Consent to Participate in the Research Study:

Vitamin D supplementation on bone turnover in NCAA D1 collegiate and professional basketball players: a pilot study

Introduction

You are being asked to be in a research study that is being done by Oakland University researchers. This study is being done by Tamara Hew-Butler DPM, PhD, Associate Professor of Exercise Science.

This form describes the study and what you will be asked to do. The researcher can answer any questions you may have so you can make an informed decision. You can talk with your friends and family about this research study before making your decision. When your questions have been answered, you can decide if you want to be in this study. This process is called "informed consent." If you decide to be in the study, you will be asked to sign this form and will be given a copy of the form.

What is the purpose of this study?

The main purpose of this research study is to see if taking Vitamin D supplements will improve bone health in basketball players. Our previous study (performed on Oakland University student-athletes) showed us that basketball players had the lowest Vitamin D levels (especially the males) compared with other athletes. Thus, we want to follow-up by seeing whether or not giving Vitamin D supplements can improve the physical response to training (especially, improving bone mass) and mood state in response to hard summer training.

Who can participate in this study?

You are being asked to participate in the study because you are a member of the 2017-2018 Oakland University's Men's and Women's Basketball team, or professional basketball player, and between 18 and 36 years of age. You should not participate in this study if you have a history of fainting due to having your blood drawn. Also, since the radiation exposure from dual-energy x-ray absorption (DXA) scans (used to assess body composition) can be harmful to a developing fetus (baby), all females who are pregnant or think they may be pregnant will not be allowed to participate in this study.

Who is the financial sponsor for this study?

The financial sponsor of this study is Oakland University's Research Committee (URC Summer Fellowship award). Contact Dr. Tamara Hew-Butler if you would like more information.

Where will this study take place?

All laboratory testing will be performed in the Prevention Research Center, located on the second floor of the Human Health Building. Supplements will be brought to you every week, by the research staff, in the Athletic Training Room.

What do I have to do?

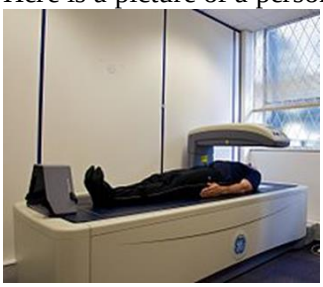
If you are in this research study you will be asked to sign this Consent form before we can start testing.

Pre-intervention testing will occur in the Prevention Research Center: The following tests will be performed:

Body Composition measurement: Your height and weight will be obtained before we can measure body composition, using a dual energy x-ray absorptiometry (DXA) scan. For the scan, you will be asked to lay flat on a special table located just below the DXA scan beam. Dr. Hew-Butler will position your body under the scan and you will lie still until the scans are completed. Two scans will be taken in this position: one of your entire body and another just of your spine. The amount of fat, muscle and bone in your body will be determined by assessing the absorption rates between two separate low intensity x-ray

beams ("dual x-ray") passing through your body. You will not be able to feel or see these x-ray beams. Additionally, you will then be asked to sit in a chair next to the DXA scan, with your arm on the scan table. Your forearm will then be scanned. All female participants will be privately asked by Dr. Hew-Butler if they are pregnant and if not, will sign an attestation statement before each scan.

Here is a picture of a person undergoing a DXA scan:

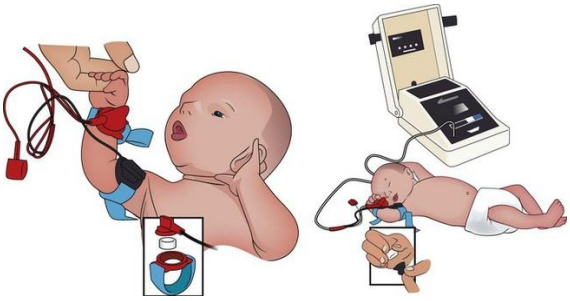


Biochemical Measurements: Per session, 10mL (2 teaspoons) of blood will be collected from your arm vein by a medical professional. Your blood will be analyzed for Vitamin D (serum 25-hydroxy vitamin D) and serum Vitamin D binding protein. Other biological chemicals looking at bone will be measured from your blood, including: plasma osteocalcin (a bone formation marker) and serum collagen type 1 cross-linked C-telopeptide (CTx; a bone resorption marker). The hormones parathyroid hormone (PTH) and insulin-growth factor-1 (IGF1) will be assessed to monitor growth. Electrolytes such as sodium ($[Na^+]$), phosphorus ($[PO_4]$), and calcium ($[Ca^{++}]$) concentrations will also be measured in your blood, since these minerals are also stored in bone and contribute to bone strength.

