How to Reduce Restless Legs Syndrome Symptoms.

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ABSTRACT

In this paper, I sought to understand which things affect Restless Legs Syndrome (RLS) symptoms, so that I could learn what causes RLS to get better or worse. Previous research has predicted RLS symptoms by variables such as melatonin intake, quetiapine intake, and physical inactivity. In my first (correlational) study, I looked at how these variables changed each day for 10 days to see how strong the relationships were. I measured melatonin and quetiapine intake by writing down the number of mg each was taken, physical inactivity by writing down the number of hours spent sitting, and RLS symptoms on a subjective 5-point scale. Based on the strength of correlation found only between quetiapine intake and RLS symptoms in my correlational study, I then conducted a second (experimental) study to test for a causal relationship between these two variables. Over a period of 14 days, I randomly assigned the participant each day to either a quetiapine condition or a placebo condition using a double-blind procedure and measured the effect this manipulation had upon RLS symptoms. Data from my experimental study showed significantly stronger RLS symptoms on quetiapine nights than placebo nights. These results can help people who use quetiapine by having their doctors watch for RLS symptoms more carefully, as they may need to choose other medication if RLS symptoms appear.

1. Introduction

1.1 Research Problem

The purpose of this study is to better understand how to reduce my Restless Legs Syndrome (RLS) symptoms. RLS is a condition which makes the legs feel strange or uncomfortable, especially at night or when resting. It creates a strong need to move the legs to feel better. By studying this, I hope to better understand what makes RLS symptoms worse and find ways to make them better. I also want to help other people who have the same problem.

1.2 Case History

I have experienced RLS symptoms for the past 8 years These symptoms are felt in the calves, hips, and shoulders, usually last for one to a few hours, happen most often while sitting before bed or during sleep, and come 1-2 times a week. The symptoms seem to mainly occur after sitting for a long time (> 6 hours) and might also be related to intake levels of the following drugs I take: caffeine (100 mg per day from drinking coffee in the morning), sleep medication (20 mg of melatonin at night), and antidepressant medication (25 mg of quetiapine at night or 60 mg of fluoxetine

per day). In the past, I have tried things like muscle massage, drinking water before bed, and warm baths, but none of these fully solved the problem.

1.3 Literature Review

One factor that has been found in the scientific literature to affect the severity of RLS is melatonin intake. For example, in an experimental study by Whittom et al. (2010), eight people with RLS took 3 mg of melatonin and were exposed to bright light, which is known to suppress melatonin secretion. In this experiment, the participants rated their discomfort using a visual analog scale and the researchers recorded periodic leg movements with electromyography, a measure of the electrical activity of muscles. After taking melatonin, the participants showed more leg movements than before, which suggests that melatonin could make the motor symptoms of RLS worse. Based on these results, the researchers suggested that melatonin might have a bad effect on the motor symptoms of RLS.

Another factor previously found to predict RLS symptoms is the use of quetiapine. For example, a survey by Ocak et al. (2019) study looked at 454 patients who were treated for depression and anxiety. They checked if these patients had symptoms of RLS. To measure the severity of RLS, the researchers used the International Restless Legs Syndrome Study Group (IRLSSG) scale. This scale has 10 questions to assess the severity of symptoms and their impact on daily life. It was found that quetiapine, a medicine used for treating mental health problems, might make RLS worse. Patients who took quetiapine had higher RLS scores than those who did not. The researchers suggested that quetiapine might make RLS symptoms stronger because it affects dopamine, a brain chemical involved in movement.

A third factor previously found to predict RLS symptoms is a lack of physical activity. For example, a correlational study by Cederberg et al. (2019) examined people with multiple sclerosis who also had mild RLS. These individuals were less active and had worse RLS symptoms. The researchers used an accelerometer, a device that measures movement, to track how much physical activity and sitting time the participants had. They found that those who were less active experienced more severe RLS symptoms. Based on these results, the researchers suggested that increasing light physical activity could help reduce the severity of RLS symptoms.

