

## Background

### Nutrition education makes for healthier, more effective doctors:

Schools that implemented nutrition curriculums found that the participating students had improved self-reports of personal dietary habits. [Magallanes et al., 2021]. Training medical students in nutrition improves their personal diets and their prevention counseling attitudes. [Spencer EH et al., 2006]. Regular dietary counseling by doctors only occurs in 20 - 40% of patient visits. [Magallanes et al., 2021]. Most medical students and practicing physicians lack knowledge in dietary reference intakes and medical nutrition. [Hargrove EJ et al., 2017].

### Nutrition education may save the healthcare system money and resources:

The Western diet has been linked to heart disease, stroke, type 2 diabetes mellitus, Alzheimer's, cancer, and obesity. Altogether, these cost the US healthcare system \$2.6 trillion per year (75% of the US healthcare budget). [Magallanes et al., 2021]. Barriers between patients and non-physician nutritionists include a lack of finances, insurance coverage, lack of time, or confidence in patients' willingness to change their behaviors. Due to these barriers, PCPs are at the forefront of patient nutrition care. [Hargrove EJ et al., 2017]. California's Expanded Food and Nutrition Education Program (EFNEP) found that every \$1.00 USD spent on nutrition education in California, between \$3.67 and \$8.34 were saved in healthcare costs. [Joy AB et al., 2006].

### Nutrition education among US medical students is inadequate:

Less than 25% of US medical schools achieve the recommended hours of nutrition education, and the existing education lacks focus on clinical implementation. [Magallanes et al., 2021]. Nutrition education is minimal compared to other subjects in medical school curriculums. It has been recommended that students receive 25 hours of nutrition education, and as of 2013 71% of medical schools fail to achieve 25 hours of training for their students. [Adams Et. Al. 2015].

### Osteopathic students are well suited for receiving and providing nutrition education:

Osteopathic medicine is primarily family medicine focused and therefore nutrition is an important aspect of whole-patient care. [Spencer EH et al., 2006]. Osteopathic Medicine emphasizes the self-regulatory and self-healing nature of the human body. Nutrition education is vital for Osteopathic students. [Hargrove EJ et al., 2017].

### The Mediterranean Diet (MD):

Evidence-based diet that emphasized the use of vegetables, fruits, whole grains, fish, legume, nuts, and seeds. Olive oil is used as the primary source of fat. [Magallanes et al., 2021]. The MD is scientifically recognized as a healthy eating pattern. Higher adherence to the MD is associated with significant improvements in health. [Lopez-Olivares M et al., 2021]. It has been found to be cost effective, with no increase in energy cost when compared to the Western diet. [Saulle R et al., 2013].

### Health Meets Food (HMF):

HMF and Culinary Medicine provide the education and resources students need to improve their diet. There is an emphasis on group cooking, eating together, and peer teaching. A large study at Tulane University showed that students involved in the Culinary Medicine program had better personal diets and outlooks on their ability to provide nutrition counseling, when compared to traditional education. [Magallanes et al., 2021].

## Methods

An Elective HMF course was provided through Culinary Medicine, with an emphasis on the Mediterranean Diet through the teaching materials and the recipes used during cooking workshops. It was offered in-person and virtually for medical students at the Lake Erie College of Osteopathic Medicine (LECOM). Participation was voluntary.

A Mediterranean Diet Score (MDS) survey sent by email to current LECOM medical students, both enrolled and not enrolled in HMF. Responses were voluntary and anonymous. An MDS rubric validated by Trichopoulos *et al.* was applied to the responses, and a MDS was produced for each response. Responses analyzed range from September 2018 to October 2020. Enrolled students had the opportunity to provide both pre-course and post-course responses. Non-enrolled students had the opportunity to provide a control response.

A total of 356 students responded.

257 students did not take the course and are considered the control.

99 enrolled students provided post-course responses.

