

## Descriptive Analysis of the Metformin Effect on Low Back Pain

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### Background

Low back pain (LBP) is one of the most common complaints from patients in clinical settings. Recent research demonstrates that metformin may have inhibitory effects on the inflammatory pathways that have been linked to intervertebral disc degeneration (IDD). Metformin decreases the liver's glucose production through the activation of the AMPK pathway, which is a key player in IDD. Given the anti-inflammatory potential of metformin, it might hold therapeutic promise for the treatment of LBP.

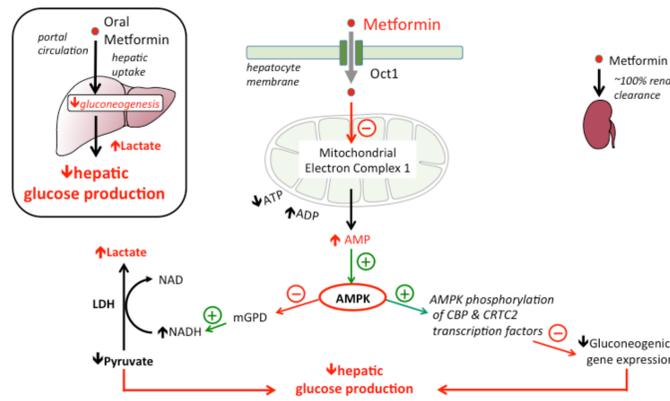


Figure 1. Metformin stimulates the AMPK pathway. He L, Wandisford FE (2015)

### Hypothesis

Among patients with low back pain, prescription of metformin will be associated with lower pain and healthcare utilization.

### Methods

Retrospective, observational study to generate hypotheses

- UPMC electronic health record dashboard of low back pain patients
- Aggregate data with 4 cohorts

- Diabetics + metformin (+DM+M)
- Diabetics – metformin (+DM-M)
- Nondiabetics + metformin (-DM+M)
- Nondiabetics – metformin (-DM-M)

•Dependent variables

- Utilization of healthcare through ED visits due to back pain
- Pain medication usage
- Pain scores, disability scores (ODI scores), inflammation levels (ESR)

•Odds ratios calculated with 95% confidence intervals with the following comparisons:

- +DM+M vs. +DM-M
- +DM+M vs. -DM-M
- DM+M vs. -DM-M
- +DM-M vs. -DM-M

### Results

#### Odds of Opioid Usage

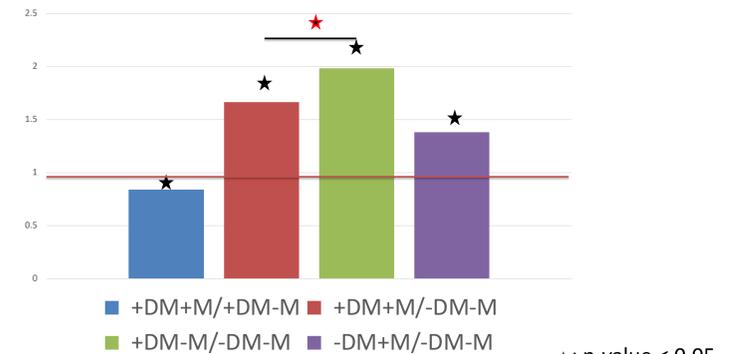


Figure 2. Comparison of odds of using opioids between patient cohorts. 95% CI indicates significance with p-value < 0.05.

#### Odds Ratios of ED visits

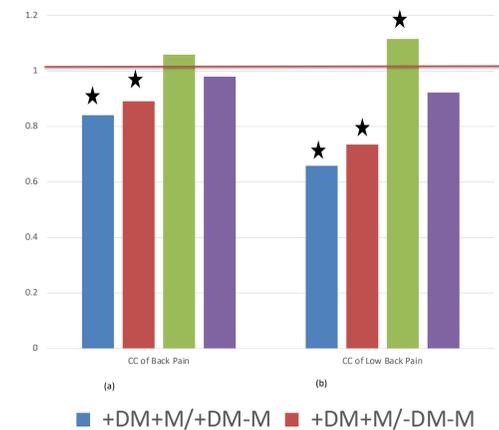


Figure 3. Comparison of odds of visiting the ED with a chief complaint of (a) back pain or (b) low back pain. 95% CI indicates significance with p-value < 0.05.

