



A Clinical Trial on Weight Loss among Truck Drivers

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Abstract

Background: The high prevalence of obesity among commercial truck drivers may be related to sedentary nature of the job, lack of healthy eating choices, and lack of exercise. There may be a link between obesity and crash risk, therefore an intervention to reduce obesity in this population is needed.

Objective: To assess feasibility of a 12-week weight loss intervention for truck drivers with a weight loss goal of 10% of initial body weight.

Methods: Drivers were selected based on age (≥ 21 years) and body mass index (≥ 30 kg/m²). The drivers participated in a before-after clinical trial. The intervention included a 12-week program that provided information on healthy diet and increasing exercise, and telephone-based coaching using SMART goals. Outcomes included change from baseline in reported energy intake, measured weight, waist, hip, and neck circumference, blood pressure, and point of care capillary blood lipids and hemoglobin A_{1c}. Exit interviews were conducted to gain insight into driver opinions on the program features and usefulness. This study was registered with the NIH Clinical Trials Registry, number NCT02348983.

Results: 12 of 13 drivers completed the study. Weight loss was statistically significant ($p=0.03$). Reported energy ($p=0.005$), total fat consumption ($p=0.04$), and saturated fat consumption ($p=0.02$) intake were also lower after the 12-week intervention. Drivers attributed their weight loss to health coaching and suggested a longer intervention so that they could reach their goal and become accustomed to the changes.

Conclusion: This weight loss intervention is feasible for this difficult population. Additional research is needed to compare this intervention with a control group.

Keywords: Motor vehicles; Obesity; Health education; Occupational health; Workplace; Nutrition therapy

Introduction

While there are varying estimates regarding the size of the Commercial Motor Vehicle (CMV) driver, referred to as truck driver population, common estimates are approximately 5.6 million truck drivers in the US.¹ Truck drivers face many health challenges in-

cluding obesity, cardiovascular disease, type 2 diabetes, heightened levels of stress, cancer, and sleep apnea due to the nature of their jobs: poor working conditions and opportunity for unhealthy lifestyles.²⁻⁹ These health risks are of public safety concern because of the increased risk of crashes.^{2,4,10-12}

Obesity is a major health issue for truck

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drivers with the prevalence of obesity ranging from 50%–69% of drivers being considered obese.^{8,12,13} Obesity is related to increased crash risk in this working population, and the rate of fatal crashes is 50% greater than the rate for all other vehicles on the road.^{2,11,14} Obese truck drivers (body mass index [BMI] ≥ 30 kg/m²) have a two-fold accident rate compared to non-obese drivers.¹¹

Wellness interventions focused on helping truck drivers improve their health and lose weight are limited. The Federal Motor Carrier Safety Administration (FMCSA) Getting' in Gear program was not successful at producing significant weight loss.¹⁵ Holmes conducted a six-month intervention with 30 truck drivers comparing a nutrition intervention to no intervention and found a significant difference in weight loss (mean 1.8 kg) in the intervention group compared to the control group.¹⁶ Using motivational interviewing, a weight loss competition, computer-based training, and behavioral self-monitoring in a pilot study of 29 drivers over a six-month study period, Olson saw an average weight loss of 3.5 kg.⁷ A case study at Con-Way Freight used wellness coaching and saw an average weight loss of 5.0 kg per participating employee (9489.6 kg/1890 employees).¹⁷ Several other companies have put their own wellness programs together focusing on improving the health of their drivers.⁵ These interventions provide evidence suggesting they could reduce accident rates.¹⁸

Weight loss studies in CMV drivers have shown limited success.⁶ The Worksite Health, Eating, and Exercising for the Long-haul (WHEEL) is a pilot interventional study aimed at reducing the weight of truck drivers in 12 weeks through reducing energy intake and increasing exercise. The goal of the study is for drivers to lose 10% of their initial body weight. The objective of this study was to determine if a weight loss intervention is feasible in long-

haul commercial truck drivers.

Materials and Methods

The WHEEL before-after clinical trial was approved by the University of Utah Institutional Review Board (IRB #00058425) and registered with the NIH Clinical Trials Registry, number NCT02348983. Recruitment methods included hanging fliers at local truck stops, contacting drivers from a previous study, and working with a local truck company to approach eligible drivers. Drivers were pre-screened for eligibility over the phone. Inclusion criteria for the study were current long-haul CMV driver, BMI of ≥ 30 kg/m², and age 21 and older. All participants gave informed consent prior to enrolling in the study. Study enrollment took place between February 2013 and February 2014. The drivers were compensated with US\$150 in gift cards over the 12-week intervention period.

