ongoing research by offering and providing OMT to patients being managed for chronic pain.

## Limitations

- While this was a retrospective analysis of patients, ongoing prospective study is recommended to show improvement in patient outcomes.
- Objective measures such as reduced MMEs do not provide a complete picture of pain management. Subjective measures such as pain perception have great importance but are hard to objectively measure.
- Accurate average length of time receiving opiates could not be obtained as the Oklahoma Bureau of Narcotics and Dangerous Drugs (OBNDD) only allows for records to be searched back to 4 years.
- It is unknown whether patients receiving OMT required fewer MMEs before or after OMT was added to their treatment regimen.
- It is unknown to what extent MME reduction was prioritized in both patient groups.
- There is limited published data on the efficacy of OMT for chronic pain.

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# **The Use of Osteopathic Manipulative Therapies for the Reduction of Prescribed Opiate Morphine Milligram Equivalents in Patients Receiving Treatment for Chronic Pain: A Retrospective Study**

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**Study Objective:** The objective of this study was to show that the use of Osteopathic Manipulative Therapies (OMT) would lead to overall reduction in required Morphine Milligram Equivalents (MMEs) for the management of chronic pain.

**Methods:** The study was retrospective study of patients within an outpatient primary care setting whose chronic pain regimens did or did not include the use of OMT. The assessed outcome was the total average MMEs the two patient populations required on a monthly basis. Consideration was placed on confounding variables such as the average age of the patients in both groups and the average length of time in years patients had been receiving opiates. The source of pain was considered with the exclusion of patients with the associated diagnoses of cancer, neoplasm, or malignancy related pain.

**Results:** 210 patients with a diagnosis of chronic pain were included in the analysis. 30 were actively receiving OMT; 180 were not. There was significant difference in average MMEs ( $p=0.007$ ) with the average MMEs of those receiving OMT was  $7.2 \pm 14.4$ . Compared to those not receiving OMT,  $23.1 (\pm 32.2)$ . There was significant difference in the average age ( $p=0.001$ ) with the average age of those receiving OMT of  $49.47 (\pm 17.05)$  and those without OMT  $59.21 (\pm 14.89)$ .

**Conclusions:** Augmenting chronic pain regimens with OMT appears to lead to fewer required MMEs. This makes OMT a viable component in a multimodal approach to pain management. Further prospective study of the addition of OMT to patients' pain management regimens is warranted.