1.4 Hypotheses

Based on the above literature review, I predicted the following hypotheses:
- Hypothesis #1: If melatonin intake increases then RLS symptoms will increase.
- Hypothesis #2: If quetiapine intake increases then RLS symptoms will increase.
- Hypothesis #3: If physical inactivity increases then RLS symptoms will increase.

2. Methods

2.1 Participant

The author of this paper served as the sole participant in its studies. The participant was 35 years old and female. The participant was an undergraduate student at Camosun College who completed the current studies as a research project for Psyc 110 ("Experimental Psychology") due to their interest in Restless Legs Syndrome (RLS) and its relationship with medication and lifestyle factors.

2.2 Correlational Study Methods

I first performed a correlational study to test concurrently all of my hypotheses by examining naturalistic daily changes in their variables longitudinally. The participant kept a study journal with them at all times over this study's 10-day study period in order to record self-observations of the following 4 variables: (1) melatonin intake, (2) quetiapine intake, (3) physical inactivity, and (4) RLS Symptoms.

2.2.1 Melatonin Intake

To measure melatonin intake, the participant recorded the dosage (in mg) of melatonin they consumed each night. The measurement was documented immediately before bedtime to maintain accuracy and consistency. If no melatonin was taken on a given day, it was recorded as a value of zero.

2.2.2 Quetiapine Intake

To measure quetiapine intake, the participant recorded whether they took quetiapine at night (Yes/No) and noted the dosage in mg if applicable. If no Quetiapine was taken on a given day, it was recorded as a value of zero.

2.2.3 Physical Inactivity

To measure physical activity, the participant recorded the number of hours spent sitting or lying down during waking hours.

2.2.4 RLS Symptoms

To measure RLS symptoms, the participant rated the severity of their symptoms each night before bedtime on a 5-point Likert scale (1 = No symptoms, 5 = Severe symptoms preventing sleep). The participant also recorded any qualitative observations about symptom fluctuations.

2.3 Correlational Study Planned Analyses

To assess the strength and statistical significance of associations between variables predicted by my three hypotheses, I performed Pearson product moment correlations of their predictor variables (melatonin intake, quetiapine intake, and physical inactivity) with their outcome variable (RLS symptoms). For testing Hypothesis #1, I examined the correlation between melatonin intake amounts and RLS symptom severity. For testing Hypothesis #2, I examined the correlation between quetiapine intake amounts and RLS symptom severity. For testing Hypothesis #3, I examined the correlation between amount of physical inactivity and RLS symptom severity. A correlation coefficient was considered statistically significant if the probability of its random occurrence (p) was $< .05$ (i.e., less than 5% of the time expected by chance alone).

2.4 Experimental Study Methods

Based on the strength of the correlation between quetiapine intake and RLS severity found in my correlational study, I then chose to conduct an experimental study to test for a causal relationship between these two variables from Hypothesis # 2.

I manipulated the independent variable, quetiapine intake, over a 14-day period by randomly assigning the participant each day to either a quetiapine experimental condition or a no-quetiapine control condition using a double-blind procedure. On quetiapine days, the participant took 25 mg of quetiapine at night. On no-quetiapine days, they did not take quetiapine but instead took a placebo pill. The placebo pills consisted of Bifidobacteria supplements, which are visually and texturally similar to quetiapine and had already been a part of the

participant's daily routine (1–3 pills per day).

To reduce bias and ensure blinding, a research assistant, who did not know the study's purpose, gave the participant the quetiapine or placebo pill each evening in a container that only showed the day. Quetiapine and placebo pills were wrapped in aluminum foil to obscure their identity. Each night, one packet was randomly selected and taken without knowing its contents. To further prevent the possibility of identification by texture or shape, water was consumed first, and the pill was swallowed immediately. The next morning, the used foil was unwrapped to determine which pill was taken.

To avoid order effects, each day the research assistant randomly assigned the condition using a previously shuffled deck of playing cards with an equal number of red and black cards. A red card indicated to give the control condition and a black card indicated to give the experimental condition. The assistant took the top card from the deck without replacement and prepared the assigned condition in a separate room, ensuring that the participant could not see the preparation process. The assistant recorded the assigned condition each day but did not reveal this information to the participant until after all data had been collected that night.