Study Visits

Study visits were conducted either at the trucking company or the Rocky Mountain Center for Occupational and Environmental Health at baseline and after the 12-week intervention. At each visit, demographic factors, self-reported health information, usual physical activity, perceptions of stress and social support and other potential confounders were collected via electronic-administered questionnaire. The National Cancer Institute (NCI) ASA24 Automated Self-Administered 24-hour Recall was used to collect information from the drivers about food intake in the previous 24 hours. Study staff assisted drivers with completion of these questionnaires as needed.

Height, weight, waist, hip and neck circumference, and blood pressure were measured. Height was measured using a stadiometer and was recorded to the nearest one-half inch. Weight was measured on

For more information on fitness-for-work of train drivers of Yazd railway, Central Iran see <http://www.theijoem.com/ijoem/index.php/em/article/view/199>



a calibrated electronic scale, recorded to the nearest tenth of kilogram. Circumferences were measured using a non-stretch tape measure at the level of the umbilicus, the widest point of the buttocks, and the middle of neck near the laryngeal prominence for the neck. Blood pressure was measured using an automated blood pressure machine (LifeSource UA-767, A&D Medical, Milpitas, California, USA).

Blood lipids and glucose were measured using a point-of-care testing. Specifically, a non-fasting finger stick was taken using a lancet to collect four to five drops of blood to measure total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, and glucose using the Alere Cholestech LDX[®] System (Alere North America, LLC, Waltham, Massachusetts, USA), and hemoglobin A_{1c} (HbA_{1c}) using the A_{1c} Now+[®] System (Bayer, Leverkusen, Germany).

Intervention

Drivers were provided with health education materials to use during the 12-week study including audio materials, print materials, exercise equipment, and healthy eating tools at the baseline study visit. Drivers also received a nutrition and exercise CD with general information about healthy exercising and eating as well as specific information about portions and snacking and the benefits of exercise. Print materials included laminated cards containing nutrition information and truck

driver friendly exercises. The drivers also received a scale to weigh themselves weekly, an on the go stove and stove pans to cook with, a road cooking book, resistance bands, a workout CD, light-weight dumbbells, a yoga mat, and a pedometer to report their steps weekly.

Health coaching

Each driver worked with a health coach to establish three health goals for the 12-week study at the baseline study visit using the SMART principle for goal setting.¹⁹ The SMART principle ensures goals follow certain criteria, Specific, Measurable, Attainable, Relevant, and Timely, to improve the quality of the goal being set. The health coach reviewed the anthropometric measurements, lipid panel results, and food recall information with the truck driver. The driver and the health coach then discussed the health coaching process and signed an agreement contract. After the contract signing, the driver with the guidance of the health coach created three SMART health goals.

One of the goals for the driver was the weight loss goal of the study, 10% change in body weight. The health goals were to be specific to losing weight during the 12-week study. If the driver had difficulty coming up with goals, the health coach would remind him of the measurements that were taken to see if any of those measurements were areas the driver wanted to improve upon. During this initial meeting, the driver and the health coach determined the frequency of health coaching sessions, generally once per week, and the specific day of week and time for the health coaching calls. The health coach also informed the drivers that during each health coaching session she or he would be asking for their current weight and pedometer count for the week.

The health coach called the drivers at the set time each week that did not con-

TAKE-HOME MESSAGE

- Obese truck drivers have a two-fold accident rate compared to non-obese drivers.
- There is a lack of successful weight loss interventions to help truck drivers lose weight.
- This 12-week weight loss intervention using health coaching helped truck drivers loss weight and improve their diet and physical activity behaviors.

flict with driving tasks. If they did not answer, the health coach left a message letting them know she or he would try calling again in 15 minutes. If they did not answer after the 15 minutes, the health coach left a message asking the driver to call back, but the health coach would also call them again over the next two days. If the health coach did not get a hold of the driver in that period, the health coach would count it as a missed session. The next week, the health coach would call them again on the scheduled day and time. There was no set time for the length of coaching sessions; it was dependent on the driver. The discussion focused on successes and barriers with healthy eating and physical activity. The health coach also touched on the health goals set and asked the drivers what they would like to focus on for the next week. Each week during the health coaching session, the health coach asked for the drivers' current weight and pedometer count.

Outcomes

The primary outcome was change in measured weight (at the study visits) from baseline to 12 weeks. Self-reported weight at each weekly coaching session was used for interim weight assessment. Secondary measures included anthropometric measurements of neck, chest, waist, and hip circumferences, blood pressure, cholesterol measurements, dietary intake (energy, protein, fat, cholesterol) and self-reported physical activity.