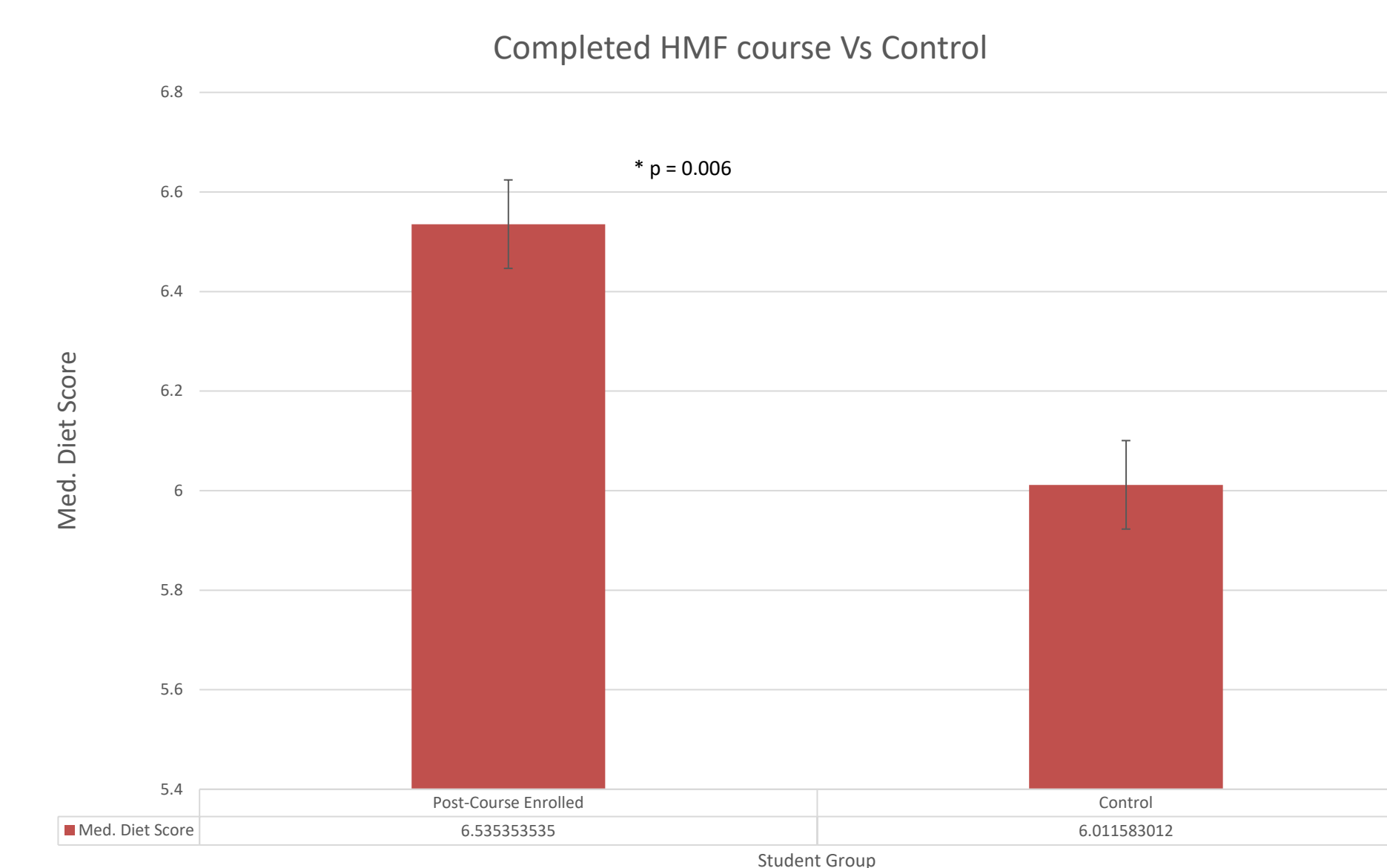
18 enrolled students responded pre-course and post-course.

Microsoft Excel was used for statistical analysis. Two-tailed T Test with unequal variance performed on the students who responded post-course and the control. A paired T Test was performed on the students who responded pre-course and post-course. A Two-tailed T Test with unequal variance was performed to compare the enrolled students who responded pre-course against the control. For all tests,  $\alpha$  was set to 0.05.

