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Body Composition Changes Associated With Methadone Treatment

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Abstract

Background: Methadone is associated with a statistically significant increase in BMI in the first 2 years of treatment.
Objectives: To evaluate the changes of body composition (bone mass, % fat, % muscle mass, % water, and basal metabolic rate) related to this increase.
Patients and Methods: Changes in body composition were monitored, via bioelectrical impedance, in 29 patients in methadone treatment for opiate dependency (age 18 to 44, mean = 29.3, SD = 7.0, 13 men, 16 women).
Results: Within one year from admission to treatment, a statistically significant (t-tests, $P < 0.05$) increase was noted in their body mass index (BMI), % of body fat, average body mass, and average basal metabolic rate, and relative decrease in their % of muscle mass and % of bone mass. Neither absolute bone mass nor muscle mass changed significantly.
Conclusions: Physicians involved in care of methadone patients should recommend dietary and lifestyle changes to improve their overall health.

Keywords: Methadone, Body Mass Index, Obesity

1. Background

Clinical lore suggests that methadone treatment for opiate dependency leads to increase in body mass, however, very few studies measured this statistically. In the Slovak Republic, Okruhlica and Slezakova (1) followed 274 methadone patients for a year, starting with their admission to treatment. All were classified via body mass index (BMI). A significant increase ($P < 0.001$) was noted on all BMI categories from admission to one year follow up. The proportion of those underweight decreased from 10 to 5%, the proportion of normal weight changed from 72% to 58%, the proportion in the overweight category increased from 15 to 29%, and the proportion of obese patients increased from 3 to 8%. However, even at the one year follow up, these patients still remained significantly below proportions of these BMI categories in the general population (4%, 49%, 34% and 13%, $P < 0.001$). Similarly, the Polish study by Szpanowska-Wohn et al. (2) noted an increase in average body mass from 71.7 kg to 75.7 kg within 9 months following entry to methadone treatment. A study by Montazerifar et al. (3) noted a significant increase in BMI already within the first 8 weeks on admission to methadone treatment. Within the 8 weeks, the average weight of patients treated by Montazerifar's team showed a statistically significant increase from 61.4 kg on admission to treatment to 65.3 kg which corresponded to a BMI increase from 21.4 to 23.0. The rapid weight increase within the first 8 weeks is remarkable, but was perceived as medically valuable with respect to those underweight and malnourished. The proportion of the underweight patient decreased by half. However, the proportion of those in the obese category doubled. As shown by Montazerifar et al. (3), the percentages of underweight, overweight and obese patients were 27.3%, 18.2% and 3.6%, respectively before methadone treatment, and 12.7%, 18.2% and 7.2% at the end of the 8 weeks. A subsequent US study of 69 methadone patients by Fenn et al. (4) also found a significant increase in BMI from admission to follow up. The data published by Fenn's team indicated a mean increase by 8.1 kg which corresponded, on average, to an increase of 10% in body weight. The average BMI in a study by Fenn et al. (4)increased from 27.2 (overweight category) to 30.1 (lowest section of the obese category).

Okruhlica and Slezakova (5) examined the BMI of 42 methadone patients over 4 years. The BMI significantly increased in the first year of treatment and also from the first to the second year; however, no significant change was noted in the subsequent 2 years. This suggests that the BMI stabilized. The correlation of methadone dose to BMI was not significant at the end of this follow up. According to data in Okruhlica and Slezakova (5), the weight of their 42 patients at the end of the 4 year follow up did not differ from the measures in the general local population. At that point in the follow up, there was no significant correlation between the daily dose of metha-

done and the patients' BMI. Okruhlica and Slezakova (5) hypothesized that the weight gain of their patients in opiate substitution treatment is most probably a consequence of the changes in their lifestyle and not the result of direct adverse pharmacological effect of methadone medication. The findings by Okruhlica and Slezakova (5), if replicated, are of crucial medical importance because they suggest that the rapid weight increase such as the twofold increase of patients within the obese category observed by Montazerifar et al. (3) within the time span as short as only 8 weeks does not continue beyond the first or the second year of methadone treatment and is perhaps more related to changes in lifestyle than to pharmacological properties of methadone.