The dependent variable, RLS severity, was measured by the participant each experimental and control day using the same method described in the correlational study.

2.5 Experimental Study Planned Analyses

To assess the statistical significance of differences seen in RLS severity on quetiapine experimental days vs. no-quetiapine control days, a Student's *t*-test was performed. An average difference between conditions was considered statistically significant if, using a one-tailed distribution (i.e., to determine if there is a difference between groups in a specific direction), the probability of its random occurrence (*p*) was $< .05$ (i.e., less than 5% of the time expected by chance alone).

3. Results

3.1 Correlational Study Results

As shown in Table 1, this study found that daytime quetiapine intake, but not melatonin intake or physical inactivity, were connected to nighttime severity. Melatonin intake was not significantly correlated with RLS severity ($r = -0.22$, $p = 0.55$, see Figure 1), meaning changes in melatonin were not related to changes in RLS symptoms. Quetiapine intake and RLS severity had a strong positive correlation ($r = 0.77$, $p = 0.007$, see Figure 2), indicating that more quetiapine was associated with worse RLS symptoms. No significant correlation was found between physical inactivity and RLS severity ($r = 0.18$, $p = 0.63$, see Figure 3), where more sitting time was not linked to worse RLS symptoms. In comparison across all the correlations examined in this study, the strongest link was found between quetiapine intake and RLS severity ($r = 0.77$).

3.2 Experimental Study Results

The RLS symptoms were stronger on nights when quetiapine was taken than on nights when a placebo was taken. A paired-samples *t*-test showed that this difference was statistically significant ($t = 5.02$, $p = 0.00015$; see Table 2 and Figure 4).

4. Discussion

4.1 Summary of Results

This study looked at the relationship between three variables (melatonin, quetiapine, and sitting time) to RLS symptoms. First, my results did not show a clear association between melatonin and RLS symptoms. This means melatonin may not have a strong effect on RLS. Second, quetiapine was not only found to be positively correlated with RLS symptoms but was also shown experimentally to make RLS symptoms worse. Third, my results did not support an association between amount of time spent sitting and RLS symptoms. So in the end, quetiapine was found to be most related to making RLS symptoms worse.

4.2 Relation of Results to Past Research

My research failed to find a clear link between melatonin and RLS that had been reported by past research. Whittom et al. (2010) had shown that people with RLS who took 3 mg of melatonin moved their legs more in bright light. Possible reasons for the discrepancy in these results with the current findings might be that my dose was higher (10 or 20 mg) or that I did not test with light as Whittom et al. (2010) had. Also, the people in the studies were different, with Whittom et al. (2010) studying people diagnosed RLS while I did not.

My correlational and experimental findings are consistent with past research showing that quetiapine worsens RLS symptoms. Ocak et al. (2019) found that people who took quetiapine had worse RLS. This finding may be due to a consequence of quetiapine blocking dopamine, a brain chemical that helps with movement.

In contrast to past research, I did not find that sitting time was related to RLS symptoms. Cederberg et al. (2019) studied people with multiple sclerosis (MS) who also had RLS and found that less active people had worse RLS symptoms. One possible reason for this discrepancy in results could be how sitting was measured. While Cederberg et al. (2019) used a device called an accelerometer which measures overall activity levels, my study measured the time spent actually sitting or lying down. Future research should explore whether different types of activity may play a role in affecting RLS.

4.3 Implications of Results

My results may be helpful to people who take quetiapine and have RLS. Consistent with past research, I found that quetiapine made RLS worse, and so I recommend that doctors should be careful about prescribing this medication. They may need to check for RLS symptoms more often and to choose other medications when RLS symptoms appear.

I did this study to find out what makes my RLS symptoms worse in order to improve them. I looked at medicine and sitting time. The results showed that quetiapine may really cause RLS to get worse. This helps answer my question and gives a solution to RLS severity by my reducing quetiapine intake in consultation with my physician.