#### Odds of Severe Pain

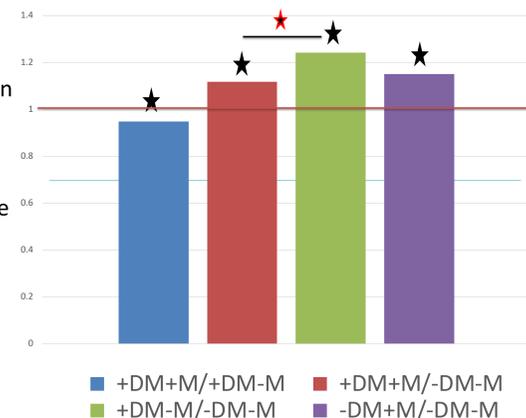


Figure 4. Comparison of odds of reporting a severe pain score (8-10). 95% CI indicates significance with p-value < 0.05.

#### Odds of Severe Pain Across BMIs

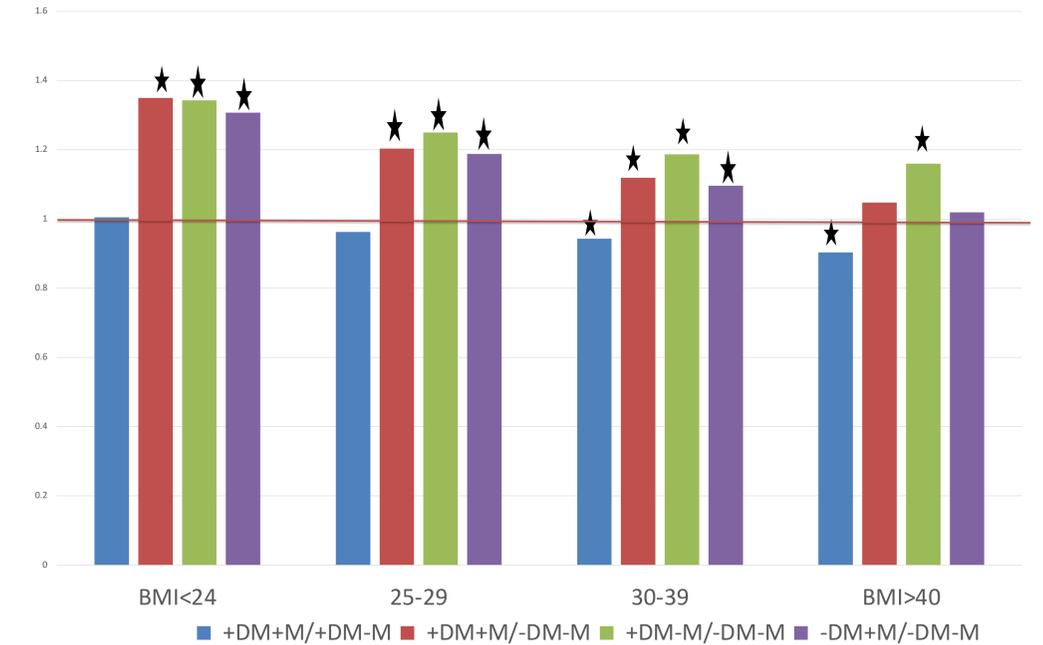


Figure 5. Comparison of odds of reporting a severe pain score (8-10) in patients with BMI <24, 25-29, 30-39, and >40. 95% CI indicates significance with p-value < 0.05.

### Conclusion

Different profiles of LBP patients were analyzed, and the findings demonstrate that patients with LBP taking metformin had lower odds of opioid usage, having a high pain score, and visiting the ED due to back pain when compared to LBP patients not taking metformin. There was no significant difference in the odds of having high ESR levels or ODI scores between metformin treated and non-metformin treated cohorts.

### Future Directions

The following hypotheses were generated with the analyses from this study:

- Patients on metformin will have less opioid usage than patients not on metformin.
- Patients on metformin will have fewer visits to the ED related to back pain than patients not on metformin.
- Patients taking metformin will have a greater reduction in NPSR score compared to patients not on metformin.
- Patients with a BMI over 30 will show more of a reduction in pain score than patients with a BMI less than 30 when treated with metformin.