Dietary Evaluation: You will be asked to fill in a food frequency questionnaire, which will analyze what you eat in terms of fats, carbohydrates and proteins (macronutrients) and vitamins and minerals (micronutrients).

Surveys: you will be asked to complete a Profile of Mood States (POMS) survey and a bone-specific physical activity assessment (BPAQ).

Sweat Test: We want to see how much sodium and calcium you lose when you sweat. So, we will place two electrodes on your forearm, which will apply a small amount of medicine on your skin. Then the electrodes will be removed after five minutes and a collecting disc will be placed on your arm to collect the sweat. It may take between 5-20 minutes for enough sweat to be collected. This is a test commonly performed on babies (to detect cystic fibrosis) and here are a few pictures explaining this test:

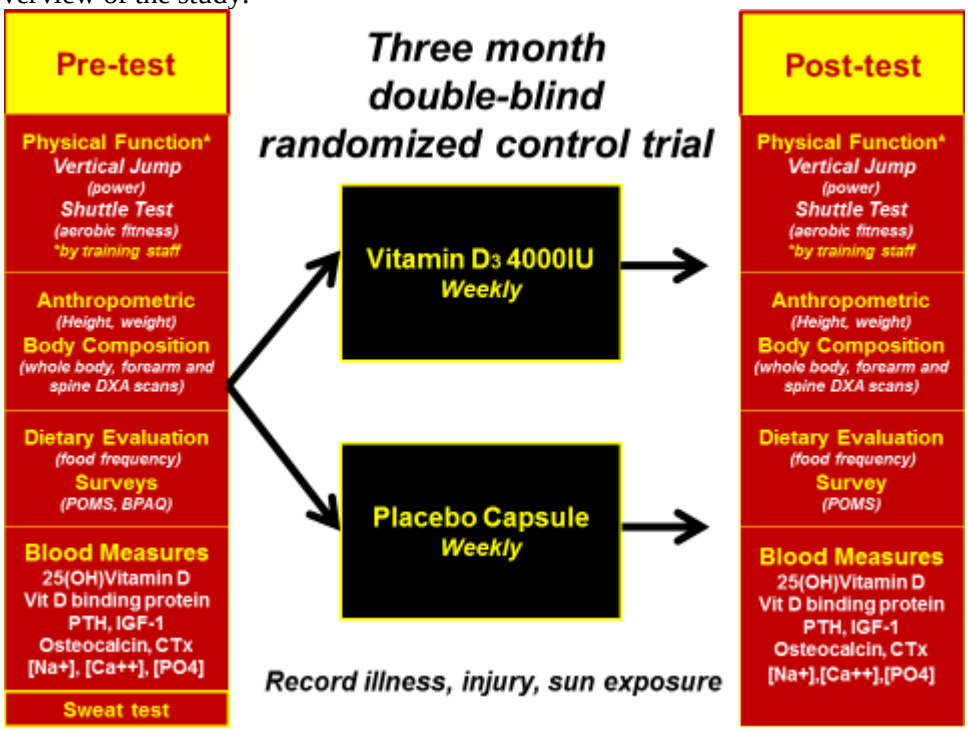


Additionally, a vertical jump test and 20-meter shuttle run will be performed in the Athletic Training facilities, as part of your normal training assessment. We want to use these values to assess your peak power and aerobic fitness pre-intervention and post-intervention.