References

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Whittom, S., Dumont, M., Petit, D., Desautels, A., Adam, B., Lavigne, G., & Montplaisir, J. (2010). Effects of melatonin and bright light administration on motor and sensory symptoms of RLS. *Sleep Medicine, 11*(4), 351-355. https://doi.org/10.1016/j.sleep.2009.12.008

Table 1

Correlations of Study Variables

Variables	RLS Severity Score	
	r	*n*
Melatonin intake	-0.22	10
Quetiapine intake	0.77*	10
Sitting time	0.18	10

* *p* < .05.

Table 2

Descriptive Statistics for RLS Symptom Severity Across Different Quetiapine Intake Conditions
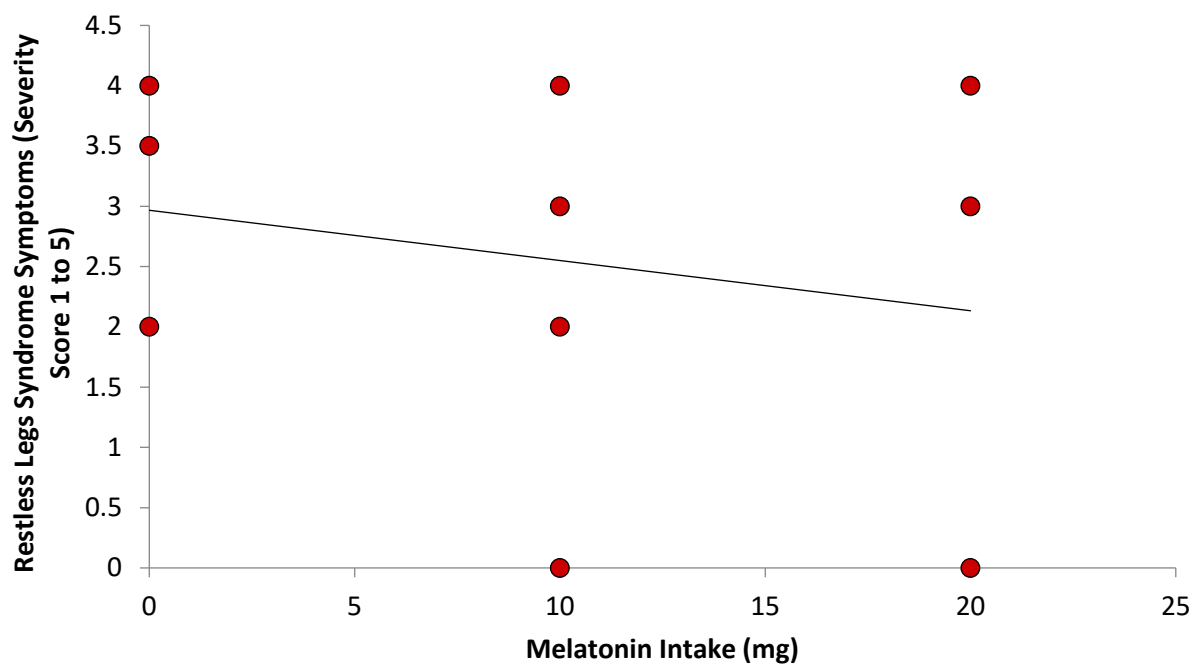
Statistic	Quetiapine	Placebo
M	5.57*	3.14
SD	2.15	1.46
n	7	7

Note. *M*, *SD*, and *n*, represent mean, standard deviation, and sample size, respectively. RLS

symptoms were rated on a scale from 1 to 5 in severity.