In our effort to reduce the risk of metabolic syndrome, it is important to know which parameters of body composition (e.g., % body fat versus % muscle mass) are primarily affected by the weight increase observed in the first year of methadone treatment.

2. Objectives

We measured, via bioelectrical impedance, the changes in body composition and in the body mass index (BMI) within one year following admission to methadone treatment.

3. Patients and Methods

On their admission and also at one year follow-up, 29 methadone maintenance patients (age 18 to 44, mean = 29.3, SD = 7.0, 13 men, 16 women) completed the symptom check list 90 revised (SCL-90-R) and we measured their weight, BMI, and body composition (muscle mass, bone mass, % of fat, % of water, and basal metabolic rate,) via bioelectrical impedance, using Tanita Ironman body composition monitor BC554.

4. Results

Within one year following their admission to methadone treatment, our patients showed a significant decrease (t-tests, $P < 0.05$, 2-tailed) on SCL-90-R scales of depression, anxiety, and overall psychopathology. A significant increase was noted in their mean BMI (increase from 24.1, SD = 4.1 to 26.3, SD = 4.8), mean body mass (from 71.8 kg, SD = 14.4 to 78.3 kg, SD = 15.9), % fat (from 25.3% of total body mass, SD = 10.0 to 30.6%, SD = 9.3), and basal metabolic rate (from 1593.4, SD = 267.0 to 1633.5, SD = 288.6) and a significant decrease in % of muscle mass (from 71.0% of body mass, SD = 9.6 to 65.8%, SD = 8.9), in % of water (from 52.0%, SD = 6.1 to 48.8%, SD = 5.5) and in % bone mass (from 3.7%, SD = 0.5 to 3.5%, SD = 0.5). Absolute measures of bone and of muscle mass have not noticeably changed.

5. Discussion

Neither absolute muscle mass nor absolute bone mass changed significantly within one year of admission to methadone treatment. The overall body mass has increased chiefly due to an increase in the proportion of body fat. Hopefully, future studies might clarify the relative contribution of biochemical, environmental, and lifestyle mechanisms responsible for the increase in percent of body fat.

The patients' average BMI increased from the normal to overweight category. On the one hand, this points to an increased risk of metabolic syndrome and associated conditions. For example, with respect to insuline resistance, a recent US study found that diabetes mellitus was significantly more common in patients receiving opiate dependence treatment via methadone than via buprenorphine (6). In methadone patients with sleep difficulties, obstructive sleep apnea was more common in those with higher BMI and longer duration of methadone maintenance treatment (7). On the other hand, methadone treatment helps the patients to avoid conflicts with the law and dramatically increases their chances of long term survival. An Australian retrospective study of a cohort of 307 heroin addicts indicated that these patients were nearly three times as likely to die if outside of methadone maintenance treatment than in it. A retrospective analysis of UK data showed that the total number of convictions, theft and fraud convictions, and weeks spent in prison per year were reduced by 39.3%, 52.17%, and 82.8%, respectively (8). A recent Chinese neta-analytic study of the total of 30,239 patients found a decrease in arrest rates from 13.1% to 4.3% and increase in employment rates from 26.4% to 59.8% within 12 months following admission to methadone treatment (9). Furthermore, some comparative studies of methadone and buprenorphine indicate that the former is associated with higher treatment retention rates (10). Such data show that medical, societal, and economic benefits of methadone treatment outweigh the potential adverse side effects. However, physicians involved in care of methadone patients should preventively recommend dietary and lifestyle changes to improve their overall health.

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Footnote

Authors' Contribution: Study concept and design: Gamal E. Sadek, Zack Z. Cernovsky, Simon Chiu; acquisition of data: Zack Z. Cernovsky and Gamal E. Sadek; analysis and interpretation of data: Zack Z. Cernovsky and Simon Chiu; drafting of the manuscript: Zack Z. Cernovsky; critical revision of the manuscript for important intellectual content: Simon Chiu, Gamal E. Sadek; statistical analysis: Zack Z. Cernovsky.

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