Statistical Analysis

Statistical analysis was performed with SAS ver 9.4. (SAS Institute, Cary, NC, USA). We used data from our cross-sectional study of truckers to estimate the cross-sectional mean and SD for power calculation. Five-hundred and seven truckers had a BMI >30 kg/m² with a mean (SD) body weight of 116 (22) kg; 175 of these were owner/operators. Previous dietary studies have

reported SDs in weight change over 12 weeks of 2.5% or greater than the average baseline weight.²⁰ Therefore, we estimated a SD of 8.7 kg for the change in the study visit weights from baseline to 12 weeks. Assuming (conservatively) that at least 70% of enrolled truckers return for the 12-week study visit, the sample size of 26 subjects per group will provide a power of 80% for a 2-sided test with an α of 0.05 to detect a mean difference in weight loss of 5 kg, and a power of 90% to detect a mean difference of 5.8 kg. Our primary outcome was weight change from baseline to week 12. The Wilcoxon Signed Rank test was used because the data was not normally distributed. A p value <0.05 was considered statistically significant.

Results

Thirteen truck drivers were enrolled and 12 drivers completed the study (one driver was lost to follow-up). All drivers were male with a median age of 50.7 (IQR 21.2) years. They had a median professional driving experience of 12.0 (IQR 25) years. The median baseline weight was 125.6 kg, and the median baseline BMI was 39.7 kg/m². Participants in the study had high lipid panel results and anthropometrics (Table 1). Drivers completed a median of 10.0 health coaching sessions. The follow-up times are given in Figure 1. Median weight loss of the 12 drivers, using the measured weight at the final visit or the last reported weight before 12 weeks (when follow-up time was delayed), was 5.1 kg. Drivers who completed the final study visit within a month from the study termination ($n=6$) lost a median of 6.1 kg. When we included only measured weight (final study visit) taken more than a month from the completion of coaching, the median weight loss during the study was 3.2 kg, significantly ($p=0.03$) lower than the baseline value (Table 1). Four drivers lost 5% or more of

Table 1: Demographic data at baseline and 12-week study visits. Values are median (IQR).

Variable	Baseline	Exit	p value*
BMI (kg/m ²)	39.7 (12.7)	38.1 (14.1)	0.03
Weight (kg)	125.6 (38.7)	123.5 (44.4)	0.03
Total cholesterol (mg/dL)	186.0 (56.0)	183.0 (59.5)	0.34
Triglycerides (mg/dL)	213.0 (128.0)	189.0 (111.5)	0.17
HDL-cholesterol (mg/dL)	29.0 (8.0)	30.0 (13.0)	0.72
LDL-cholesterol (mg/dL)	103.5 (57.5)	112.0 (47.0)	0.96
Systolic blood pressure (mm Hg)	133.0 (18.0)	132.5 (22.0)	0.24
Diastolic blood pressure (mm Hg)	85.0 (12.0)	79.5 (25.0)	0.52
Pulse (beats/min)	80.0 (14.0)	79.0 (21.0)	0.85
Hemoglobin A _{1c} (%)	5.8 (0.9)	5.4 (1.2)	0.82
Glucose (mg/dL)	123.0 (51.0)	98.0 (48.5)	0.79
Neck circumference (cm)	47.5 (8.0)	47.1 (9.5)	0.04
Chest circumference (cm)	130.0 (20.6)	126.0 (23.8)	0.10
Waist circumference (cm)	125.0 (22.5)	129.5 (27.7)	0.06
Hip circumference (cm)	123.5 (18.9)	121.7 (21.6)	0.29
Total calories (daily)	3036.5 (1792.0)	2050.1 (2204.0)	0.005
Total fat (g)	133.9 (80.0)	77.6 (99.1)	0.04
Saturated fat (g)	45.7 (31.2)	25.3 (30.3)	0.02
Total carbohydrate (g)	313.4 (140.9)	245.8 (260.0)	0.06
Dietary cholesterol (mg)	511.1 (342.8)	318.6 (240.0)	0.27
Physical activity (min/wk)	0.0 (120.0)	137.5 (368.8)	0.24

*Wilcoxon signed rank sum test for difference between baseline and exit measures.

Twelve participants were included in the end of study analysis regardless of the date of their exit study visit.

their starting body weight during the 12-week intervention.