* *p* < .05 for comparison of quetiapine condition with the placebo condition.
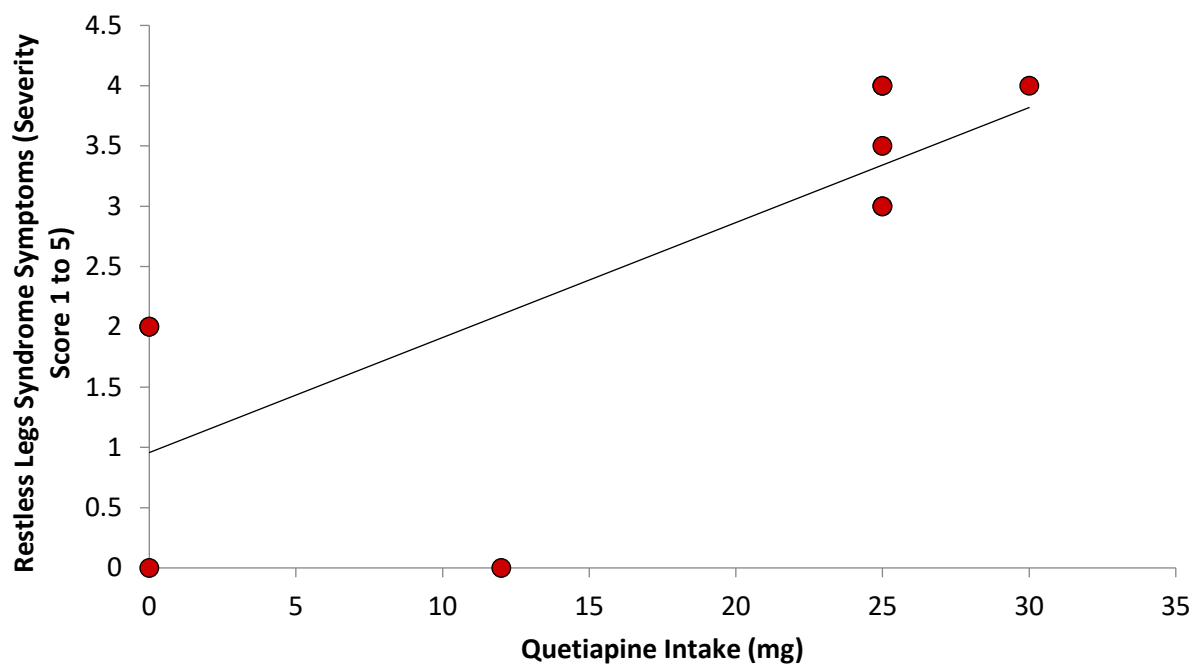
Figure 1

Association Between Melatonin Intake and Restless Legs Syndrome Symptoms

Notes. Some data might not be visible in the figure due to overlapping markers.
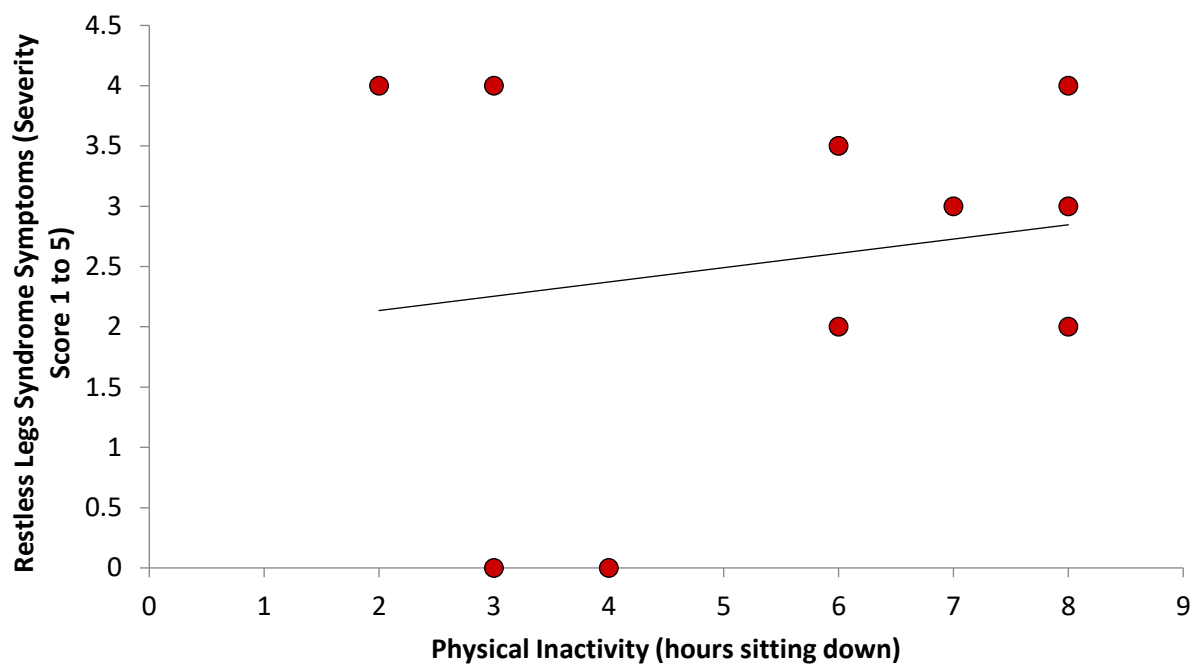
Figure 2