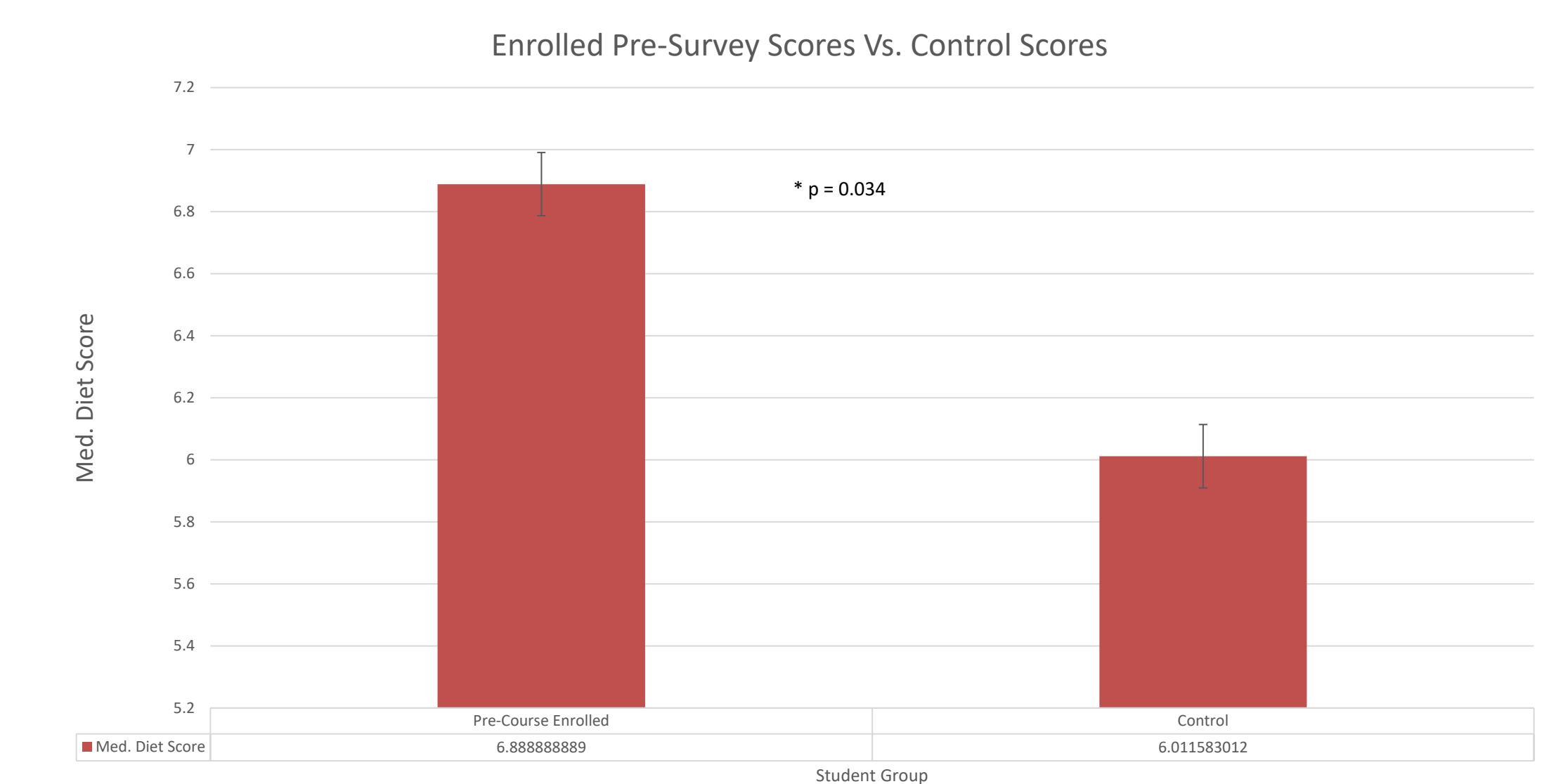
## References

- Adams, K. M., Butsch, W. S., and Kohlmeier, M. (2015). The State of Nutrition Education at US Medical Schools. *Journal of Biomedical Education*. Article ID 357627, 7 pages. <https://doi.org/10.1155/2015/357627>.
- Hargrove, E. J., Berryman, D. E., Yoder, J. M., and Beverly, E. A. (2017). Assessment of Nutrition Knowledge and Attitudes in Preclinical Osteopathic Medical Students. *J Am Osteopath Assoc*. Oct 1;117(10):622-633. doi: 10.7556/jaoa.2017.119.
- Hayek, J., Vries, H., Tuoni, M., Lahoud, N., Winkens, B., and Schneider, F. (2021). Increased Adherence to the Mediterranean Diet and Higher Efficacy Beliefs Are Associated with Better Academic Achievement: A Longitudinal Study of High School Adolescents in Lebanon. *International journal of environmental research and public health*. 18, 6928. <https://doi.org/10.3390/ijerph18136928>.
- Jayanama, K., Theou, O., Godin, J., Cahill, L., Shivappa, N., Hébert, J. R., Wirth, M. D., Park, Y.-M., Fung, T. T., and Rockwood, K. (2021). Relationship between diet quality score and the risk of frailty and mortality in adults across a wide age spectrum. *BMC Medicine*. 19:64. <https://doi.org/10.1186/s12916-021-01918-5>.
- Joy, A. B., Pradhan, V., and Goldman, G. (2006). Cost-benefit analysis conducted for nutrition education in California. *California Agriculture*. October-December. Pg 185-191.
- Levine, D. M., Vasher, S., Beller, J., Sasson, L., Caldwell, R. (2015). Medical student nutrition and culinary training. *Medical education [Med Educ]*. May;49(5):516-7. doi: 10.1111/medu.12684. PMID: 25924132.