The intervention period:
After pre-intervention testing is completed, all study participants will be randomized into two groups (using a random number generator). Half of the group will be given Vitamin D_3 supplements (4000IU) while the other half will be given a placebo tablet. These supplements will be taken weekly and delivered by a member of the research team to you in the training room. These supplements will be given for 3-months. Sun exposure will be estimated by the researcher, asking you how much time you spent outside the previous week. At these weekly visits, researchers will ask all participants if they sustained an injury or illness over the past week.

Post-intervention testing will occur in the Prevention Research Center, after the 3-month supplement intervention trial. The same tests that were performed pre-intervention will be performed post-intervention, except for the sweat test and BPAQ. After the post-intervention, it will be revealed to both the researchers and participants which supplement was ingested.

Here is an overview of the study:



How long will I be in the study?
It is estimated that you will spend a total of 4 total hours participating in this study. Both Pre-intervention and post-intervention testing will last one hour for each visit (2 hours total) while each weekly supplement visit will take 10 minutes (10 minutes x 12 visits over 3 months = 2 hours).

Are there any risks to me?
Research studies may involve different kinds and levels of risks or discomforts. These could be physical, emotional, social, economic or legal risks. For this study, the potential risks and discomforts that we know about are described below

Dual energy X-ray absorptiometry (DXA) scan

All females will be asked if they are pregnant or think they may be pregnant, prior to each DXA scan. If the answer is yes at any time, then that female will be excluded from participating in this study because the DXA machine (used to measure body composition) uses a small dose of radiation which may be harmful to a developing baby. Additionally, all female subjects will be asked to sign a written attestation form prior to each scan, confirming they are not pregnant. Three DXA scans will be performed pre- and post-intervention. During normal operating conditions, the amount of radiation a person is exposed to (in microsieverts or μSv for short): is 0.8μSv for a whole body scan; 13μSv for a scan of your spine and 3.5μSv for a forearm scan. Thus, the TOTAL radiation exposure for this trial (six total scans) is estimated at 34.6μSv. For comparison of radiation risks: an airplane flight from New York to Los Angeles would give you a radiation exposure = 30-40μSv; one dental x-ray= 40-150μSv; one chest x-ray = 100μSv; and smoking a pack of cigarettes a day for one year = 80,000μSv. Thus, the radiation exposure obtained from this study is the same as one airline flight across the United States. To further reduce radation risks, all of the scans will be performed by Dr. Tamara Hew-Butler, which minimizes the risks of radiation exposure by making sure you are positioned correctly when the scans are taken.

Blood sampling
Two invasive needle sticks (into a superficial arm vein) will be performed during this investigation (one needle stick pre- and another post-intervention). Ten milliliters (10mL) of blood will be collected each time. This total amount of blood (20mL) equates to 4 teaspoons of blood (5mL = 1 teaspoon) over the testing period. The risks of blood draw may include: infection, delayed healing, bruising and/or inflammation at the site of vein puncture, physical discomfort, mental discomfort, fainting and feeling faint and injury to a nerve or vessel. These risks will be minimized by the use of trained professionals (Professor's Landis-Piwowar and Hew-Butler) experienced with performing the blood draws, sterile technique and single use, disposable, materials. ***Athletes with a history of previous fainting episodes secondary to blood draws should not participate in this study.*** You may refuse to participate at any time that you feel uncomfortable.

Psychosocial, BPAQ and food frequency surveys
Participants may experience some personal discomfort when answering the psychosocial questions on the mood questionnaire. If this happens, the participants can choose not to answer any of these questions.

Sweat test
There may be slight tingling from the electrodes and continued sweating on the forearm from the sweat test. However, these effects will not last long. We can stop this test at any time, if you feel uncomfortable.

There are minimal risks to non-invasive measurements of height, weight, or reporting sun exposure and/or whether or not you have had an injury or illness over the past week. The vertical jump and shuttle test are part of your normal (supervised) training regimen and do not carry risks above normal training as an OU Basketball player. Additionally, the amount of Vitamin D contained within the supplement is not above the recommended daily dose for this vitamin (4000IU). Therefore, there should be little to no side effects from taking the supplement or placebo pill.

With many research studies, there is a risk of a breach of confidentiality. A breach of confidentiality means that it is possible that someone who is not part of this research may accidentally see your personal information. We will try to make sure that this does not happen by keeping your research records as confidential as possible. However, no researcher can guarantee complete confidentiality.