Association Between Quetiapine Intake and Restless Legs Syndrome Symptoms

Notes. Some data might not be visible in the figure due to overlapping markers.
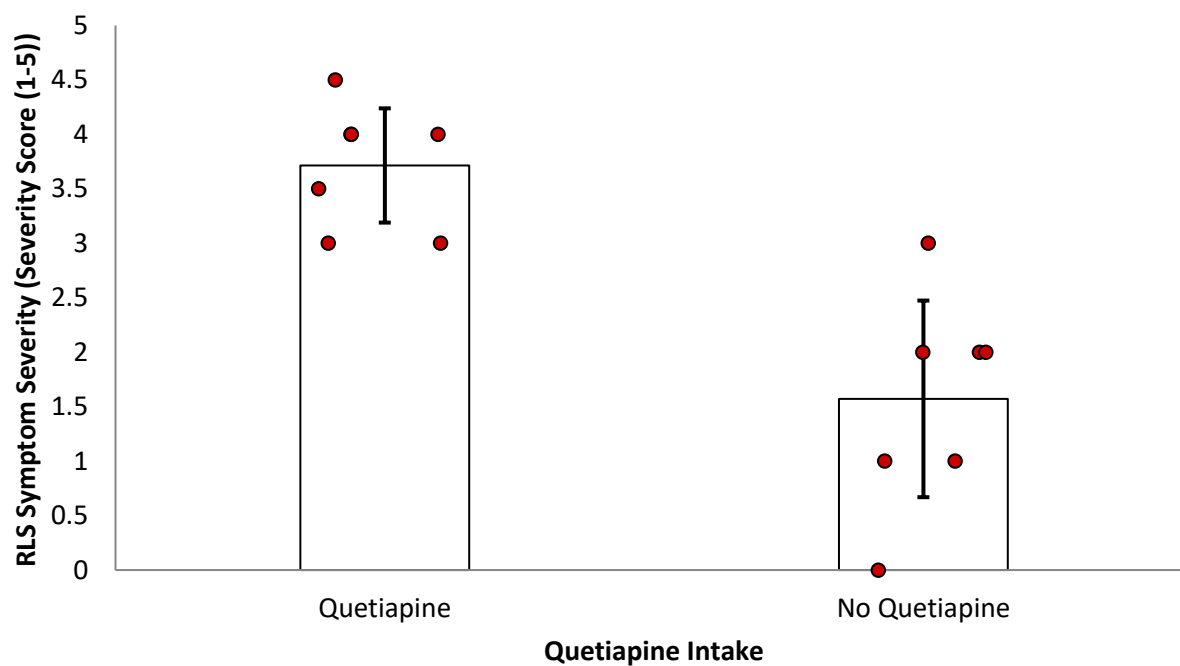
Figure 3

Association Between Physical Inactivity and Restless Legs Syndrome Symptoms

Notes. Some data might not be visible in the figure due to overlapping markers.

Figure 4

Average RLS Symptom Severity Across Different Quetiapine and Placebo Conditions

Notes. Errors bars show ± 95% confidence levels. Overlapping scatterplot shows data from the

participant.