- López-Olivares, M., De Teresa Galván, C., Nestares, T., Fernández-Gómez, E., & Enrique-Mirón, C. (2021). Lifestyle Factors Influencing Dietary Patterns of University Professors. *International journal of environmental research and public health*, 18(18), 9777. <https://doi.org/10.3390/ijerph18189777>.
- Magallanes, E., Sen, A., Siler, M., and Albin, J. (2021). Nutrition from the kitchen: culinary medicine impacts students' counseling confidence. *BCM Medical education*. 21:88. <https://doi.org/10.1186/s12909-021-02512-2>.
- Saulle, R., Semyonov, L., & La Torre, G. (2013). Cost and cost-effectiveness of the Mediterranean diet: results of a systematic review. *Nutrients*, 5(11), 4566-4586. <https://doi.org/10.3390/nu5114566>.
- Schoettler, C. L., Lee, J. N., Ireland, K. A., and Lenders, C. M. (2015). A Novel Method of Increasing Medical Student Nutrition Awareness and Education. *Hindawi Publishing Corporation Journal of Biomedical Education Volume*. Article ID 784042, 8 pages <http://dx.doi.org/10.1155/2015/784042>.
- Spencer, E. H., Frank, E., Elon, L. K., Hertzberg, V. S., Serdula, M. K., Galuska, D. (2006). Predictors of nutrition counselling behaviours and attitudes in US medical students. *Am J Clin Nutr*. Sep;84(3):655-62. doi: 10.1093/ajcn/84.3.655. PMID: 16960182.
- Trichopoulos, A., Costacou, T., Bamia, C., Trichopoulos, D. (2003). Adherence to a Mediterranean diet and survival in a Greek population. *N Engl J Med*. Jun 26;348(26):2599-608. doi: 10.1056/NEJMoa025039. PMID: 12826634.

