2021

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Financial Disclosure: The authors would like to thank the grant funders from Selinger Shone Foundation and the Providence Foundation for support of the primary study *Dietary, Sleep, and Exercise Habits of Registered Nurses Working Full-Time, 12-Hour Day or Night Shifts*.

Background

The proliferation of health and fitness mobile applications (apps) has created **new avenues for healthcare** to improve access to medical support and management outside of a brick-and-mortar facility. **MyFitnessPal™ (MFP)** is one of the **most well-known commercial health and fitness mobile apps** with over 50 million downloads as of 2019 on Android™ platforms alone.[1] The app provides users with a free-to-use digital medium to **track their daily food and water intake** and monitor progress towards personalized weight-based goals. Recent national and international surveys have shown an **increase in use of MFP in dietetic practice.**[2-4]

Currently, only **two validation studies** have been conducted on MFP with both indicating an **underestimation of nutrients** when compared to other validated dietary recording methods such as a pen-and-paper dietary record or 24-hour dietary recall.[5,6] A recent evaluative study out of Japan noted that while MFP allows users to correct inaccurate nutrient values, the use of a **user-based quality control method** greatly **limits the efficacy of MFP** to provide an accurate and valid food database.[7] The accuracy and validity of this dietary tracking application have been brought into question in the clinical and research settings.

This **secondary analysis study** aimed to evaluate the auto-populated protein recommendations provided through MyFitnessPal against the most current **Recommended Dietary Allowances (RDA)** established by The National Academies for Science, Engineering, and Medicine (NASEM). This study utilized preliminary data collected from the *Dietary, Sleep, and Exercise Habits of Registered Nurses Working Full-Time, 12-Hour Day or Night Shifts* study. From the data, researchers discuss the findings, clinical implications, and potential negative consequences of chronic aberrant protein intake in at risk populations.

Research Methods

- **n = 30** participant MyFitnessPal accounts analyzed
- All participants were **currently employed registered nurses** in WA, OR, ID, CA, and TX
- All participants' weight goals were set to **"maintain my current weight"**
- Participant characteristics are reported in **Table 1**

- ❑ **The default MFP protein recommendation is 20% of calories** [8]
- ❑ **The current NASEM RDA for protein is 0.8 g·kg^{-1}·d^{-1}** [9]
- ❑ **Dietitians commonly recommend 0.8 - 1 g·kg^{-1}·d^{-1} of protein** [10]

- **Repeated measure ANOVAs** to test for mean group differences were performed and results with ***p*-value <0.05** were considered statistically significant and recorded in **Figure 1**

Table 1. Characteristics of study participants

	Female Participants n=25	Male Participants n=5
Mean Age (years) (SD)	35.5 (±9.1)	32.4 (±4.6)
Mean BMI m/kg^2 (SD)	25.8 (±5.0)	29.7 (±3.6)
BMI <18.5 m/kg^2, n(%)	2 (8%)	0 (-%)
BMI 18.5-24.9 m/kg^2, n(%)	9 (36%)	0 (-%)
BMI 25.0-29.9 m/kg^2, n(%)	8 (32%)	3 (60%)
BMI >30.0 m/kg^2, n(%)	6 (24%)	2 (40%)

Results

- **MFP significantly exceeded standard daily protein recommendations by 35.3g to 50.3g (p<0.001)**

- The mean protein recommendation from MFP (110.6g, 95% CI [103g-118.2g]) was compared to the mean protein recommendations for the participants using the US RDA 0.8 g·kg^{-1}·d^{-1} (60.3g, 95% CI[55.2g-65.3g]) and 1 g·kg^{-1}·d^{-1} (75.3g, 95% CI [69g-81.6g]) in **Figure 1**