To minimize the risk of a breach of confidentiality, all of your data will be "blinded" (not identified as yours). You will be assigned an unidentified subject number once you sign this consent form. The "master list" which contains the link between your name and your assigned subject number will be placed in a locked cabinet in Dr. Hew-Butler's office, separate from the actual data, once your subject number is assigned. All of your information will remain strictly confidential and your identity will not be identified in any subsequent publications or presentation of the results.

There may also be risks involved from taking part in this study that we do not know about at this time.

Are there any benefits to me?
The possible benefits to you for participating in the research study are knowing your Vitamin D levels and determining if taking a Vitamin D supplement can help you (and other basketball players) build more bone mass, improve conditioning gains and improve your mood state during the off-season training. The results of this investigation could benefit athletes, coaches, trainers, and doctors by providing evidence to support (or not) measurement of blood Vitamin D levels throughout the season. These results will also help us understand if taking a vitamin D supplement will help or hinder (or do nothing at all) to body composition, mood, and response to training.

What are the alternatives to participation in this study?
You may choose not to participate in this study.

How much will it cost me to participate in the study?
There is no cost to you for participating in this study.

Will I receive anything for participating?
You will not receive anything for participating in this study, other than your individual study results.

Who could see my information?
The researcher/research team will have access to your information. Information about your research participation may be shared with others if required by law (for example, child or elder abuse and/or neglect).

Your research records may be reviewed by the following groups:
- Representatives of the Oakland University Institutional Review Board and/or the Office of Research Administration, whose job is to protect people who are in research studies
- Regulatory authorities who oversee research (Office for Human Research Protections, or other federal, state, or international regulatory agencies)

When the results of this research are published or discussed in conferences, no information will be included that personally identifies you.

What happens if I become ill or injured because I took part in this study?
In the event of illness or injury related to the research, you should contact Tamara Hew-Butler [248-364-8686 (work) or 810-375-2162 (home)] immediately. No funds have been set aside for medical treatment in the case of injury related to research and you may be charged for treatment, however, by signing this form you are not waiving your rights to seek compensation if taking part in this study caused illness or injury. If any of your laboratory tests are abnormal, Dr Hew-Butler will counsel you in detail, in private.

What are my rights if I participate in this study?

Your decision to participate in this study is voluntary. You may choose to leave the study at any time, or refuse to answer any questions that may be asked during the study. You will not lose any benefits to which you are otherwise entitled and your decision will not affect your present or future relationship with Oakland University, the OU Basketball team, your current basketball team, the researchers, or the School of Health Science. As an Oakland University student-athlete, your decision about participation will not affect your grades or team status.

If you would like to stop participating in this study, you should contact the principal investigator, Tamara Hew-Butler, 248-364-8686 (work), who will provide instructions on how to withdraw from the study.

Any new information that may affect your willingness to participate in the study will be provided to you as soon as possible.

Who do I contact if I have questions about this study or my rights as a research participant?
For questions about the study you may contact Tamara Hew-Butler, DPM, PhD; 3157 Human Health Building, Oakland University, Rochester, MI 48309; Phone: 248-364-8686 (work); Email: hew@oakland.edu. For questions regarding your rights as a participant in human subject research, you may contact the Oakland University Institutional Review Board, 248-370-4898.

Signing the consent form
Your signature below means that you have read this form, or someone has read it to you. Check each statement below indicating your understanding and consent to participate in the study.

- ☐ I am being asked to be in a research study.
- ☐ I understand the possible risks and potential benefits.
- ☐ I have had the chance to ask questions and they have been answered to my satisfaction.
- ☐ I agree to be in this study.
- ☐ The risks of radiation from DXA have been explained to me during the consent process.

You are not giving up any rights by signing this consent form. You will be given a copy of this form.

_____	_____
Print name of participant	**Signature of participant**
	_____
	Date

Investigator/Research Staff
I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

_____	_____
Print name of person obtaining the consent	**Signature of person obtaining the consent**
	_____
	Date