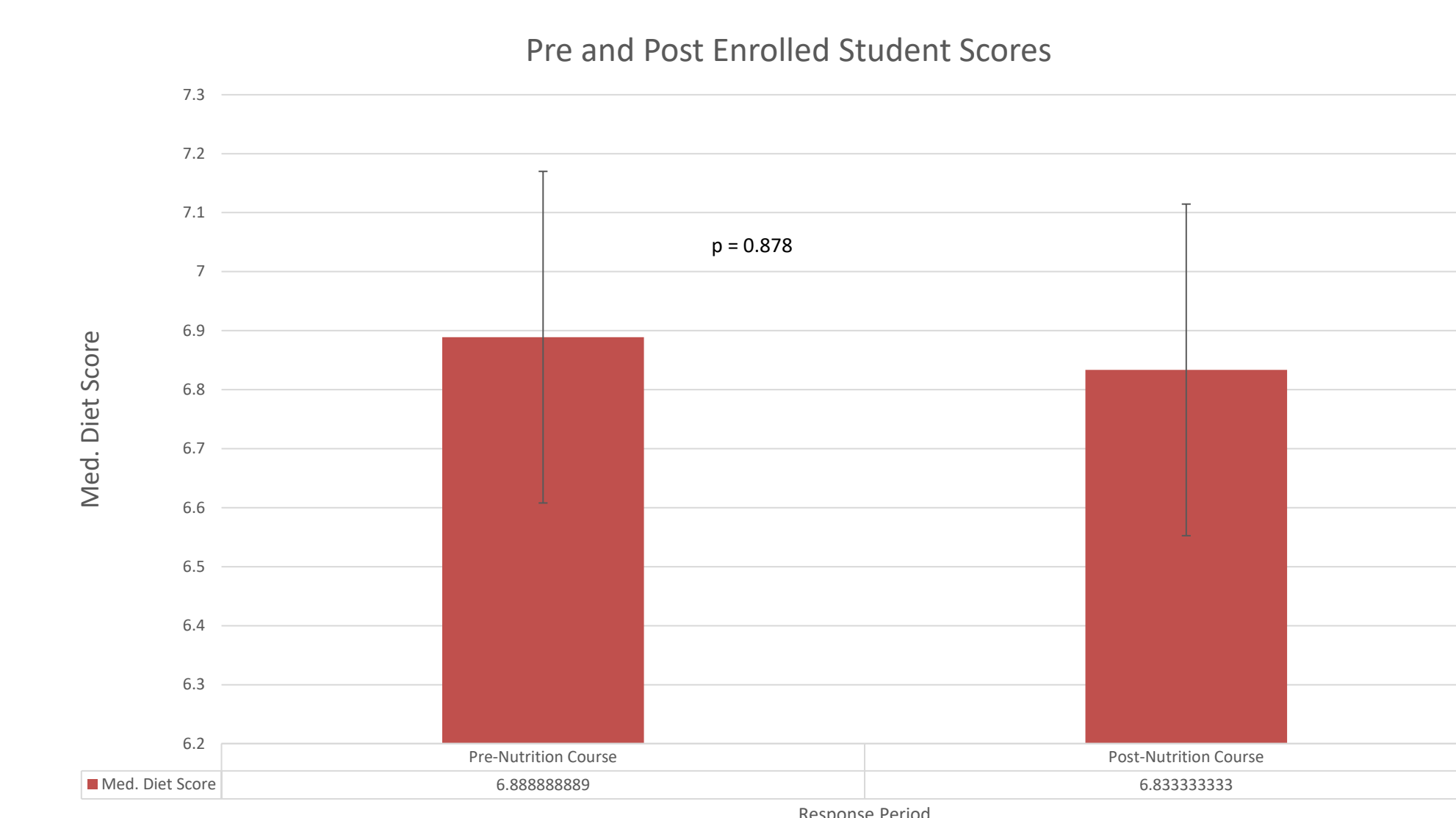
## Results



**Fig. 1.** Students who took the HMF course demonstrated significantly ( $p = 0.006$ ) higher MDS than the control group.



**Fig. 2.** Students who enrolled demonstrated a significantly ( $p = 0.034$ ) higher MDS than the control, before they took the coursework.



**Fig. 3.** Students who responded before and after taking the HMF course demonstrated no significant ( $p = 0.878$ ) change in their MDS.

## Discussion

Nutrition education may improve the diets of Osteopathic medical students.

Due to limitations of a voluntary enrollment and response among a large body of LECOM medical students, we have a risk of selection bias. The significantly higher difference between the 18 enrolled responses pre-course and the control may demonstrate this. (fig. 2.)

If a comprehensive nutrition education course was made mandatory at LECOM we could pursue further research with less selection bias.

There is a clear need for increased nutrition education in US medical schools. Osteopathic Medical Colleges are uniquely positioned to tackle this, given their philosophies on the use of holistic medicine that accounts of the mind, body, and spirit of a patient.

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