- The mean MFP protein recommendation corresponds to 1.5 g·kg^{-1}·d^{-1}

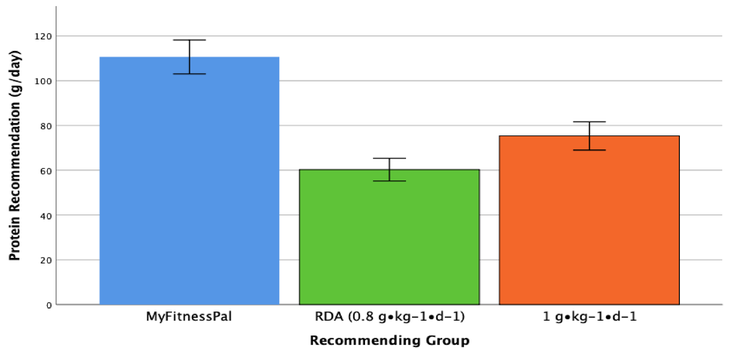

Figure 1. Comparison of daily protein recommendations from MyFitnessPal, RDA 0.8 g·kg^{-1}·d^{-1}, and 1 g·kg^{-1}·d^{-1} with 95% CIs.
RDA = Recommended Dietary Allowance. CI = Confidence Interval.

- **Figure 2** depicts the percent of the mean MFP protein exceeding the RDA and 1 g·kg^{-1}·d^{-1} recommendations.

- MFP exceeded the RDA by 216.6% for underweight participants, 196% for normal weight participants, 193.8% for overweight participants, and 160% for participants with obesity.

- MFP exceeded 1 g·kg^{-1}·d^{-1} by 173.3% for underweight participants, 156.8% for normal weight participants, 155.1% for overweight participants, and 128% for participants with obesity.

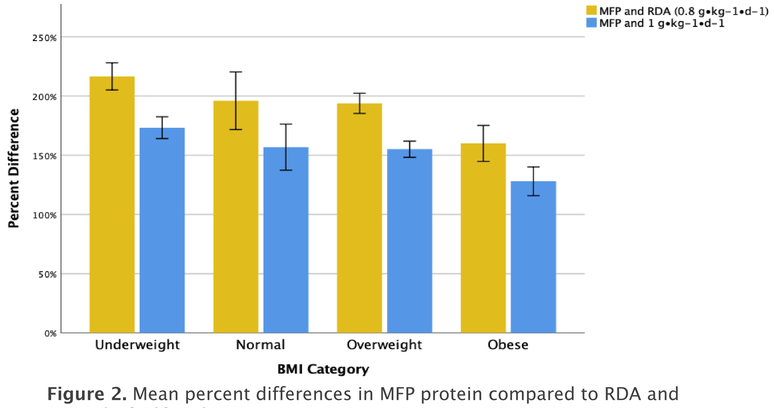

Figure 2. Mean percent differences in MFP protein compared to RDA and 1.0 g·kg^{-1}·d^{-1} with 95% CI.
CI = Confidence Interval.

Discussion

The results of this study showed **statistically significant overestimation of protein intake recommendations from MFP when compared to the RDA and 1 g·kg^{-1}·d^{-1}**. MFP's default protein recommendation of 20% of calories from protein is within the Acceptable Macronutrient Distribution Range (AMDR) of 10-35% of calories from protein. However, our data demonstrates this results in protein recommendations that significantly exceed the RDA of 0.8 g·kg^{-1}·d^{-1}. These findings raise several key points for consideration if using these tools, such as MyFitnessPal, with patients/clients.

The first consideration is if the protein recommendations from MFP **pose adverse health risks from prolonged excessive intake**. This is crucial for populations where a high protein diet can lead to a build-up of nitrogenous waste and induce damage to the kidneys. **Conditions that are of greatest concern from this form of renal damage are diabetes mellitus (DM), chronic kidney disease (CKD) and end stage renal disease (ESRD).** The updated recommended protein intakes are 0.55-0.6 g·kg^{-1}·d^{-1} for patients with CKD stages III and IV in the absences of DM and 0.6-0.8 g·kg^{-1}·d^{-1} for those with DM.[11] These values are dramatically less than the default protein intakes recommended by MFP.

Another consideration with long-term elevated protein intake is the **potential deleterious effects on bone health**. Literature has demonstrated that excessive protein intake increases urinary calcium excretion.[12] The surge in urinary calcium losses contribute to bone resorption and can subsequently heighten the risk of orthopedic complications, such as osteopenia, osteoporosis, and bone fractures.[12] Additionally, excessive urinary calcium losses may **increase the risk for developing calcium oxalate nephrolithiasis.**[12]

It is imperative for health care professionals to critically analyze the researched validity, safety, and efficacy of health apps prior to use with patients diagnosed with chronic diseases.

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