BMI (1.0 kg/m², $p=0.03$), neck circumference (0.5 cm, $p=0.04$), total daily calories consumed (1320.6 calories, $p=0.005$), total fat consumption (47.0 g, $p=0.04$), and saturated fat consumption (9.9 g, $p=0.02$) were significantly lower at exit

than baseline in analysis using all 12 drivers regardless of the date of the exit visit. Reductions were in waist circumference (3.7 cm, $p=0.06$) and total carbohydrate consumption (68.5 g, $p=0.06$) was not significant.

Exit Interview

We obtained feedback on the study from 12 drivers during the in-person exit visit. Overall, drivers were pleased with the study. Four drivers became more aware of how much they were eating each day. One driver indicated that the study materials helped him see what exercises he could do in a small space. Drivers enjoyed the materials provided. Eleven drivers said that the health coaching was the most useful part of the program. Six drivers found the portable stove to be the most useful material provided. Others reported the weights, resistance bands, or the educational materials as the most useful.

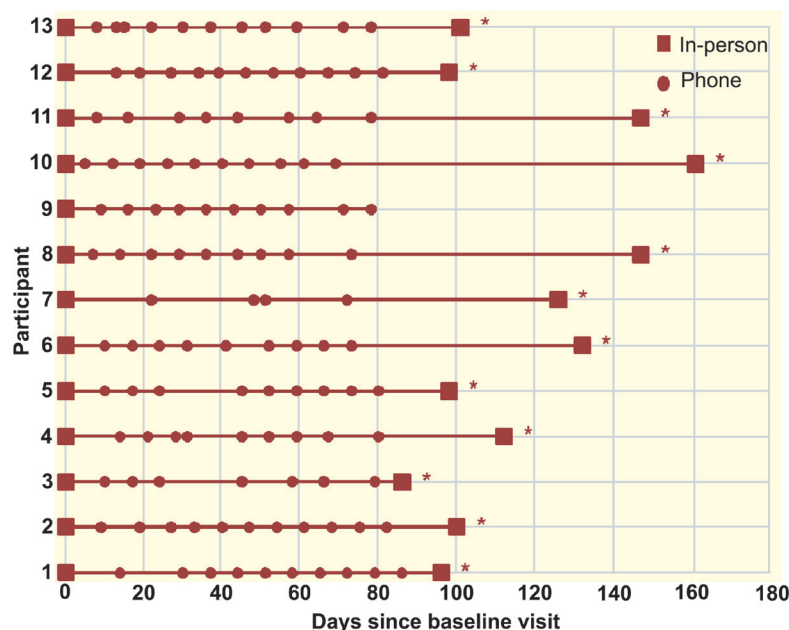
The most common factor drivers attributed their weight loss to was the health coaching. Eight drivers said the health coaching helped because it made them more accountable by having to report to someone each week. One driver stated that it was “nice to talk to somebody about what you're doing.”

Drivers said they would recommend the study to other drivers because it helps and because of its value. One driver said he was already recommending the study to others. Another driver recommended the study and said “I see too many drivers.... I do not want to end up like that.”

When asked what recommendations drivers had to improve the study, five drivers stated they wanted a longer study, suggesting an additional 6–12 months in order to complete study goals and adjust to the change in lifestyle. Additionally, drivers suggested recipes that they could make using the portable stove, meetings with a registered dietitian, a Web site, nonperishable food list, more in-person visits, twice a week health coaching calls, and exercises that could be done while driving.

Discussion

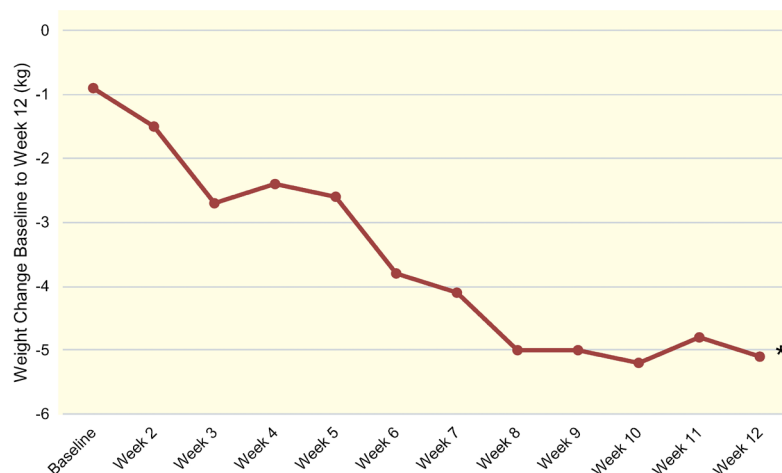
A weight loss intervention for long-haul truck drivers using weekly health coach-



*Data used in Table 1 for end of study. Participant 9 was lost to follow-up.

Figure 1: Timeline for coaching calls and exit interview for 13 drivers

ing sessions and driver specific intervention materials is feasible and acceptable to drivers. Drivers in the study had significant



*n=12 for week 12. Measured weights are reported for six drivers who completed the study by week 14. For those six drivers who completed the study after week 14, the week 11 self-reported weight was carried forward to week 12.

Figure 2: Weight change over 12-week study period based on self-reported weight for week 2–11 and measured weight for study termination.

improvements in BMI, weight, neck circumference, and a reduction in total daily calories consumed, total fat consumption, and saturated fat consumption. Most drivers had positive comments regarding the intervention, though a universal desire was a longer intervention. The significant improvements in some outcomes suggest that drivers were able to implement changes as a result of the intervention methods, particularly the coaching and dietary elements.

Early efforts using small samples or single group design including the FMCSA 'Getting' in Gear program were not successful at producing significant weight loss. More recently, other unsuccessful efforts to reduce weight have been reported.^{15,16,21,22} One focused on the bus terminal environment by changing the food choices in vending machines and providing exercise facilities.²¹ However, commercial drivers do not generally spend much time at the terminals, limiting the access to these changes, which did not result in significant weight changes. The second study was a multi-level intervention targeted at smoking cessation and weight loss that resulted in improved smoking cessation, small changes in sugar sweetened beverages and fatty foods, but no significant weight loss.²² These studies highlight the importance of an intervention focused on driver's behavior in their work environment.

In a study most similar to the present study, Olson reported an average weight loss of 3.5 kg with four planned sessions using motivational interviewing, a weight loss competition, computer-based training, and behavioral self-monitoring in 29 commercial truck drivers over a six-month study period.²³ Our study observed similar weight loss in 12 weeks and has demonstrated that a multidimensional intervention incorporating coaching and goal setting regarding diet and physical activity is feasible for this unique population. The

improvements in objective outcomes of measured body weight of 5% or more of body weight was achieved by four drivers, a longer intervention should allow drivers to achieve a goal of 10% weight loss. Significant reductions in neck circumference were also achieved and suggest that this interventional approach may be an effective intervention for improving the health of drivers.

Further study implementing this intervention strategy in a randomized controlled trial within a commercial driving population is needed. This study does have many shortcomings. Recruitment of drivers was challenging and took longer than anticipated. We had difficulty reaching drivers in a timely fashion for their weekly coaching sessions and scheduling them for their 12-week interview. There may have been selective bias due to lack of weight loss or other outcome metrics. Furthermore, a 12-week intervention was not long enough for all of the drivers to reach the 10% goal, nor to demonstrate maintenance of the weight loss that was observed. The reported dietary intake at the end of the study reflects a greater calorie deficit than the reported or measured weight loss. There are several points to be made regarding self-reported intake. First, the measure is for a single day at the beginning and the end of the study and may not reflect an average intake during the study. The wide SD reflects wide variation across drivers. Drivers knew they would be reporting their intake. Nonetheless, the reduction can be interpreted as an increased awareness of their own energy intake and of more appropriate dietary intake resulting from the study materials and the coaching.

Table 1 describes measured data collected at the study exit (n=12), which for many participants (n=6) was beyond 14 weeks since the first enrollment. Figure 2 illustrates the relationship between self-reported or measured body weights over

the 12-week study period. Six participants completed the study by week 14 and had their measured weight collected at that time. The other six participants who completed the study between week 15 and week 23, had their measured weights reported at the time of study completion, beyond week 15. For these six participants who had measured weight after week 14, their week 11 self-reported weight was carried forward to week 12 for Figure 2. Lastly, the driver who did not complete the study reported 2.9 kg weight loss after 11 weeks, but he had lost more than 45.4 kg over the past year. Future planned studies will employ more rigorous pre-selection of drivers so as to exclude those with prior significant weight loss.

In conclusion, a weight loss intervention with driver specific health information, SMART goals, and weekly phone health coaching sessions is appropriate for commercial truck drivers. Most of the drivers were able to lose weight and have improvements in other health measures. Drivers recommended a longer study period in order for them to meet their goals and fully incorporate positive changes. A large randomized controlled trial comparing weight loss approaches is warranted to demonstrate efficacy.

Conflicts of Interest: None declared.

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Disclaimers

The views expressed in this article are the views of the authors and not an official position of the institution or funder.

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